

World Bank Loan

Hunan Forest Restoration and Development Project (HFRDP)

Environmental Protection Guidelines

Forestry Foreign Capital Project Management Office of Hunan Province

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1. Introduction

1.1 Goals and Significance

The purpose of making the Environmental Protection Guidelines (EPG) is to guide the project activities of reforestation and rehabilitation of damaged ecological forest plantations for ensuring the further improvement of the ecological outcomes and reduction or elimination of the negative impacts on natural environment during the implementation of the Hunan Forest Restoration and Development Project (HFRDP hereafter) so that the expected ecological and environmental targets of the project can be fully realized.

1.2 Main References of Laws and Documents

In the process of making the EPG, the experience and lessons learnt from environment management in the implementation of the previous World Bank loan forestry projects, i.e. National Afforestation Project (hereafter as "NAP"), Forest Resource Development and Protection Project (hereafter as "FRDPP"), Forestry Development in Poor Areas Project (hereafter as "FDPA") and Sustainable Forestry Development Project (hereafter as "SFDP") had been seriously taken into consideration. The following legal documents had been seriously taken as important references:

(1) The relevant PRC laws and regulations, namely:

- 1) "Environmental Protection Law of the People's Republic of China" Dec. 26, 1989
- 2) "Forest Law of the People's Republic of China" Jan. 1, 1985
- 3) "Land Management Law of the People's Republic of China" Jan. 1, 1999
- 4) "Soil and Water Conservation Law of the People's Republic of China" Mar. 1, 2011
- 5) "Environment Impact Assessment Law of the People's Republic of China" Oct. 28, 2002
- 6) "Forest Disease and Insect Pest Prevention Regulation" Dec. 18, 1989
- 7) "Plant Quarantine Regulation of the People's Republic of China" May 13, 1992
- 8) "Forest Fire Prevention Regulation" Jan. 1, 2009
- 9) "Implementation Rules of Soil and Water Conservation of the People's Republic of China" Aug. 1, 1993
- 10) "Nature Reserve Regulation of the People's Republic of China" Dec.1, 1994
- 11) "Cropland Conversion for Forest Regulation" Jan. 20, 2003

- 12) “Provisional Methods for Afforestation Quality Management” July.28, 2010
- 13) “Bulletin of Enhancing EIA Management of the International Financial Institution Funded Projects” 1993.

(2) World Bank Operational Policies, namely:

“OP 4.01 Environmental Assessment”, “OP 4.09 Pest Management”, and “OP 4.36 Forestry”.

(3) Pesticide Classification Guidance (2009) made by the World Health Organization (WHO)

2. Previous Experience from World Bank Loan Forestry Projects in Hunan on Environment Management

Since 1990, NAP, FRDPP, FDPA and SFDP have been executed successfully in Hunan Province. In the implementation of these projects, EPG has been formulated and executed by each project for the purpose of guiding the design and operation of projects; hence to reduce or eliminate the negative impacts on environment and to increase the stability and environment protection function of the project plantation ecosystem. The EPG of the above projects have come up with the following experience and lessons that can be used for guiding the compilation of EPG for this project and making it more scientific and perfect to meet the requirement of HFRDP.

2.1 Experience and Practices

(1) A practical and feasible EPG was formulated to guide the implementation and constantly revised to be more improved in each World Bank project. Scientific and practical requirements and measures of environmental protection have been formulated in the timber forest establishment, bamboo forest establishment/rehabilitation, economic forest establishment, multi-functional protection forest establishment, existing forest tending/management etc, which ensured the achievement of the environmental target of World Bank project.

(2) A specific “Pest Management Plan” (hereafter as PMP) was made and executed. Under the guidance of concepts and methods of the Integrated Pest Management (IPM), timely and effective monitoring and management of the forest pests were carried out in the project plantation.

(3) The environmental monitoring was seriously carried out during the project implementation. The long-term located monitoring on soil erosion, soil fertility and pest of the project plantation has been carried out.

(4) Whether EPG was executed was taken as one of the important indicators to evaluate the project implementation quality. The "Environmental Protection Compliance Rate" was set up as one of criteria for quality checking and acceptance of each afforestation sub-compartment, thus serious execution of EPG was ensured and good effects of environmental protection were achieved in the project implementation.

