



SUSTAINABLE FOREST MANAGEMENT



SOMMAIRE

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NATURAL FOREST

1. The management of natural forests can have several different goals: the production of lumber or other forest products, watershed protection and the conservation of biological diversity. The next section focuses on projects or components of projects on the exploitation of timber and the consequences it entails for the environment. The forest management oriented towards other products and various modes of agro-sylvo-pastoral production is also briefly discussed. Impacts related to transformation, to conservation as well as plantation and reforestation programs are examined in the following directives: 'Natural Habitats' and 'planting and reforestation.

Potential impacts on the environment

2. Good management of natural forests can and must be able to support sustainable production of a variety of wood and non-wood products, preserve the ecological benefits of forests, conserve biological diversity and provide livelihood to different populations (including the indigenous forests and tribals that represent threatened cultural values). Many types of forests, if they are well managed, can provide a continuous and unlimited lumber supply, as well as other commercial goods. The maintenance of forest cover in a region defends against erosion, stabilize its slopes, slows the flow of water, protects aquatic, preserves the soil fertility, houses wildlife habitats and finally, provides local economies and families of resources in products wood and non-wood. A sustainable harvest of forest products can provide the economic incentives that will make obstacle to conversion of forest for destructive purposes and alleviate pressures on other forests that it would be better to leave intact or whose current holding has little negative impacts.



3. On the other hand, poor management of a forest or its clearance to use the land for other purposes, such as agriculture or grazing, can reduce it to a secondary forest, a simple Bush, or even to infertile land. Forest management of poor quality may increase erosion and siltation of water bodies, disrupt the hydrology with, for results, an increase in problems of floods, shortages of water and damage to aquatic environments, reduce genetic resources and intensify social and economic problems. Most of the more serious impacts come from the clearing of forests. The effects that cause that disrupt ecological processes or activities that transform the character of a forest are more subtle, though real. Large-scale clearing can be direct or indirect a forestry programme (timber exploitation, construction of forest tracks, for example) or non-forestry activities, such as the construction of infrastructure (dams and roads, for example), resettlement of populations and agricultural projects (crops and livestock) programmes. Low exploitation of land and forest resources, as selective cutting of various species, agro-forestry, livestock on a small scale, fuelwood collection and the collection of non-timber products, has less dramatic consequences. These activities begin not dramatically, the amount of vegetation or vegetation, but they are likely to impair the quality of the forest by modifying the distribution and composition of species and ecological processes.



Exploitation of lumber

4. The decision to exploit timber owned by other institutions as the Bank. More specifically, the Bank funds no exploitation of tropical forests projects. The reduction of vegetation cover and the physical effects caused by the forest felling are part of the most serious consequences of deforestation. The magnitude of these consequences depends on local conditions (in particular, the nature of the soils, topography and rainfall), the ecological characteristics (such as forest type, forest stand density, the wildlife and the importance of their populations), and finally, methods of cutting and extraction (from the wood of the forest).

5. Logging has a direct impact on water resources: increase in the surface runoff after cuts causing larger and more rapid influx of water in streams, reducing infiltration and groundwater supply, increase evaporation and the runoff of rain during the wet seasons which modifies the base flow and therefore lowers the flow of watercourses in times more dry. Increased erosion increased sedimentation in streams and lakes. The crossing of streams, which facilitates the slaughter operations, is also responsible for an increased sedimentation. The disappearance of trees, which were shading to riparian areas, raises the temperature of the water. Floating of logs for their transportation as well as poor management of plant debris increase the amount of organic matter in rivers, affect the quality of water and may cause oxygen loss and eutrophication problems. Fuels, lubricants, pesticides and other substances, which is used in logging operations, are responsible for the pollution of surface and groundwater.



