Food and Agriculture Organization of the United Nations

Report on the

Assessment of the Scope of Earthquake Damages to the

Livestock Sector in Gujarat State, India

Submitted

by

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Executive Summary

- On January 26, 2001 at 08:47, one of the worst earthquakes to have occurred in India during the last 50 years struck Gujarat State in the western part of the country. Twenty-one out of Gujarat's 25 districts were affected by the earthquake. It is estimated that a total of nearly 20,000 people died and over 150,000 injured. Millions were left homeless. The worse affected districts were Ahmedabad, Banaskantha, Kachchh, Jamnagar, Patan, Rajkot and Surendranagar. Kachchh District was the most severely damaged and was where 92 percent of all quake-related deaths occurred. Some 500,000 houses were destroyed or damaged, and 5,000 schools flattened. Health centers, water supply systems, sanitation facilities and other crucial infrastructure was destroyed. In Bhuj, Rapar, Bhachau and Anjar -- Kachchh's four most affected blocks -- between 70 and 100 percent of all physical structures were destroyed.

- The present FAO mission was charged with updating information on the small holder livestock sector in the areas most affected by the earthquake and identifying possible thematic areas in which a technical cooperation project (TCP) proposal could be developed.

- A preliminary estimate released by the GOG in March of the total number of livestock that were killed or died due to the earthquake in Kachchh, Patan and Rajkot Districts combined was about 18,100 animals. However, government authorities considered this figure to be too high and a second survey was conducted which indicated that overall livestock losses were much lower than initially thought. Kachchh District had the largest loss of animals (8,096), followed by Jamnagar (549), Rajkot (178), Banaskantha (103), Surendranagar (103), Ahmedabad (20) and Patan (15) Districts. Had the earthquake occurred at an earlier time of the day or late at night the loss in human lives and numbers of livestock killed would have been even more catastrophic. As it was, most livestock had already been taken out of the villages for grazing when the earthquake struck.

- Based on the findings of the mission a TCP proposal (Relief and Rehabilitation Activities for the Livestock Sector in Earthquake Affected Areas of Kachchh District, Gujarat State) was submitted to FAORAP and is under review. The proposed project will provide small and marginal farmers who own livestock in the hardest hit livestock communities in Kachchh with immediate benefits in the form of simple animal shelters and concentrate feed. It will also assist the GOI/GOG in restoring the operational capacity of village veterinary first-aid centres so that necessary animal health activities and disease preventative measures can be carried out. Additionally, the TCP project will support the GOI/GOG in their medium and long-term efforts to restore small holder animal husbandry activities to their pre-earthquake levels and to address the secondary effects of the on-going two-year drought.

- While the earthquake has brought about adverse effects on livestock, the main problem facing farmers is the drought. Even with the arrival of the monsoon rains, there will be a need for long-term watershed development, water harvesting, establishing fodder banks, and improving grasslands. Training will need to be a key component. Although much of this work will fall to the GOG, particularly AHD and MOA, national NGOs will continue to play an important role and should be considered as potential collaborative partners.

Acknowledgements

The consultant wishes to express his appreciation and thanks to all whom rendered assistance and facilitated the mission in carrying out its work. The FAO(RAP) was instrumental in the initial planning of the mission and handling necessary administrative matters. The FAO Representative in New Delhi and his staff were most helpful in organizing meetings and FAO(TCOR) in Rome provided useful information regarding TCP guidelines. The National Dairy Development Board (NDDB) and the Gujarat Cooperative Milk Marketing Federation Ltd., (GCMMF) liaised closely with FAO, New Delhi in planning the mission and generously designated national staff to accompany the consultant throughout his visit to Gujarat State. Officials from the Department of Animal Husbandry and Dairying, Ministry of Agriculture in New Delhi and the Department of Animal Husbandry in Gandhinagar and Bhuj, Gujarat State provided background information on the livestock situation and directed their staff to assist the mission in visiting the major earthquake affected areas.

Special thanks are due to Dr. Mohan Namjoshi from NDDB and Mr. Himanshu P. Rathod from GCMMF for participating in the Gujarat portion of the mission and drawing-up a well-organised field itinerary. Their insight and knowledge about the earthquake situation was most valuable and they made useful contributions to the mission report. Mr. Yash Shethia, Foundation for Ecological Security, helped to arrange meetings within Kachchh District and assisted in collecting background information. The mission would also like to thank those individuals working with the numerous nongovernmental organisations with which the mission met who freely gave their time and shared their knowledge. Lastly, the mission would like to especially thank the farmers and their families who generously recounted their experiences and openly discussed the difficulties they are facing following in this major disaster.

Disclaimer

Abbreviations and Acronyms

AHD	Department of Animal Husbandry and Dairying
BAIF	Bhartiya Agro Industries Foundation (BAIF) Development Research Foundation
FAO	Food and Agriculture Organisation of the United Nations
FMD	foot and mouth disease
GOG	Government of Gujarat
GOI	Government of India
GCMMF	Gujarat Cooperative Milk Marketing Federation
HS	haemorrhagic septicaemia
KNA	Kachchh Navnirman Abhiyan
KVK	Krishi Vigyan Kendra
MOA	Ministry of Agriculture
NGOs	Nongovernmental organisations
SEWA	Self-Employed Women's Association
TCOR	Technical Cooperation Department, Special Relief Operations Service (FAO)
VTRI	Vivekandand Research and Training Institute

Exchange Rates

Rs 46.2 = $US 1.00
Rs 100,000 (Lakh) = $US 2,164

1. Background

1.1 Earthquake

On January 26, 2001 at 08:47, one of the worst earthquakes to have occurred in India during the last 50 years struck Gujarat State in the western part of the country. Gujarat State is bordered on the northeast by Rajasthan State, on the east by Madhya Pradesh State, on the southeast by Maharashtra State, on the south and southwest by the Arabian Sea, and on the northwest by Pakistan. The earthquake measuring between 7-8 on the Richter Scale had its epicentre about 30 km northeast of the city of Bhuj, the headquarters of Kachchh (Kutch) District in the north western part of the state. India is divided into five seismic zones with respect to severity of earthquakes. The entire Kachchh area lies close to the western margin of the Indian plate and falls into zone 5. It is thus very prone to earthquakes. The compressive stresses responsible for the earthquake are related to the ancient collision of India with Asia and the resulting rise of the Himalayas to the northeast (IFRC, 2001, NASA/JPL, 2001).

Twenty-one out of Gujarat's 25 districts were affected by the earthquake. It is estimated that a total of nearly 20,000 people died and over 150,000 injured. Millions were left homeless. The worse affected districts were Ahmedabad, Banaskantha, Kachchh, Jamnagar, Patan, Rajkot and Surendranagar (Annex 3, Table 1). Kachchh District was the most severely damaged and was where 92 percent of all quake-related deaths occurred. Some 500,000 houses were destroyed or damaged, and 5,000 schools flattened. Health centers, water supply systems, sanitation facilities and other crucial infrastructure was destroyed. In Bhuj, Rapar, Bhachau and Anjar -- Kachchh's four most affected blocks -- between 70 and 100 percent of all physical structures were destroyed.

