



PLANTING AND REFORESTATION

1. Projects and parts of projects in this category relate to plantations of trees for forest production or protection of the environment. Exploitable forest products include lumber, wood pulp, Poles, fruits, forage, fibre and wood fuel. The size of farms is the large commercial plantation in the small forest stand operated by the community up to individual trees planted by farmers around homes or in the fields. As for actions that are part of the measures for the protection of the natural environment, they include: the planting of trees to stabilize slopes and sand dunes, planting green curtains, hedges, and trees shading as well as the development of various types of agroforestry.

Potential impacts on Environment and society

2. Plantations, reforestation of degraded land and plantations made in social forestry programs have positive consequences, insofar as they allow removing products and providing natural benefits.

3. Plantations provide the best remedy to the exploitation of natural forests insofar as they meet the demand for timber and timber products. They typically use scents who have rapid growth, are more accessible and more easily exploitable as natural forests and produce more uniform and more marketable species. Similarly, plantations established near populations and whose purpose is to serve the communities of fuel wood and fodder can both facilitate access to these goods and relieve the local vegetation exposed to excessive cutting and overgrazing. These plantations, generally established on marginal or unsuitable land for agriculture, prove beneficial, across, but these benefits must not conflict with higher productivity uses.



4. Reforestation offers a range of benefits and environmental services. Restore or increase forest cover may increase soil fertility by improving moisture retention, structure and nutrient content (decreasing soil leaching, by providing green manure and adding them to nitrogen, if one makes use of nitrogen-fixing species). When shortages of fuel wood encourage use as fuel feces (dry) animals which are usually fertilizer, then we can say that the production of fuel wood indirectly helps to maintain soil fertility. In addition, plantations consolidate soils, reducing erosion by water and wind on the slopes, in the adjacent fields and sensitive terrain such as sand dunes, help consolidate the soil.

5. Creating a forest cover on denuded or degraded lands helps reduce runoff of rainwater, regulates the flow of streams and improves the quality of surface water by reducing their content in sediments. Shade trees on the one hand, lowering the temperature of the water and moderating cycles of wet and dry seasons, provide conditions conducive to the development of a microclimate that can grow micro-organisms in the soil and wild species of fauna and flora, and secondly, stop laterization soil. These plantations mitigate the effects of wind and contribute to stabilize the dust and maintain soil particles. The presence of trees in farming improves crops, thanks to their positive action on soil and climate. Finally, the canopy, that the establishment of large plantations and tree-planting projects increase, is a carbon sink that temporarily meets the problem of the warming of the planet created by the accumulation of carbon dioxide in the atmosphere.

6. Large scale commercial plantations are likely to have negative impacts of a considerable scope. The worst example is the destruction of natural forests and replaced by plantations. Aside from the methods which enrich plantations or create an understory in a forest, most of the time, the land destined to become a plantation is first got rid of competing vegetation. This



practice entails not only the destruction of vegetation and ecological, economic and social values which are attached to him, but also raises environmental problems associated with land clearing: aggravation of soil erosion, disruption of the hydrological cycle, soil compaction and loss of nutrients resulting in a decrease in soil fertility. If all these consequences are destructive, it remains that they do not persist and that the environment starts to regenerate as soon as you replant vegetation.

7. Plantations are forests created by man where trees are before any considered long rotation agricultural products and, for this reason, most of the agriculture-specific adverse effects also occur in forest plantations. Their importance depend prerequisites for location, techniques for preparation thereof, planted species, employees salaries during the rotation, the duration thereof and methods of cutting. Reforestation and deforestation, especially in drier regions, activities may deplete the soil of its humidity, lower the level of groundwater and to alter the stream base flow.

