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REPUBLIC OF THE NIGER
OFFICE OF THE PRIME MINISTER

INFRASTRUCTURE REHABILITATION PROJECT
(Project de Réhabilitation des Infrastructures—PRI)

**SUMMARY OF THE REPORTS OF THREE
ENVIRONMENTAL IMPACT STUDIES ON UNPAVED ROAD
REGRAVELING AND/OR CONSTRUCTION WORKS**

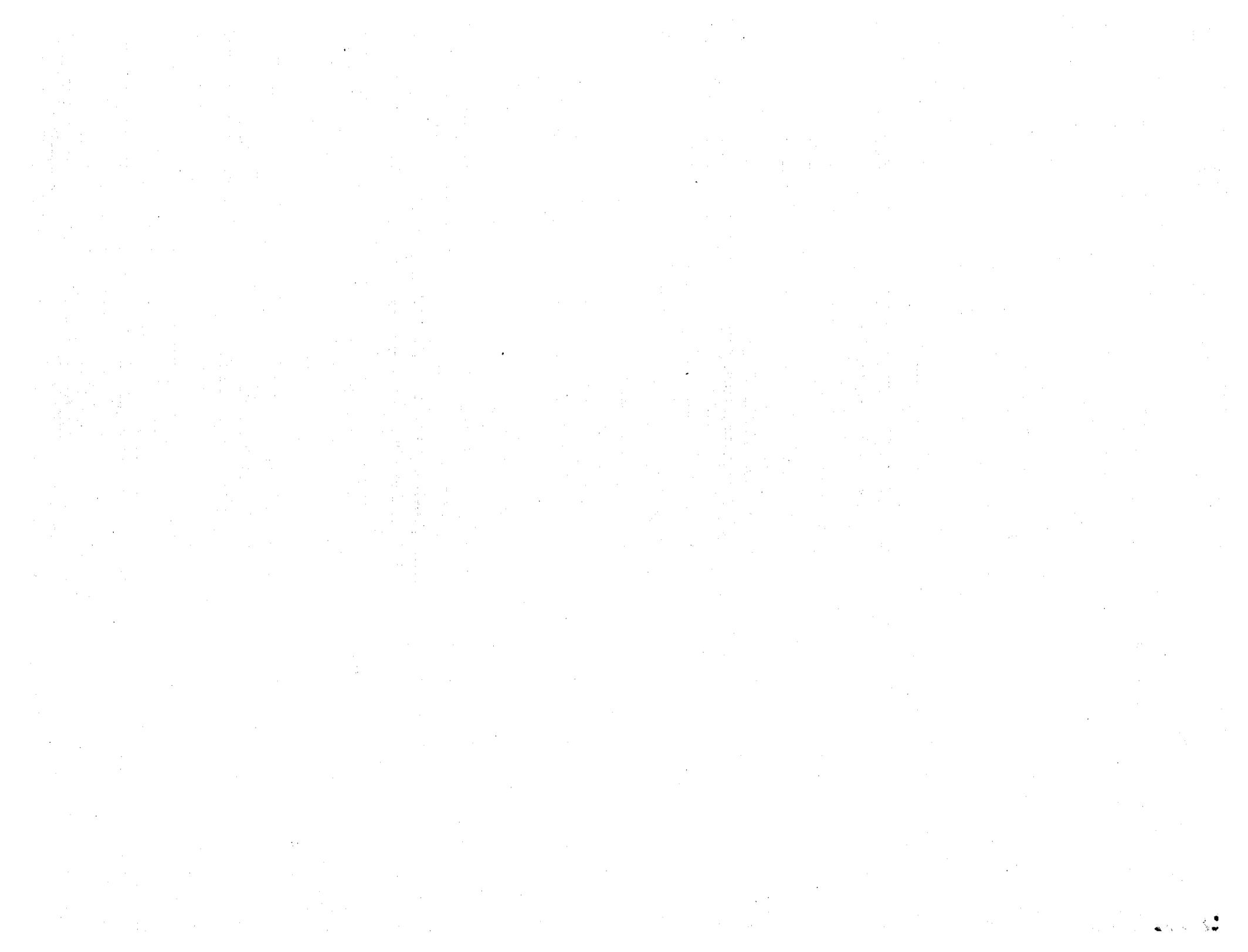
AND

**CONSOLIDATED ENVIRONMENTAL
IMPACT MITIGATION PLAN**

FINAL REPORT

**BEGHS:
SAHEL GEOLOGICAL AND HYDROGEOLOGICAL STUDIES OFFICE
NIAMEY, NIGER**

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Introduction

The roads and transport section of the Infrastructure Rehabilitation Project (*Projet de Réhabilitation des Infrastructures--PRI*) comprises six main components:

- Regraveling of unpaved roads;
- Maintenance and/or construction of 40 new rural roads;
- Road transport;
- Institutional support for the Ministry of Plant and Infrastructure (MEI), *inter alia* concerning the environment;
- Institutional support for Niger institutions with responsibility for environmental issues in relation to project preparation;
- Project management.

The following three reports were prepared as part of the PRI environmental activities:

- Environmental impact study of the Gaya-Margou and Margou-Ounditan road regraveling works (BEGHS, June 1997);
- Prior environmental study of 40 new rural roads (Marc-A-Erbetta, June 1997);
- Environmental impact study of regraveling of unpaved roads (Inger Bertilsson, November 1996).

In accordance with the methodology defined in the Terms of Reference and following the schemes of the first two reports, the summary will center on the following points:

- Purpose of the Studies
- Legal and Administrative Framework
- Description of the Unpaved Roads Regraveling and Construction Projects
- Starting Condition of the Environment
- Potential Positive and Negative Impacts on the Environment
- Negative Impact Mitigating or Offsetting Measures
- Environmental Monitoring Plan and Recommendations
- Aspects Specific to the DTP/MEI Environmental Unit;
- Consolidated Environmental Impact Mitigation Plan.