1.2 Previous and Present FAO Missions

FAO's Special Relief Operations Service (TCOR) fielded a Technical Assessment team from February 5-16 to carry out a preliminary qualitative assessment of the earthquake damages to the agricultural sector and identify relief and rehabilitation needs. The mission team was composed of an international disaster management expert and three national consultants in the fields of crop production, animal husbandry and agricultural engineering (water management) (UN, 2001). The mission visited Jamnagar, Kachchh, Rajkot, Patan and Surendranagar Districts. Findings from that mission are given in Schimann (2001). Supplementary information on the animal husbandry and fisheries sector is contained in the report of Bhaumik (2001). Comments by the Government of Gujarat (GOG) on the TCOR mission report are given in David (2001).

The present mission, which was carried out about 4 months later (May 28–June 12), focused only on the impact of the earthquake on the livestock sector. The consultant was charged with updating information on the animal husbandry situation at the small holder level and identifying areas in which technical cooperation project (TCP) proposals could be developed (Annex 1, Terms of Reference).

1.3 Selection of Target Area

After arriving in New Delhi, the consultant was briefed by the FAO Representative and his staff of the general situation with ongoing relief and rehabilitation activities in the earthquake affected areas of Gujarat State and informed of developments that had occurred since the earlier TCOR mission. The consultant also held discussions with officials from the Department of Animal Husbandry and Dairying (AHD) and the Ministry of Agriculture (MOA) to learn how the earthquake had impacted the livestock sector and what relief and rehabilitation measures were required to assist small holders who relied on animals for their livelihoods. The consultant then travelled to Ahmedabad where he was joined by two national consultants, one from the National Dairy Development Board (NDDB) and the other from the Gujarat Cooperative Milk Marketing Federation (GCMMF). A meeting was held in Gandhinagar with MOA and AHD officials from Gandhinagar and Bhuj who were responsible for livestock and animal health-related activities in western Gujarat. After the mission arrived in Bhuj, follow-up meetings were held with other GOG and AHD officials, as well as staff from relief/aid

organisations and nongovernmental organisations (NGOs) who were involved in rehabilitation work that included a livestock/agricultural-related component (Annex 2, Persons Met).

The consensus of opinion at each of the meetings was that Kachchh District had been most severely affected in terms of livestock losses and injuries, and that any available outside assistance for relief and rehabilitation to this sector should be focused on this district. Thus, the mission concentrated on identifying possible TCPs that would: 1) provide immediate benefits to the hardest hit livestock communities in Kachchh; and 2) support the GOI/GOG in their medium and long-term efforts to restore small holder animal husbandry activities to their pre-earthquake levels.

1.4 Kachchh District

Kachchh District is the largest district in Gujarat (45,652 km^2). It has a human population of about 1.3 million people living in 10 talukas comprising 905 villages. The rate of literacy is just under 53%. Bhuj, the district headquarters, is located in the south central part of the district. Agriculture and allied activities, particularly livestock rearing, is a main source of livelihood for a majority of the rural population, especially in low rain fed areas where crop yields are low.

Land holdings usually range from 3-8 ha for irrigated and non-irrigated farms, although non-irrigated holdings may be as large as 15 ha. Groundwater exists throughout most of the district, but the inherent salinity of the soil and the proximity of the sea on all sides make the water highly saline. The district is classified as arid/semi-arid and experiences extreme weather conditions. Temperatures vary from 40-48 ^oC in summer (April-June) to a minimum of 1 ^oC in winter months (November-February). The mean wind speed for Kachchh is 12 km per hour throughout most of the year and there is high amount of solar radiation for eleven months. Kachchh is prone to not receiving adequate rainfall and every 5 years the district has seen 2-3 years of drought. When there is rainfall, it is erratic, with a low mean and high variation (about 325 mm for Bhuj and 450 for Mundra in the south on the coast). The bulk of the rainfall occurs over a 12-14 day period, which is not conducive for agriculture unless collected and regulated over the four months of kharif cultivation (June-September). Cropping is also carried out in the rabi season (October-February) and during other months in irrigated areas. The main cultivated crops are castor, cotton, groundnut, sorghum, wheat, vegetables, mustard and spices (cumin, coriander). Sorghum, millet, maize and alfalfa are grown as fodder crops under rotation. Mixtures of wheat and alfalfa are sometimes also grown. Wheat straw and crop residues are stored for the dry season. Alfalfa (often grown under irrigated conditions) along with green fodder are valuable cash crops that are sold by rural farmers to other farmers living in the proximity of urban centres who lack adequate land/natural pasture for their animals.

Farmers who rely on rainfed agriculture usually have 1-2 pairs of bullocks (Kankrej or Gir) for draught, and one buffalo (Mehsana, Jaffrabadi, Surti, Murrah) and a cow for milk for household consumption and sale/income. Farmers who own irrigation systems often have 1-2 pairs of bullocks (more wealthy use mechanization), two buffalo and 1-2 cows. Age at first calving for cows averages >4 years, with calving intervals of 1.5-2.0 years. The main calving season is November-January, but calving can occur throughout the year. Average milk yields are about 2.5-3.0 litres per day or 700-800 litres for a 240-day lactation. Buffalo usually calve at 3.5 years and have a 2-year calving interval. Offspring are usually born in July-September. Lactations can last up to 11 months and average 3.0 litres per day. Lactating cattle and buffalo, and draught animals are commonly fed wheat bran or purchased concentrate feed or groundutcake, in addition to cut fodder or grazing. Sheep and goats (flocks/herds of up to 50 or more animals) are raised mainly by the Maldhari people who are for the most part landless. Goats are commonly raised by the poorer segment of the rural population who cannot afford a cow or buffalo. Poultry production except for household consumption is mainly confined to urban areas and is commercially industrialized. Pig rearing in Kachchh is normally not practiced, and most pigs seen scavenging in villages or small towns are just free roaming.

2. Impact of Earthquake on Livestock Sector

2.1 Animal Losses

A preliminary estimate released by the GOG in March of the total number of livestock that were killed or died due to the earthquake in Kachchh, Patan and Rajkot Districts combined was about 18,100 animals. However, government authorities considered this figure to be too high and ordered that another survey be conducted. (MOA, 2001). Results from the second survey showed that overall livestock losses were much lower. Kachchh District had the largest loss of animals (8,096), followed by Jamnagar (549), Rajkot (178), Banaskantha (103), Surendranagar (103), Ahmedabad (20) and Patan (15). Livestock losses reported for other districts throughout the state were minimal (ranging from 1-8 animals), except for Bharuch District (76) located in the eastern Gujarat (Bhaumik, 2001a). Livestock losses district-wise were negligible when expressed as a percentage of total animal numbers (Annex 3, Table 2).

