

Floods and Tropical Storms

A guide to livestock-based emergency preparedness, response and recovery

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Floods in Kerala, India partially washed away the stacked hay (in background).

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ACRONYMS

F	AO	Food and Agriculture Organization of the United Nations	LEGS	Livestock Emergency Guidelines and Standard
C	GDP	Gross domestic product	PRIM	Participatory Response Identification Matrix
18	EC	Information, education and communication	WSPA/WAP	World Society for the Protection of Animals, now World Animal Protection



Guidelines and Standards

Photo credit: Tim Leyland

Executive summary

Every year, floods, storms and cyclones affect the livelihoods of millions of vulnerable people, triggering food insecurity, increased malnutrition and vulnerability to infectious diseases. Flooding is considered one of the most damaging physical stresses, annually affecting 17 million km2 of land surface. Recent studies indicate that climate change is resulting in more extreme weather events, such as flooding or soil waterlogging, that negatively affect agricultural production. Floods and storms are the second and third most serious disasters after droughts for the agriculture sector; they are responsible for a total of US\$40 billion (floods \$21 billion; storms \$19 billion) of the crop and livestock production losses from 2008 to 2018 in low- and middle-income countries. Animal losses also have psychological implications for the livestock owners and their family members.

The Livestock Emergency Guidelines and Standards (LEGS, 2014), a set of international standards and guidelines for humanitarian actors, help in designing and managing emergency livestock-based interventions. The LEGS evidence-based approach and best practices can be adapted and applied through the eight core standards and the six technical interventions, which are destocking, veterinary support, feed supplies, provision of water, livestock shelter and settlement, and provision of livestock. Effective coordination between stakeholders in the delivery of a humanitarian response and ensuring that affected livestock-dependent communities are always actively engaged and at the



centre of any local discussions and decision-making processes are two key elements of the LEGS approach. Multistakeholder engagement in assessments helps identify the disaster's impact on livestock from different perspectives (community, animal health practitioners, humanitarian actors and government) to plan a comprehensive response intervention.

This technical brief highlights the impact of floods and storms on the livelihoods of livestock-dependent vulnerable communities and on global food security. It provides specific guidance on how to design livestockbased emergency preparedness, response and recovery interventions. The lessons, experiences and case studies for adapting and progressing through the four-stage LEGS approach (initial assessment; response identification; analysis of technical interventions; and monitoring and evaluation) are presented in the context of flood and storm emergency responses. It includes a checklist for conducting flood- and storm-related assessments, as well as a list of recommended livestockbased interventions that could be adopted for designing and planning emergency livestock programmes.

The brief also highlights the need for investments in comprehensive flood and cyclone preparedness, response and recovery strategies at all levels. Good livestock emergency strategies focus on both reducing the vulnerabilities as well as increasing the resilience of dependent communities and assisting these communities in adopting sustainable flood and storm/ cyclone coping measures.

1. Introduction to floods and tropical storms

The Food and Agriculture Organization of the United Nations (FAO, 2015) states that natural hazards and disasters in developing countries between 2003 and 2013 affected more than 1.9 billion people and caused over US\$494 billion in estimated damages. Out of the total 78 post-disaster needs assessments reviewed, within agriculture, 42% of all damage and losses is in the crop subsector, followed by livestock at 36% (FAO, 2015).

In 2021, a total of 432 catastrophic events were recorded, which is considerably higher than the average of 357 annual catastrophic events for 2001 to 2020. Floods and storms dominated these events, with 344 occurrences, of which 223 were floods and 121 were storms, up from an average of 163 and 102 respectively. See Figure 1 on the occurrence by disaster type as per the Emergency Events Database (EM-DAT, 2021). This fact clearly highlights that floods and storms are the major disaster events causing setbacks to countries and making it challenging for vulnerable communities to cope during emergencies.

Between the 1960s and 2000s, the number of floods increased significantly. There were 151 disasters caused by floods between 1960 and 1969, but this

rose to 1,499 between 2000 and 2009. Since 2000, flood numbers have remained high, with an annual average of more than 128 per year (World Disasters Report, 2020). Floods cause widespread devastation to life (animals and people), property and livelihoods of communities. The persistent increase in sea levels presents serious coastal threats of inundating and salinizing natural fresh water sources triggered by highintensity floods, cyclones and storms. Sea level rise may also lead to more-frequent storms, hurricanes, typhoons and monsoon rains (Oliver-Smith, 2009). The Intergovernmental Panel on Climate Change (IPCC) in a special report warns that, beyond 2100, sea levels will continue to rise for centuries due to continuing deep ocean heat uptake and mass loss of the Greenland Ice Sheet and Antarctica Ice Sheet (Oppenheimer et al., 2022).

Livestock, livelihoods and food security

Livestock and livelihoods are intrinsically linked in many communities. Globally, 1.3 billion people directly depend on livestock for their food (Ashley, 1999), and over 600 million smallholder farmers in the world's poorest countries depend primarily on livestock for their livelihoods (Herrero et al., 2006). Almost 80% of the world's undernourished people live in rural areas, and most depend on agriculture, including livestock, for their livelihoods (FAO, 2009).



Figure 1: Occurrence by disaster type: 2021 compared to the 2001 to 2020 annual average. Source: EM-DAT, 2021.





According to the World Health Organization (WHO, 2016), floods trigger food insecurity, increase malnutrition and enhance vulnerability to infectious diseases. The health implications of floods are usually more serious in low-income countries, as they often have less capacity to deal with them. In terms of production loss caused by disasters, floods and storms are the second and third most serious disasters after droughts for the agriculture sector. They are responsible for a total of US\$40 billion (floods \$21 billion; storms \$19 billion) of the crop and livestock production losses from 2008 to 2018 in low- and middle-income countries. This amounts to 37% (floods 19%; storms 18%) of total production losses (FAO, 2021) - see Figure 2.

Flooding is considered the most damaging physical stress, annually affecting 17 million km2 of land surface. Recent studies indicate that climate change is resulting in more extreme weather events, such as flooding or soil waterlogging, that negatively affect agricultural production. Therefore, it is imperative to understand flooding stress on crops and livestock to develop resilient practices.