I. Purpose of the Studies

The Government of the Niger, while aware of the key role of Niger's road network in its socioeconomic development, is also concerned to preserve its highly fragile environment (physical, biological and socioeconomic). Accordingly, in compliance with the operational directives of the World Bank (OD.04) and Ordinance no. 97-001 of January 10, 1997, institutionalizing Environmental Impacts Studies (**Etudes d'Impacts sur l'Environnement--EIEs**), it has been decided to execute the environmental impact studies of unpaved road

regraveling and/or construction works under the PRI's roads and transport component. The essential purpose of these studies is to identify the environmental effects and risks the road projects involve so that they can be factored into the planning and execution of the projects and thereby minimized.

II. Legal and Administrative Framework

The legal framework governing the environmental impact study comprises a number of legislative and regulatory instruments that define the regulatory system governing and the conditions of appropriation and exploitation of natural resources and/or more global management of the environment:

- Law no. 62-28 of April 4, 1962 regulating hunting in Niger;
- Law no. 71-17 of March 31, 1971 regulating fishing in Niger;
- Law no. 74-07 of March 4, 1974 regulating forest operations;
- Ordinance no. 92-017 of August 21, 1992 concerning energy wood marketing and transportation;
- Ordinance no. 93-16 of March 2, 1993 setting forth mining law and the standard agreement;
- Ordinance no. 93-014 of March 2, 1993 regulating water resources;
- Ordinance no. 93-013 of March 2, 1993 concerning the public hygiene code;
- Decree no. 93-44/PM/MME/A setting the modalities of the Mining Law;
- Ordinance no. 93-015 of March 15, 1993, on the guiding principles of the Rural Code;
- Ordinance no. 96-092 of April 26, 1996 setting the charges for hunting and capture permits, slaughtering fees and hunting guide licences;
- Ordinance no. 97-001 of January 10, 1997, institutionalizing environmental impact studies.

