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DISASTER MANAGEMENT PLAN

For Livestock and Fisheries Sectors of Sindh

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INTRODUCTION

1. Sindh is highly prone to natural hazards and climate change impacts. This has implications for various productive assets and sectors in the province, including livestock and fisheries sectors. According to the 'Preliminary Damage and Needs Assessment Report 2010' conducted by World Bank and Asian Development Bank, Pakistan suffered a total economic loss of around USD 9 billion, of which USD 5 billion were losses associated only with the agriculture, livestock and fisheries sectors. Out of the USD 5 billion losses estimated, 89% of the figure relates to agricultural productivity loss, 11% relates to livestock losses, and fisheries account for 0.08%. Sindh's share of total national livestock losses is 33% (or USD 186.2 million), while its share of national fish losses is 13% (or USD 0.56 million) (Pakistan Floods 2010: Preliminary Damage and Needs Assessment Report, ADB and World Bank).

2. In order to mitigate such losses in future, government authorities in Sindh province need to integrate disaster risk management (DRM) into their existing policies and frameworks governing livestock and fisheries sectors. In particular, DRM refers to taking a comprehensive approach to the design and implementation of interventions and measures that reduce the adverse impacts of a disaster. It encompasses all actions taken before, during, and after the disasters that include: mitigation, preparedness, emergency response, recovery, rehabilitation, and reconstruction.

    2.1 The National Disaster Management Authority (NDMA) is an autonomous institution in Pakistan, constitutionally mandated to deal with all aspects of disaster management and preparedness at the federal and provincial levels, in collaboration with its subsidiaries: the Provincial Disaster Management Authorities (PDMAs) and District Disaster Management Authorities (DDMAs).

    2.2 The NDMA and PDMAs have prepared DRM plans for each province. In Sindh, a Disaster Management Plan was developed in 2008 and outlined the roles and responsibilities of key government departments and line agencies in disaster relief and management.

    2.3 The present DRM plan is an effort to supplement existing guidelines and strategies proposed in the DRM plans developed by the NDMA and, in particular, Sindh Provincial and District Disaster Management Authorities, which focuses on reducing disaster risks and climate vulnerabilities in various sectors, including livestock and fisheries.

2.4 The present plan has been developed through consultations held with representatives from key departments and ministries of the provincial and federal governments such as: 1) Fisheries and Livestock Department, Government of Sindh, 2) Planning and Development Department, Government of Sindh, 3) Environment Department, Government of Sindh, 4) Fisheries Department, Government of Baluchistan, and 5) Ministry of Food Security, Government of Pakistan, among others, as well as, representatives from non-governmental organizations and the academia.

3. The present DRM plan aims to propose fisheries and livestock sector specific recommendations that will assist provincial and district authorities in Sindh to mitigate losses in these sectors due to climate change and disasters. The plan highlights specific vulnerabilities of fisheries and livestock sectors to climate change impacts and disaster risks. It then proposes sector specific, priority strategies and policy interventions for disaster management before, during, and after disasters. The roles and responsibilities of Livestock and Fisheries Department have also been highlighted.

4. The plan aims to assist planners and implementing agencies within Sindh Government in enhancing institutional capability for disaster management for fisheries and livestock sectors and making these sectors more disaster resilient.

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HAZARDS, VULNERABILITIES AND DISASTER RISKS IN LIVESTOCK AND FISHERIES SECTORS

Climate change and natural hazards have the potential to alter all segments making up, as well as, inputs and outputs of pastoral and aquatic systems. Extreme weather conditions exacerbated by climate change have far-reaching consequences for livestock and fisheries production. For example, heat stress and prolonged periods of droughts can reduce the rate of animal feed intake (mainly by impacting rangeland productivity) or affect the fish stock. This, in turn, results in heightened food security among households that are largely dependent on livestock and fisheries for their dietary intake and livelihoods.

The following sections provide an overview of the climate hazards, vulnerabilities and disaster risks in both livestock and fisheries sectors:

The effects of climate change and disasters on livestock

1. Increasingly, impacts of climate change are expected to result in intense and frequent disasters that have implications for livestock production systems. The direct effects of climate change on livestock will include, for example, extreme weather events (such as floods, droughts), higher temperatures and reduced rainfall leading to heat and water stresses. These factors could translate into increased spread of existing vector-borne diseases and macroparasites, with the possibility of emergence of new diseases in livestock.

2. For rural communities, this means losing livestock assets that can push livestock dependent households into chronic poverty and have a prolonged effect on their livelihoods.

3. The table below lists down the factors that impact livestock and livestock production systems:

FACTORS	IMPACTS	LINKAGES
Temperature changes	Vector borne disease	Enhanced heat and water stressed conditions result in loss of adapted animal genetic resources that leads to increased incidence of vector borne diseases in animals.
Extreme weather event	Morbidity (in surviving animals) and mortality	Increased rate of extreme weather events directly affect fodder production and subsequently, livestock productivity.