6. Forest slaughter also has effects on the climate and the quality of the air. The main problems it brings about the quality of the air are due to dust and smoke. In semi-arid regions or those undergoing dry seasons, transport equipment can generate quantities of dusts hazardous to health and expose the land cleared and burned to wind erosion. The smoke produced by the burning can cause very serious pollution problems. The accumulation of trash produced by slaughter increases the risk of fire. The removal of vegetation changes locally microclimates, while deforestation large-scale alter the thermal regime in the region and alter the circulation systems of air and moisture regime. Deforestation, raising the levels of carbon dioxide (a greenhouse gas) into the atmosphere, is largely responsible for the warming of the planet (see 'Policy operation of the BOAD on the resolution of global and cross-border problems in environmental assessment including Air Pollution').

7. The shape, orientation, and the inclination of the land, as well as slaughter practices, determine the extent of damage to the environment. Erosion, degradation of soils, slopes instability and the elevation of the temperature of the soil are the main concerns posed by culling operations. The decline of fertility of soils resulting from logging is potentially the biggest concern in rainforests, whose soils are naturally poor in nutrients and strongly leached. Indeed, the nutrients are maintained in forest soils through rapid ecological cycles between the vegetation and soil. Organic debris that accumulates on the ground are quickly broken down and nutrients resulting are also rapidly absorbed by vegetation and organisms in the soil. Clear-cutting and unregulated slaughtering disturb this process by removing the biomass in which most of the nutrients are, and weakens the microorganisms present in the soil. Clearing of vegetation, exposing the soil to direct light and raising temperatures, changes the populations of microorganisms, alters the process of decomposition and nutrient transfer. On the other hand, a bad location of



tracks or their construction on slopes, cause mudslides, landslides, erosion and sedimentation.

8. The exploitation of tropical wood subject to controversy: it is considered to be unsustainable. Indeed, the places of slaughter deterioration from the depletion of nutrients and soils (due to the removal of vegetation and the effects on the structure and fertility of the soil) may not be detectable for centuries when slaughter is done in long cycle rotation, so much and so it is risky to assess the risks posed by current slaughter methods (culling). The International Tropical Timber Organization (ITTO) for its part concludes that less than one percent of tropical forests are exploited in a sustainable manner. The 1990 report of the Programme of Action for the Protection of the rainforest recommends that any forestry project is interrupted as the sustainable exploitation of the forest is not feasible.

9. Consequences suffered by vegetation are a range that goes well beyond the simple fact of making the cut of selected trees. Other trees and plants are also damaged by those who are killed by skidders and other vehicles. Sometimes the number of non-target however is lost above the shot, especially trees trees when it comes to methods of selective cutting. In addition, the selective removal of the most beautiful trees can lead to genetic degradation species in the region. If specimens are not spared as trees as seed or if they succumb to disturbances to the forest, then regeneration of the species is endangered. Moreover, if the cuts are too large, the recovery of the forest in its natural state can not be achieved before long, particularly in the case of tropical rainforests where the regeneration of some species is problematic.

In forests where interspecific interactions are complex, the removal of certain species, even if a selective cut low-impact, may have negative consequences on other species that are ecologically dependent. Moreover, if cuts are of such magnitude that they begin the canopy, of chablis will



occur over vast areas of natural vegetation.

10. The exploitation of mangroves can be particularly destructive for both the forest itself, which is a balanced and sensitive system to change, and the neighboring areas protected by the swamp. Mangroves are highly productive coastal ecosystems that protect the one hand the land to the sea, and on the other hand, the inland waters of adverse effects from land (the increase in freshwater inputs and the increased siltation, for example). Cuts of lumber in the mangroves may be sustainable, unless they are poorly managed, which may then lead to the destruction of the wetland itself, precious wood and fishery resources, for its crabs and shellfish production and its protective role.

11. Cuts trees have effects on wildlife by destroying their habitat, fragmenting migration corridors, accentuating pressures from poaching, causing noise and pollution as well as causing hydrological changes in turn, affect aquatic systems. It bears repeating that, in the case of rainforests, the effects can be amplified to such an extent that habitat disturbance may, in turn, eventually reaching a large number of species.