In addition to these instruments of national scope, there are certain international conventions ratified by the Republic of the Niger. They include the following:

- African Convention on the Conservation of Nature and Natural Resources, known as the ALGIERS CONVENTION (ratified on February 26, 1970);
- Convention on Wetlands of International Importance, Especially as Waterfowl Habitat, known as the RAMSAR CONVENTION (ratified on August 30, 1987);
- Convention on Conservation of Migratory Species of Wild Animals, known as the BONN CONVENTION (ratified on July 7, 1980);

- Convention Concerning the Protection of the World Cultural and Natural Heritage, known as the WORLD HERITAGE CONVENTION (accepted on December 23, 1974 but not yet ratified);
- United Nations Framework Convention on Climate Change (FCCC) (ratified on July 25, 1995);
- United Nations Convention on Biodiversity (ratified on July 25, 1995);
- International Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (ratified on January 19, 1996).

The following are the main national institutions with responsibility for administering environmental issues:

- The Ministry of Water Resources and Environment (MH/E), whose chief responsibilities are to design, prepare and implement policies in the areas of water resources, rural plant, conservation and development of fishery and wildlife resources, and pollution and nuisance prevention and control.
- The National Environmental Council for Sustainable Development (*Conseil National de l'Environnement pour un Développement Durable--CNEDD*), which is attached to the Office of the Prime Minister. The CNEDD, which was created by Decree no. 96-004 of January 9, 1996, is a deliberative organ whose functions are to draw up, monitor and evaluate the National Environmental Plan.

In addition, several ministries have directorates or technical agencies whose responsibilities include specific environmental aspects.

III. Description of the Projects

Works on unpaved roads will be limited to the following activities: regravelling of wearing courses and shoulders with laterite gravel material; localized rehabilitation of the roadbed; rehabilitation and/or cleaning out of ditches and drainage works; rehabilitation and/or strengthening of signposting and rain barriers. The existing longitudinal profile will be conserved except for certain minor adjustments such as, for example, the development of water points.

Rural road works will comprise the construction of new or rehabilitation of existing roads. The rehabilitation works will be similar to those described above for unpaved roads. The construction works will take into account the recommendations of the strategy study on rural road maintenance prior to definition of the works program.

IV. Starting Condition of the Environment

4.1 General considerations

Niger has a topography of relatively low relief formed by plateaus from southwest to northeast, a mountainous massif in the North and plains and valleys. It is divided into three climatic zones. These are, from south to north: the Sudanian zone in the South, the Sahel zone in the center and the desert zone in the North. Rainfall ranges from 60 mm (Bilma) to 900 mm (Gaya).

Niger's plant formations present a very clear species diversity gradient from the North (drier) to the South (more humid) and constitute specific biotopes.

The almost nonexistent hydrographic network in northern Niger (Ténéré and Tamesna) is organized in Kori north to south, with episodic runoff. The permanent or semi-permanent watercourses are the Niger River and the Komadougou. The existence of permanent or temporary ponds (Tabalak, Madarounfa, Baga, etc.) has also been mentioned.

The groundwater greatly used for human and animal consumption is essentially located in the phreatic and deep fossil watertables.

The soils, which vary greatly in facies and fertility depending on climatic setting, support farming and herding activities between precipitation levels varying from 400 mm in the North and 600 mm in the South.

Niger has a high population growth rate (3.13 percent). The population is concentrated in the South over a 100-150 km strip north of the Nigerian frontier. This relatively high population concentration exerts heavy pressure on the meager natural resources.

4.2 Aspects specific to the initial condition of the environment in the Gaya-Margou and Margou-Ounditan study area (BEGHS, June 1997; Bertilsson, November 1996)

The area of influence comprises a number of environmentally sensitive sectors:

- The Dallol Bosso area is the refuge of the last giraffes in West Africa and is currently unprotected. It is mostly cultivated or used as grazing land. The giraffes coexist with the human and domestic animal populations. They have become a tourist attraction. The Government has hence trained about 20 guides from nearby villages with the object of turning ecotourism into a local source of income while at the same time strengthening knowledge about and protection of wildlife. The Fakara-Boboye protected forest, which is of considerable interest for its biodiversity, is located in this area.