An overview of the type and number of animals killed within selected talukas in Kachchh District is given in Annex 3, Table 3. It should be noted that while the death of an animal for an individual small holder family can be tragic, the number of animals in Kachchh that were killed, expressed as a percentage of the total number was very small (less than 1%) (AHD, 2001a,b,c) (Annex 3, Tables 3,4). Had the earthquake occurred at an earlier time of the day or late at night the loss in human lives and numbers of livestock killed would have been even more catastrophic. As it was, most livestock had already been taken out of the villages for grazing when the earthquake struck. Those farmers who got a late start that morning or did not have labour that day lost more animals (Annex 4, Field Visits). In some instances, cows and buffalo that were killed had been recently milked and were standing next to a wall of the house or shed when it collapsed.

2.2 Breakdown in Husbandry Practices

During the first two weeks following the earthquake, little attention was given to livestock, as people were still recovering from the shock of the disaster and relief efforts were focused on the human population. Farmers and their families were primarily occupied with getting their lives back in order and ensuring that they had adequate shelter constructed before the onset of the monsoon rains. Most livestock were just left to wander around the towns and villages in search of feed and water. Some animals died due to injuries received from collapsing buildings or wounds from debris. Other animals, which normally were kept at night in some form of shelter, died from exposure, as it was the colder period of the year. Once farmers were able to give attention to their animals and provide them with some form of feedstuff many of the animals had already become in poor condition. Those cows and buffalo, which had not been milked during this period, stopped lactating. Many water holding tanks cracked or collapsed due to the earthquake. Therefore, regular watering points were no longer available and animals had to be walked longer distances, resulting in less frequent watering (often only once every 3 days) and degradation of cropland and natural pastures as animals passed through new areas.

The agricultural and livestock activities of small and marginal farmers have been drastically disrupted. At the time of the mission, there was little rebuilding of permanent structures observed in villages in the affected talukas visited. Nearly all families are living in temporary shelters (tents, tarpaulins, locally constructed thatch-roofed structures). Some individuals (those whose houses were not totally destroyed and the more wealthy) have been able to begin making repairs, although this is not widespread. Demand for building supplies (cement, iron reinforcement rods) has resulted in higher prices and shortages. Animal shelters, feed storage structures and water holding tanks for the most part remain disrepair. Collapsed buildings caused damage to animal-drawn equipment (ploughs, harrows, ridgers, carts), hand tools, plant protection equipment and irrigation assets (diesel engines, electric motors, water pipes). On some farms, wells and boreholes have been damages and water levels affected. Access to feed supplies is erratic and many animals have deteriorated in body condition. In particular, buffalo and cows (relied on for milk production for household consumption/sales) and draught animals are in poor condition.

Farmers are still mainly occupied with trying to rebuild their homes and have little extra time to properly tend to their livestock. Most animals are without shelter and are still being kept in the open in common holding places on the outskirts of villages and towns. Poor management, overcrowding, reduced access to drinking water and inadequate removal of waste has exacerbated the situation. In some cases, farmers have been able to erect simple temporary shelters for their animals near to their former houses. Farmers stated that they did not like the idea of their animals being kept away from their dwelling area and in the open as it requires more labour to care for them and management suffers. They are also concerned about the animals not having shelter when the monsoon rains arrive. Security can also be a problem when the animals are not kept near the home.

2.3 Animal Health and Disease

Following the earthquake, much of the government veterinary services were not able to function as normal. Veterinary office buildings, laboratories, dispensaries and staff quarters were totally destroyed or severely damaged (Annex 3, Table 5). Many rural dispensaries and village first aid centres collapsed or require massive repairs. Medicines, instruments and supplies were lost under the rubble. Equipment such as lights, fans and refrigerators were destroyed or no longer operate because the electrical installations to the buildings were damaged. Water supplies have been cut-off or disrupted because of damage to pipelines, open borewells and holding tanks. In some areas, vaccines and general medicines are in short supply.

Production losses during the period following the earthquake, due to neglect of animals and subsequently a lack of feed/fodder or proper management, has resulted in animals being in poor condition, and therefore, more susceptible to diseases or poor health brought about by under nutrition and stress. To date, there have been no reports of any outbreaks of animal diseases in the earthquake-affected areas, although the potential exists if general management and overall animal condition is not improved. Major diseases that may affect livestock at this point are foot and mouth disease (FMD), haemorrhgic septicemia (HS), black quarter, anthrax (mainly buffalo and cattle) and enterotoxaemia and pox in sheep and goats (Bhaumik, 2001a).

2.4 Secondary Contributing Factors

Gujarat State has experienced two consecutive droughts, (1998-1999 and 1999-2000) which has had a negative effect on agricultural production and animal husbandry. The coastal areas of Kachchh District still suffer from the effects of a cyclone which struck in May 1998 and which killed an estimated 50,000 livestock. The earthquake is the third natural disaster to strike Gujarat State in four years. Its impact on the agriculture and livestock sector has only been magnified due to the continuation of the current drought. The drought has wiped out most of the forage grass and natural pastures have become deteriorated or destroyed. The lack of fodder is compounded by a shortage of drinking water for livestock, resulting in increased migration, and in some areas mortality. Farmers in the drier areas are facing greater problems that those in irrigated areas where green fodder is more available for sale.

2.5 Economic Losses

It was not possible within the timeframe of the mission to obtain adequate information to quantify the loss of income/employment due to the earthquake and determine the extent to which such losses will affect food security at the small holder level. Reduced crop yields, because of late irrigation or delayed harvesting, coupled with destroyed or damaged storage facilities will have an adverse impact human food supplies and animal feed. Moreover, the total disruption of life of the farmers, the loss of their homes and livestock, and break-up of their families will result in a reluctance to undertake agricultural operations for some time. During this recovery period, farmers are also likely to neglect management of their animals, which will have a negative affect on productivity (reproduction, milk, work). Loss of milk producing animals or reduced yields from those in lactation will directly affect human nutrition, especially in younger children or older adults. Lack of or sporadic collection of milk, particularly in some of the more remote rural areas will directly impact household sales/income. Private traders using motorcycles modified to carry milk cans have been able to accommodate some of the excess demand.

In other instances, farmers living near small towns or in the vicinity of urban areas have themselves organised the hiring of vehicles to transport the milk to processing plants.

As already described, many farmers who suffered total destruction of their houses and farm structures also lost agricultural inputs (seed and fertilizer), hand tools, farm equipment (animal-drawn and mechanized) and irrigation assets. However, the extent of the damage varies widely from village to village. In some cases, damage may be relatively minor, allowing inputs/resources to be salvaged and basic repairs to equipment made using local blacksmiths or artisans (Schimann, 2001). Nevertheless, this will require the use of scarce cash resources or sale of personal assets to meet such expenses, thus placing an additional financial burden on the farm household.

