

SUMMARY INITIAL ENVIRONMENTAL EXAMINATION

**Supplementary Appendix to the
Report and Recommendation of the President
to the Board of Directors**

on the

**FLOOD MITIGATION PROJECT
IN THE
REPUBLIC OF AZERBAIJAN**

<p>This report was prepared by ADB. The IEE is available on request.</p>

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SUMMARY INITIAL ENVIRONMENTAL EXAMINATION

I. INTRODUCTION

1. The Republic of Azerbaijan faces many natural calamities. Flash floods, sediment flow, and land slides inundate vast areas causing loss to property and crops in many areas. These calamities have significant impact and pressures on nation's economy. These floods affect the poor population the most due to their location in less protected areas and their poor access to the services. The frequent flooding is the main obstacle in the socioeconomic development of the flood-affected areas.

2. An initial environmental examination (IEE) study was conducted under the Project Preparation Technical Assistance. This summary IEE brings together the findings of the IEE of the Project. The summary IEE describes the Project and baseline environmental conditions found in the project area, presents an analysis of the environmental benefits and potential adverse environmental impacts, and outlines recommended mitigation and monitoring measures.

3. As specific design for each of schemes under the component of structural measures will be carried out during Project implementation, an Environmental Management Plan (EMP) has been prepared to guide the environmental assessment of schemes with structural measures and facilitate institutional arrangement and compliance with environmental requirements of the Republic of Azerbaijan and the Asian Development Bank (ADB). The EMP specifies the type of schemes to be assessed; the procedure of environmental assessment to be carried out (including responsibilities, procedure for environmental assessment, and environmental criteria of scheme selection); and institutional arrangement and monitoring program during Project implementation.

II. DESCRIPTION OF THE PROJECT

4. The ensuing investment project is a multidimensional one, proposing interventions for protection of settlements, agricultural lands, and infrastructure from recurring floods. These measures include structural as well as non-structural interventions.

5. The Project is proposed to cover the areas which get devastated by floods in the hill torrents and rivers of the Republic of Azerbaijan. These areas lie in and the exclave of Nakhchivan, the north-west in the Greater Caucasus, the south-west close to the border of Russia, and south-east near Iran.

6. The structural measures comprise the least-cost feasible solution to protect settlements, agricultural areas, and/or important infrastructure. These structures have been designed against a flood with average occurrence of once in 50 years. The proposed measures will protect five major towns and 43 villages, covering 76,790 hectares (ha) area and inhabited by 215,250 persons in 12 districts.

7. The Project will include the following components: (i) Structural Measures; (ii) Non-structure Measures; (iii) Disaster Preparedness, and (iv) Project Management and Monitoring.

8. The structural measures include construction of flood protection structures located at 25 sites within 12 districts in Azerbaijan. In the Araz River, the flood protection consists of

rehabilitation/construction of 30 kilometers (km) embankment with stone pitching in 10 km reaches under the direct threat of erosion. In case of Ganikai River, the flood protection consists of stone pitching at two locations covering a total length of 4.2 km. The structures proposed for hill torrents include concrete gravity walls, stone concrete walls, and reinforced concrete walls. The total length of 38 protection walls in 22 schemes located in 11 districts is 23 km.

9. Non-structural measures constitute watershed management, flood forecasting and warning, and flood zoning. The Project proposes a pilot community afforestation of 550 ha in the middle height watershed area of Kishchay Hill Torrent in Sheki District. In order to improve flood forecasting capability and to facilitate delivery of early warning, the Project proposes rehabilitation of eight and establishment of five new meteorological stations in the catchment of the hill torrents at 2,000 to 2,500 meters (m) altitude. These stations are proposed to be telemetrically connected to their respective district officers.

10. Flood zoning is an important non-structural measure which, which hardly any investment, helps minimize flood damages even under extreme flood conditions. It is proposed that the Government will issue a resolution specifying land uses for each of the prohibitive, restrictive, and warning zones of the flood-prone areas.

11. The total cost of the project is estimated at US\$29.50 million, including physical and price contingencies. The project is planned to be completed in 3 years. Initial project activities include survey and detailed design, and preparation of the sub-projects to be tendered and awarded. Physical execution of works is expected to take two-and-a-half years. The Project is likely to start in early 2004 and is anticipated to be completed in 2007.

III. DESCRIPTION OF ENVIRONMENT

A. Physical Resources

12. The Project lies in four areas of Azerbaijan, namely Araz area, Greater Caucasus area, Gusar area, and Astara area. Out of 25 sites, 22 sites are located in Greater Caucasus area, while 1 each is located in Araz, Gusar, and Astara areas.

1. Araz Area

13. The climate of Nakhchivan is very harsh with summers very hot and winters very cold. The climate of this area may be termed as arid. The temperature range from -30°C in winter months to 43 degree Celsius (°C) in summer months. The rainfall is more in spring-summer months and evaporation is relatively high in summer months. The average annual rainfall is about 220 millimeters (mm).

