

## ANNEX 13 – AGRICULTURE, LIVESTOCK AND IRRIGATION

### A. Introduction

1. Most of the rural population in AJK and NWFP is engaged in subsistence agriculture. Winter (*rabi*) crops are mainly rainfed, while summer (*khariif*) crops rely on surface irrigation. For the majority of households, the share of agricultural income in the total household income varies between 60 to 70 percent, and a major source of household income is employment in services, trading, construction and industrial sectors, in urban and industrial areas, locally or elsewhere in the country. The main crops include maize, wheat, paddy, fruits, vegetables, and fodder for livestock. Livestock and poultry, generally tended by women, are an important source of nutrition and the main savings instrument to meet emergency cash requirements.

2. The earthquake caused major physical damage to the agriculture sector, including standing and harvested crops, stored seed and grains and animal feed, implements and tools, livestock and poultry, irrigation sources and channels, terraces, soil conservation structures, and some damage to fruit trees, and physical damage to service-related civil works. The loss, if not mitigated in time, will likely further aggravate not only the direct damage but also the indirect damage to the production capacity, further impairing the food security and livelihoods while generating severe social and environmental consequences in the watershed itself and in downstream areas.

### B. Damage Overview and Recovery Needs

3. The damage and needs assessment was undertaken in the three most severely damaged districts in Azad Jammu and Kashmir (AJK) and five districts in North West Frontier Province (NWFP). The methodology of the assessment is based on the Handbook for Estimating the Socio-Economic and Environmental Effects of Disasters published by Economic Commission for Latin America and the Caribbean, the United Nations.

4. This assessment is based on the preliminary damage assessment data compiled by the respective Governments, District Governments, and the concerned line agency staff, and aerial and ground visits to the affected areas by the ADB/World Bank-led assessment and FAO teams. The assessment also relies heavily on information compiled by FAO field teams, which was used to validate other observations through extensive discussions with the field staff and scoping sessions with affectees. The field teams confirmed the extensive direct and indirect damage and identified various issues that need immediate attention.

5. Based on the assessment, total direct damage to the agriculture sector in AJK and NWFP, including crops, livestock and irrigation, is estimated at Rs. 13,257 million (US\$223.2 million). Crop damage includes harvested and standing crops and byproducts, losses to terraces, farm stores, and feeds, and extension and research buildings. Damage to the livestock sector was also severe, including loss of large and small ruminants and poultry, animal sheds, and extension and research buildings.<sup>1</sup> Irrigation infrastructure, including water channels, diversions, water lifts, spillways, and water tanks was also damaged. Indirect damage to the agriculture sector includes production losses of fruit trees and milk, and anticipated decrease in yields in the forthcoming wheat crop. The recovery needs for the agriculture sector are estimated at Rs.18,469 million (US\$311 million). The immediate requirements (in the next one month) are for inputs for winter crops and establishment of temporary animal sheds for protection during the approaching winter. There is also an immediate need to restore buildings of relevant line agencies and rehabilitation of irrigation facilities to enable a rapid resumption of services to affected people. Long

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<sup>1</sup> About 133,500 cattle and 107,700 buffalos have been lost.

term needs include restoring livestock inventories and rehabilitation of terraces. Longer term recovery plans also call for measures to improve sustainability of the sector through strengthening institutional capacities and providing enhanced support services. Table 1 presents a summary of the direct and indirect damage and needs, including relief and support for revitalizing farm production and related economic activities.

**Table 1: Damage and Needs in the Agriculture Sector  
(in Millions)**

Area	Sub-sector	Direct Damage	Indirect loss	Total Loss	Reconstruction Cost
<b>Total of Agriculture Sector</b>					
	Crop	3,956.0	711.8	4,667.8	5,953.6
	Livestock	8,976.8	6,058.6	15,035.4	11,892.2
	Irrigation	323.8	-	323.8	623.2
	<b>Total (in Rs. million)</b>	<b>13,256.6</b>	<b>6,770.4</b>	<b>20,027.0</b>	<b>18,469.0</b>
	<b>(in US\$ million)</b>	<b>223.2</b>	<b>114.0</b>	<b>337.2</b>	<b>310.9</b>
<b>Azad Jammu and Kashmir</b>					
	Crop	3,209.2	529.0	3,738.2	5,345.9
	Livestock	5,043.0	3,688.6	8,731.6	7,133.3
	Irrigation	240.1	-	240.1	472.0
	<b>Subtotal (in Rs. million)</b>	<b>8,492.3</b>	<b>4,217.6</b>	<b>12,709.9</b>	<b>12,951.2</b>
	<b>(in US\$ million)</b>	<b>143.0</b>	<b>71.0</b>	<b>214.0</b>	<b>218.0</b>
<b>North West Frontier Province</b>					
	Crop	746.8	182.8	929.6	607.7
	Livestock	3,933.8	2,370.0	6,303.8	4,758.9
	Irrigation	83.7	-	83.7	151.2
	<b>Subtotal (in Rs. million)</b>	<b>4,764.3</b>	<b>2,552.</b>	<b>7,317.1</b>	<b>5,517.8</b>
	<b>(in US\$ million)</b>	<b>80.2</b>	<b>43.0</b>	<b>123.2</b>	<b>92.0</b>

6. The following sections describe in greater detail the initial direct and indirect damage estimates for AJK and NWFP and estimated needs restore the crop, livestock and irrigation subsectors to the pre-earthquake levels.