Camps and forest roads

12. Construction camps for logging causes many problems inherent in any construction activity environment and social problems facing all projects face an influx of populations often ethnically diverse, socially and economically distinct from the local population. The fact that the slaughter of natural forests occurs in remote rural areas, where indigenous populations have remained isolated and without contact with the outside forces intensifies the problem.



13. Roads and roads built for logging have some direct effects, but more importantly, indirect effects. When tracks sink into remote areas, they stimulate so almost inevitable uncontrolled migration of families in search of agricultural land and other resources. It happens most of the time, that changes in land use are inappropriate to the environment because of their intensity or their nature. Populations increased overload the infrastructure and existing social services, such as housing, schools and health centres which, moreover, may create conflicts over land use rights and resources, racial tensions and various other social problems.



Management of forests in regeneration

14. Regenerating forests (or secondary forests) that are the result of practiced in primary forests cuts could be developed and used for timber production, thus reducing the pressure on natural forests. These forests are generally more accessible to populations centers as remote areas of natural forests and can be just as productive as plantations without the initial capital contribution. Transform these forests in areas of production can, first, be simpler, and then, less destructive to the environment as natural and just as economically viable forestry. It would be good to consider the development of forests in regeneration as being preferable to the exploitation of regions which have remained intact.

Management of non-timber forest products

15. Non-timber forest products represent to trade a virtually ignored resource which, however, could generate revenue well above those of the softwood lumber products, and this, with smaller investments. Latex, oil seeds, resins, fruits and rattan are taken and well marketed Nontimber products. Nuts, tannin, natural medicines, fibres and other "forest products minor" important for the local economy and used by households, could be more widely marketed. It is sometimes difficult to develop methods of production, market and promotion mechanisms and yet, when this company is successful, it shows that it is possible to use a forest, in a sustainable way, while getting reasonable economic returns and without major impacts on the environment



and society. For this reason, should be considered the potential loss of non-wood products as an opportunity cost of logging. There is fear, however, that once the non-wood products markets established, this production sees demand growing faster than supply and could lead to the destruction of resources.

Sustainable management of agriculture and livestock

16. Swidden agriculture (also known as slash and burn agriculture or forest fallow) is a very ancient cultivation technique which is practised both in humid and semi-arid forest. Swidden agriculture is a method of sustainable production, without great consequence on the forest ecosystem, provided that clearing are limited and widely dispersed, and provided that between crops fallow periods are long enough to allow the Earth to regenerate. On the other hand, if fallow periods are too short, due to population pressure, soil degrades. Methods such as forest plantations (taungya) culture, that culture is practiced among the trees until they occupy the space, give them as good results. Such methods are based on a stable population in order to avoid crops intensify to become destructive and unsustainable.

17. Seeking methods to integrate forest management and livestock have obtained mixed results. The quality of the environment and the intensity of the development are determining factors. The presence of herds must be sufficiently limited so that forest resources suffer unacceptable damage. The clearing of forests for farming in tropical humid lowland forests, that is carried out in South America and Central America, has had disastrous consequences, just like overgrazing of semi-arid forest, which proves to be a common problem (see 'Livestock and pasture management' guidelines).



External Impacts

18. A number of external factors may contribute to the deterioration or destruction of forest ecosystems: Flooding transformed into impoundment behind a dam (see "Dams and reservoirs" guidelines), clearing and conversion of forests to pasture (see "Livestock and pasture management" guidelines), development of intensive slash and burn agriculture and conversion of land for cash crops (rubber, oil palm, coffee, cocoa and rice, for example).