In addition to losses at the farm level, the input supply and marketing network that normally functions with the district had been disrupted. Supplies of agricultural inputs (seeds, fertilizer, pesticides) will be delayed or arrive too late for the coming planting season. Farmers will also be directly affected by destruction of various public property or infrastructure facilities, such as irrigation canals, agricultural/livestock market areas and buildings belonging to agricultural co-operative and credit societies. MOA sample surveys indicate that the loss of agricultural inputs, implements, standing crops, farm produce, irrigation assets, etc in 20 of the 23 worse affected talukas in the state will be an estimated Rs 733.71 crore ($US 158.8 million) (MOA, 2001). The AHD in Kachchh has estimated that about Rs 27.4 million ($US 601,000) is needed for repair/replacement of its veterinary hospital, grass godowns and buildings and associated structures for its cattle and camel breeding farms, and poultry extension programme. Damages to agricultural assets for 780 villages in nine talukas in Kachchh (irrigation equipment and structures, farm buildings, etc) were estimated by the MOA to be about $US 4.8 million (AHD and MOA, 2001, cited by Schimann, 2001). Although the Kachchh Dairy outside of in Bhuj has not functioned for over two years, the Gujarat Dairy Development Cooperative (GDDC) reported losses to chilling plants and dairy plants, buildings totaling Rs 270.47 lakh ($US 585,433) (AHD, 2001a).

3. Livestock Relief and Rehabilitation

Relief and rehabilitation efforts carried out for the livestock sector have in many cases had a dual purpose, namely to address the immediate problem of the earthquake and the continuing problem of the drought. Assistance has focused on three areas, supply of animal feed (primarily fodder), animal health (vaccinations and treatment of injured animals) and monetary compensation for animals killed. These efforts are being mainly carried by the GOI/GOG. Some NGOs have also been involved in providing assistance to livestock holders in the form of materials for shelters, feed and veterinary medicines.

3.1 Feed and Fodder

Due to inadequate monsoon seasons the two previous years, the vast majority of the agricultural community has lost or suffered reductions in two consecutive annual harvests. The most at-risk populations are living in remote areas, including small and subsistence who typically have no access to irrigation. The landless and those living on the edge of society, including lower castes and tribal groups, are also vulnerable. In Gujarat State, it is estimated that 12,240 villages in 22 of the 25 districts are affected. The GOI has responded to the drought by providing emergency food rations and potable water. The GOI has activated the National Crisis Management Committee to monitor and drought mitigation activities, including the distribution of drought contingency to the affected states. During 2000 and 2001, the GOI National Calamity Fund for Drought Mitigation Measures provided approximately $61.6 million. In addition, the Indian Railway system is providing free transport of potable water and animal fodder to the state. The GOI has established a food-for-work, creating 320 million workdays until June 2001 and supplying 500,000 MT of food grains and 170,000 MT of animal fodder to support these programs (USAID, 2001).

The Kachchh District Revenue Department (DRD) runs fodder depots that supply fodder to needy farmers at subsidized rates during the dry season. The DRD purchases fodder at Rs 5/kg and sells at Rs 1/kg. The fodder arrives from southern Gujarat, Maharashtra State or Rajasthan State by train to

Gandhidam or Bhuj where it is loaded on trucks. Alternatively, the fodder is also trucked directly. For example, the mission spoke with truck drivers were transporting 49 bales of paddy straw weighing a total of 4,400 kg from Valsad in south Gujarat to Banni in north central Kachchh, a distance of 716 km. Trucks bring the dry fodder (mainly paddy straw and forest grass) in form of bales which are dropped off at preselected depots within the district. Generally, there is one depot located in a central in an open distribution area for a cluster of 5-8 villages. A person is assigned to distribute the fodder to individuals who are "card holders" in the village. The card identifies the farmer and indicates how many animals he/she has and then feed is allocated at 4 kg per head. The fodder bales are supplied to farmers at the rate of Rs 110/bale paddy straw and Rs 90 for grass (difference in price due to weight, not quality). If adequate feed is available, farmers can receive the equivalent of 10-days rations for livestock. The weakness of the system is that those farmers in need may not always receive their allotment. Sometimes, arranging farmer schedules to come and pick up fodder with individual assigned to distribute it can be a problem and farmers have to return a second time. This can be quite costly if the farmer needs to hire transport twice. From January 26-April 8, the DRD supplied free fodder as part of earthquake relief. Since May, the DRD has been selling fodder to farmers at a subsidized rate through its drought relief programme. However, once the monsoons arrive, this drought relief will end 10 days after 125 mm rainfall has been received in the affected areas (MOA, 2001).

The GCMMF and numerous local NGOs also supplied concentrate feed and fodder free of cost to affected animals in villages and cattle camps during several months following the earthquake. The AHD has also distributed fodder 'mini-kits" to farmers to support the plating of fodder for the dry season. The kits contain several types of fodder, including 'multi-cut' hybrid 'jowar' (sorghum), Rajaka bajari (millet) and oat, along with fertilizer and recommendations for planting. The AHD has a regional station for forage demonstration located in Gandhinagar.

Two other key institutions have been directly involved in supplying fodder to livestock following the earthquake and during the ongoing drought. These are 'gaushalas' and 'panjarapoles'. In most of the villages in Kachchh there is an informal but registered institution called 'gaushala' (also known as a cattle camp). **A** gaushala collects or receives donations from individuals, which is mainly used in creating a facility for holding animals and for feeding and watering. The money is used for buying fodder for the animals. The government recognizes these institutions provides a matching grant (often up to 50%) to village level trusts towards constructing 'godowns' for fodder to be stored for the drier periods when feed supplies and are scarce. Animals are kept under relatively good conditions and reared by the private institution that controls the gaushala.

Panjarapoles are institutions that have been primarily established for salvaging cattle and buffaloes that are older, sick and will eventually die. They are also a place where farmers can leave their animals when they are no longer able to take care of them for whatever reason. If, for example, a farmer leaves an animal because it was not possible to provide it with feed and later wishes to take the animal back, he/she can do so for a nominal fee. In some instances, there are panjarapoles that are very well operated and farmers actually go there to buy animals. The overall operation of the panjarapole depends on the trustees.

3.2 Animal Health and Disease Control

Vaccination campaigns were carried out in the last week of February. Cattle were vaccinated for FMD and HS. There were no outbreaks of FMD reported at the time of the earthquake, rather vaccination was carried out as a preventative measure. Assistance to livestock owners was also provided by private organisations (Animal Help Foundation, Ahmedabad) and NGOs (World Society for the Protection of Animals, UK) in the form of shelter material, feed and veterinary medicines.

The AHD sent 36 teams consisting of veterinary officers and livestock inspectors to Kachchh District and provided door-step treatment to nearly 34,000 sick and injured animals (Annex 3, Table 7). Additionally, over 316,000 animals were vaccinated against FMD and HS (AHD, 2001a) (Annex 3, Table 8). An example of some of the types of treatments given to animals during the first month after the earthquake in Anjar taluka is given in Annex 3, Table 9. The Veterinary Department in Kachchh

has one polyclinic, 22 dispensaries, 29 first-aid centers and 4 mobile units. Many of the dispensaries and first-aid centres suffered major damage from the earthquake (Annex 3, Table 5).