2. Greater Caucasus Area

14. Based on the watershed characteristics, the Greater Caucasus area can be divided into two groups. The hill torrents in western and central part of Great Caucasus area (Group A) are characterized as having hills in their upper catchments, a very steep slope of around 1:8 and gravely/sandy beds and some also having large boulders. The hill torrents in the eastern side of Greater Caucasus area (Group B) are generally characterized by much milder slope of around 1:20 and having gravely sandy bed.

15. In the Group A, Kishchay Hill Torrent in Sheki District and in Group B, Damiraparanchay Hill Torrent in Gabala District are the typical hill torrents representing the characteristics of the Group. The selected representative schemes are located close to big towns and thus are exposed to the maximum negative environmental impact the Project can have.

16. Group A Area: The main rock groups identified in Kishchay watershed are limestone, sand stone, clayey shales, clays of Jurassic and Chalk system of reptile age. The soils in the Kishchay watershed area are formed of three parent material: residuum (in situ), colluvium, and piedmont alluvium.

17. The temperature ranges from -13°C in winter to 36°C in summer months. The rainfall is more in spring-summer months and evaporation is relatively high in summer months. The average annual rainfall is 760 mm.

18. In the Kishchay watershed area, non-succulent perennial trees mainly form the forest cover between 600 and 2000 m altitudinal zone.

19. Group B Area: The rocks and the soils in the area are similar to that of Kishchay Hill Torrent in Sheki. The temperature ranges from -26°C in winter months to 37°C in summer months. The rainfall is more in spring-summer months and evaporation is relatively high in summer months. The average annual rainfall is 950 mm.

3. Gusar Area

20. The watershed area of Samur River is of volcanic origin of Mesozoic period. The soils are mountain meadow brown soils. The parent material is derived from clays, sandstone, shale, and limestone underlying bed rock.

21. The climate of Gusar area may be termed as pleasant warm climate with approximately equally distributed rainfall in all seasons. The average annual rainfall is about 570 mm. The temperatures in summer seldom goes above 40°C . However, the winters are very cold with average temperature in January and February going as low as -28°C minimum.

4. Astara Area

22. The rocks in the Astara area are also of volcanic origin of Mesozoic period. The mountains are severely dissected and composed of volcanic landslide beds of Palaeogene period. The soils of the Astara area are of three types: (i) mountain meadow soils, (ii) yellow soils, and (iii) meadow soils.

23. The temperature ranges from -13°C in winter months to 36°C in summer months. The rainfall is more in spring-summer months and evaporation is relatively high in summer months. The average annual rainfall is 1,280 mm.

B. Ecological Resources

24. The wildlife resources in the project area are scarce. The present vegetation cover, together with human disturbances, provides a few habitat variations in terms of feed, shelter, and protection. The population size of some of the rare species including snow leopard, brown bear, caucasus deer, etc., is currently at its critical levels and could be regarded as extinct for

practical purposes. This is because the population levels have fallen below the critical level required for replacement levels of reproduction.

25. Livestock raising is a fundamental component of the agro-pastoral system in the project watershed area. Livestock population has been increasing rapidly in the project area since independence. In 2002, the total number of animals, converted to sheep units, has been estimated at 23.2 million. Sheep, goats, cattle, and buffaloes constitute the main wealth of the rural population of project area. Wool production is substantial and much of it is exported. Based on the watershed characteristics. Mutton and beef form the main food in the project area.

C. Socio-Economic Resources

26. The population of Azerbaijan is approximately 8.14 million. The Azeris comprise 90% of the population, while the remaining comprises Russian, Dagestanis, and Armenians. About 94% of the population are Muslims. The socio-economic resources of each project area is described below.

1. Araz Area

27. The project area covering Araz River lies in the north west of Nakhcivan Autonomous Republic. The villages in the project area lie in the Sharur District and the total population of the six villages is about 6,800. The people earn their livelihood mostly from agriculture.

28. The water for irrigation comes mainly from Sharur canal and Arpachay canal. The main crops grown in this area are wheat, maize, potatoes, and sugar beet. The sugar beet is sent to Turkey for sugar production. A significant part of the arable land is under orchards. The main fruits are melons, water melons, grapes, peaches, and apricots.

2. Greater Caucasus Area

29. **Kishchay Hill Torrent Area.** Sheki is one of the major towns in the Greater Caucasus area. The population of Sheki town is 62,000. The people of Sheki area earn their livelihood mostly from agriculture. Rainfed cultivation is spread throughout the valley and mountain slopes. Wheat and maize are the dominant rainfed crops. The other crops are mulberry and hazelnut. The villagers use tubewells and hydrants (underground pipes) for irrigation.

30. The area has got a silk factory, a hazelnut processing factory in Zagatala near Sheki and a tobacco processing plant. A state buffalo breeding farm is also functioning in the Sheki area.

31. **Damiraparanchay Hill Torrent Area.** The population of Gabala, which is the main town in the area, is 12,505. The economy of Gabala area is principally agriculture, with more than 86% people of the district living in the villages. Wheat and maize are the dominant crops. Gabala also has large area under orchards where apples, peaches, apricots, and grapes are grown. The villagers use tubewells and hydrants (underground pipes) for irrigation.

32. The Gabala area does not have any major industry. However, one fruit processing plant and several small units of readymade garments are functioning in the area.