FACTORS	IMPACTS	LINKAGES
Precipitation changes	Feed and clean animal drinking water	Reduced precipitation in rain-fed areas lead to shortage of feed and clean drinking water for animals.

The effects of climate change and disasters on fisheries

1. Factors such as winds, water currents, rainfall, and temperature have strong influence on the distribution and productivity of fish, which are likely to be affected by climate change and natural hazards.

2. Changes in the characteristics of the El Niño-Southern Oscillation (ENSO)[1] cycle may affect the intensity and duration of drought and flood events on land and associated weather patterns over the ocean.

3. Inland fisheries and aquaculture are likely to be most affected by the cumulative impact of warmer temperatures, changing evaporation rates, reduced rainfall, and competing needs for utilizing scarce water resources by non-fishing users.

4. The table on the right lists down the factors that affect fish and fish production systems:

FACTORS	EFFECTS
Water temperatures	Shift in the distribution of fish species Changes in phenology, such as the timing of spawning Changes to growth and reproductive rates Altered diseases and parasite susceptibility and physiological stresses Decreased oxygen availability Enhanced or suppressed feed-conversion ratios in aquaculture systems Increase in the range and availability of warm water species (e.g., pelagic game fish species) for longer periods in a year
Extreme weather events (storms, cyclones)	Changes in fish productivity and fish stock

1 The El Niño-Southern Oscillation (ENSO) is a naturally occurring phenomenon that involves fluctuating ocean temperatures in the equatorial Pacific. For more info, please see: http://www.nc-climate.ncsu.edu/climate/patterns/ENSO.html

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PRIORITY STRATEGIES FOR DISASTER RISK REDUCTION AND MANAGEMENT IN LIVESTOCK AND FISHERIES SECTORS

Existing national and provincial disaster management plans have not holistically emphasized on fisheries and livestock when suggesting DRR strategies for these sectors, and often, these are covered within agriculture.

The present DRM plan aims to build upon the guidelines and recommendations given in existing disaster management plans in Pakistan. However, unlike other plans, this focuses entirely on livestock and fisheries sectors.

The strategies put forth in this DRM plan were prioritized in consultation with experts in the livestock and fisheries sectors from the government, academia and non-governmental organizations. Community members were also consulted to provide their feedback.

DRR and CCA Guidelines for Livestock Sector in Pakistan

1. In Pakistan, livestock production is divided into two main categories: 1) rural smallholder subsistence production and 2) rangeland/pasture based production.

2. The following guidelines are aimed to address climate vulnerabilities and disaster risks for both types of livestock production systems, as well as, to provide more general guidelines for resilient livestock production:

2.1 GENERAL

2.1.1 Improve water productivity and water use efficiency in rain-fed areas.

2.1.2 Introduce Livestock Insurance Schemes to compensate for loss of animals or reduced productivity due to a natural hazard or climate disaster.

2.1.3 Increase forecasting of emerging infectious animal diseases.

2.1.4 Implement early warning forecasts (disaster-specific, season-specific).

2.2 SMALLHOLDERS PRODUCTION SYSTEM

2.2.1 Conserve fodder using techniques such as ensiling.

2.2.2 Use of feed blocks (MNB, UMB) to help lactation, reproduction

and weight gain among livestock.

2.2.3 Efficient utilization of crop residues and agro-industrial by-products for animal feeding.

2.2.4 Conservation of well-adapted local breeds.

2.2.5 Upgrading mobile veterinary services in disaster prone areas, especially in emergency situations.

2.2.6 Raise awareness/training of small farmers on appropriate animal husbandry practices and disease prevention.

2.3 **RANGELAND/PASTURE BASED PRODUCTION**

2.3.1 Improve rangeland/pasture management to increase carrying capacity.

2.3.2 Promote use of fodder trees and shrubs.

2.3.3 Cultivate drought-tolerant fodder crops.

2.3.4 Diversify herds/flocks (multi-species and multi-breed) while browsing and grazing animals.

2.3.5 Herd splitting and right sizing.

2.3.6 Rotational grazing.

DRR and CCA Guidelines for Fisheries Sector in Pakistan

The National Fisheries Policy of Pakistan, formulated in 2006, acknowledges the need to adopt measures to prevent damage to aquatic biodiversity from environmental factors such as climate change and natural hazards. In light of this, the following guidelines and recommendations are proposed to improve the resilience of fisheries sector to climate change:

1. Improve resilience of aquaculture operations:

   1.1 Carry out selective breeding of aquaculture species to increase tolerance to changing water temperatures and other environmental factors. The experience with Genetically Improved Farmed Talapia (GIFT) can be repeated with other commercial species.