3.3 Compensation for Animals

The DRD has earmarked cash payments for compensation to farmers who lost animals due to the earthquake. Based on discussions with farmers and AHD officials, the amounts to be paid will only cover between 50-70% of full replacement of animals (Annex 3, Table 10). In the villages visited by the mission, people were either unaware about such payments, or had yet to receive them.

Banks are to rescheduled their agriculture and dairy loans to farmers in earthquake affected areas (AHD, 2001a; David, 2001). The use of loans to assist farmers in purchasing new animals, while an option, was regarded by the AHD, MOA and farmers with whom the mission spoke as placing additional undue burdens on small holders already in debt. This finding (which can only be considered preliminary and is not based on a statistical method of sampling) is in contrast to the information given in the TCOR mission report which recommends financial assistance in the form of loans, rather than grants or standard kits of agricultural inputs (Schimann, 2001). The choice of preferred financial assistance to farmers, regardless of which form, is most likely to be dependent on the resources/wealth of an individual/family and the options offered. It would be prudent to carry out additional surveys prior to making any recommendations or decisions concerning the type of financial assistance that would be appropriate for a particular area affected by the earthquake.

3.4 Farm Equipment and Structures

As noted, some farmers sustained damage to their animal-drawn implements. Estimates of the extent of the damage are not available. Some villages reported having received hand tools (spades, hoes) and ploughs. Relief packages in the value of Rs. 10-15,000 are to be distributed to agriculturalists in affected areas. Farm structures (pump houses, electric motor and storerooms) would be repaired by extending subsidy amounting to Rs. 10,000 for loss and Rs. 2,500 for partially damaged. For loss or damage to irrigation assets (tube wells, engines, electric motors, etc) a subsidy would be given to farmers, subject to a minimum of Rs one lakh (GOG, 2001a,b).

3.5 NGOs

The Kachchh Navnirman Abhiyan (KNA) network is coordinating most of the relief operations being carried out by national NGOs in Kachchh District. Over 200 NGOs of Gujarat State brought together under the aegis of Janpath Citizen's Initiative support the KNA network and other relief efforts. Several of these NGOs have been involved in projects having a livestock component (Annex 5).

4. Recommendations

While the earthquake has brought about adverse effects on livestock, the main problem facing farmers is the drought. Even with the arrival of the monsoon rains, there will be a need for long-term watershed development, water harvesting, establishing fodder banks, and improving grasslands. Farmers are in general not in the habit of storing fodder; rather emphasis is on storing of crop residues. There is still much to be done in creating awareness among farmers to develop fodder banks and store quality forage for the scarce periods. Training will need to be a key component. Although much of this work will fall to the GOG, national NGOs will continue to play an important role and should be considered as potential collaborative partners.

4.1 Short-Term

Based on its findings, the mission recommends a TCP project, which focuses on two activities: feed distribution and animal health/rehabilitation.

Feed Distribution

At the time of this writing, the monsoon rains have begun in Gujarat State and the outlook is that the rainfall will be within the expected 'normal' range. This should result in regeneration of natural pastures over the next 2-3 months. Supplying concentrate feed to farmers as part of a TCP project will compliment supplies obtained from the natural pasture and provide animals with a basic maintenance level to see them into the next lactation. The feed will help livestock (cattle and buffalo) to regain body condition and support milk production.

Animal Health/Rehabilitation

This component of the project will support GOG in its efforts to prevent livestock losses in the four most earthquake affected talukas in Kachchh District through the provision of temporary shelters for animals, temporary structures for veterinary first-aid centers and vaccines to prevent disease outbreaks.

It is recommended that the TCP project be implemented by the GOG in collaboration with Bhartiya Agro Industries Foundation (BAIF) Development Research Foundation. Bhuj. BAIF is an NGO which has through its local office in Bhuj already carried out detailed village surveys in the more severely earthquake affected areas of Kachchh and it can provide reliable baseline data on households, livestock ownership, numbers of animals, etc. BAIF has extensive experience in implementing programmes having a livestock component at the village level. They have a strong record of working through local village organisations, thereby ensuring that the stakeholders are directly involved and accountable in meeting the project goals.

Note:
In order to expedite and facilitate assistance to the livestock sector in Kachchh District, a TCP proposal (Relief and Rehabilitation Activities for the Livestock Sector in Earthquake Affected Areas of Kachchh District, Gujarat State) was submitted in early July to FAO (RAP), Bangkok and is presently under review. The proposed TCP will assist the GOI/GOG in their efforts to restore small holder animal husbandry activities to pre-earthquake levels and to prevent livestock productivity from further deteriorating due to the lingering impact of the drought which has affected the district over the past two years.

The project will provide small and marginal farmers in the most severely affected areas who own livestock with immediate benefits in the form of simple animal shelters and concentrate feed. This will permit them to supplement their buffalo and cattle (particularly lactating animals) for several months following the monsoon rains until the quality of natural grazing land improves. The project will also assist the GOI/GOG in restoring the operational capacity of village veterinary first-aid centres so that necessary animal health activities and disease preventative measures can be carried out.

Supply of Animals

While animals could be supplied to farmers who lost theirs, the mission does not recommend it. The main reasons for not doing this are that it will be difficult to find adequate numbers of quality lactating females with calves; the logistical problems of distribution; and there is the difficulty in accurately determining who lost their animals and what types and numbers. Moreover, farmers are already facing a feed shortage with the current numbers of animals they have.

4.2 Long-Term

Based on the information gathered by the mission it is felt that there are a number of possible long-term projects appropriate for rehabilitating the livestock sector that could be developed.

These include:

- Distribution of Fodder Seeds/Fertilizer
- Development of Grazing Lands and Fodder Banks
- Watershed Development and Water Harvesting
- Training Programmes in Fodder Production and Watershed Management
- Milk Marketing through Women's Cooperatives

Additional information will be required to fully develop complete project proposals for these long-term projects. It is recommended that each of the projects be implemented by the GOG in collaboration with one or more NGOs having expertise in that particular area and who are already carrying out relief/rehabilitation activities in Kachchh District (Annex 5). In this regard, it should be noted that most of the NGOs contacted informed the mission that they are currently occupied with projects and their human resources are being stretched to their limits. Thus, it would be difficult for them to be involved in implementing any new projects in the next year or two. However, several stated that they might be able to provide training in specific areas. Each NGO will need to be approached on a case by case basis.

With specific reference to milk marketing through women's cooperative, it should be noted that since last 2-3 years, there are no dairy cooperatives operating in Kachchh District. The Kachchh Dairy Plant has been completely damaged from the earthquake. The GCMMF is the apex organisation of all milk marketing cooperative organisations in the state. Discussions are taking place between GCMMF and GOG to revive the cooperative dairy structure in the district.