3. Gusar Area

33. The flood protection interventions are proposed near Kirik village in Gusar district. The population of Kirik village is 1,170. The area is a tourist attraction, especially during the summer season. The area has large tracts of forests. Gusar is also famous for its good quality fruits especially apples. Agriculture is the main source of income as 80% of the people in the Gusar district live in villages. The main field crops grown are wheat, maize, potatoes, and vegetables. However, large area is under orchards where apples, apricots, and peaches are the main fruits.

34. The Gusar area is not much industrialized. However, one fruit processing plant, and one juice factory exist. Gusar area is also famous for its handmade carpets. One handmade carpet factory employing about 100 workers is working in the area.

4. Astara Area

35. The Astara area lies close to the border of Iran. The climate of Astara area is sub-tropical. Summer season is relatively hotter than other project areas. Rainfed cultivation is spread throughout the valley and mountain slopes. Wheat and maize are the dominant rainfed crops. Astara area is famous for its citrus fruit mainly oranges and lemons.

36. There is hardly any industry in the area and people rely on agriculture to earn their livelihood.

D. Quality of Life Values

37. According to the 2002 census data, there are 51% women and 49% men in the total population of Azerbaijan. Women are contributing equally in all fields of life. Women of project area enjoy equal literacy, status, occupational engagement, social image, household prestige, access to resources, and management skills.

38. Using \$1.0/day criterion, the World Bank has classified that 68% of Azerbaijan population is below the poverty line. However, on the basis of the official absolute poverty line of Azerbaijan Manat (AZM) 120,000 per capita per month, equivalent to \$24.5, some 49% of the population is classified as poor. At the national level, the poverty percentage is higher in urban areas (55%) than rural areas (42%). About one-quarter of the national poor are living in the capital city of Baku. Poor in the project area is relatively more protected than urban poor.

39. Public health in five project areas is affected mainly by drinking water supplies. The public health facilities, including sanitation, are generally in good shape. The water borne diseases are not prevalent in any of the five project areas. In these areas, people have access to basic school education. However, recreational facilities, e.g., clubs, theaters, cinema houses, gymnasium, etc are very limited in number.

40. Water quality in Araz, Gabala, Gusar, and Astara areas is good. However, in the Sheki town and its adjoining areas, the water used for drinking purposes is deficient in iodine. Therefore, the people suffer from disease of enlarged thyroid glands.

IV. SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

41. The proposed structures will be constructed along the rivers/hill torrents on Government property and hence the Project will not be engaged in land acquisition issues. The Project, through various flood management measures, will help reduce human, property, livelihood, and environmental damages. The Project will have a positive impact on the project area environment particularly on terrestrial habitats, through flood control and prevention structural measures, flood zoning, and improving the local environment and institutional capacity for flood control.

A. Araz Area

1. Environmental Issues Arising from Project Location

42. The proposed project on Araz River consists of construction of 30 km embankment. Most of it comprises rehabilitation of existing embankment. However, at some places, where there is no existing embankment, new embankment would be constructed. Thus, it is anticipated that routes or paths, ancient monuments, or utility lines will not be encountered. Also no land acquisition is anticipated.

2. Environmental Issues Arising from Project Design

43. The proposed 30 km of embankment will be strengthened with stone pitching in 10 km reaches under the direct threat of erosion by active channel too close to the embankment. The proposed embankment has been designed to protect large agricultural and populated areas from flooding while still keeping enough velocity and waterway not to cause deposition of sediment and thus causing the riverbed to rise and consequently creating flood problems in upstream areas. Similarly, the proposed works are not expected to aggravate the problems downstream.

44. The Araz River is a perennial stream and flows along the border with Iran. The construction of embankment will not obstruct the usage of the river water or damage the aquatic life.

3. Environmental Issues Associated with Construction Stage

45. It is envisaged that small-scale construction camps will be established on sites. Attention will be paid to proper collection and disposal of their wastes.

46. Soil erosion will be controlled by proper planning and staged construction to ensure that only small areas remain exposed to rainfall for any length of time. Also this area receives less rainfall as compared to other areas of the Project, and thus erosion would be relatively easier to manage.

47. During the construction phase, careful planning and quality control procedures in handling of the social aspects would protect workers health and avoidance of accidents. Also, by following quality control procedures, environmental pollution of area like noise and dust would be controlled.

4. Environmental Issues Arising from Project Operation

48. It is envisaged that no significant environmental problems will arise during operation of the Project. The Project, through a monitoring team will establish a comprehensive monitoring and evaluation system to ensure compliance of project activities with agreed procedures and standards.

B. Greater Caucasus Area

1. Kishchay Hill Torrent Area

a. Environmental Issues Arising from Project Location

49. There are no existing routes, which the general public or wildlife use which will get obstructed due to the proposed interventions. There are also no ancient monuments in the vicinity of the project areas that will get affected by the Project.

50. There are no utility facilities near the proposed project and thus it is envisaged that the project will in no way obstruct any of the utility facilities, e.g., powerline, pipeline, telephoneline etc.