- Together with the Fakara-Boboeye forest, the classified forests of Gorou-Bassounga and Koulou represent the last wildlife sanctuaries in the area served by the roads.
- Along the Niger River, wild animals have access to a number of depression ponds. The marshlands and flood plains also constitute biotopes for a number of aquatic animal species.
- Population pressure is high, with nearly 20 villages and hamlets located along the road. Land tenure disputes between farmers and herders have already broken out, several years ago.

4.3 Aspects specific to the initial condition of the environment in the areas affected by the 40 new rural roads (Marc-A-Erbetta, June 1997)

An environmental evaluation has been carried out in order to determine the expected effects of the construction of new roads on the environment, furnish impact classification criteria and facilitate selection of the roads to be included in the project, and prepare an impact mitigation plan designed to take environmental factors into account in preparing and implementing the road works. Maps have been prepared in order to measure the basic ecological potential of the area of influence of each rural road. Tests have been performed on seven of the ten road sectors to obtain needed data to round out the analytical work done on the maps.

4.4 Roads meriting specific consideration

- *Madaoua-Keita-RN25-PK 22.* The topography of the Keita region is characterized by hilly terrain, with steep slopes. The soil erosion risk is hence particularly high during road works.
- *Foneko-Yatakala.* This road is located in a region comprising several zones which have only scattered settlements and are still undeveloped. The entire region is now the subject of a large-scale environmental impact study triggered by a request by the mining industry to the Government and the European Community to build access roads to future potential mining sites. However, the road itself does not open up access to new settlement and development areas.

V. Potential Positive and Negative Impacts on the Environment

5.1 Regraveling of the Maya-Margou and Margou-Ounditan roads

5.1.1 *Positive impacts identified:*

- development of ecotourism (sightseeing: giraffes, manatees, water birds, etc.);

- increased marketing of farming-forestry-herding products thanks to the transport facilities;
- creation by the road of a natural firebreak which would help to combat brush fires and hence foster wildlife protection and conservation;
- creation of jobs for local temporary labor and hence increased incomes;
- improvement of traffic and transportation and therefore of passenger safety;
- signposting and other devices (cross-drains) to increase the protection of giraffes;
- construction and development of new water points, etc.

5.1.2 *Major medium-term negative impacts:*

- increase in waterborne diseases associated with the use of pond water
- effects on the giraffe herd, of three kinds:
 - a. disturbance of giraffes and destruction of their habitat;
 - b. accidents involving giraffes due to the presence of the road regravelling gangs;
 - c. accidents involving giraffes due to increased road traffic;
- disturbance of classified and protected forest biotopes by opening of the quarries;
- water erosion, especially at Ouna, endangering houses and fruit trees.

5.1.3 *Major long-term negative impacts:*

- silting of the Dallol Bosso through erosion of hill-slope quarries and rock outcrops;
- deforestation consequent on high population pressure, for example over-exploitation of palms at Doum and increased firewood consumption;
- increased incidence of land tenure disputes between farmers and herders owing to higher population growth;
- pollution due to dust, exhaust gas emissions and gasoline, gas-oil and oil vapors;
- vehicle noise nuisance;
- road safety problems.

5.2 Construction of the 40 new rural roads

A multi-criteria analysis was performed to assess the risks to the environment posed by each of the 40 roads among which the pilot-operation roads would have to be selected. The eight most important risks identified are: water erosion; impacts due to geomorphology along the road during construction; silting up; over-exploitation of local materials; brush fires; impacts on biodiversity; deforestation, and over-exploitation of land. The following table shows the environmental risk assessment classes; class 1 represents the lowest and class 3 the highest risk. The analysis identified the following roads by environmental risk class: low risk, 16 roads (570 km); medium risk, 15 roads (1,190 km); high risk, 9 roads (350 km).