Economy and development

Currently, livestock is one of the fastest-growing agricultural subsectors in lower- and middle-income countries. Its share of agricultural gross domestic

product (GDP) is already 33% and is quickly increasing. This growth is driven by the rapidly increasing demand for livestock products, and is further driven by population growth, urbanization and increasing economic growth in low- and middle-income countries (Department for Animal Husbandry and Dairying, Government of India, 2021). A review on natural disasters and economic growth (Shabnam, 2014), using a large panel dataset of 187 countries observed from 1960 to 2010, showed that the total number of people affected by floods significantly decreases the annual GDP per capita growth rate. One thousand in every one million people affected by floods decreases the GDP per capita growth rate by 0.005%.

Household livestock management responsibilities

Family roles and responsibilities in managing livestock differ during normal times and following floods/ cyclones. For example, livestock trade, ploughing and transport-related activities, often men's responsibility, become disrupted during floods. Grazing pastures become inundated and shelters get flooded - looking after grazing livestock and managing shelters are roles often done by children and women. It becomes even more challenging when the people and livestock are evacuated to temporary flood camps/shelters. These changes in the livestock management responsibilities can result in physiological and psychological strain on the affected communities.

2. The LEGS approach: "Help provide immediate benefits, protect and rebuild livestock assets."

The Livestock Emergency Guidelines and Standards (LEGS) Handbook provides guidance to humanitarian actors in both the planning and decision making processes for the implementation of livestock-based interventions in emergencies impacting livestock and livelihoods. Refer to the LEGS Handbook to know more about the different technical interventions.

LEGS focuses on providing immediate benefits to livestock-dependent communities affected by an emergency; protecting their assets; and supporting vulnerable communities in rebuilding their assets. In order to achieve these goals, interventions should progress through the four-stage LEGS approach:



Floods and storms are **rapid onset emergencies**, which LEGS categorizes into three emergency phases for intervention: **1. immediate aftermath; 2. early recovery;** and **3. recovery.** The priority is to rapidly assess and implement early action to ensure protection of livestock and dependent communities from the floods or storms. As a good practice, LEGS recommends integrating the eight core standards (participation, preparedness, competencies, initial assessment, technical analysis, monitoring and evaluation, policy and advocacy, and coordination), the crosscutting themes (gender and social equity, HIV/ AIDS, and environment and climate), plus the four protection principles (described in the Sphere Handbook) into each of the livestock-related interventions. LEGS also complements the FAO's **Good Emergency Management Practice:** The Essentials (Gary *et al.*, 2021) for managing animal health emergencies and the **Standards for Supporting Crop-related Livelihoods in Emergencies** (SEADS, 2022).

2.1 STAGE 1 – ASSESS: initial assessment

Floods and storms can rapidly inundate livestock grazing areas and livestock shelters (forcing livestock to stand in waterlogged areas for hours/days in low-lying areas). The flowing water deposits sludge and debris, polluting the water and feed/fodder sources. This can further trigger spread of waterborne diseases and flood-related health issues such as foot rot, mastitis, diarrhoea, pneumonia, worm infestations, ticks, hoof abscesses and plant poisoning. The assessment stage aims to rapidly assess the flood's impact on livestock and livelihoods of communities.

The initial assessment (see Annex 1: Checklist for flood/ storm assessments) is the first stage in determining the need and viability of a livestock-based intervention with regard to the emergency. It focuses on understanding three key components: 1. the role of livestock in livelihoods; 2. the nature and impact of the emergency; and 3. the situation analysis using the LEGS assessment checklists. For example, following floods and storms there can be situations where the affected areas are cut off. The emergency teams may not have access to the affected areas to provide assistance or emergency support due to damaged roads/bridges and lack of transportation services. These are considerations that would be clarified after assessment as part of the situation analysis.

The type of livestock flood/cyclone assessment¹ to be adopted can be determined as per the evolving situation of the floods or storms, information gaps, emerging local needs, and the stakeholders engaged in the assessment process.

Multistakeholder engagement in assessments collectively helps identify the disaster's impact on livestock from different perspectives (community, animal health practitioners, humanitarian actors, and government) to plan a comprehensive response intervention. Vulnerable livestock-dependent communities always need to be actively engaged and at the centre of any local discussions and decision making processes.

Case study 1:

Strategic engagement of stakeholders in flood assessment, Pakistan floods, 2022

In August 2022, monsoon floods devastated Pakistan, affecting 33 million people, inundating 9.4 million acres of crops, killing 1.1 million livestock, and putting millions of surviving animals at risk of disease (FAO, 2022). The Food Security and Agriculture Working Group was engaged immediately, along with 59 partners in the field to assess and help facilitate consultations. In addition to this, continued remote monitoring in collaboration with cluster lead agencies helped support the pursuit of lifesaving food assistance to the most vulnerable communities.

Working together, the International Atomic Energy Agency (IAEA) and FAO, in close consultation with Pakistan's government, coordinated through a technical cooperation project to develop an emergency support package consisting of veterinary equipment and training to prevent future disease outbreaks (IAEA, 2022).

At national level, the Food Security and Agriculture Working Group (Food Security Cluster) facilitated the flood response through strategic coordination, information sharing and gap analysis. Coordination at the provincial and district levels was led by the local governments. Two of the LEGS core standards (participation and coordination) were adopted in the assessment process to design and plan appropriate flood response interventions. Such initiatives can facilitate timely provisions of agriculture inputs and help protect livelihoods of communities.

Sources: Agriculture and Food Security Working Group, Global Food Security Cluster Support Team, World Food Programme, 2022; Madsen, M.A., 2022.



¹ Type of flood assessments: 1. remote: information obtained instantly via phone/email (1 day); 2. rapid: instant observational visits (air, road) to flood-affected areas (1–2 days); 3. joint: assessments conducted jointly with partners (4–5 days); 4. in-depth: detailed sector-specific (feed, shelter, etc.) assessments for a long-term recovery (1 month); 5. technical: scientific assessments on specialized areas (epidemic outbreaks, biosecurity, etc.) for strengthening the flood preparedness and risk reduction measures (3 months) (personal communication).

2.2 STAGE 2 PLAN: response identification

Response identification is the planning stage in the LEGS approach, which aims to engage multiple stakeholders in a participatory process to develop community-centred response interventions.