51. The sites of the proposed physical structures are along the river banks, which are owned by the Government. Thus, the proposed facilities would not require any land acquisition. There are no squatters. Therefore, neither land nor displacement of any human population is anticipated and consequently no resettlement issues due to construction of the protection facilities are likely to be encountered.

b. Environmental Issues Arising from Project Design

52. The flood protection structures have been designed to avoid any backwater effect that may cause deposition of sediments and thus causing the riverbed to rise and consequently creating flood problems upstream of the flood protection facilities. Similarly, the proposed works are not expected to aggravate the problems downstream.

53. The Kishchay Hill Torrent does not have water year round and, therefore, its water is not used as a resource for daily life. There are no wet lands or forest in the project area. The proposed interventions will not obstruct the natural flow of water. There do not exist any aquatic life in the area that could be disturbed.

54. The Project is expected to have a positive impact on hygienic conditions of the area as less area will be flooded and consequently inundated. This will, in turn, prevent the health problems arising due to creation of water ponds and breeding of water-borne insects like mosquitoes and flies.

c. Environmental Issues Associated with Construction Stage

55. The Project will not involve any significant earthwork on sloping lands. The major earthwork activity is to carry out excavation, about 4 m deep, for the foundations of the concrete walls and also the excavation area will not be exposed to rainfall for a prolonged time. The material excavated for construction of concrete walls will be utilized for backfilling and thus there will be no surplus material requiring disposal. The positive impact of backfilling will be to provide additional protection to the concrete wall against scouring.

56. The skilled and unskilled labor is available locally for carrying out the construction work. Thus, no large scale establishment of construction camps is envisaged.

57. During the construction phase, careful planning and quality control procedures could protect workers health and avoidance of accidents. Also by following quality control procedures, environmental pollution of area like noise and dust can be minimized.

d. Environmental Issues Arising from Project Operation

58. It is envisaged that not much environmental problems will arise during operation of the Project. The Project, through a monitoring team will establish a comprehensive monitoring and evaluation system to ensure compliance of project activities with agreed procedures and standards. The environmental component of the project monitoring program will include effects monitoring as well as compliance monitoring and checking of a limited number of key indicators to track environmental changes by the Project. These will include flooding regime, river hydrology, morphology, sedimentation, bank erosion/cutting, quality of river water, groundwater fluctuations, ecology, and value of life.

2. Damiraparanchay Hill Torrent Area

a. Environmental Issues Arising from Project Location

59. There are no existing general public or wildlife routes which will get obstructed due to proposed interventions. There are also no ancient monuments in the vicinity of the project areas that will get affected by the Project.

60. The utility facilities do not exist near the proposed project and thus there is no possibility of disruption of services because of project facilities.

61. The proposed facilities do not require any land acquisition as they are to be constructed along the banks and such land belongs to the government.

b. Environmental Issues Arising from Project Design

62. The flood protection structures have been designed to avoid any backwater effect that may cause deposition of sediment and thus causing the riverbed to rise and consequently creating flood problems upstream of the flood protection facilities. Similarly, the proposed works are not expected to aggravate the problems downstream.

63. The Damiraparanchay Hill Torrent does not have water year round and is, therefore, not used as a water source for daily life. Also, there are no wet lands, forests, or aquatic life in the project area.

64. The Project would have positive impact on hygienic conditions of the area as less area will be flooded and consequently inundated. This will in turn prevent the health problems arising due to creation of water ponds and breeding of water-borne insects.

c. Environmental Issues Associated with Construction Stage

65. The flood protection structures would be constructed close to Gabala Town, thus skilled and unskilled labor would be available locally. Hence no large scale establishment of

construction camps is envisaged. Nevertheless, attention would be paid to proper collection and disposal of their wastes.

66. There is no problem of soil erosion as no major earthwork activity would be involved.

67. During construction phase, careful planning and quality control procedures could protect workers health and avoidance of accidents. By following quality control procedures environmental pollution of area like noise and dust would be controlled.

d. Environmental Issues Arising from Project Operation

68. It is envisaged that no significant environmental problems will arise during operation of the Project. The Project, through a monitoring team will establish a comprehensive monitoring and evaluation system to ensure compliance of project activities with agreed procedures and standards.

C. Gusar Area

1. Environmental Issues Arising from Project Location

69. The proposed interventions are located close to the international boundary. Therefore, the access to area is restricted. There are no existing routes or paths, ancient monuments, or utility lines at the proposed construction sites.

70. The proposed facilities would not require land acquisition as they are to be constructed along the banks and such land belongs to the government.

2. Environmental Issues Arising from Project Design

71. The flood protection structures have been designed to avoid any backwater effect that may cause deposition of sediment and thus causing the riverbed to rise and consequently creating flood problems upstream of the flood protection facilities. Similarly, the proposed works are not expected to aggravate the problems downstream.

72. The Samur River flows along the border with Dagestan (Russia) and is a perennial stream. The proposed interventions are upstream of the Kirik village and existing flood protection structures and will not obstruct the usage of river flows. There are no wetlands in the project area.

3. Environmental Issues Associated with Construction Stage

73. The flood protection structures are going to be constructed close to Kirik village. The skilled and unskilled labor is available locally. Thus, no large scale establishment of construction camps is envisaged.

