



**TRANSPORTATION, WATER AND URBAN DEVELOPMENT DEPARTMENT
THE WORLD BANK**

**November 1994
Transport No. RD-17**

ROAD MAINTENANCE AND THE ENVIRONMENT

Jean Marie Lantran

Environment is seldom taken into account in the design and implementation of road maintenance tasks. While impact might be gradual because of the limited size of maintenance works, it is noticeable throughout the road network. The frequency of road maintenance operations can facilitate the implementation of standard good practices. Environmental consideration should be included in road maintenance programs and should be looked at from methodological, technical, economical and institutional/contractual points of view.

Road maintenance does not lead to substantive degradation of the environment or have tangibly negative effects on people living along the road. Maintenance work may result, nevertheless, in frequent minor damage to existing conditions (e.g. tree-cutting, dust, landscape damage) at the length of the entire network. To prevent the gradual deterioration of the environment or to improve existing conditions, it is important therefore to include environmental considerations in the preparation and implementation of road maintenance programs. At present, it is seldom the case, because road specialists are unaware of the potential impact of road maintenance on the environment or because information is not readily available on how to address the related problems.

ASSESSING THE ENVIRONMENTAL IMPACT OF ROAD MAINTENANCE WORKS

Road agencies should prepare a detailed check list to help road designers identify and assess the possible impact of each of the activities, which together constitute road maintenance, on the environment of the road (such impact may be classified as positive or negative, and also as slight, moderate, or substantial).

For instance:

- drainage repair or maintenance has generally a positive impact, which may be substantial in erosion-sensitive soils;
- quarry activities have generally a negative impact, such as excessive deforestation and interference with drainage; and
- old quarries can be transformed into ponds to store water for agricultural-pastoral use.

[Table 1](#) gives an overview of the assessment of road maintenance tasks on the environment and can be used as a checklist in preparing maintenance for paved and unpaved roads. This is an extract from a much more comprehensive table (Lantran, 1994). The impact assessments are based on conditions in Sub-Saharan Africa (SSA) but provide an adaptable framework for other regions. Specific factors that need to be taken into account include climate, geology, and human activities. In SSA, special attention needs to be paid, for example, to sand movement and erosion control; in cold climate countries different conditions prevail (Isotalo, 1993).

SELECTING TECHNICAL OPTIONS

Road agencies need to define and develop technical guidelines for maintenance based on the environmental conditions of the paved and unpaved network under their jurisdiction. The different stakeholders (civil servants, consultants, material suppliers, and contractors) should be involved in this process and have easy access to essential information. e.g. manuals and workshops.

In the case of SSA, recommended action for improved water management includes the creation of turnouts and retention basins, as well as the leveling of waste heaps left around borrow areas.

FINANCIAL ASPECTS OF ENVIRONMENTALLY-SENSITIVE ROAD MAINTENANCE

The marginal cost of maintenance work that promotes environmental protection is generally modest, while the benefits are significant. Supplemental work must be determined based on its cost and expected environmental benefits. It is useful to carry out analysis for "with" and "without" scenarios of environmental action. Evaluation can help determine whether work should be part of routine or periodic maintenance or rehabilitation. For example, digging new turnouts would improve water retention and assist in the reconstitution of natural vegetation surrounding the turnouts. Such work is expensive, however, and should be incorporated into a rehabilitation program.

SETTING UP THE INSTITUTIONAL FRAMEWORK

All stakeholders in road activities should be involved in the formulation of standards and principles and take part in the implementation of environmentally integrated road maintenance work. Road agencies should take the lead in gathering a committee where all stakeholders are represented (farmers , communities, consultants, contractors, etc.).