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Annex 1. Terms of Reference

Assessment of the Scope of Earthquake Damages to the Livestock Sector in Gujarat State, India

Objective

The objective of the assistance, to be jointly carried out with the National Dairy Development Board (NDDB), is to build upon work already initiated by FAO and other UN agencies, Government of India (GOI), and relief/aid organisations and NGOs to assess the earthquake damages affecting the livestock sector in Gujarat State. The mission will base its assessment on available information (draft/internal documentation, preliminary reports, interviews, etc) and selected field/site visits in order to quantify the impact on the livestock sector in the most severely affected areas. It will propose long-term measures to rehabilitate the sector and prepare a cost estimate of rehabilitation works and an implementation plan.

Scope of Work

a) Review the preliminary damage assessment reports prepared by FAO and other UN agencies, Government of India (GOI), and relief/aid organisations, NGOs. Meet with representatives of these groups to obtain information on most recent developments relating to the livestock sector;

b) Carry out field assessment of selected areas agreed upon by FAO-India in close liaison with GOI authorities and NDDB. Identification of additional damages, if not reported earlier, including the inspection of the sites requiring significant (and minor as appropriate) rehabilitation work. The damages/losses should be expressed in quantified and in monetary terms, and, if possible, in terms of loss of income and employment (economic loss). The losses should also be expressed in terms of impacts on food security. More specifically, the field assessment should include the following subjects:

- assess the numbers of animals (cattle/buffaloes, sheep, goats, poultry birds, ducks, etc) which were affected (i.e., injuries, deaths and impact on production), as a result of the earthquake within the different farming systems, and the most probable causes;
- appraise the effects of the earthquake on ongoing livestock projects and disease control programmes) with the view to rehabilitate all aspects of the programmes so as to restart them as soon as possible, particularly as new animals are acquired by farmers;
- define in co-operation with NDDB and concerned departments a strategy for rehabilitation and estimate costs for this;
- assess physical infrastructures, facilities and equipment in the livestock sector affected by the quake with the view to rehabilitate priority infrastructure.

c) Identify emergency relief/rehabilitation works already initiated or completed (if any) in the livestock sector including the provision of field veterinary services, vaccinations, and other services;

d) Based on the above assessment, prepare a list of damages requiring relief and/or rehabilitation with the indication of medium/long-term priority, taking into account their economic impact, and social and environmental importance;

e) Following consultations with FAO-India, FAORAP (Bangkok) and FAO-TCOR (Rome) prepare a draft Emergency TCP (as per FAO guidelines) for rehabilitation measures and action programme/projects with the indication of priority, time frame and cost estimates.

Annex 2. Persons Met

India

New Delhi

Mr. Peter Rosenegger, FAO Representative (India and Bhutan)
Mr. Gopi N. Gosh, FAO National Professional Officer
Mr. Dilip Biswas, Secretary, Department of Animal Husbandry and Dairying, Ministry of Agriculture
Mrs. Chitra Gauri Lal, Joint Secretary (A&IC)
Mr. D.S. Negi, Joint Secretary Dairy Development
Dr. Anup Bhaumik, Veterinarian, Assistant Commissioner

Gandhinagar District

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Dr. S.T. Pandya, Director, Animal Husbandry Department
Mr. Arvind Agarwal, Commissioner of Agriculture, State Ministry of Agriculture
Mr. D.U. Parmar, Deputy Secretary (Agriculture and Cooperation)
Dr. R.P. Shukla, Joint Director , Animal Husbandry Department
Dr. Pandit, Assistant Director, Animal Husbandry Department
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Mr. H.P. Rathod, Assistant Manager, Gujarat Cooperative Milk Marketing Federation Ltd, Anand

Kachchh District

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Dr. P.N. Mankadia, District Animal Husbandry Officer
Mr. Yash Shethia, Foundation for Ecological Security
Mr. Shailesh Vyas, Programme Coordinator, Sahjeevan
Mr. Yogesh, Representative Sahjeevan
Mr. M. Mankad, Director, Rural Agro Research and Development Society, Mundra
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Mr. H.A. Patel, Livestock Inspector, Ratnal
Mr. Hemant Bar, Coordinator, Kutch Nav Nirman Abhiyan, Adhoi sub-Centre (Setu)
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Ms. Lata Sachde, Joint Secretary, Kutch Mahila Vikas Sangathan
Ms. Mona Dave, Project Coordinator, Self-Employed Women's Association
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Mrs. Hilde Niggemann-Pucella, Operations Officer
Mr. Guy Sneyers, Country Project Officer, Project Operations and Support Branch

Animal Production and Health Division

Dr. Samuel Jutzi, Director
Dr. Ricardo A. Cardellino, Senior Officer
Dr. Peter Roeder, Animal Health Officer
Dr. Beate Scherf, Animal Production Officer

Annex 3. Tables

Table 1. Districts and talukas of Gujarat State affected by the earthquake.

Name of district	Name of taluka
Kachchh	All 10 talukas
Jamnagar	Jodia
Rajkot	Morbi, Maliya-Miyana, Wankaner
Patan	Santalpur, Sami
Surendranagar	Halvad, Dhangadhra, Dasada, Wadhwan, Limbdi
Banaskantha	Deodhar
Ahmedabad	Daskroi

Source: MOA, 2001.

Table 2. Livestock population of districts in Gujarat State affected by the earthquake[1].

District	Cattle[2]	Buffalo	Goats	Sheep	Horses	Camels	Total
Kachchh	348,713	128,329	463,296	475,123	1,490	17,639	1,434,590
Rajkot	93,074	56,845	71,921	106,464	138	68	328,510
Surendranagar	158,333	62,110	106,042	48,028	466	329	375,308
Patan	55,848	24,540	48,112	40,341	136	1,265	170,242
Jamnagar	18,999	9,024	11,242	21,841	28	96	61,230
Ahmedabad	43,267	79,627	41,239	20,857	170	1,794	186,954
Banaskantha	43,262	45,532	38,791	10,249	155	1,443	139,432

[1]Based on 1992 census.
[2]Includes 1,874 exotic crossbred cattle (mainly Holstein-Friesian or Jersey), of which 60% are in Kachchh, 20% in Surendranagar and 16% in Rajkot.
Source: AHD (2001b).

Table 3. Numbers of livestock in Kachchh District killed due to the earthquake.

Taluka	Cows	Oxen	Buffalo	Others[1]	Total
Bhuj	216	170	195	619	1,200
Rapar	--	--	--	--	2,755
Bhachau	147	57	275	1,183	1,662
Anjar	101	12	44	356	513
Mundra	6	4	--	9	19
Mandvi	--	--	--	--	652
Nakhtrana	7	--	4	20	31
Total	477	243	518	2,187	6,832[2]

[1]Sheep, goats, equines.
[2]This total is less than the figure of 8,096 animals given in the text (Section 2.1), as the table only shows data for seven of the districts 10 talukas.
Source: AHD (2001c).

Table 4. Livestock populations in earthquake affected talukas of Kachchh District.