74. There is no problem of soil erosion as only some minor work will be carried out. During the construction phase, careful planning and quality control procedures could protect workers health and avoidance of accidents. Also by following quality control procedures environmental pollution of area like noise and dust could be controlled.

4. Environmental Issues Arising from Project Operation

75. It is envisaged that no significant environmental problems will arise during operation of the Project. The project, through a monitoring team will establish a comprehensive monitoring and evaluation system to ensure compliance of project activities with agreed procedures and standards.

D. Astara Area

1. Environmental Issues Arising from Project Location

76. The proposed interventions are located very near the international boundary. A barbed wire on Azerbaijan side limits access to the Astara Hill Torrent. There are no existing routes or paths, ancient monuments, or utility lines near the international boundary line. Also no land acquisition is anticipated for the proposed works.

2. Environmental Issues Arising from Project Design

77. The flood protection structures have been designed to avoid any backwater effect that may cause deposition of sediment and thus causing the riverbed to rise and consequently creating flood problems upstream of the flood protection facilities. The Astara Hill Torrent flows along the border with Iran. The barbed wire obstructs the usage of hill torrent flows. There are no wet lands, forests, or aquatic life in the project area.

3. Environmental Issues Associated with Construction Stage

78. The flood protection structures would be constructed close to Astara town. The skilled and unskilled labor is available locally. Thus, no large-scale establishment of construction camps is envisaged.

79. There is no problem of soil erosion as only some minor works will be carried out. During the construction phase, careful planning and quality control procedures could protect workers health and avoidance of accidents. By following quality control procedures environmental pollution of area like noise, and dust would also be controlled.

4. Environmental Issues Arising from Project Operation

80. It is envisaged that no significant environmental problems will arise during operation of the Project. The Project, through a monitoring team will establish a comprehensive monitoring and evaluation system to ensure compliance of project activities with agreed procedures and standards.

V. INSTITUTIONAL REQUIREMENTS AND ENVIRONMENTAL MONITORING PROGRAM

81. The Project Steering Committee established during project preparation is proposed to continue functioning during project implementation to provide policy guidance and facilitate interministerial coordination of activities involving more than one ministry. The Chairman of State Amelioration and Water Farm Committee (SAIC) will be designated as project director with overall responsibility for project implementation. A Project Management Office (PMO) will be established within SAIC to manage project activities on a daily basis. Two Project

Implementation Units, one each at Nakhchivan in Sharur and at Sheki, will be responsible for project implementation activities in their areas, and maintaining liaison with the PMO, local administration, and the beneficiaries.

82. A monitoring and evaluation (M&E) unit will be established within the PMO. One of the responsibilities of M&E unit will be to implement the environmental monitoring system and to monitor the environmental impacts of the Project.

83. The M&E unit will have three staff members. They will collect and analyze the data relating to the geography and morphology of active river channels, quality of water, soils, and groundwater depth and quality.

84. The M&E unit will also be responsible to carry out monitoring of dust, noise, and other constructions nuisance during the execution of the Project.

85. To ensure compliance of the project activities with agreed procedures and standards, a comprehensive monitoring and evaluation system would be established, keeping in view the following objectives:

- (i) To select key indicators and to keep record of the environmental changes caused by the Project during construction and operation phases;
- (ii) To keep record of the morphology, hydrology, and sedimentation during construction and after construction in flooding and after flooding seasons;
- (iii) To keep monthly record of the fluctuation of ground water and quality of ground water;
- (iv) To keep record of the damages done by flooding, and duration of flood water that stays in the area;
- (v) To keep record of the flood aftermaths, including creation of ponds/marshes; and
- (vi) To keep record of the human health.

86. The monitoring and evaluation program should be initiated well advance of start of the project design and should extend at least two years after the completion of the Project.

VI. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

87. The beneficiaries of the Project were consulted at all stages of the Project. It was not only the bio-environmental concern but also the socio-environmental apprehensions which have been considered in the design of the Project. The project preparatory technical assistance consultants had a team of environmental and community development specialists who kept a close liaison with the beneficiaries.

88. A comprehensive questionnaire was developed and a team of consultants was deployed to all districts for identification of beneficiaries and to have meetings with general public, beneficiaries, the district management, and the local government officials. These meetings were held during the months of May and June. Table 1 gives the locations and dates of these meetings and the number of participants in each meeting.

89. The participants of the meetings were informed of the Project details and the questionnaire was also handed over to them for deliberations. Details on public consultation follow:

A. Nakhchivan Area

90. Nakhchivan exclave is separated from the main land of Azerbaijan by the Republic of Armenia.

91. The Araz River is a perennial stream, having flow throughout the year with discharges exceeding 1,000 cubic meter per second in summer and causing floods in the river. The river spills out of the banks and causes inundation of vast areas on the Nakhchivan side. The other bank of the river falls in the Republic of Iran and is well protected.

92. The public identified two areas for immediate redressing:

- (i) The river should have adequate protection works so that the river spillage could be checked, and
- (ii) Those areas where the river is encroaching the land and causing embayment, should be protected the way they have been protected on the other side (Iran).

93. It was observed by the public that due to spillage of the river, water remains stagnant in fields and causes waterlogging and salinity. The salts travel up in water logged areas and the land is becoming useless for agriculture. Creation of ponds by water accumulating in low lying area was identified as the pest breeding areas.