   1.2 Diversify income and operational activities of households and businesses involved in aquaculture.

   1.3 Incorporate climate change risk management strategies into business plans of aquaculture industry.

2. Identify and address barriers to climate adaptation in aquaculture operations:

   2.1 Assess costs-benefits associated with various adaptation options in the aquaculture sector.

   2.2 Understand the legislative, policy, and management issues existing in the fisheries sector in relation to aquaculture.

   2.3 Optimize the efficiency of operations through cost-cutting and intensification methods.

3. Deliver a research, development and extension program (RD&E) for coordination and targeting of investments to climate change issues:

    3.1 Encourage end-user input to ensure that RD&E is appropriately targeted, prioritized, communicated, and applied.

    3.2 Bring together multiple investors to help identify synergies and maximize leverage opportunities.

4. Identify, prioritize and undertake integrated vulnerability assessments at appropriate scales:

    4.1 Improve understanding of the implications of climate change and natural hazards on aquaculture and associated communities through assessing habitats, species and communities within a risk-management framework.

    4.2 Similarly, understanding of how climate change and natural hazards affect inland waterways, estuarine systems and inshore coastal habitats needs to be established.

5. Communicate climate and disaster information to researchers, practitioners, and policy makers relating aquaculture.

6. Monitor changes in aquaculture productivity and indicators of ecosystem structure such as changes in growth period, environmental factors (including benthos and infauna around aquaculture sites), and farming practices and species.

7. Improve the understanding of how non-climate change stressors interact with climate change, and how they can reduce ecosystem resilience at local and regional levels.

8. Expand data and information frameworks for assessment purposes.

9. Ensure aquaculture management strategies incorporate climate change and natural hazards.

10. Coordinate aquaculture related responses to climate change and disasters within and across agencies and governments.

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POLICY INTERVENTIONS FOR LIVESTOCK AND FISHERIES SECTORS

To implement the above priority DRR and CCA strategies, following interventions can be taken at the policy level for both livestock and fisheries sectors:

1. Development of high producing, heat and drought tolerant livestock breeds.
2. Promotion of biotechnology to produce improved livestock and fish breeds using genetic engineering.
3. Promotion of feed conservation techniques.
4. Establishment of fodder banks in arable areas.
5. Ensuring availability of quality feed and feed supplements (UMB, MNB) of grazing animals in rangelands.
6. Establishment of animal/fish diseases monitoring and surveillance at district level.
7. Conservation of local AnGR and establishment of gene banks (semen, embryo, carp, DNA).
8. Building vegetative barriers to safeguard against erosion of rangelands/pastures.
9. Control and maintain livestock densities (Herd Right Sizing) for optimal output.
10. Ensuring close coordination among livestock and forest departments, and fisheries and irrigation departments.
11. Promote rotational livestock grazing methods in pastures/rangelands.v
12. Designate alternate pastures and passages in case of an extreme weather event.
13. Develop appropriate varieties of grasses and increased grasslands in saline and waterlogged zones.

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KEY ROLES AND RESPONSIBILITIES OF LIVESTOCK AND FISHERIES DEPARTMENT

In the post-18 amendment context, the main responsibility to manage disasters and disaster preparedness planning fall on the provincial government and Provincial Disaster Management Authority (PDMA). While each line department within the provincial government has a set of specific roles and responsibilities to perform before, during, and after disasters, however, in terms of livestock and fisheries sectors, the Livestock and Fisheries Department is mandated to "create an environment for enhancement of livestock and fish production as a means for social security, poverty alleviation, and rural development".

In this regard, the following are the key roles and responsibilities that fall upon the Livestock and Fisheries Department for disaster risk reduction and climate change adaptation for these sectors:

Mitigation

- Carry out vulnerability and risk analysis for fisheries and livestock sectors in hazard prone areas, especially during droughts and locust attacks.
- Identify appropriate actions for reducing vulnerability of drought risks to livestock in close coordination with PDMA.
- Establish early warning systems for identifying risks to livestock and fisheries sectors in collaboration with PDMA and research institutions.
- Build institutional and individual capacity of government officials, local extension workers and farmers on disaster preparedness for livestock and fisheries sectors.
- Promote alternate income generation opportunities and sustainable livelihoods in areas of recurring climate risks and natural hazards such as animal husbandry and aquaculture. Further, provide market outlets for the products of rural farmers.

Preparedness

- Inform livestock and fisheries farmers about imminent floods and droughts through early warning information.
- Ensure fodder security to the rural livestock economy.
- Provide veterinary information and services to livestock farmers, especially

during disaster situations.

- Earmark funds in annual budgets for implementation of disaster risk management activities in hazard prone areas with relation to livestock and fisheries sub sector.
- Promote contingency planning to deal with year to year climate variations that trigger and exacerbate drought.
- Develop disaster risk management plan to deal with hazards and disasters in relation to department's mandate and assets.

Response

- Provide emergency animal feeds during extreme weather events such as droughts and floods.
- Provide emergency vaccines during outbreaks of animal diseases.
- Maintain water level in fish farms and animal ponds.