Community engagement is a process-driven initiative, and all the related progress for response will depend on the relationship established between the community and the external stakeholders. Following floods or cyclones, the community is usually in a state of shock, and therefore it is advisable to have brief discussions to understand their immediate concerns. Casual and informal meetings to identify opportunities to provide emotional support or basic psychosocial care to animal owners due to loss of their livestock; repairing their animal shelters; guidance on the process to access insurance/ compensatory benefits, etc. can be explored through community discussions. Refer to the LEGS Handbook for the list of participatory tools that could be used at different emergency stages.

The initial rapport-building can be time-consuming but crucial for all the efforts that follow at the later stages. Therefore it is of utmost importance to be sensitive to the local cultures and practices for gaining the trust and confidence of the community to work together. If the community is in a relocated site (flood/cyclone shelter), discussions to help them commute back and forth to their residence (if nearby) or opportunities to support coordination with livestock merchants could help the communities in managing their production and livelihood activities. There can also be internal community disagreements that should be handled with utmost care, always allowing the community to emerge with a way forward to address the concerns. This is also a step in activating their local decision making and facilitating them to step forward and engage external stakeholders in building their resilience to floods and cyclones.

The assessment findings help in designing appropriate, feasible and timely livestock-based interventions in emergencies. Please refer to Annex 2 on the recommended livestock-based interventions in floods/ cyclones. The decisions made for each emergency will be unique and are made as per the local context, impact of floods/storms on the communities, and livestock-specific needs.

The Participatory Response Identification Matrix (PRIM) is a tool that uses the findings of the initial assessment to facilitate discussions with local stakeholders in order to decide which livestock interventions are most appropriate and feasible for achieving the LEGS objectives. See Table 1 below. A PRIM should be completed by a group of stakeholders (including both men and women from the community and people from different sectors of the community) using the initial assessment findings. Stakeholders should agree on their own definitions regarding the phase of the emergency specific to the context in which they are working. In the light of the assessment findings, the PRIM considers the three LEGS livelihoods objectives of: 1. providing immediate livestock-based benefits; 2. protecting assets; and 3. rebuilding assets against the range of possible technical interventions (destocking; veterinary support; feed; water; shelter; and provision of livestock). The PRIM also emphasizes the importance of all three objectives in order to support livelihoods in an emergency context, and it addresses how the different interventions can fit and overlap within the phasing of an emergency. The right-hand side of the matrix (as in Table 1) can help agencies plan the timing of their interventions and allow sufficient time for preparation and lead-in for later activities. The emergency phases vary for rapid-onset and slow-onset emergencies. Refer to the LEGS Handbook to learn more about PRIM.

In the PRIM example, veterinary support was identified to be appropriate from the immediate aftermath until the recovery stage, as many animals were weak and stranded in the hilly terrain, with limited access to animal health services. The livestock feed (dried grass), usually stocked or piled up surrounding the tree trunks (in the open), was washed away in the flood waters, and many livestock shelters that were adjacent to the riverbanks were destroyed by the fast-flowing waters. The local community could manage alternate feed and temporary shelter arrangements for their livestock but could not access animal health services. Therefore, feed, water and shelter as part of long-term interventions were the focus during the early recovery and recovery stages.

TECHNICAL	Livelihood objectives			Emergency phases		
INTERVENTIONS	Immediate benefits	Protect assets	Rebuild assets	Immediate aftermath	Early recovery	Recovery
Destocking	n/a	n/a	n/a			
Veterinary support	****	*****	****			
Feed	**	*****	*****			
Water	*	*	*			
Shelter	**	*****	*****			
Provision of livestock	n/a	n/a	n/a			

Table 1: Example of a Participatory Response Identification Matrix (PRIM) for flood response (Uttarakhand flash floods, India, 2013)

The decisions made through the PRIM process help in designing and planning livestock-based interventions backed with constant monitoring of the weather/ monsoon situation. The PRIM also provides the scope and flexibility to be modified/updated depending on the increasing/decreasing impacts of flood and storms, even during the intervention period.

Coordination and communication between stakeholders (animal owners, community, animal health service providers, humanitarian actors, and government) are crucial to address the gaps and prevent any possible duplication of response interventions. This also strengthens collaborations between stakeholders and enables complementary efforts in assisting the floodaffected communities.

Floods and cyclones affect the normal life routine of the community and livestock owners, making it challenging for them to coordinate with stakeholders and carry out their livelihood activities. Discussions to identify the gaps and opportunities to strengthen stakeholder coordination help communities recover faster from the impacts of floods and storms.

Communities' active participation and ownership in the designing and planning of livestock-based response interventions activate the existing community management system in collectively contributing and also further strengthen the local coping strategies for floods and storms/cyclones. Investing in flood preparedness initiatives (awareness, trainings, simulations/mock drills) reinforces meaningful early actions among communities, resulting in reduced disaster loss and damage.



Community discussion on coordination with livestock-related stakeholders in West Bengal, India (2011 floods).

Case study 2:

Madagascar is one of the tropical countries that is most affected by cyclones globally. It has one of the highest rates of cyclones in Africa. Each year an average of 3–4 tropical cyclones originate in the Indian Ocean and the Mozambique Channel and hit Madagascar during the cyclone season from November to April. The high winds, excessive rainfall and associated flooding have devastating impacts on both the national economy and local livelihoods.

Cyclones damage infrastructure, flood agricultural areas, destroy crops, injure livestock, threaten food security, contaminate water supplies, increase the incidence of waterborne diseases, and cause human injuries and sometimes deaths. The associated economic and humanitarian costs of natural disasters in Madagascar are enormous: it is estimated that floods, drought and cyclones have affected more than 11 million people in Madagascar in the last 35 years and resulted in roughly US\$1 billion of damage.

In 2012, the intense Tropical Cyclone Giovanna affected Madagascar. In order to rebuild the destroyed homes, a total of 24% of farmers sold their small livestock or took out loans. Farmers identified several strategies that could have helped reduce the impacts of Cyclone Giovanna on their livelihoods. These approaches included building sturdier houses (mentioned by 95% of farmers), storing more grains prior to the cyclone (84%), protecting livestock, i.e., moving livestock to safer locations to higher ground or inside their homes (76%), relocating to the shelter sooner (67%), moving temporarily to another location (49%), and selling stored crops prior to the cyclone (34%).