5.3 Regraveling of unpaved roads

- upgrading the condition of the roads should not greatly alter the traffic or, therefore, involve any major change in the environment;
- *The Madaoua-Keita-RN25-PK 22 road.* The topography of the Keita region is characterized by hilly terrain, with steep slopes. The soil erosion risk is hence particularly high during road works.
- *The Foneko-Yatakala road.* The road is located in a region comprising several zones which have only scattered settlements and are still undeveloped. The entire region is now the subject of a large-scale environmental impact study triggered by a request by the mining industry to the Government and the European Community to build access roads to future potential mining sites. However, the road itself does not open up access to new settlement and development areas.
- *Social impact.* Current road conditions have not placed any limitation on the transport of goods and persons. Surface regraveling is hence not expected to boost traffic or foster any significant increase in new development. Road upgrading will allow higher vehicle speeds which could in turn pose a danger to pedestrians and non-motorized vehicles.

VI. Negative Impact Mitigating or Offsetting Measures

6.1 Gaya-Margou and Margou-Ounditan roads: main recommendations

The principal measures recommended for these roads comprise action to:

- control felling of protected trees and protect sensitive habitats;
- protect the giraffe and rehabilitate its habitat;
- combat wind and water erosion;
- limit vehicle speeds;
- rehabilitate quarries, borrow pits and watersheds;

- conduct population training and awareness-arousing programs, using technical agencies, associations and NGOs.

6.2 Preliminary study of 40 new rural roads

Since selection of the rural roads to be included in the pilot operation is limited to those with a low or medium negative impact on the environment, during the environmental impact studies the mitigating measures will be specific to the roads, they will be included in the works contracts, and monitoring of their implementation will be provided for in the works supervision contracts.

6.3 Other environmental impact mitigating measures

- *Guidelines on environmental aspects of road maintenance.* It has been recommended that the guidelines on environmental aspects contained in the document "Road Maintenance and the Environment", prepared under the Sub-Saharan Africa Road Transport Program at the initiative of the World Bank and the Economic Commission for Africa, should be adopted as a framework for integrated environmental management in road maintenance in Niger and serve as practical guidance for the technical regravelling studies for each project road.
- *Site-specific environmental studies.* For each individual road, a detailed environmental study should be carried out right from the preparation stage and a set of impact mitigation measures should be prepared and incorporated into the Schedule of Conditions for the works. The terms of reference of these studies are available in the project documentation.
- *Madaoua-Keita road.* The environmental study should pay particular attention to the high erosion risk and recommend necessary measures to minimize the negative impacts on the environment and reconstitute the existing degraded areas in the vicinity of the road, to the benefit of both the road and the environment.
- *Foneko-Yatakala road.* The environmental impact study should analyze and take into account all the recommendations concerning the area of influence of the road [and closely follow up on the] results of the EU-financed environmental impact assessment concerning mining access roads in the region.
- *Participation by local population.* Local residents should be given an opportunity to participate in and influence the decisions to be taken, for example in helping to find the most suitable solutions for runoff management near settlements.

VII. Environmental Monitoring Plan and Recommendations

The plan comprises three phases:

- publicizing of the environmental impact study reports by means of a broad public information campaign addressed to populations, NGOs and the other project actors;
- creation of a framework for discussion and environmental monitoring of preliminary designs, comprising Public Works, the environmental agencies, local populations and the other partners, which will define the resources to be deployed, the resource mobilization mechanisms and each partner's role in the process;
- annual evaluation of the activities implementing the mitigation and compensating measures by a multi-disciplinary team in the form of a study mission of at least four days in the field.

The chief recommendation is that these environmental impact studies be pursued and the mitigation measures effectively implemented as soon as they have been identified.