Particular Problems

Moist tropical lowland forests

19. The rapid deterioration, or even destroyed outright many tropical moist lowland forests, which are characterized by high biological diversity and ecological system very complex, and the difficulties to manage them in a sustainable manner subject to real concerns everywhere in the world. The rapid deterioration, or even destroyed outright many tropical moist lowland forests, which are characterized by high biological diversity and ecological system very complex, and the difficulties to manage them in a sustainable manner subject to real concerns everywhere in the world. However, only a limited number of them can be well protected. Economic and demographic pressures intensify once sustainable land uses (shifting cultivation, for example) are now reaching levels that not only provide them more sustainable, but are destructive to the environment; these pressures grow the practice of clearcutting or lead to the conversion of forests for agriculture or extensive grazing activities are generally very unsustainable and irreversibly damaging to the ecosystem of the forest. The management of the forests to ensure sustainable production of timber and other products and to make



substantial financial income is one of the best ways to prevent the conversion of forests to other productive uses, while retaining the values they have, from the point of view of the environment.

20. The development of a rainforest whose aim is to produce lumber poses two intractable problems: (a) the difficulty of implementing sustainable production methods, and (b) how those are implemented to not compromise unacceptably, the other values from the forest. Rainforests can theoretically provide forest products continuously, and yet the reality is that few methods of operation have proved durable or apply to most of these forests. All of the current methods for sustainable forest management implemented in natural forests concerns only a limited number of species. For this reason and because of the economic pressures that encourage rapid income, one generation small proportion of tropical moist lowland forests that are harvested for commercial purposes, are in a sustainable manner.

Problèmes sociaux

21. Most of the activities having an impact on natural forests - whether it is trade of wood, forest products processing industries, their conversion to other uses (mining, construction of dams, irrigation, industrial development, for example), the closure of forest areas for their restoration or conservation - raise important social problems. Development projects that cleared land for use for other purposes may lead to the displacement of populations, or to prevent access to the resources they depend on to survive. The timber trade can destroy resources underpinning local subsistence economies and risk, in addition, to pave the way for colonization uncontrolled new land which aggravates the degradation of the environment and exacerbates social



conflicts. Similarly, the closure of some forested areas, for restoration or preservation, may reduce the income of the surrounding population who no longer have access to important food resources and income-generating products. Such a closure may also compel people to search for alternatives to damage a little more nearby forests. If the pressure on the closed areas are too large, the efforts of restoration and conservation will result in failure.

22. Over the centuries, forest peoples have accumulated considerable practical knowledge on the qualities, possible uses and the sustainability of flora and local fauna and geological resources. In mountainous arid and semi-arid regions where sources of fodder are often limited, it is common to see a close connection between the forest management and the local farming methods; farmers generally adopt mixed subsistence strategies in which livestock production is done in conjunction with the use of forest resources. In the Himalayan region, the mountainous crop productivity is largely dependent on compost and mulching picked up in the forests. The hunting and gathering and slash were practised sustainably in the rainforests for centuries. Artisanal fishing is important to first order for residents who live in the forest regions of plain. The social organization of indigenous populations is generally very well adapted to the requirements of specific production methods. Technical knowledge and knowledge management resources can be valuable for technical experts who want to intensify or change the production in the region or in a similar region to adapt, for example, the recommendations that relate to the agriculture, land which are subject to shifting cultivation, develop a forest management plan and use patterns of forest land for restoration. Often, these knowledge are lost with the displacement of forest peoples. It would be crucial to undertake, prior to that, a careful assessment including a realistic economic analysis prior to assume that the current use of forest land as pasture areas should be replaced by uses so-called 'best '.



23. The problem of land tenure is almost always complex when it comes to forestry projects. Often, we notice that tariffs on the timberlands overlap: rights customary, concessions granted to farms forest and rights recognized by the State. When it comes to ethnic minorities living in the forests, it may have these customary rights on forest land that are constitutionally valid despite authorities subsequently acquired by the State on those lands. In many societies, rights on land and trees may be held separately, and species subject to specific rules. Tariffs on fruit trees, for example, may be different from those which grant individuals permission to use the land for other purposes including swidden agriculture. It is possible that the traditional land tenure systems are better suitable for the sensitive land that the solutions promoted by the State.