Improved early warning systems can reduce the inherent vulnerability of smallholder farmers to cyclones and other climate risks and help farmers prepare for upcoming cyclones.

Source: Rakotobe et al., 2016.

2.3 STAGE 3 – IMPLEMENT: analysis of technical interventions

The third stage in the LEGS approach focuses on implementation, and therefore it is important to have an analysis of the technical interventions that have been identified through PRIM in order to understand the benefits, challenges and implications that livestockbased interventions could have on the livestock and the livelihoods of flood-affected communities. The implementation of technical interventions during floods and storms will require certain livestock- and regionspecific information to plan the procurement, logistics and related resources. The most common operational challenge during floods and storms/cyclones is coping with secondary hazards (constant rain, lightning and water-/vector-borne diseases).

Example: analysis of livestock feed and fodder

Analyzing the flood and cyclone's impact on feed and fodder helps in addressing the needs and challenges faced by the local community. The LEGS Decision making tree for feed options (Figure 3) should be used to support the analysis – it has a series of questions which help actors consider the feasibility of an intervention and the stock to target.

Some of the challenges post floods are:

- Stock feed and fodder (in the open and indoors) can get washed away or contaminated by flood waters.
- Prices of feed and fodder can drastically increase (prices can even increase by more than 100%), making it unaffordable for the local community to purchase feed for their livestock.
- Due to the deficit of feed in the local areas, feed and fodder often need to be procured from distant locations, with high transport costs and challenges in delivery of the supplies.

Delivering feed to remote areas through local traditional boats can be done only in small quantities due to these boats' limited capacity to carry supplies, and it is a timeconsuming process.



Note The result 'No action (unless outstanding questions can be address ed)' does not necessarily mean that no interventions should take place, but rather that further training or capacity building may be required in order to be able to answer 'yes' to the key questions.

Figure 3: Decision making tree for feed options (Source: LEGS Handbook page 155)

The following list provides some suggested criteria that need to be considered relating to feed and its supply:

- Flood/cyclone impact on feed sources and related services.
- Feed availability—feed quantity (surplus/deficit) in affected areas.
- Accessibility to feed—distance of feed from flood-/ storm-affected livestock.
- Feed storage—flood/cyclone safety, pest/rodent attacks.
- Feed transportation—by road, rail, boat, air; safe transport/logistics.

Decisions on the type of feed for livestock-based intervention in floods and storms depend on the agroclimatic conditions, regional considerations, livestock species and the local lifestyle practices (see LEGS Feed Standard 4). The livestock feed transported to the flood-affected areas should match the community's lifestyle and feeding practice. For example, cattle feed distribution can be different from place to place; paddy straw for cattle was preferred in Odisha, India (floods, September 2011); concentrate feed for cattle was preferred in West Bengal (floods, June 2011); rice bran for cattle and pigs was preferred in Assam (floods, June 2012). Assam has a significant cattle and pig population, so rice bran is used to feed both livestock species, but this might be different for other places depending on the livestock and management practices (personal communication).

Similar analysis for each of the technical interventions generates adequate information for applying need-based flood response strategies, drawing on the LEGS technical standards for each intervention.

Case study 3:

Coping strategy of flood-affected communities, South Sudan, 2022

In August 2022, flash and riverine floods severely affected 48,000 km2 in nine states in South Sudan, affecting more than 900,000 people. Prolonged flooding damaged thousands of hectares of farmland and resulted in a lack of food, causing nearly 800,000 livestock deaths from 2019 to 2021. The food insecurity worsened as several crop and grazing areas became submerged. Floods also affected the internally displaced persons (IDPs), refugees, returnees and host communities, resulting in secondary displacement.

Access constraints made it difficult to fully assess the flood-affected areas, and it was anticipated that the impact of floods may have been much more than was actually reported. Such constraints can also have an impact during the flood response interventions. The LEGS situation analysis checklist can help in understanding this context before planning an intervention. Cross-cutting themes such as gender, social equity and protection principles are important components for supporting the host community.

As a coping strategy, local communities, with assistance of humanitarian organizations, built mud or sandbag dykes to keep flood waters out to save their crops, grazing areas and livestock. Although these dykes act as flood safety measures for the community, they are also prone to damage from erosion or destruction by livestock and therefore need to be regularly monitored and repaired.

Source: ACAPS, 2022.

2.4 STAGE 4 – EVALUATE: monitoring and evaluation

The final stage in the LEGS approach is the monitoring and evaluation of the livestock-based interventions. The evaluation of the interventions can be conducted by using the indicators and any baseline data obtained before/during the start of the flood intervention. Good monitoring and evaluation ensures that all indicators are transparently evaluated, leading to better accountability. Local communities are the first responders to disasters and are always at the heart of any intervention. Therefore, the traditional knowledge, best practices and experiences of local communities in coping with floods contribute to further strengthening and improving risk reduction strategies at different levels.

If there are no baseline data documented before the start of the flood response intervention, it can be challenging to measure the impact, although data can also be obtained from secondary sources. However, participatory assessments allow useful baseline data to be collected, and they can generate retrospective baseline studies using 'before' and 'after' approaches with tools such as proportional piling and scoring methods².

The type of information that would be useful for evaluation are: mortality rates, morbidity rates, access

to animal health services, livestock-related services, feed availability, changes in feeding practices, level of contamination in natural water sources, status of water-related health issues in animals, etc.

Instant livestock health check-ups can also be conducted by anyone using a participatory tool called "Traffic Light Chart" (Bihar State Disaster Management Authority, 2018). This is an observational exercise to randomly assess livestock based on the health indicators for each of the animal's body parts. Red, amber, green (RAG) status is marked for each animal: green means normal, amber means mild health issues, and red means severe health issues. This exercise can be completed quickly to have a broad overview of animal health in the flood-affected areas to evaluate the overall health of animals following the intervention period.