94. The solutions of earthen embankment and stone pitching at various locations to check the river embayment were discussed with the public and the gathering was, in general, satisfied with these solutions.

B. Greater Caucasus Area

95. Public had bitter experience of floods in these areas and were, in general, very vocal about the damages. Public was strongly in favor of construction of walls and were of the view that nothing less than the concrete walls is acceptable. They expressed that they could be of help to designers and the contractor during the construction stage.

96. The participants of these meetings stated that with the construction of the Project, their access to the usage of water of hill torrents will not be obstructed. They also stated that, as these hill torrents are non-perennial and they remain dry for most of the year, the water is not used for irrigation as it is available in adequate quantities only during the rainy season when the crops do not require irrigation supplies. For the balance of the year, the flow is either inadequate or has to be lifted such that it becomes uneconomical to harness it.

C. Gusar Area

97. People in Gusar, the district capital in which Kirik village is situated, desired additional protection as the present proposal was not adequate for protection of additional areas exposed to the flood threat.

98. The public expressed that they were well informed about floods and, therefore, there are no losses of life or even livestock. According to local people, if the measures like the bank protection by construction of concrete wall are not taken at the earliest, about 20 houses, cultivated areas, orchards, and river side forests of the village will soon be threatened by the floods of Samur River.

D. Astará Area

99. In the meeting held at Rudakend Village, covering the population of other two villages, a large number of participants gathered. The people of the area appeared to be more concerned about their problems. The Astará River is flowing along the border and the other side of the river has been protected by walls and stones by Iran. The public was of the opinion that flood protection structures are needed urgently on Azerbaijan side as well. The participants in the meeting also stressed the need for protection structures as the spillage causes inundation of large areas and the stagnant water forms pools and ponds which serve as breeding areas for flies, mosquitoes, and other water breeding insects.

VII. FINDINGS AND RECOMMENDATIONS

A. Findings

100. The screening process carried out in the IEE has not identified any significant negative environmental impact. It is concluded from the screening test that:

- (i) The Project will not result in any unwarranted loss of natural resources and any adverse impact on national heritage sites.
- (ii) The Project will not cause any additional hazards to endangered species.
- (iii) The Project will not require any resettlement of the people as there is no likelihood of displacing the people.
- (iv) The Project will not cause any increase in the affluent-poor income gap. Instead it will promote sense of security to the low income people living in the vicinity of the hill torrents. This will consequently have a positive impact on the economic conditions of the poor.
- (v) The Project will provide employment opportunities for the local poor people.
- (vi) The Project will significantly reduce the damages caused by the floods and will considerably help in improving the economy of the region and consequently the economy of Azerbaijan.

B. Recommendations

101. The IEE studies have pointed out that monitoring and studies will be required in the following areas:

102. **Change in River Morphology.** The morphology of some rivers changes with time, and change even after the construction of the flood protection facilities. The changes may, however, occur not necessarily due to the Project construction. The rivers tend to adjust their path over a long time period even if there are no flood protection facilities. The long-term behaviour of the river needs to be monitored and studies need to be carried out to see that the changed river behaviour does not start damaging some other areas.

103. **Construction Stage Hazards.** It is recommended that during the implementation stage, particular attention should be paid for establishing methods of site supervision, quality control, and certification to minimize the risks.

VIII. CONCLUSIONS

104. This IEE has clearly shown that the proposed Project will have very minor impacts on the environment. Also the IEE has clearly indicated that any adverse environmental impacts arising during construction and operation could be kept at acceptable levels through implementation of mitigation measures and proper monitoring.

105. As a result of IEE findings, a full environmental impact assessment will not be required.

106. The EMP developed to guide the specific environmental assessment of schemes with structural measures and institutional arrangement and monitoring must be fully implemented during Project execution.