Environmental standards and principles must be translated into actual practices, both at the design and at the implementation phases. Road agencies should, therefore:

- prepare sample clauses to be included in contracts for road maintenance works, design and supervision. Improved contract clauses and specifications are a very important method for ensuring better environmental outcomes from road works; some examples are given in Annex 1. These clauses would include the appropriate incentives for contractors to comply with their obligations; they would specify either additional tasks (paid for by specific unit prices) or precautions to be taken in carrying out the works (with penalties in case of non-completion).
- develop a training program for agency staff, local consultants involved in road design and work supervision, and contractors, to familiarize them with the proposed practices and with the related contractual requirements.
- set up and operate a monitoring system which ensures that these standards and practices are enforced.

The impact of road maintenance on the environment is seldom taken into account when planning and implementing such tasks. With a paper framework of technical, economical and institutional components, maintenance programs can be designed to have a positive impact on the environment while respecting funding constraints.

TO LEARN MORE

Lantran, J.M. 1994. "Road Maintenance and the Environment". Road Maintenance Initiative. SSATP Report. Africa Technical Department and Sahelian Department. The World Bank.

TWUTD and SETRA. 1994. "Roads and the Environment, A Handbook". TWU 13. Washington, D.C. The World Bank.

Isotalo, J. 1993. "Seasonal Truck-Load Restrictions and Road Maintenance in Countries with Cold Climate. Infrastructure Note RD- 14. The World Bank.

Annex 1: Examples of Contract Clauses for Road Maintenance Contracts

1. Special clauses

Article ... Worksite installations. The contractor shall propose to the supervisor the location of work site installations and detail proposed measures to reduce impacts on the environment of these sites and the people living in the immediate vicinity, as regards both the surface area used (clearing, bush and tree removal, drainage, trash dumping) and underground impacts (disruption or pollution of the water table). On completion of the work, the contractor shall do everything necessary to restore the sites to their

original state. The supervisor shall draw up a report confirming the restoration before acceptance of the works.

Article ... Preparation and supply of gravel materials in pit or quarry. During works execution, the contractor shall ensure: preservation of trees during piling of materials; spreading of stripped material to facilitate water percolation and allow natural vegetation growth; re-establishment of previous natural drainage flows; improvement of site appearance; digging of ditches to collect runoff; and maintenance of ramps where a pit or quarry is declared usable water source for livestock or people living nearby. Once the works are completed, and at own expense, the contractor shall restore the environment around the worksite to its original state. The supervisor shall provide the contractor with a report confirming the restoration before acceptance of the works.

Article... Cleaning of side ditches, diverging ditches, and summit slope or foot slope ditches. Debris shall be dumped upstream of the ditch at a sufficient distance from the roadside and spread with a counterslope with respect to the ditch to prevent ditchwater being polluted with fines entrained by rain.

Article ... Tree planting. The contractor shall plant trees in the locations fixed by the supervisor, with protection as specified (mud brick walls, wire netting, etc.), and provision of the necessary water, and shall also remove any dead trees. The contractor shall take care of all required maintenance for one year from the time of planting, comprising: watering; cleansing the area at the base of the tree; maintaining protection in good condition. The number of trees planted with the installation of protection and the digging of a basin at the base of the tree shall be entered by the supervisor in the site record. This record will be the basis for payment for work actually done at the time of final acceptance. When the road maintenance is completed, the contractor shall enter the plantings made by him (position, number) on the route plan.

Article... Documents to be furnished by the contractor. Upon completion of works the contractor shall provide the route plan with the work performed marked on it and also showing the environment improvements made (description, location, numbers).

2. Priced bill of quantities

Price No. x Preparation of materials in quarry or pit. The preparation of gravel materials at the quarry or pit (stripping, bulking and piling) and the restoration of the pit site to its original state upon completion of the works shall comprise the following operations, renumerated at the price No. x: storage of the stripped material where it will not disrupt water drainage, restoration of the natural site around the pit by spreading out the heaps, etc.

Price No. xx Reshaping/compacting with application of materials.

Price No. xxx Digging of diverging ditches.

Price No. xxxx Construction of laying-up basins.

Source: Extract from Lantran, 1994, Annex 12, which gives 6 pages of example clauses.