In order to understand the management of livestock (feed, water, shelter, etc.) to meet the community's basic survival needs, the 'Animal Resource Mapping' tool can be used (Bihar State Disaster Management Authority, 2018). This tool helps to understand the community's level of independence and also their dependency on other communities to manage the needs of their animals following floods and cyclones. This tool also helps identify and strengthen the flood or storm coping mechanisms within the community.

Case study 4:

Investing in livestock flood response assists livestock production, Assam floods, India, 2012

In Assam every year during the monsoons (May to September), the Brahmaputra and Barak Rivers (with more than 50 tributaries) are prone to floods. In June 2012, continuous rains flooded 30 districts, affecting 191,661 livestock and thousands of livestock-dependent communities as well as changing the rivers' courses. The stocked feed and fodder were washed away by floods, many animals were sick (from diarrhoea and waterborne infections), and the local animal health practitioners had poor capacity (inadequate human resources and limited health kits) to treat animals in the flood-affected areas.

World Society for the Protection of Animals (WSPA), now World Animal Protection (WAP), along with its partners (Just Be Friendly - JBF) and local government, jointly implemented the flood response interventions in Seujiapathar village of Dhemaji District of Assam. The response intervention supported the community through the provision of emergency feed (rice bran) for the cattle and pigs. Animal health camps were organized to treat the sick and injured animals. Capacity building of local animal health units was done through the supply of health kits to help the units treat a greater number of flood-affected animals. Monitoring and evaluation visits jointly planned by WSPA along with the community, partners and local government highlighted the improved livestock health status after 12 months.

In 2014, the intervention's cost-benefit analysis by Economists at Large highlighted that '\$96 of livestock production was assisted for every \$1 that was spent in livestock flood response.' Such evaluations help in measuring the intervention's impact on livestock, production and livelihoods of communities.

Source: Economists at Large, 2014.





2 The FAO Livestock-Related Interventions in Emergencies–The How To Do It Manual, Chapter 10 provides more detailed information on

no Do it Manual, Chapter 10 provides more detailed information monitoring, evaluation and impact assessment.

3. Preparedness and risk reduction

Flood preparedness measures include mapping of the areas prone to floods and storms; safe evacuation routes; identifying the livestock mode of evacuation/ transportation (by foot, road, rail, boat); and developing/ updating livestock cyclone/flood emergency plans, with periodical simulation exercises to practice safe evacuation and stakeholder coordination. Livestockspecific information, education and communication (IEC) resources can help animal owners adopt early action protocols on receiving the early warning messages from authorities. Public service announcements specific to managing livestock before floods and storms from local authorities can help the communities in preparedness measures.

Establishment of early warning systems close to cyclone- and flood-prone areas helps governments in sharing regular weather updates. The early warning information helps communities to take 'early action' in evacuating their livestock to safer areas in a timely manner. Inclusive and dynamic weather and early warning information used in Nairobi is one such model developed by the Kenya Meteorological Department (Figure 4).

Understanding the different rainfall patterns, through seasonal calendars (Figure 5) for example, can help

communities prepare in safeguarding their crops and livestock before the rainy seasons. This also helps in planning the appropriate time to cultivate and harvest the crops without being impacted by the seasonal floods.

Building resilience to floods and storms focuses on impacting and influencing multiple stakeholders at different administrative levels to create a multilayer safety approach. Refer to Figure 6: The Flood Resilience Rose. The overarching aim of the livestock-based interventions is to enhance and strengthen the coping mechanisms of the vulnerable communities.

Enhanced resilience to floods and storms

Resilience needs to be strengthened at multiple levels, from individual to global (individual, household, community, local government, national government, organizational, regional and global). Monitoring and evaluation initiatives help analyze and measure the intervention's impact on indicators related to increase in the resilience and decrease in the vulnerabilityrelated factors of the flood-affected communities. In order to enhance the resilience of livestock-dependent communities, it is important to understand the livestockand livelihood-related vulnerabilities. Once these have been identified, options for both decreasing the vulnerabilities and increasing communities' capacities need to be discussed and developed.





Figure 5: Seasonal calendar for unimodal and bimodal rainfall zones in South Sudan. Source: ACAPS, 2022.



Figure 6: The Flood Resilience Rose is a management tool to promote transformation towards flood resilience. Flood resilience can be increased by operationalizing the multilayer safety approach (level 1, yellow) within the institutional context (level 2, pale yellow). Both are embedded in the wider context (level 3, pale grey). Karrasch et al, 2021.

4. Lessons and experiences

Preparedness for secondary disasters:

Secondary disasters usually occur as a consequence of the primary disaster (floods, storms/cyclones) and can have cascading impacts, disrupting various services within a community. The impacts can also depend on the type of services available and operating in the floodprone areas. Below are a few secondary disasters that impact both livestock and the dependent communities, which may need improved preparedness measures.

- **Lightning:** Lightning and thunderstorms are common phenomena during floods and cyclones/ storms. Any livestock sheltered under trees or close to metal objects, electric posts and vehicles are at high risk of being affected by lightning and thunderstorms.
- Danger of snakes: Snakebites are one of the major killers in the post-flood scenario.
 Waterlogging prevalent in low-lying areas forces snakes to take shelter on rooftops of houses and buildings, and in trees. This can be dangerous for both people and livestock. Emergency first aid and necessary preparedness measures to cope with snakebites are strongly recommended.
- Water-/vector-borne diseases: Stagnant water provides insects, rodents and animal hosts with a conducive environment to flourish and spread diseases. Water- and vector-borne diseases can become rampant following floods and if unaddressed at an early stage, can trigger disease outbreaks among livestock and people.
- Animals not kept warm and dry: Animals that are kept in the open, including those that are kept in restricted side enclosures (with no covered shelters) can be directly exposed to hours of continuous rains and storms, leaving them cold, wet and stressed, which can predispose them to a range of infections, for example pneumonia.
- **Road/rail accidents:** Increased incidence of livestock deaths and injuries due to road/rail accidents are observed following floods and storms. This is because livestock prefers to stay on roads and rail tracks to keep themselves dry and stay away from waterlogged areas. Post-flood traffic control measures can help prevent such accidents.

Emergency response and coordination:

Immediately after any major flood or storm, there will be different stakeholders actively engaged in providing emergency support to the flood-affected communities. This is a crucial time, but if poorly coordinated, it can cause chaos and increase duplication of efforts in the accessible areas. The needs of livestock in remote or inaccessible areas risk being ignored. Some of the points below need to be taken into consideration for good coordination and emergency response.