### **Azad Jammu and Kashmir**

#### ***Direct damage***

7. It is estimated that the AJK suffered total direct damage of about Rs. 8.5 billion (US\$141.5 million). The bulk of the damage was in the livestock subsector (Rs. 5.0 billion or US\$84.1 million), followed by crop subsector estimated at Rs. 3.2 billion (US\$53.5 million), and irrigation structures Rs. 240 million (US\$4.0 million).

8. In the case of livestock, it is estimated that about 30 percent of the large ruminants and about 18 percent of the small ruminants were either killed or injured severely enough to be of no productive use and therefore needed to be culled. Most of these losses were sustained in the collapse of animal sheds, the near total destruction of which also constitutes a major blow. The assessment team also reported that the death of animals continues as a result of the absence of shelter for animals to be kept at night.

9. In the case of crops, the main damage was to harvested crops that were still in the field for threshing, cleaning and drying. Affected crops included just harvested and/or ready to harvest maize and paddy, *kharif* fodder, and some damage to fruit trees. Straw (a byproduct of maize and paddy) was also damaged. Damage was primarily caused by landslides, followed by occasional rains, aftershocks, delayed harvest, unattended or roaming livestock, and unavailability of harvest labor, family or hired, who were either injured or moved away for safety. Other direct damage includes loss of wheat seed, stored grain and animal feed, animal sheds, implements and tools, irrigation structures, terraces, and other infrastructure.

10. Damage to productive infrastructure includes irrigation structures (water channels, ponds and tanks, diversion structures, lifts, etc.). Rapid restoration of these structures is important to enable rapid resumption of cultivation. It is estimated that the total value of the civil works is about Rs. 240 million, while the cost of reconstruction is estimated at Rs. 472 million. The above are conservative estimate and may increase after a detailed survey and inspection.

### ***Indirect losses***

11. The preliminary estimate of the indirect losses is about Rs. 4.2 billion (US\$70.3 million). The major loss is accounted for by loss of production of milk and dairy products due to significant loss of milk animals, and egg production due to loss of poultry. The livestock, especially (cows, buffalo, and goats) not only provides milk for the household, they are also a source of farm yard manure, and dung cakes that are used as fuel.

12. Although damage to fruit trees was relatively small at about 3 to 4 percent of trees, the high value of the crop means that the damage is significant in terms of value of production forgone. It is estimated that the annualized value of the fruit production is about Rs. 225 million.

13. Most of the farmland is self-cultivated. However it also provides significant employment to the landless households that are normally engaged for land preparation, sowing, and harvesting. These household have lost the employment opportunities due to damage to crops. It is estimated that the loss of wages from the current crop is about Rs. 300 million.

### ***Needs***

14. Total costs to restore the agriculture sector are estimated at about Rs. 13.0 billion (US\$218 million). Immediate requirements that need to be met in the next month is wheat seed, fertilizers, support for land preparation, and construction of temporary animal sheds and is estimated at Rs. 1.8 billion (US\$30.3 million) of which animal sheds alone would cost about Rs. 1.4 billion (US\$22.9 million). Similarly, Rs. 1.8 billion (US\$30.9 million) is needed within the next 18 months mainly to restore buildings of the relevant line agencies and to rehabilitate the irrigation related infrastructure. Long term needs are estimated at Rs. 9.4 billion (US\$157.8 million) mainly to restore the livestock inventory and to rehabilitate terraces and associated soils conservation structures.

### **North West Frontier Province**

#### ***Direct damages***

15. Total direct damage in NWFP is estimated at about Rs. 4.8 billion (US\$80.2 million). As in AJK, the bulk of the damage was experienced by the livestock subsector (Rs. 3.9 billion or US\$66.2 million), followed by the crop subsector estimated at Rs. 747 million (US\$12.4 million), and irrigation structures at Rs. 84 million (US\$1.4 million).

16. In the case of livestock, it is estimated that about 20-25 percent of the large ruminants and about 20 percent of the small ruminants were either killed or injured severely enough to be of no productive use and therefore needed to be culled. Most of these losses were sustained in the collapse of animal sheds the near total destruction of which also constitutes a major blow. The assessment team also reported that the death of animals continues as a result of the absence of shelter for animals to be kept at night.