(5) The supervision was strictly conducted on the environmental protection quality. The effective administration methods of "prior training, timely guidance and follow-up checking" and the quality supervision methods of "checks by work procedures and checks level by level" were adopted in combination with carrying out the environmental monitoring programs to strengthen the environmental quality supervision.

(6) Great efforts were focused on staff training. The adoption of six training management methods, i.e. lectures, study tours, meetings or workshops, field demonstration, on-site teaching and distribution of technical materials, etc. greatly improved the environmental protection professional knowledge or skills of environmental management and technical staff, and thus ensured that "Environmental Protection Compliance Rate" can meet the requirement of the project design.

2.2 Main Lessons

(1) The species (varieties) of project plantation were limited, and forest pests/diseases occurred sometimes. The previous four World Bank loan forestry projects in Hunan have afforested 25.83×10^4 hectare of planted forest, 82.5% of which were man-made Coniferous forest and bamboo forest. The low diversity of tree species caused the low stability of project plantation ecosystem and frequent incidents of forest pests/diseases. Thus, the ability of project plantation to combat natural disaster became weak.

(2) The project farmers had their own habits and methods of pesticides use. The farmers have become accustomed to the use of broad-spectrum chemical insecticides to prevent forest pests. It always took a long time for them to accept new pesticides. It

still needs to make more efforts to give up their bad habits although the farmers were trained on the correct selection and safety use of pesticides for many times during the previous projects. Representative examples may help change the traditional habits of farmers.

2.3 Enlightenments to HFRDP

(1) Afforestation with multiple species and varieties is the foundation of the maintenance of ecosystem stability. Different species or varieties have different resistance to forest pests/diseases, thus can avoid the large-scale occurrence of pests/diseases in single tree species or variety.

(2) Establishment of mixed forest is the guarantee for the maintenance of forest ecosystem stability. Practice has proved that establishing mixed forest can increase the biodiversity, form biological chain with coexistence of pests and their natural enemies in plantation ecosystem prevent and control the incident of pests/diseases.

(3) The reasonable collocation of tree species is the precondition of the stability maintenance of the forest ecosystem. Whether ecological habit of different tree species can be relatively complemented or not should be fully considered during the collocation of tree species.

(4) Proper afforestation density in accordance with local conditions is vital for maintaining the stability of the forest ecosystem. The worse the site condition is the bigger planting density should be; otherwise, the afforestation density should be smaller. The smaller the tree crown is, the bigger the afforestation density should be; conversely, the afforestation density should be smaller.

(5) Farmers need to be guided in correctly use new type pesticides. Setting demonstration and typical examples, together with more trainings and guidance, can help the farmers gradually change their traditional habits and accept new pesticides.

3. Selection of Project Site

(1) Forest Plantation Areas which are seriously destroyed by ice disaster, of geo-ecological importance, fragile in ecological conditions or have severe ecological problems should be selected for project afforestation.

(2) Areas with valuable natural habitats, natural and cultural heritages can never be selected. The forbidden areas for new plantation establishment and existing plantation improvement include areas less than 2000 m from the buffer zones of nature or cultural heritages, less than 50 m from the main river banks and 20 m from the subsidiary river banks.

(3) The area with slope over 35° cannot be selected for project afforestation.

3.1 Site Selection for Reforestation of Ecological Forestlands Completely Denuded by the Ice Storm

The existing plantation with canopy closure over 0.2 should not be selected.

3.2 Site Selection for the Rehabilitation of Damaged Ecological Forests

The forest plantation destroyed seriously by ice disaster that with simple forest structure and species, or low ecological function should be selected for rehabilitation or improvement. The existing plantation with canopy closure over 0.5 should not be selected.

Annex 1 explains in detail the screening procedures for project site selection.

4. Site Slashing and Preparation

4.1 Site Slashing

(1) Mountain burning is forbidden for the site slashing.

(2) For slope lands over 15 degree, bushes or grasses that hinder the afforestation activities should be removed in patch or strip forms.

(3) Removed bushes or grasses should be piled between such strips or planting holes for natural decomposition.