VIII. Aspects Specific to the DTP/MEI Environmental Unit

The analyses covered the following points:

8.1 Role of the Environmental Unit

The Unit's functions will be to:

- participate in the site-specific environmental impact studies under the PRI;
- organize training for DTP staff on environmental management and mining activities;
- assist in drafting a new framework law on environmental protection, the pertinent decrees and the future environment code;
- prepare the necessary legislative instruments and regulations for improved factoring of environmental considerations into all the DTP's activities;
- participate in drafting of the enabling legislation to Ordinance no. 70-001 of January 10, 1997 concerning the CNEDD and the BEEEI;
- collect basic data on the environment, the state of Niger's road network, the legislation on the environment and natural resources, etc.;

- draft the TORs for the execution of environmental assessment and environmental impact studies of equipment projects;
- provide support for works carried out in the regions, through the CNEDD's decentralized agencies;
- provide support for effective implementation of the mitigation measures arising out of the environmental impact studies;
- conduct the processes of monitoring and evaluation of the activities resulting from implementation of the mitigation measures;
- coordinate the information gathering and circulation activities with the other institutions and agencies with responsibility for environmental issues;
- provide general coordination of environmental protection and management activities;
- serve as the CNEDD's counterpart within the MEI.

8.2 Environmental Unit staff

Two professionals, a road construction engineer and an environmentalist, will be necessary.

This permanent staff would need to be supported by a number of other specialists, for example in biology, economics, water sciences, human sciences, etc., through consultancy services and the future consultative committee composed of environmental experts belonging to the various institutions with responsibility for environmental matters.

8.3 Environmental Unit equipment

In addition to the proposed logistical resources, estimated at CFAF 107 million, it would be advisable to provide the Unit with an all-terrain vehicle.

8.4 Training needs

The training would be conducted essentially through the following activities:

- effective participation by Unit staff in the environmental impact studies provided for under the PRI project;
- participation in the work of monitoring and evaluating implementation of the mitigation measures;
- refresher training in hydrogeology and soil science;

- participation in study trips, seminars, workshops and training courses in Niger, in the region or outside Africa;
- training civic society administrative staff in Niger to factor in the environmental dimension in preparing the various development programs and projects;
- staff training in methods of assessing and analyzing the environmental impacts of the programs and projects;
- initiation and/or further training in certain Geographic Information System (GIS) softwares;
- specifically-targeted technical assistance by a consulting firm or an independent consultant;
- making available the information and reference documents on the impact studies.

IX. Consolidated Environmental Impact Mitigation Plan

The Consolidated Environmental Impact Mitigation Plan will comprise a number of different activities:

9.1 Activities already carried out

- adoption of Ordinance no. 97-001 of January 10, 1997 institutionalizing the impact studies;
- execution of the preliminary study on the 40 new rural roads;
- execution of the environmental impact study on regravelling of the Gaya-Margou and Margou-Ounditan roads. The purposes of this study were to identify the negative and positive impacts on the environment and decide on the necessary mitigating measures and estimate their total cost, including that of monitoring and evaluating the activities;
- setting up of DTP-MEI's Environmental Unit: Order no. 028/MEI/I of May 5, 1997 concerning the functions and organization of the Public Work Directorate (DTP) set up an "Environmental Impact Studies" Division within the DTP;
- taking environmental studies into account in the bidding documentation for the preliminary design studies for regravelling unpaved roads, thereby evidencing the commencement of inclusion of the standard environmental protection clauses in road works contracts. The cost of the environmental impact study was not specified in the comprehensive "technical and impact study" financial bid.

- designation of the counterpart at the Ministry of Water Resources and Environment (MH/E) (cf. letter no. 0388 May 29, 1997) of the DTP's Environmental Unit;
- appointment and assignment of a Division Chief, Environmental Studies (Environmental Unit) at DTP-MEI (Decision no. 068/ME/I of June 27, 1997).