Table 1: The Areas Visited and the People Consulted

S. No	District/ Area	River	Area/Town/ Village	Type of Protection	Length (Meter)	Persons consulted	Town/ Village	Date of visit	
1	Nakh-chivan A R	Araz	Karimbeyli	Earth Embankment (With Stone Pitching)	12(2.1) km	19	Karimbeyli	08/06/03	
			Alishar		4 (2.0) km	22	Alishar	08/06/03	
			Muganli		2 (0.45)km	24	Muganli	09/06/03	
			Garahesenli		5 (1.35)km	18	Diyadin	09/06/03	
Diyadin	2 (1.8) km								
			Arabyengija		5 (2.3) km				
2	Balakan	Mazimchay	Mazim	Stone Concrete Wall	714	19	Katekh	14/05/03	
		Balakanchay	Khanifa	Stone Concrete Wall	1260				
		Katekhchay	Katekh	Concrete Gravity Wall	2259				
3	Zagatala	Ganikhchay	Ititala	Stone Filling	350	34	Muganli	16/05/03	
			Asagi chardakhla		350				
			Uzungazmalar		700				
					700				
		Katekhchay	Muganli	Stone Concrete Wall	238	14	Mazikh	17/05/03	
			Talachay	Mazikh	Concrete Gravity Wall	1500	26	Goyem	18/05/03
Mukhakhchay	Goyam	Stone Concrete Wall	2000	32	Suvagil	19/05/03			
		Suvagil							
4	Gakh	Ganikhchay	Almali	Stone Filling	1050	24	Gakh	21/05/03	
			Zayam	Stone Filling	1050				
			Kurmukchay	Gakh town	Concrete Gravity Wall				2690
			Gashgachay	Gashgachay Gum	Stone Concrete Wall				710
			Gumchay		Stone Concrete Wall				71
5	Sheki	Shinchay	Ashagu Goynuk	Stone Concrete Wall	978	123	Ashagu Goyuinuk	22/05/03	
			Ashagi shabalit (Selbasan)	Stone Concrete Wall	200	104	Bash Goynuk	23/05/03	
			Bash Goynuk	Stone Concrete Wall	250				
		Kishchay	Sheki (Kish, Kakhmut, Okhut locations) Parts of Sheki	Concrete Gravity Wall	2190				
			Dashaglichay	Dashagil torpaglar	Stone Concrete Wall	600			
					Stone Concrete Wall	352			
6	Oguz	Dashagilchay	Bash Dashagil	Stone Concrete Walls	200	31	Bash Dashagil	24/05/03	
			Mukhos		176	18	Filfilli	24/05/03	
			Basha		100				
		Galachay	250						
					Xachmaz	321			
7	Gabala	Bumchay	Bum	Concrete Gravity Walls	276	30	Bum	30/05/03	
			Khirkhtala		100	60	Uludash	30/05/03	
			Uludash		100				
			Gabala town		600				
		Damiraparan with Tikanli Tributary	Makhligovak		548				
					Tikanli	100	56	Gabala	01/06/03
					Abrikh	80			
					Hamzali	100			

Table 1: The Areas Visited and the People Consulted (continued)

S. No	District/Area	River	Area/Town/Village	Type of Protection	Length (Meter)	Persons consulted	Town/Village	Date of visit
8	Goychay	Goychay	Goychay Town	Reinforced Concrete Wall	1000	42	Goychay	02/06/03
9	Ismaili	Girdimanchay Akhokhchay	Lahidj	Concrete Gravity Wall	550	26	Lahidj	13/06/03
			Talistan		100		Talistan	13/06/03
			Ismaili		100		Ismaili	15/06/03
10	Agsu	Agsuchay	Agalarbayli	Reinforced Concrete Wall	450	28	Mashadganli	17/06/03
			Mashadganli		600			
11	Gusar	Samurchay	Kirik	Concrete Gravity Wall	300	35	Gusar	27/05/03
12	Astara	Astarachay	Gapchimakhalia	Reinforced Concrete Wall	250	40	Rudakend	10/05/03
			Rudakend		500			
			Alasha		250			

ENVIRONMENTAL MANAGEMENT PLAN

FLOOD MITIGATION PROJECT

IN THE

REPUBLIC OF AZERBAIJAN

September 2003

CURRENCY EQUIVALENTS

(as of 11 September 2003)

Currency Unit	–	Manat (AZM)
AZM1.00	=	\$0.000203
\$1.00	=	AZM4,916.00

ABBREVIATIONS

ADB	–	Asian Development Bank
EAR	–	environmental assessment report
EIA	–	environmental impact assessment
EMP	–	environmental management plan
IEE	–	initial environmental examination
PMO	–	project management office

NOTE

In this report, "\$" refers to US dollars.

ENVIRONMENTAL MANAGEMENT PLAN

I. INTRODUCTION

1. The Project is categorized as environmental category B. An overall initial environmental examination (IEE) was undertaken as a part of the feasibility study for assessment of generic impacts of each project scheme. The overall IEE shows that the Project will have a positive impact on the project area environment particularly on terrestrial habitats through improving flood control capacity, reducing flood damage, and improving the local environment and institutional capacity for flood control. It also shows that none of the project schemes is in environmentally sensitive areas, and the potential negative impacts on the environment are localized, short-term, not significant, and can be mitigated. Therefore, a full environmental impact assessment (EIA) is not required.

2. As specific design for each of schemes under the component of structural measures will be carried out during project implementation, this Environmental Management Plan (EMP) is prepared to guide the environmental assessment of schemes with structural measures and facilitate institutional arrangement and compliance with environmental requirements of the Republic of Azerbaijan and the Asian Development Bank (ADB).

II. OVERVIEW OF TYPE OF SCHEMES TO BE ASSESSED

3. The Project has been designed to address the immediate need for protecting the flood-prone areas together with initiation of medium- to long-term comprehensive flood management measures. The Project has four components: (i) structural measures, (ii) nonstructural measures, (iii) disaster preparedness and flood fighting, and (iv) project management and monitoring.

4. Specific environmental assessment requirements are applied to all 25 schemes under the component of structural measures.