- Globally and locally appropriate interventions: There are certain generalized messages on cyclone and flood preparedness that can be promoted if they are locally relevant. For example, 'Untie the animals' is a general message but it can vary depending on the local conditions and needs to be context specific to ensure the right message is conveyed for the safety of the livestock. Decisions on response identification and implementation should be both globally and locally appropriate. Application of global standards as per the local needs and context can create impactful change among communities.
- Evacuate people and animals: On receiving flood/cyclone early warning, due to limited resources, it is often only people who are evacuated to safety on a priority basis. Many animals are lost, abandoned or stranded, with little chance of survival. Emergency plans should include measures to safely evacuate animals along with people (if possible).
- Responsibility of animal health stakeholders: The demanding humanitarian situation post floods often results in the need for animal health stakeholders to support the peoplefocused response, and the needs of livestock can be overlooked. Enhanced stakeholder coordination (of animal owners, animal health service providers, government and disaster management authorities) protocols with defined responsibilities can support the management of both people and livestock needs.

Case study 5:

Investing in enhancing livestock resilience, Assam floods, India, 2012

In Assam, traditional bamboo animal shelters are constructed by communities to shelter approximately two to four cattle and store enough dried fodder above this shelter to feed the animals for a maximum of two months during annual monsoons floods. If the flooding extends beyond two months, the stocked fodder will be insufficient to feed the animals, forcing the communities to risk their lives by swimming alongside their wading animals through the flooded waters to safer areas. In 2012, this issue was studied during an assessment, and an intervention was implemented to double the coping capacity so communities can survive for at least four months if floods persist. The traditional shelter designs were improved through community discussions integrating their lifestyle practices in caring for their animals. Shelters were constructed in Seujia Pathar village of Dhemaji District. In the 2014 monsoon floods, all the animals didn't have to be evacuated. The monitoring and evaluation process helped in measuring this enhanced resilience and coping capacity of the communities in managing their livestock during floods.

Source: Prem and Sutar, 2012.

Information gaps and challenges: Information is the key for planning the resources required to implement any emergency intervention. Planning to have adequate information related to livestock in normal times can help effectively address their needs during emergencies. Please refer to the points below on information gaps and challenges for planning livestock interventions.

- Improve data management: Inadequate disaggregated data on livestock species, livestock population in high-risk areas, animal identification measures, and owner contact details make it challenging to track and reunite livestock with owners post floods and cyclones. As part of flood preparedness measures, communities should be encouraged to have identification for their animals, along with their contact details.
- Strengthen disease surveillance: Flooding can trigger outbreaks of animal health emergencies in densely populated areas. Therefore, it is of paramount importance to prepare and strengthen the disease monitoring and surveillance systems, with adequate resources and biosecurity measures in place.
- **Document and report:** Measures to document and report the lessons learnt by communities and stakeholders in safely evacuating, transporting and rescuing animals from past floods and cyclones could be helpful for future preparedness of the community. Documentation and reporting can help in sharing of experiences with other communities that are facing similar challenges.

- **Scope and opportunity:** There is scope and opportunity for enhancing the resilience of the livestock sector and the capacities of the vulnerable communities that are dependent on livestock for their livelihoods. Some of the potential opportunities for humanitarian stakeholders are:
- Research and development: Technical studies and research programmes on management of the needs of livestock and dependent communities in waterrelated disasters (floods, storms, cyclones, tsunamis) contribute to policy development and capacity building of stakeholders.
- Livestock shelter blueprints: There are opportunities for designing and developing emergency animal shelter blueprints. Such standardized structural codes of practice can help design, plan and implement species-specific and region-specific flood/cyclone-resistant structures for livestock.



Photo credit: Kelly Lynch

Annexes

Annex 1: Checklist for flood/storm assessments

The following set of points is important to help capture the flood- and storm-specific information and to complement the 'LEGS Assessment Checklist 2: Nature and impact of the emergency' section.

Торіс	Description
	What is the topographical condition in the affected areas? (geographical terrain, soil type, land cover)
Flood/storm hazards	What is the rainfall pattern and the weather forecast (wind/rain) for the next few days/weeks? (warning, alert, no warning)
	Which are the places still facing severe lightning, thunderstorms and waterlogging issues?
	What are the livestock species affected by floods or storms? (cattle, buffaloes, horses, mules, donkeys, sheep, goats, pigs, camels, yaks, mithuns, chicken, ducks, turkeys, etc.) How many are affected (died, washed away, stranded, evacuated, relocated) so far?
Exposure to floods/storms	How are the relocation sites (emergency flood/cyclone shelters) and evacuation routes for both people and livestock decided? What modes of transportation (by foot, truck, boat, etc.) are available?
	What physical structures (animal shelters, animal health centres, livestock feed storage structures, livestock/poultry farms) are affected by the floods or storms? How many structures are affected (fully destroyed, partially damaged) so far?
	What is the total livestock population (species-wise) located close to water sources (rivers, seas, ponds, lakes, backwaters, estuaries, etc.)? Do they all have proper identification (ear tags, collars, halters, bells, branding, etc.), along with owner contact details?
Livestock vulnerability	How many animals need special care and assistance in the flood-/cyclone-prone areas? (pregnant animals, sick/injured, calves/kids, etc.)
	How many animals don't have any shelter, owner or caretaker in the flood- or cyclone-prone areas? (those of nomads/those of landless individuals/feral animals/community animals)
	What is the current animal health status in the flood-/cyclone-affected areas? (increased, decreased, stable) How many animals have died, are sick, or are injured due to diseases?
Livestock indicators	How is the productivity (milk, eggs) of the animals in the flood-affected areas? (increased, decreased, stable, stopped) Please provide any quantifiable information. How are the production supply and animal wastes managed at the relocation site?
(* •)	Has there been any change in the economic value of the animals due to the floods or storms? (increased, decreased, stable) What was the economic value before the floods?
	How many families have migrated (temporarily or permanently) along with their animals due to the floods or cyclones? What are their expectations and challenges?
Relief / support /	What is the flood-/cyclone-related relief support offered by the government for livestock and to the dependent communities? (emergency relief, compensations, etc.)
assistance	What are the livestock-based emergency services offered by private and humanitarian actors so far to assist communities to cope with the ongoing floods and storms? (emergency assistance, insurance, etc.)
	How many local animal health centres are functional? What was the impact of floods and cyclones on their services?
Sorvico Providoro	What is the condition of livestock feed and fodder suppliers? Has there been any impact of floods/ cyclones on the feed availability and cost of feed?
Service Froviders	What provisions are in place for livestock feed, water and veterinary support at in-situ and relocation sites, and how are they managed?
	What is the status of the production value chains due to the floods and storms? How are the livestock markets and merchants managing their services?