(4) The original vegetation at hill top, hillside and foot of the hills are maintained.

(5) When slashing, the planting sites at streamside areas, protection zone of sufficient size should be demarcated based on the conditions of stream size, water flow, cross section and river course stability.

(6) When slashing in existing plantation for rehabilitation, rotted wood, fallen woods or other mechanically damaged trees should be removed, and bushes or grasses should be cut. The rotten wood should be handled by technician of the county forestry station instead of being randomly stacked to avoid the spread of pathogens.

4.2 Site Preparation

(1) Hole, strip or overall types are selected at the time of site preparation, which should be based on the slopes conditions. The ground breaking area should be controlled below 25%. Table 1 shows the relationship between the site preparation and slope conditions of the plantations. At the same time, when digging holes on rocky mountain with slope over 25 °C, the ecological fence should be built to prevent stone rolling.

Table 1 Relationship between site preparation and slope conditions

Slope conditions	Selection of site preparation
<16 degrees	Overall type
16-25 degrees	Hole type, strip type along the contour line or terrace type
>25 degrees	Hole type in triangle form layout; water retention gully prepared along the contour line

(2) Vegetation protection belt of 10 m wide should be retained between the edges of the forest plantation plot and the farmland; in the case when overall site preparation method is adopted on the long slope surface, a 2-meter-wide original vegetation belt should be retained for every 100 meters.

5. Species (Variety) Selection and Distribution

(1) To reinforce biodiversity conservation, native tree species should first be selected. The superior provenance, families or clones of native tree species are selected for afforestation to strengthen the pests and diseases resistance capacity and to reduce risks of pests/diseases incidence. The exotic tree species and invasive species should be not introduced.

(2) In the project design and construction, the original native tree and shrubs species should be used as much as possible, and the project plantation should associated with the native species in order to mimic natural forest landscape pattern to promote the protection, restoration and regeneration of natural plant communities.

(3) The use of multiple tree species and varieties in one plantation is recommended, for purpose of controlling the size of contiguous plantation of single species or variety.

In the mixed afforestation models, the number of dominant tree species cannot exceed 70% of the total tree numbers.

(4) The size of contiguous plantation of single species or variety should be strictly controlled. Areas of each sub-compartment of the reforestation and rehabilitation of damaged ecological forest should not exceed 20 and 35 hectares respectively.

(5) In designing and arranging forest plantations, the wild animal corridors consisted of raw vegetation, generally between 50-100 meters wide, should be maintained.

6. Tending Management of the Plantations

6.1 Weed and Soil Loosening

Herbicide is forbidden for weeding. Partial treatment is adopted for young forest tending, i.e., to enlarge the planting hole, loosen the soil and weeding around the young trees. Efforts should be made to retain the natural vegetation of the young plantations. The vegetation residue after weeding should be kept in-site as mulches. Firewood collection of the forest litters is prohibited to enhance the water retention capacity and soil fertility of the plantations.

6.2 Fertilization

Organic manure is favorable at the time of fertilizing. Use of chemical fertilizer should strictly follow the afforestation models, including the timing for application, application frequency, quantity and manner in line with the specific requirement and character of the fertilizer. Abused fertilizing is forbidden. Fertilization schemes should be defined in accordance with related research accomplishments or test results of soil and plant growth. Fertilizer should be applied by planting holes or trenches, and broadcast fertilizer addressing is strictly forbidden. The fertilizer should be applied at the upper part of the holes and covered by soil to prevent nutrient from runoff and the surface water from pollution.

6.3 Irrigation

Water-saving irrigation measures, such as retaining rainwater by tanks, covering plastic-film around planting holes of trees and application of water retention agents, are encouraged, so as to save local underground water resources and raise the effective utilization rate of natural precipitation.

7. Integrated Pest Management

IPM is adopted under the project to ensure the healthy growth of the plantations. For this purpose, the PMP is formulated, which will be carried out during the project implementation.