III. SPECIFIC PROCEDURE OF ENVIRONMENTAL ASSESSMENT TO BE USED FOR SCHEMES

A. Responsibilities, Authorities, and Procedure for Environmental Assessment of Schemes

5. An environmental assessment report (EAR) will be prepared for each scheme under the component of structural measures during the project implementation. Careful screening of schemes will be conducted based on the EAR review. The EAR for each proposed scheme will be conducted by a specialized agency with capacity of environmental assessment with supports by the consultants. For each of the schemes, the EAR will provide information on baseline environment condition in its area, and key engineering indicators of the scheme that have environmental implications. The report will also identify specific potential adverse impacts related to location, design, construction and operation, and provide specific mitigation measures and financial sources as a pre-requisite for allocation of resources for the scheme, and implementation of monitoring and enforcement program will be developed to ensure that none of the schemes would have any major adverse environmental impacts. The EAR will be submitted to the Ministry of Ecology and Natural Resources or its subordinate office at local level for review and approval before the scheme implementation based on related Azerbaijan laws and regulations on environmental assessment.

6. If the EAR result shows that the scheme under evaluation has significant adverse environmental impacts, additional study or a full EIA will be conducted, and the EIA report will be submitted to ADB for review and approval before the implementation of the scheme.

7. Public consultation will be conducted through interviews, meetings, or surveys as part of environmental assessment for each scheme. The results of public consultation will be documented and reflected in EAR.

B. Environmental Criteria for Confirming Scheme Selection

8. The following table summarizes environmental criteria for confirming scheme selection:

Overall Requirements	
<p>No scheme under the component of structural measures will be located in environment sensitive areas, nor seek to replace any of natural ecosystems with flood control infrastructure. The proposed interventions are located at an appropriate distance from population centers and meet the national and local environmental standards. Each scheme must be designed, constructed and operated in accordance with national environmental requirements An environmental assessment report (EAR) will be carried out for each scheme and submitted to an authorized environmental protection agency for review and approval. The EAR will identify specific mitigation measures and financial sources as pre-requisite for approval of credit, and implementation of monitoring and enforcement program will be developed to ensure that none of the project activities would have any major adverse environmental impacts. Public consultation will be conducted during environmental assessment process, and documented in EAR.</p>	
Project Activities	Special Specifications
<ul style="list-style-type: none"> - No scheme will be located in environmental sensitive areas - No scheme will change river characteristics or cause significant changes in the surrounding environment, including existing wetlands - Construction of embankment, protection wall, and road will not involve any cleaning of forest - New embankment/protection wall, reinforce dykes and platform slopes will be provided with reasonable fertile topsoil and planted with vegetation cover to mitigate potential problem of soil erosion - Solid waste from construction sites such as removed blocks, reinforcing steel bar need to be recycled, soil and stone generated from excavation will be used for ground leveling, and may fill up the lowland - Domestic wastes from labor camps (sewage and solid wastes) will be appropriately treated or disposed, including the establishment of waste disposal systems, construction of temporary toilets with small treatment device, and sanitary pit latrines during construction period - Oil and grease (from pumps, generators, vehicles, storage drums) during the construction and operational periods will be appropriately collected, transported and disposed. - Dust emission will be minimized by sprinkling water on construction area in dry season - To protect wild animal and plants in surrounding area, lodging will be strictly limited inside the specified temporarily occupied fields, transport vehicles outside roadway will be prohibited, illegal hunting will be strictly prohibited - Noise during construction will be minimized 	<p>Training construction workers in related environmental and safety regulations and in use of best available practice to minimize environmental impacts during the construction period.</p>

IV. INSTITUTIONAL ARRANGEMENT AND MONITORING PROGRAM

9. Project management office (PMO) and project implementation units will have overall responsibility for implementing environmental mitigation measures. A monitoring and evaluation unit will be established within the PMO and will be responsible for establishing the environmental monitoring system and monitoring and reporting the environmental impacts. The monitoring and evaluation unit will have three staff members. They will collect and analyze the data relating to the geography and morphology of active river channels, quality of water, soils, and groundwater depth and quality. They will also be responsible for carrying out monitoring of dust, noise, and other construction nuisance during the execution of the Project.

10. To ensure compliance of the project activities with agreed procedures and standards, a comprehensive monitoring and evaluation system would be established, keeping in view the following objectives:

- (i) To select key indicators and to keep record of the environmental changes caused by the Project during construction and operation phases;
- (ii) To keep record of the morphology, hydrology, and sedimentation during construction and after construction in flooding and after flooding seasons;
- (iii) To keep monthly record of the fluctuation of ground water and quality of ground water;
- (iv) To keep record of the damages done by flooding, and duration of flood water that stays in the area;
- (v) To keep record of the flood aftermaths, including creation of ponds/marshes; and
- (vi) To keep record of the human health.

11. The Ministry of Ecology and Natural Resources, other environment-related authorities, and its subordinate offices at local levels would undertake compliance monitoring and inspection of environmental mitigation measures in accordance with Azerbaijan laws and regulations on environmental monitoring.

12. Environmental specialists (3 person-months for international consultants, and 12 person-months for domestic consultants) will be recruited during project implementation to (i) provide guidance and assistance in EAR preparation, and pre-review all EARs before sending to relevant environmental authorities for review and approval, (ii) inspect and ensure compliance with the mitigation measures proposed in the EARs, and (iii) provide necessary trainings. Appendix 10 of the Report and Recommendation of the President for the Project provides the outline terms of reference.