Photo credit: Michael Benanav

Annex 2: Recommended livestock-based interventions in floods/cyclones

Several interventions could be implemented to address concerns of livestock during floods and storms depending on the local needs that emerge from the disaster situation. Below is a list of recommended livestock-based interventions that could be planned if they are aligned with the PRIM discussions for each specific disaster event, and if they are appropriate to the local context.

Recommended livestock-based	Emergency ph-ases			
interventions in floods/storms	Preparedness	Response	Recovery	
1 Feed and fodder interventions for livestock (refer to LEGS Handbook, Chapter 6: Ensuring feed supplies)				
1.1 Technical assessment on livestock feed/fodder (feed/fodder affected by flood/storm, feed type/ source/availability/deficit/surplus)	In-depth feed assessment	Rapid feed assessment		
 Fodder crop protection from floods and storms (compensation, insurance claim, flood-proof fodder plantation) 		Fodder crop protection	Fodder crop management	
 1.3 Identification of appropriate feed/fodder (green/ dry fodder, rice/wheat bran, concentrate feed, mineral/vitamin supplements) 	Feed identification	Feed identification		
1.4 Procurement/stocking of feed/fodder (feed source, supplier, procurement, stocking process)	Feed procurement/stocking	Feed procurement/stocking		
1.5 Distribution of feed/fodder (logistical arrangements, transportation by boat/truck/rail/ air, stocking, delivery)		Feed distribution	Feed distribution	
1.6 Evaluation of feed and fodder intervention (impact on livestock, animal owners, community)			Feed evaluation	

2 Livestock water supply and drainage interventions (refer to LEGS Handbook, Chapter 7: Provision of water)

2.1 Technical assessment on livestock water supply and flooding (water quality source/availability/ waterlogged animal shelters/fodder supply)	In-depth water supply assessment	Rapid flood and water supply assessment	
2.2 Disinfection of water sources to prevent and control waterborne diseases (foot rot, blackleg, anthrax, mastitis, etc.) among livestock	Water quality management	Disinfection of water sources	Water quality management
2.3 Support in appropriate water drainage management (setting up storm drains, pumping out standing water)	Water drainage management	Water drainage management	Water drainage management
2.4 Evaluation of intervention on water supply and water drainage (impact on livestock, animal owners, community)			Evaluation on water supply and drainage

3 Interventions on livestock shelter and settlements (refer to LEGS Handbook, Chapter 8: Livestock shelter and settlement)

3.1 Technical assessment on livestock shelter and settlements (type of existing animal shelters, waterlogged shelters, extent of shelter damages)	In-depth shelter assessment	Rapid shelter assessment	
3.2 Design livestock species-specific and region- specific flood-/storm-proof shelters (relevant to local practices)	Flood-/storm-proof shelter designs	Flood-/storm-proof shelter designs	Flood-/storm-proof shelter designs
3.3 Sustainable emergency flood-/storm-proof livestock shelters (with community/animal owners' contribution)	Establish flood-/storm-proof shelters	Emergency flood/storm shelter arrangements	Sustainable flood-/storm-proof shelters
3.4 Evaluation of livestock shelter intervention (Impact on livestock, animal owner, community)			Shelter evaluation

4 \	Veterinary support interventions in floods/storms (refer to LEGS Handbook, Chapter 5: Veterinary support)					
4.1	Technical assessment of vet services (common livestock diseases, health issues, accessibility/ availability of services, cost of medicines/ treatment, flood/storm impact on services)	In-depth assessment of animal health services	Rapid assessment of animal health services			
4.2	Pre-monsoon livestock vaccination (Ferrarir and Mariano, 2022) and de-worming camps (before onset of monsoons and rainy season)	Pre-monsoon vaccination				
4.3	Livestock health check-up and treatment camps (livestock standing in waterlogged areas, pneumonia/diarrhoea, waterborne diseases)	Health check-up and treatment camp	Health check-up and treatment camp	Health check-up and treatment camp		
4.4	Safe and appropriate carcass disposal with necessary biosecurity protocols to control spread of diseases	Implement biosecurity measures	Safe carcass disposal			
4.5	Evaluation of animal health support-related interventions (impact on livestock, animal owners, community)			Evaluation of animal health support		

5 Stocking/destocking interventions (refer LEGS Handbook, Chapter 4: Destocking; Chapter 9: Provision of livestock) Rapid assessment on stocking on and destocking king Stocking/destocking identification Destocking of livestock Stocking of livestock Evaluation of stocking and destocking

5.1 Technical assessment on livestock stocking and destocking (local practice, legal conditions, flood/ storm impact on services)	In-depth assessment stocking and destock
5.2 Identification of appropriate stocking/destocking requirements (disease prevalence, livelihood dependency, food security)	
5.3 Livestock destocking process in coordination with animal owner and local authorities (biosecurity protocols, animal health practice, legal aspects)	
5.4 Livestock stocking process in coordination with livestock-dependent communities (quarantine, market, transport, insurance)	
5.5 Evaluation of stocking and destocking interventions (impact on livestock, animal owners, community)	

6	Other livestock interventions in floods/sto	orms		
6.1	Promote livestock emergency management plans to cope with floods/storms at all levels	Develop emergency management plans and organize simulation exercises	Implement the Livestock Emergency Management Plans	Update the Livestock Emergency Management Plans
6.2	Develop information, education and communication (IEC) audiovisual resources to protect livestock from floods and storms (awareness messages)	Develop IEC resources	Disseminate IEC resources	Improve IEC resources
6.3	Training and capacity building for animal owners, communities and stakeholders on management of livestock in floods/storms	Trainings on livestock flood preparedness	Trainings on managing livestock in floods/storms	Trainings on livestock flood recovery
6.4	Research and technical studies on livestock-based interventions in floods and storms (species- and region-specific)	Research studies	Research studies	Research studies
6.5	Legal and policy advocacy for protection of livestock from floods and storms (disaster management acts, policies, framework, financial provisions)	Policy advocacy	Policy advocacy	Policy advocacy

References

Ashley S., Holden S. and Bazeley P., (1999). Livestock in poverty-focused development. Livestock in Development, Crewkerne, United Kingdom.