24. The closure of forest areas or restriction of their access and resources contained therein, affect differently the various groups of the population. The closure of forest sectors may, for example, do economic damage to livestock farmers who are landless, insofar as, in contrast to the landowners, they do not have the possibility of using their land as a source of forage. As for women, may be that they see their workload to increase by increasing the distances to find replacement products, which, moreover, will not be recognized as such by local people who grant a lesser status. With regard to the routes used by migratory herds, may be hindered, submitting outstanding land available near the site of the project to a heavy overgrazing of consequences for these lands and sedentary populations that depend on.

25. Managers are seeking in addition to ways of integrating the needs of local populations to conservation and forest restoration programs, by establishing a common management of resources or management practices involving Government and users. It is important to provide information about various local management practices, including those that no longer work due to an increasing development pressure. In regions that are home to a unique



biological diversity, it took incorporate measures such as the creation of buffer zones offering new opportunities for exploitation for the inhabitants who depend on traditionally these lands or the design of conservation methods that allow the controlled use of the forest that you want to protect. In the West African sub-region, specifically in Togo, include, as such, the project of establishment of a buffer zone in southern Abla Park run by the NGO friends of the Earth Togo in 2012.

Improved of wood processing technologies

26. The expansion of the use of forest products can contribute to intensification of forest management. Absence of processing equipment and means of marketing, many species are not exploited. In the tropical forests that are home to a great diversity of species, marketable individual species are often scattered across a vast expanse that makes difficult collection and often little profitable. Logging of regions that lack of diversity that are remote or whose density is low, it also turns unprofitable. If new products came from other species and a variety of diameters could be cut, thanks to the improvement of processing or the creation of new markets, a greater proportion of available forest resources could be exploited. The development of new products is not only new business opportunities but can help maintain existing markets (improving, for example, the quality of against-plated, of waferboard and chipboard, using wood waste and recycling revenues from waste processing plants) and help restore the balance between supply and demand, while reducing the pressure on natural forests. The use of a wider variety of species can lead to more intensive exploitation of forests that absence of methods of sustainable forest management, can lead to major operations of clearing or extraction of forest resources.



Alternatives of projects

27. Les solutions de remplacement à l'aménagement des forêts primaires et secondaires destinées à la production de bois d'œuvre, de produits non ligneux, à l'agriculture et à l'élevage extensifs à faible impact comprennent :

- reducing the demand for wood through a conservation plan, dissemination of improved wood stoves and using alternative fuels;
- the production of improved against plywood, chipboard agglomerated particles and the use of wood residues and recycling of generated waste panels;
- Use larger species through the development of processing techniques and the development of new products and marketing;
- the development of plantation activities to increase forest production;
- the establishment of community forestry programs and planting trees for timber production by landowners and the development of eco-tourism as an economically sustainable use of tropical forests;
- encouraging the use of local processing for obtaining value-added benefits rather than promoting policies seeking to maximize the production of lumber in the short term;
- optimal use of destroyed trees (often wasted) by deforestation for non-forest activities (eg, construction of dams, reservoirs and roads, industrial and urban development);
- increased production of agricultural land and plantations on fertile land or in areas that have been cleared before allowing the development of new forest areas.

Training and Management



28. Countries that enjoy expanses of natural forests should assess the forest resources they have, put in place policies and programs to protect areas that are important because of the biological resources that they contain, their hydrological role, or their cultural value. They will also make possible the sustainable production of timber and other forest products, as well as the sustainable agricultural production (agroforestry and livestock) in order to preserve the forest. In addition, forestry institutions must anticipate and manage plantations, implement the methods of fuelwood supply, encourage community efforts of people living in the forest («Planting and reforestation» projects are discussed in the next section), etc..