17. In the case of crops, the main damage was to harvested crops that were still in the field for threshing, cleaning and drying. Affected crops included just harvested and/or ready to harvest maize and paddy, *kharif* fodder. Straw (a byproduct of maize and paddy) was also damaged. Damage was primarily caused by land slides, followed by occasional rains, aftershocks, delayed harvest, unattended or roaming livestock, and unavailability of harvest labor, family or hired, who were either injured or moved away for safety. Other direct damage includes loss of wheat seed, stored grain and animal feed, animal sheds, implements and tools, irrigation structures, terraces, and other infrastructure.

18. Damage to productive infrastructure includes irrigation structures (water channels, ponds and tanks, diversion structures, lifts, etc.) and field terraces with soil conservation structures. Rapid restoration of these structures is important to enable rapid resumption of cultivation.

### ***Indirect losses***

19. The preliminary estimate of the indirect losses is about Rs. 2.6 billion (US\$42.5 million). The main loss is production of milk and dairy products, amounting to Rs. 2.4 billion (US\$39.5 million), which is due to significant loss of milk animals, and egg production due to loss of poultry, followed by estimated decline in wheat production estimated at Rs. 183 million (US\$3.0 million).

20. Most of the farmland is self-cultivated. However it also provides significant employment to the landless households that are normally engaged for land preparation, sowing, and harvesting. These household have lost the employment opportunities due to damage to crop. It is estimated that the loss of wages from the current crop is about Rs. 200 million.

### ***Needs***

21. Total recovery needs for the agriculture sector are estimated at about Rs. 5.5 billion (US\$91.8 million). Immediate requirements include wheat seed, fertilizers, support for land preparation, and construction of temporary animal sheds which would cost a total of about Rs. 1.5 billion (US\$26.3 million), of which animal sheds alone would cost Rs. 1.1 billion (US\$18.2 million). Similarly, Rs. 0.1 billion (US\$1.9 million) are needed within the next 18 months mainly to restore the buildings of the relevant line agencies, and to rehabilitate the irrigation related infrastructure. The long term needs would cost Rs. 3.9 billion (US\$66.2 million), and mainly include restoring the livestock inventory requiring Rs. 3.6 billion (US\$60.3 million), and rehabilitation of terraces and associated soils conservation which would cost about Rs. 359 million (US\$6.0 million).

## **C. Reconstruction and Recovery Strategy**

### ***Approach***

22. The overall approach to recovery in the agriculture sector is to protect against further loss during the coming winter while providing assistance to farmers to resume farming as soon as possible. The strategy will require a well-coordinated delivery mechanism with adequate logistic support. Special attention will be accorded to very poor and marginal communities, women-headed families, and orphans. At present both the landowning farm households and the landless farmers have relocated themselves to safer places away from their normal abode. Some of the families who have a close relative working in

urban areas, within AJK/NWFP or elsewhere in the country, have migrated to these places. They need to be encouraged to come back to settle through monetary and physical support to build their houses and animal sheds, and start farming.

### ***Critical Issues***

23. The main approach for the reconstruction and rehabilitation of the agriculture sector focuses on short term measures, such as resettlement of livestock in temporary shelters followed by supply of seed and fertilizer to catch the fast approaching *rabi* season, and restoration of irrigation supplies. Providing shelter for animals is a critical priority, as lack of shelter and extreme cold could lead to further severe losses of remaining livestock and further damage to livelihoods. Farm families who have lost implements and tools would also need to these to restart farming operations. In the medium to long term, they would be provided support to diversify their cropping pattern and replant lost orchards.

### ***Short term Strategy***

24. In the short term, farmers who have lost animals, especially landless farmers, would be provided with animals to improve their nutrient status and provide support to livelihoods. In addition, support to farmers would focus on building improved, earthquake-safe livestock sheds. The repair of civil structures, namely, office and residential buildings, research laboratories, field offices, etc. would be restored in phases. The irrigation channels needs to be restored by the *Kharif* season, otherwise the cultivation of maize, paddy, vegetables, and fruits will be severely hampered.

### ***Medium to Long term Strategy***

25. Similarly, in the medium and long term, the agriculture, livestock, and irrigation departments which have traditionally been weak (and have been weakened further by the disaster) will need to be restored and strengthened in order to revitalize the farm sector. Hence, the civil structures for agriculture and livestock extension, research, and veterinary facilities need to be restored to assist the farmers in maintaining yield levels that were realized prior to the earthquake. The animal sheds need to be reestablished with earthquake resistance measures.

## **D. Environment and Social Aspects**

26. Some adverse environmental impacts are expected as a result of the disaster. Increased and possibly indiscriminate felling of trees for shelter and fuel wood is expected to result in damage to watersheds. Damage to soil conservation structures can be expected to increase the risk of landslides during the rainy seasons.

27. Landless households are particularly vulnerable to hardship as a result of the earthquake. Providing employment opportunities and safeguarding livestock (an important source of income and nutrition) will be important to avoid severe loss of livelihood and deepening poverty. The capacity of the concerned departments of the Provinces needs to be strengthened for implementation of the rehabilitation and reconstruction activities, especially programs that provide employment through non-government organizations. Restoring livestock shelters is also important in this regard.