Taluka	Cattle		Buffalo	Goats	Sheep	Equines	Camels	Poultry
	Indigenous	Exotic[1]						
Bhuj	69,576	184	40,813	66,430	37,666	468	3,663	3,342
Rapar	33,824	--	16,486	49,371	155,396	134	2,789	249
Bhachau	25,659	--	14,786	62,188	138,803	171	2,892	701
Anjar & Gandhidham	32,949	231	1,248	34,804	38,039	253	165	10,660
Mundra	27,692	19	5,798	20,015	9,569	195	431	1,000
Lakhpat	26,558	20	5,189	31,336	11,245	35	2,229	1,139
Abdasa	45,157	251	4,527	66,094	39,258	74	2,194	3,736
Mandvi	49,111	412	10,403	47,772	30,165	136	390	4,380
Nakhtrana	37,063	7	17,899	58,286	14,982	24	2,886	218
Total	347,589	1,124	117,149	436,296	475,123	1,490	17,639	25,425

[1]Mainly Holstein-Friesian or Jersey.
Source: AHD (2001b).

Note: Table 5 given on following page.

Table 6. Details of fodder distribution through fodder depots by the Revenue Department of Kachchh from February 9 through June 2, 2001

Taluka	Number of depots	Total card holders	Number of animals	Fodder distributed or sold (mt)
Abdasa	17	12,917	63,535	2,432
Anjar	8	5,373	17,807	1,689
Bhachau	15	6,394	40,000	2,307
Bhuj	44	8,799	86,298	3,789
Gandhidham	3	1,661	14,185	564
Lakhpat	15	5,336	54,919	2,992
Mandavi	9	8,787	67,347	1,360
Mundra	9	6,912	41,417	1,468
Nakhtrana	16	5,710	47,867	2,199
Rapar	19	14,047	57,830	2,002
Total	155	75,936	491,205	20,802

Source: District Revenue Department, Kachchh (2001).

Table 5. Earthquake damages to veterinary dispensaries and animal health centres (AHC) in Kachchh District.

Taluka	Type of building	Location	Type of damages		Cost to repair/rebuild (Rs. Lakhs) [1]
			Total	Partial	
Bhuj	Dispensary	Bhuj		X	1.00
	Dispensary	Bhirandiya		X	0.50
	Dispensary	Loday	X		4.00
	AHC	Khavda	X		3.00
	AHC	Dhori	X		3.00
	AHC	Chakar	X		3.00
	AHC	Kera	X		3.00
	AHC	Deshalpar	X		3.00
Bhachau	Dispensary	Bhachau	X		4.00
	Dispensary	Chobari	X		4.00
	AHC	Janji	X		3.00
	AHC	Lakadia	X		3.00
	AHC	Adhoi	X		3.00
	AHC	Janan	X		3.00
Rapar	Dispensary	Rapar	X		4.00
	Dispensary	Bhimsar	X		4.00
	AHC	Ramav	X		3.00
	AHC	Suvai	X		3.00
	AHC	Fatehgadh	X		3.00
	AHC	Palasava	X		3.00
Anjar	Dispensary	Anjar	X		4.00
	AHC	Ratnal	X		3.00
	AHC	Dudhai	X		3.00
Mundra	Dispensary	Mundra		X	0.25
	Dispensary	Bhadreshw	X		4.00
	AHC	Bhujpur	X		3.00
Gandhidham	Dispensary	Gandhidham	X		4.00
	AHC	Khedoi	X		3.00
Mandvi	Dispensary	Mandvi		X	0.25
	Dispensary	Gadhsisa		X	0.25
	Dispensary	Bidada		X	0.25
	AHC	Kotadi	X		3.00
Nakhatran	Dispensary	Nakhatran		X	0.50
	Dispensary	Nirona		X	1.00
	Dispensary	Netra		X	0.25
	Dispensary	Sukhpar		X	0.25
	AHC	Ravapar		X	0.25
Lakhpat	Dispensary	Gaduli	X		4.00
	Dispensary	Matanama		X	1.00

[1]Rs 100,000 (Lakh) = $US 2,164.
Source: KPRBD (2001).

Table 7. Numbers of livestock in Kachchh District receiving veterinary treatments following the earthquake.

Taluka	Cattle	Buffalo	Others
Bhuj	456	311	515
Rapar	945	485	575
Bhachau	857	471	2,013
Anjar	892	538	4,065
Gandhidham	704	186	317
Mundra	506	142	1,127
Lakhpat	464	359	1,771
Abdasa	350	88	11,740
Mandvi	185	45	2,829
Nakhtrana	321	188	518
Total	5,680	2,813	25,470

Source: AHD (2001c).

Table 8. Vaccinations for haemorrhagic septicemia given in Kachchh District following the earthquake in Kachchh District (February 22-28, 2001).

Taluka	Villages covered	Animals vaccinated
Bhuj	252	99,270
Rapar	141	42,148
Bhachau	81	42,901
Anjar	85	43,032
Mundra	65	34,250
Total	624	261,601

Source: AHD (2001c).

Note: Haemorrahgic septicaemia (HS) is an acute, fatal, septicaemic disease of cattle and buffalo caused by specific serotypes of the bacterium *Pasteurella multocida*. The disease can be controlled by vaccination. Buffalo are more susceptible than cattle and the disease occurs more frequently in poor animal husbandry conditions. Clinical symptoms are often not observed, but include high temperature, loss of appetite, nasal discharge, increased salivation and laboured breathing. Death usually occurs quickly and mortality is virtually 100% in infected animals (de Alwis, 1999).

Table 9. Veterinary treatments given to animals during the first month after the earthquake in Anjar taluka.

Treatments	Cattle	Buffalo	Other[1]	Total
Wounds	476	218	128	822
Fractures	35	18	10	63
Vaccinations				
Foot and mouth	1,930	240	---	2,170
Haemorrahgic septicaemia	26,071	16,791	---	42,862
Clinical bronchitis, acidosis, mastitis, drenching, other	210	146	1,887	2,243
Deaths	689	126	184	1,000[2]

[1]Sheep, goats, horses, donkeys and camels.
[2]Approximate number.
Source: VDAT (2001).

Table 10. Compensation to be paid to livestock owners who lost animals due to the earthquake.

Animal	Amount of compensation (Rs)[1]	Actual replacement costs (Rs)[2]
Cow	2,500	6,000 - 8,000
Heifer	750	3,000 - 4,000
Bullock	4,000	4,000 - 8,000
Buffalo	6,000	10,000 - 16,000
Donkey	300	500 - 600
Sheep / goat	150	800 - 1,000
Camel	3,000	3,000 - 4,000

[1]Figures from AHD (2001b).
[2]Estimates for quality animals, based on discussions with AHD technical officers and farmers.

Annex 4. Village Visits

Sunday, June 5

Town of Ratnal

Fodder depot. The depot was operated by the DRD. Forest grass and paddy straw brought by truck from Rajasthan State. Farmers were allowed to purchase 4 kg per head of livestock (cattle and buffalo) at subsidized price of Rs 1 per kg. System appeared to be working well, although if farmers are not able to coincide their visit with times that the DRD official is there, then they have to return the next day. This can be a major problem, particularly when a farmer is not living in the nearby vicinity and has already rented transport.