29. The fate of forests depends as part of forest policy. It must, indeed, integrate and be consistent with the policies of other sectors that affect forest land - colonization, agriculture, energy, industry, trade, infrastructure development and conservation of nature - and with economic, financial and social plans. The State of the forests is addition, dependent on international factors in mind which include trade, development aid and the debt service.

30. Policies forest established by the Governments of some countries, driven by the need to generate revenues and currency, based on the principle of maximisation of short-term sector performance. This short-sighted economic design translates overexploitation of resources, the felling of trees in inappropriate places and other inadequate forest management practices. A large number of countries, which have significant forest resources, have granted rights of clearing to operators who enjoy operating, royalties or taxes which represent only a tiny portion of the net commercial value of wood. These problems are in addition the leases short term which encourage dealers to begin operations as soon as possible, and to proceed with clearcuts and royalty systems that push loggers to cut than the trees of very high quality (in damaging and destroying many other trees). There is often no regulations or enforcement of regulations concerning the reforestation or to reduce the



negative environmental impacts caused by the felling of trees, or the ability to apply them. Economic, financial, environmental and social practices costs can be very significant, in addition to heavy losses that the Government may have in terms of shrinking revenues, logging and loss of wealth in biological resources.

31. Trade policies also encourage deforestation of tropical forests. Industrial countries are often allowed to import wood from tropical countries at prices duty-free or low tariff rates, which encourages them to develop their own production of softwood lumber. Furthermore, wood rather tending to be exported in their raw state, this practice translates into a loss of profits and loss of profits in value added that could account for processing into lumber, Poles, sleepers, plywood, wood veneer or other products.

32. Institutions must be able to be stable in the long term to plan, manage, and supervise forestry activities. In many developing countries, it often happens that the forest offices, regarded as secondary, suffering from a shortage of personnel, insufficient funds, a program of little substantial research and a lack of monitoring, and extension capacities have need to be strengthened. Forestry training institutes are, most of the time, neglected or even absent. As data, they also have shortcomings (in quantitative and qualitative terms, certain data being outdated). Foresters who are traditionally trained for the protection of forest reserves and their development for industrial production have often not trained to manage forests for other purposes or to address the socio-economic aspects of forest management.

33. Les institutions gouvernementales chargées de la foresterie doivent avoir la capacité :

- Establish a forestry policy;



- Coordinate central government agencies responsible for other sectors and policies affecting forest resources;
- To prepare forest management plans;
- Undertake inventories of forest products and forestry research;
- To regulate imports and to levy taxes;
- From market forest products;
- Establish parks and reserves and to finance and oversee the management;
- Establish training programs, outreach and public awareness;
- To provide transport and infrastructure required for forestry operations;
- Ensure that the population groups and local communities are well represented and to involve them in decision-making;
- To promote appropriate technologies to stimulate local economies of the region and employ the local workforce;
- To coordinate and ensure the cooperation of non-governmental organizations.

34. To increase the knowledge and technical expertise of staff planning and forest management, training will be provided in the following areas: (a) policies, regulations, marketing, economy, management, organization, accounting, personnel, contracts, evaluation, -accounts records and conflict resolution; (b) mapping, biological studies and inventories, forestry, forest management, forest engineering and environmental impact assessment; (c) research, education and extension.

Monitoring



35. The monitoring of forest projects is vital to ensure that management plans are respected and that the salaries of the forest give expected results. It will allow to:

- Operators and manufacturers of railways shall comply with the conditions to reduce the effects on the environment which stipulate their contracts;
- The collection and transport of wood do create environmental problems unforeseen (followed by the erosion of soil, fertility of land, from the River, the level of groundwater water quality, modification of vegetation and wildlife);
- Changes in species and the soil conditions are known, and methods of forest management amended accordingly;
- The designated areas are the only ones that can be accessible and species and specified volumes are respected;
- As expected, natural regeneration can occur after operation (restoration of cover and species regeneration rate);
- All of the project objectives and the means of control and management of the project are appropriate;
- No socio-economic consequences which have not been foreseen arise or that appropriate measures the absorbed and that a mechanism is put at the disposal of community organizations to enable them to ensure the monitoring and evaluation of the project and to express their concerns on a regular basis;
- That financial allocations conform to contracts and can be adjusted if social services became overloaded or if costs exceeded the planned figures.