In the PMP, in order to prevent environment pollution, ensure the safety of animal and human, minimize the kill or wound of beneficial organisms and the loss caused by pests/diseases, it is necessary to strengthen the pest forecasting, to make full use of the existing provincial, county measuring and reporting organizations, and to use the IPM methods to prevent and control forest pests/diseases. The use of chemical pesticides must comply with the requirements stated in the Pesticides Classification Guidance (2009) made by World Health Organization. Pesticides of class I should be prohibited, whereas pesticides of category U and III can be widely used.

8. Fire Prevention and Control

(1) Fire prevention and control of the plantations under the project must be integrated with the local fire management system at all levels. Each afforestation entity must prepare a forest fire control plan, establish a fire control organization, and working out the detailed plans for fire prevention, public education, patrolling, law enforcement and emergent fire response programs.

(2) Each afforestation entity must work out the forest protection and fire prevention plan as well as the regulation on forest fire prevention for local villages, and define fire prevention responsible area. The enough forest rangers should be arranged to match each afforestation area, and work regarding fire prevention should be reported to the Project Management Office and forest fire prevention organizations on time.

(3) In the afforestation design, the forest protection and fire prevention plan should be considered. In the areas where total plantation sites are over 100 ha, fire breaks must be established by dividing the sites into smaller patches. The chief fire break belt is required with a length of 20 m, and the associate fire break belt of 15m. Schima and bayberry can be selected as firebreak tree species with planting space of 2x2m.

9. Timber Felling and Yarding

The thinning and regeneration felling will be needed for forest reestablishment and rehabilitation for the purpose of the maintenance of their environment functions.

9.1 Forest Felling

(1) The felling operations should be carried out by strictly abiding by the “Forest Law” and the “Forest Felling Guidelines”.

(2) Felling is allowed under the project only for purposes of tending and regeneration, and felling for commercial purpose is forbidden. Selective cutting method should be adopted to keep the permanent forest cover and its prevention function in the plantation sites.

(3) At the time of felling, the vegetations under the forests should be protected, and reforestation must be carried out in the following year after felling.

9.2. Yarding

(1) Yarding should strive to use log-length logging rather than tree-length logging, so as to reduce the damage to the ground vegetation and topsoil.

(2) Existing trails should be used for yarding. Forest earth road with width less than 1m could be built if necessary.

10 Forest Path Construction

With the purpose of maintaining the normal development of every project operation in the project areas, forest paths should be constructed, which should be designed in prior. The paths should be constructed along contour line as much as possible, and with a maximum use of existing paths. The forest path should be built with a width between 0.8m~1m and an average density between 30~80m/hm². Large scale of ground digging should be prohibited in order to reduce the ground breaking area and avoid soil erosion.

ANNEX 1 Site Screening Procedures for HFRDP

Step 1: Present Status of the Proposed Plantation Sites

1. Are there cultural relics or other protected resources in the proposed plantation sites, or their distance with these relics or resources is too short according to the rules stipulated by the local authority?
2. Are the proposed plantation sites located partly or completely in the natural habitats or natural and cultural heritages and their buffer zones, or the distance with the border of the buffer areas is less than 2000 meters?
3. Are the proposed plantation sites with slope degree $>35^\circ$?
4. Are the proposed plantation sites located in the areas which is less than 50 m of the main rivers banks or 20 m of the subsidiary rivers banks?
5. Are the proposed plantation sites located in natural forest or man-made forest with crown closure more than 0.5?

If the answer to any of the above questions is “yes”, the site is prohibited for afforestation and an alternative site must be found.

If the answers to all of the above questions are “no”, proceed to step 2.

Step 2: Does the proposed plantation sites fall into any of the following categories?

Category 1 –bare land or degraded forest land with canopy less than 0.2;

Category 2 –degraded forest land with canopy between 0.2-0.5;

If the site falls into category 1, the screening process ends, the site is suitable for reforestation site. If the site falls into category 2, proceed to Step 3.

Step 3: Does the proposed plantation sites fall into any of the following categories?

Category 1 –the number of trees in the proposed site is below $800 /\text{hm}^2$

Category 2 –the number of trees in the proposed site is over $800 /\text{hm}^2$

If the site falls into category 1, the proposed site is used for rehabilitation with supplemental reforestation; if the site falls into category 2, it is suitable for artificial promoting natural regeneration .