9.2 Future activities

These comprise:

- compliance by Niger with the directives contained in the document "Road Maintenance and the Environment" prepared under the SSATP, with respect to the environmental aspects and the regravelling technical studies for each project road;
- preparation of supplementary legislation as a first step toward better definition of the functions of the DTP's Environmental Division, in conformity with the role and functions of its Environmental Unit as defined above;
- setting up of the Environmental Evaluation and Environmental Impacts Study Office (*Bureau d'Evaluation Environnementale et des Etudes d'Impacts--BEEEI*) in the MH/E;
- road safety improvement, institutional strengthening, road accident data collection and analysis, and start-up of activities under the road safety pilot campaign;
- preparation of supplementary legislation to Ordinance no. 97-001 of January 10, 1997 concerning the EIEs;
- implementing the EIEs training program with a view to training, informing and awareness-arousing of the various partners (NGOs, civic community, technical staff, general population);
- implementing the modules training program on the policies, evaluation and impact studies proposed by the CNEDD;
- execution of the environmental impact studies of the road regravelling and/or construction projects included in the PRI. These impact studies can moreover be integrated into the road regravelling and/or construction preliminary design studies;
- effective implementation of all the mitigation measures identified by the environmental impact studies for the Gaya-Margou and Margou-Ounditan roads,

in the event that the Government decides to include regravelling of these roads in the course of execution of the PRI project;

- monitoring and evaluation of the impact mitigation activities carried out. For the Gaya-Margou and Margou-Ounditan roads, the cost of these activities has been estimated on an annual basis and will be carried on the operating budget of the DTP-MEI's Environmental Division;
- execution of the mitigation measures (and) monitoring and evaluation of their implementation, the cost of which can be estimated at about 5 percent of the total provided for unpaved roads regravelling works, maintenance and/or construction of new rural roads;
- information and awareness-arousing of the general population and the partners;

It is recommended that consideration be given to having these various actions and activities financed by the PRI project.

The success of the project will depend on effective implementation of these actions by the Government.

9.3 Estimated Cost of Certain Activities under the Consolidated Environmental Impact Mitigation Plan, and Execution Timetable:

DATE	ACTIVITY	COST (US\$)	COMPETENCE
Jan 10, 1997	Ordinance, and institutionalizing environmental impact studies	-	MH/E
May 05, 1997	Setting up DTP/MEI Environmental Unit	-	MEI
May 29, 1997	Designation of DTP Environmental Unit counterpart at MH/E	-	MH/E
Jun 27, 1997	Designation and assignment of DTP-MEI Division Chief, Environmental Studies (Environ. Unit)	-	MEI
May 1997	Setting up the Environmental Evaluation and Impact Studies Office (BEEEI) at MH/E	-	MH/E
June 1997	Appointment of BEEEI officer in DE/MH/E	-	MH/E
July 1997-1998	Drafting legislation supplementing Ordinance 97-001 of January 10, 1997 and the functions of DTP's Environmental Studies Division	-	MEI, MH/E, consultant
1998	EIEs training program for training, informing and awareness-arousing of partners (civic community, technical staff, general population, NGOs)	-	CNEDD, MEI, MH/E Project officials
Jun 04, 1997	Prelim. environ. study for 40 new rural roads	32,500	International consultant
Jun 04, 1997	Environmental impact studies, Gaya-Margou and Margou-Ounditan regravelling	8,000	Local consultants
1998-2001	Support for equipping and operation of DTP/MEI Environmental Unit	186,000	Administration, local consultants, project officials
1998-2001	Institutional support for CNEDD	183,000	CNEDD, local consultants, international consultants
1998-2001	Institutional support for BEEEI	80,000	M/HE, local advisors, international advisor
1999	Implementing environ. impact mitigation measures for regravelling Gaya-Margou and Margou-Ounditan roads, should the Government decide to include them during PRI execution	107,826	Administration, NGOs, population, project officials
1997-2000	Execution of environ. impact studies, separate or integrated into the preliminary design studies	60,000	Administration, local & international consultants, NGOs
1998-2001	Execution of mitigating measures; monitoring and evaluating their implementation	1,200,000	Administration, business, environment expert, NGOs, project officials