36. The frequency of monitoring will depend on the conditions of the location as well as the size and complexity of the project. A well trained Forester should exercise oversight, at least once per week, on completed cuts. A normative



procedure establishing an ongoing inventory of felled timber should be put in place and an independent office should regularly audit logging revenues. En outre, il conviendrait de réviser périodiquement les impacts environnementaux, en recalculant les coûts et bénéfices et apporter au plan d'aménagement les changements appropriés.

37. It is necessary, furthermore monitoring of changes that occur outside forest operations, but which have an impact on resources. One may mention, this fire, the consequences for the environment that result in certain development activities, natural phenomena that arise and demographic changes occurring in the forest regions.



OPERATIONAL GUIDELINES DE LA BOAD

Natural Forest management

Potential negative impacts

Mitigation measures

Direct impacts: logging

1. Soils :

- Erosion: disturbance understory and ground, increasing fragility of the result of erosion by water.
- instability of slopes: paths crossing the land slope and vegetation clearing leading to mudslides and landslides.
- Nutrient loss: loss due to timber harvesting, leaching increased soil and their exposure and their disturbance there where vegetation has been removed.
- Temperature: important temperature rise of a region that is more protected by the forest canopy, destroying organic matter or drying out the soil to the point where regeneration is threatened.
- Structure: compaction and loss of organic matter that alter the structure of soils, limited infiltration, the capacity of water retention, aeration, and rooting and promote the laterization.

2. Vegetation (1) :

- Distribution of species: reduction in diversity of species by selective cutting of the most beautiful specimens or sought-after species. The State of the soil and light infiltration resulting various farming methods and plans that influence the regeneration process of a forest.

1.

- Avoid cuts during the rainy season, establish criteria for logging on land sloping or near water points, and clearly identify the places where the operation should be prohibited.
- Reduce damage by monitoring the culls and encourage rapid regeneration of vegetation.
- Use of equipment and methods of operation little degrading the soil and reduce the lengths of haul.
- Make sure the wood yards are well drained and easily accessible at the bottom of the slopes by a direct path.
- Restore land in slaying and regenerating degraded areas and subsequent maintenance.
- Do not log skidders whole trees, but collect only the trunks in low places nutrient.

2.

- Gather information or support research on the dynamics of the vegetal groups, biology of regeneration and silviculture according to types of forests.
- Consider different methods of regeneration and exploitation and, possibly, to conduct research on this subject.



Potential negative impacts	Mitigation measures
Direct impacts: farm forestry (continued)	
Vegetation (2):	
<ul style="list-style-type: none">- Weeds: opening of the canopy leading to the invasion of weeds affecting natural regeneration of plants and reforestation efforts.- Plant debris: waste increase the risk of fire and impede forest regeneration.- Chablis: danger intensified by gaps created in the forest.	<ul style="list-style-type: none">- Gather information or support research on the dynamics of the vegetal groups, biology of regeneration and silviculture according to types of forests.- Select the silvicultural method which will ensure the regeneration of the forest and sustainable forest production and reduce damage (for example, by maintaining the quality sufficient seed trees and using selective cutting of areas reduced to avoid important gaps).- Establish reserves or parks to protect environmentally important forest environments, ensuring that their scope is sufficient to preserve biological diversity, ecological processes and preserve the cultural heritage.
3. <ul style="list-style-type: none">- Wildlife:- fisheries: sedimentation, nutrient loading, changes in flow and the temperature of the water that cause cuts with serious consequences for fish populations.- Habitats: disturbance of habitats, flyways and destruction of species that depend on wild species.- Presence of machinery and workers: disturbance of wildlife caused by cuts and longshoring activities.- Poaching: influx of people attracted by directly and indirectly related to forestry activities intensified poaching.	3 <ul style="list-style-type: none">- Keep up-to-date an inventory and documentation of the results of research conducted on the species present in the region.- Plan the intensity, methods and periods of cuts according to this documentation.- Particularly check the presence and use of the migration routes of endangered species, by communicating with experts from the Government, the representatives of NGOs and academics.