Assessment Capacities Project (ACAPS), (2022). Briefing Note October 2022, South Sudan, Impact of Floods.

Bihar State Disaster Management Authority, (2018). *Management of Animals in Emergencies*—A Veterinarian Handbook for Disaster Management. https://www.basu.org.in/wp-content/uploads/2018/06/handbook-of-disaster-management.pdf.

Department of Animal Husbandry and Dairying (DAHD), Ministry of Fisheries, Animal Husbandry and Dairying, Government of India, (2021). *Overview of Sheep Farming Sector in India.* https://dahd.nic.in/sites/default/filess/ NAP%20on%20Sheep.pdf.

Economists at Large, (2014). A Benefit-Cost Analysis of WSPA's 2012 Intervention in the Dhemaji District of Assam, India. A Report for The World Society for the Protection of Animals, prepared by Economists at Large, Melbourne.

Emergency Events Database (EM-DAT), (2021). 2021 *Disasters in Numbers.* Centre for Research on the Epidemiology of Disasters (CRED).

Ferrari, G., and Mariano, V. (2022). *Guidelines for Livestock Vaccination Campaigns – From Collection to Injection.* FAO Animal Production and Health Guidelines No. 31. FAO, Rome. https://doi.org/10.4060/cc3038en

Food and Agriculture Organization of the United Nations, (2009). *Livestock in the Balance*. Rome. https://www.fao.org/3/i0680e/i0680e01.pdf

Food and Agriculture Organization of the United Nations, (2015). The Impact of Natural Hazards and Disasters on Agriculture and Food Security and Nutrition. Rome. https://www.fao.org/3/i4434e/i4434e.pdf

Food and Agriculture Organization of the United Nations, (2021). *The Impact of Disasters and Crises on Agriculture and Food Security: 2021.* Rome. https://doi.org/10.4060/cb3673en

Food Security and Agriculture Working Group, Global Food Security Cluster Support Team (2022). Monsoon Flood Weekly Bulletins. World Food Programme, Rome, Italy.

Gary, F., Clauss, M., Bonbon, E., and Myers, L, (2021). *Good Emergency Management Practice: The Essentials. A Guide to Preparing for Animal Health Emergencies.* Third edition. FAO Animal Production and Health Manual No. 25. FAO, Rome. https://doi.org/10.4060/cb3833en

Herrero, M., Thornton, P.K., Kruska, R.L., Jones, P.G., Kristjanson, P., Notenbaert, A., Bekele, N. and Omolo, A., (2006). *Mapping Climate Vulnerability and Poverty in Africa*. International Livestock Research Institute (ILRI), Nairobi. https://cgspace.cgiar.org/handle/10568/2307 Karrasch, L., Restemeyer, B. and Klenke, T., (2021). The 'Flood Resilience Rose': A Management Tool to Promote Transformation towards Flood Resilience. Journal of Flood Risk Resilience, 14(3).

Livestock Emergency Guidelines and Standards, 2nd Edition, (2014). Practical Action Publishing, Rugby, U.K.

Madsen, M. A., (2022). IAEA/FAO Emergency Support to Help Flood-Hit Pakistan with Soil Fertility and Animal Diseases. IAEA Office of Public Information and Communication. https://www.iaea.org/newscenter/news /iaeafao-emergency-support-to-help-flood-hit-pakistan-with-soil-fertility-andanimal-diseases

Oliver-Smith, A., (2009). Sea Level Rise and the Vulnerability of Coastal Peoples. InterSections Publication Series No.7. United Nations University-Institute for Environment and Human Security (UNU-EHS), Bonn, Germany.

Oppenheimer, M. and Glacovic, B., (2022). Sea Level Rise and Implications for Low-Lying Islands, Coasts and Communities. In IPCC Special Report on the Ocean and Cryosphere in a Changing Climate, eds. H.-O. Pörtner et al., 321–445. Cambridge and New York: Cambridge University Press. https://doi. org/10.1017/9781009157964.006.

Prem, T. H. and Sutar, A (2012). WSPA Post Intervention Report Assam Floods - Short Term Response 15th July to 18th August 2012

Rakotobe, Z.L., Harvey, C., Rao, N., Dave, R., Rakotondravelo, J., Randrianarisoa, J., Ramanahadray, S., Andriambolantsoa, R., Razafimahatratra, H., Rabarijohn, R., Rajaofara, H., Rameson, H. and Mackinnon, J., (2016). Strategies of Smallholder Farmers for Coping with the Impacts of Cyclones: A Case Study from Madagascar. International Journal of Disaster Risk Reduction, 17, 114–122.

SEADS, (2022). Standards for Supporting Crop-related Livelihoods in Emergencies. Rugby: Practical Action Publishing. http://dx.doi. org/10.3362/9781788532419.

Shabnam, N., (2014). Natural Disasters and Economic Growth: A Review. International Journal of Disaster Risk Science, 5, 157–163. https://link.springer. com/article/10.1007/s13753-014-0022-5.

United Nations Office for Disaster Risk Reduction, (2022). *Global Assessment* Report on Disaster Risk Reduction 2022: Our World at Risk: Transforming Governance for a Resilient Future. Geneva.

World Disasters Report, (2020). *Come Heat or High Water – Tackling the Humanitarian Impacts of Climate Crisis Together*. International Federation of Red Cross and Red Crescent Societies, Geneva.

World Health Organization, (2016). *El Niño and Health: Global Overview–January 2016.* https://reliefweb.int/report/world/el-ni-o-and-health-global-overview-january-2016.





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