Grass godown. Cattle and buffalo, mainly older animals, were being kept and fed green fodder (sorghum) that had arrived by truck that had been purchased by a local NGO. Overall, the animals were in fair body condition. The holding area was dry with some trees for shade. Animals were not crowded.

First-aid centre. A veterinary first aid center had completely collapsed. The building was beyond repair. At the time, the AHD veterinary services had not been able to determine whether any of the equipment or medicine and supplies was still salvageable. Treatment of farmer's animals was being hindered, as they had to bring them further to the next centre.

Monday, June 6

Village Gharana

The village has an estimated 700 buffalo, 250 cows and 1,200 goats. Land holdings range in size from 3-200 acres. The mission met with an older woman who had suffered a broken leg in the earthquake and was hospitalized. She owned two cows, one of which died when the wall of house collapsed. The other cow, which had recently calved, was left to roam around village and was not milked. The calf died. To date, she has not received any relief in “cash or kind”. The major problems, which she faces, are that she has no house in which to live, no money to buy fodder for the remaining cow. The area is rainfed and there is little irrigation for growing fodder crops. She said she would have to use what little savings she has to buy fodder for the cow. When that runs out, she will borrow money. She previously worked as a daily labourer, but that is no longer possible due to her injured leg.

The mission also met with a landless farmer in same village who had 50 goats, but lost 30 of them when several houses collapsed on the animals which were lying along a path between the houses. He owns two cows and two buffalo. Previously, he would sell goats for needed income, but now due to influence of a religious sect in the area (Oswal Samaj) he is “forbidden” to sell them. He receives Rs 10-15/litre for buffalo milk, Rs 8-10/litre for cow milk and Rs 5-6/litre for goat milk. His main problems are a lack of fodder, no money to buy new animals and his house is damaged.

Village Aadhoi

The mission interviewed a landless farmer, who lived in a 'pucca' house, but it collapsed and now he and family are living in temporary shelter. He had six buffalo, but only one remains (three are dead and two are lost). Almost all of his 70 goats died when the walls of the houses on either side of the place where they were lying collapsed. He had depended on milk sales from buffalo and goats. He has no financial resources and works wherever he can find work. His main concern is to rebuild his house and find a way to buy new animals.

A visit was made to the Aadhoi Panjarapole. Cattle and buffalo were being fed green fodder (sorghum) that had been trucked in that day. Overall, the body condition of the animals varied from poor to fair. Quite a few young buffalo calves were seen among the group. At present, the fodder deliveries (amount and frequency) were allowing animals to be maintained, although many of the more weaker and older infirmed animals are likely to die.

Village Lakhpat

The mission spoke with group of 5 farmers and the village revenue collector. Overall, the village appeared to be a relatively prosperous with lots of irrigated areas. The collector stated that there are about 45-50 borewells in or within the close proximity of the village. Of these, 5-6 were affected by the earthquake. There were 45 open wells, but all cracked or broke apart and the water was lost. There are an estimated 150 cows, 150 buffalo, 125 goats, 5 sheep and 2 camels in village. Overall, farmers reported no major problems and work was underway to repair the open wells. Some animal drawn implements had been delivered to the village, but they were not sure why, as none of them had any implements damaged due to the earthquake.

Village Vambhka

A visit was made to Vambhka, a Maldhari village of landless people (200 out of 428 households are Maldhari). About 54 people in the village died in the earthquake. There was little loss of livestock as animals were away from the village grazing. There are about 2,500 sheep belonging to members of the village. The owners receive Rs 10 per sheep per year for selling the wool. They migrate annually with their animals to central and south Gujarat in search of grazing areas. The village was completely devastated by the earthquake. Families are unable to rebuild their homes. They stated that it would be difficult for them to find adequate fodder for their livestock when they return to the village prior to the monsoons because the Forestry Department prohibits them from grazing their animals on forestland in the nearby vicinity. They have no skills other than herding livestock and do not know what else to do as they lack education.

Annex 5. Potential NGO Collaborators

Kutch Nav Nirman Abhiyan (KNNA)
Madansinh Park, Vijay Nagar (Nr. Kalptaru), Bhuj, Kutch 370001. Tel: 02832 23426/23459; Fax: 02832 23509; Email: abhiyan@ad1.vsnl.net.in
Kutch Nav Nirman Abhiyan is a network of 22 grassroots NGOs involved in the relief and rehabilitation process in Kachchh. Founded as a response to the devastating cyclone that hit Kachchh in May 1998. Through member NGOs, the Abhiyan works in 400 villages of Kachchh. Its members have a variety of tasks Survey and needs assessment. Many work in watershed management, income generation, recharging wells and drought/relief activities. Several of these NGOs have specific experience in animal husbandry activities. These include BAIF, Gram Swaraj Sangh, Neelpar, Rural Agro-Research and Development Society and the Krishi Vigyan Kendra Agriculture Science Centre. Full details can be obtained through contacting the NGO directly or through KNNA.

Bhartiya Agro Industries Foundation (BAIF) Development Research Foundation
National Highway No. 4, Warje, Pune 411052, Maharashtra State, India. Tel.: 91 20 5231661: Fax: 91 20 5231662; Email: baif@vsnl.com. or contact: BAIF District Coordinator Sri Hari Complex, Second Floor, A - 9, Junawas, Madhapar, Bhuj, Gujarat, India

Rural Agro-Research and Development Society
Gundala Road, Sadau, Taluka-Mundra 370421. Tel: 02838 22758; Fax: 02838 22384.

Sarva Seva Sangh.
This NGO was formed in 1981 and has coodination offices in Bhuj and Mundra. It is engaged primarily in drought-relief related activities, with priority being given to making fodder accessible for cattle.

Vivekandand Research and Training Institute (VRTI) has been working in the Kachchh and Saurashtra (Bhavnagar and Amreli) regions of Gujarat since 1975. VRTI works on range of issues, such as watershed management, agriculture, animal husbandry, eco-restoration, income generation, public health, etc.

Kutch Mahila Vikas Sangathan
11, Nutan Colony, Bhuj, Kutch 370001. Tel: 02832 22124; Email: kmvs@india.com
Kutch Mahila Vkas Sangathan (KMVS), Bhuj is a NGO of rural women jointly sponsored by the Gujarat Handicraft Development Corporation and Janvikas, an Ahmedabad-based training and support NGO. KMVS works in a number of areas at the village level, including watershed management, health, literacy, ecology and legal rights.

Self-Employed Women's Association
Opp. Lokmanya Tilak Baug, Bhadra, Ahmedabad 380001. Tel: 079 550 64444; Fax: 079 550 6446; Email: mail@sewa.org
Self-Employed Women's Association (SEWA) is a member based organisation which organises craftswomen of Banaskantha and Kachchh District, sustainable economic self-reliance by getting sustainable work and income.

Environmental Planning Collaborative (EPC)
Paritosh, Usmanpura, Ahmedabad 380013. Tel: 079 755 0102; Fax: 079 755 0649; Email: epcamd@wilnetonline.net
EPC has produced detailed maps of the district for the afected areas.