Gestion des forêts naturelles (suite)

Potential negative impacts

Mitigation measures

Direct impacts: farm forestry (continued)

4. Air :

- Dust: cuts and transport of wood on the tracks generate large quantities of dust during the dry season or in semi-arid regions.

5. Water :

- Extreme variations in flows: infiltration capacity of the soil and in the areas of cutting diminished water retention, so as the runoff regime is more contrasty, aggravating flooding at the time of rain and drying up the flow during low flows.
- Groundwater supply: increased runoff reduces groundwater renewal.
- Water stagnation: changes in topography, the obstruction of rivers and the compaction of soils promote the stagnation of the water.
- The increase in sedimentation alter natural conditions of aquatic life and the regime of watercourses.

4.

- Reduce the burn.
- Avoid creating large clearings.
- Limit activities when the dust and the lights become a problem and provide the routes of transport away from population centres.

5.

- Preserve the vegetation around water bodies.
 - Evaluate the effects of forestry activities on sediment and nutrient accumulation in streams and methods to reduce them.
 - Implement waste disposal facilities.
 - Establish procedures for use and storage of chemicals, petroleum products in order to limit the risk of pollution.
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Gestion des forêts naturelles (suite)

Potential negative impacts

Mitigation measures

Direct impacts: farm forestry (continued)

- Global warming: near water bodies cover opening raises their temperature which, in turn, modifies aquatic life and the chemical composition of the medium.
- Contamination: petroleum products, herbicides and logging-related organic waste are responsible for the pollution of the water.
- The increased sediment load causes a phenomenon of turbidity reduces the penetration of the Sun's rays, which consequently, affects aquatic plants and fish species.

6. Social and cultural effects

- Local economy and social customs: impacts on the labour market and the availability of the labour for food production; moving to a more monetary economy, transformation of the habits of life and the structure of political power are commonly observed phenomena.
- Land rights and customary uses of forests: hunting, gathering and the traditional exploitation of disturbed forest resources.
- Saturation of infrastructure and social services (for example, housing, health and education services) due to instinctive migration Lumbermen and settlers causing problems, increase crime, violence, alcohol, and diseases.

6.

- Integrate local communities in planning and implementing the project.
 - Develop local infrastructure in order to cope with the increase of the population (for example, implementation of services for waste, construction of schools, health centres and implementation of laws).
 - Protect the important elements of the cultural heritage and traditional uses of land and resources.
 - Establish clear legislation for the long term and with the emphasis on local participation in decision-making.
 - Involve local leaders in protection programs in order to prepare cuts of wood or the illegal settlement.
 - Health surveillance and disease control.
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OPERATIONAL GUIDELINES DE LA BOAD

Potential negative impacts

Mitigation measures

Indirects impacts : generality

7. Made easy: lanes opening access to forested areas, facilitating migration of uncontrolled populations and problems arising therefrom.

Indirect impacts: construction of roads and transport

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|---|---|
| 8. Direct impacts (for example, intensification of the erosion of soil and sedimentation of surface waters) and indirect impacts due to the construction of runways | 8. Make tracks borrowed, culverts and the rest of the infrastructure are in a same trace. |
| 9. Deterioration of public roads by heavy loads of logs. | 9. - Limit the weight of loads.
- Use of road taxes to improve roads. |

External impacts

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| 10. Conversion of forests into pastures. | 10. CF. 'livestock and pasture management. |
| 11. Conversion pour l'agriculture de rente (caoutchouc, huile de palme, café, riz, etc.) | |
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