8. The fast-growing plantations and short rotation can reduce the nutrients in the soil and contribute to the loss of fertility of the site due to the repeated removal of biomass and operations that continue to disrupt the soil. While it is true that one can find the same effects with long-rotation species, they are not as obvious. Soil compaction and other damage occur during clearing operations (removal of vegetation by physical means or by resorting to the slash and burn), during the mechanical preparation of the location and during cutting operations. Plantations which reveal gaps in the canopy or understory is limited are subject to the phenomenon of erosion. The pile of leaves formed in plantations increases the risk of fire and hinders the infiltration of rainwater, besides that the predominance of one or two species of leaves can transform the chemical and biological soil characteristics. Thus,



needles lining the plantations of conifers (such as pine) are likely to acidify the soil.

9. A few species, allelopathic, produce toxins that prevent the germination of seeds of other species. The irrigation of plantations can conflict with other applications in water and add to the social and environmental problems generally posed irrigation projects (cf. "Irrigation and drainage" guidelines). It happens that wastewater produced by the irrigation of plantations in semi-arid areas are saline and therefore less useful for other activities and that they lead to the degradation of surface waters from which they feed. Chemical agents (pesticides and biocides) which help combat pests and diseases as well as hydrocarbons used to operate forestry equipment represent a hazard of pollution of surface and ground water and a direct health risk for those who manipulate them.

10. Large commercial plantations are the source of indirect impacts resulting from the construction of roads for the transport of wood

11. The planting of trees made in the context of a social forestry program can occur in various forms, ranging from the small forest stand managed by the community or by the village, the reforestation of lands owned by the Government or along rights of way, the planting of trees on agricultural lands, on the banks of the streams and around homes. The negative environmental impacts of such plantations are insignificant. Trees provide useful products and benefits to both natural and aesthetic. Common issues that arise from these activities are social order (read the following analyses).

12. Planting trees serving the protection of nature - curtains of greenery, windbreaks, consolidation of sloping land, fight against erosion, management of watersheds, shoreline protection and fixation of sand dunes, for example - are also beneficial nature and provide natural benefits. The problems would



be rather of a social nature (regarding, inter alia, enjoyment of the lands and resources issues).

Particular problems

Using exotic woods

13. Plantations and their conservation are often established to produce exotic essences rather than local species. The reason for this choice is that: (a) these species have a faster growth rate and have characteristics that correspond better to the use for which they are intended; (b) their seeds are immediately available in trade; and (c) their growth and the peculiarities of the finished products are better known. The introduction, for the first time, of exotic species in this region stills a risk, and although this production is successful in some cases, in others, the experiences were disappointing. Exotic species introduced into a new environment do not grow as well as is expected. The inadequate conditions of the location, at the edge of bearable by the species ecological tolerance (rainfall and temperature, for example), may be as much responsible as parasites or (sometimes devastating) diseases against which they can hardly or not to resist, a poor preparation of the site, an improper planting or a lack of maintenance.

14. The local species, despite a slower growth rate, generally have a longer viability; having been genetically selected and refined over the centuries, they are better suited to the ambient conditions and are therefore more likely to withstand climate extremes of the region, the invasions of pests and epidemics. There are cases where it undertook, in financial costs and considerable social, the clearing of the local vegetation on land Brushy 'slow growth', this is to substitute species exotic "with rapid growth" whose productivity has proven to be weaker or did not justify the costs incurred. Other examples show that the unpredictable dynamics of these species



introduced into a new environment has led to the opposite is true: overproduction. Indeed, exotic species can behave like weeds, spread and invade the region, although it is possible to eradicate them.

15. Before introducing extensively an exotic species in a region, there would be necessary, first, to test (taking account also of his place of origin). When it comes in particular plantations aimed at protection of nature when the rapid establishment and maintenance of forest cover make problem, it would be good to intersperse exotic species to rapid growth with local species which, although they grow more slowly, are more reliable in the long term. In fact, in regards to the botanical and ecological characteristics of a region and the purposes for which it was intended many barely known tropical species, it should be that they should be the subject of further research. Local people who are familiar with the vegetation of their region can provide valuable information on this subject.

16. It may happen that the use for which an exotic essence was introduced is not well accepted locally (poles and firewood, for example). A species of trees used in the production of firewood in a region will not necessarily be tailored in another where the culinary customs and methods of cooking are different. Human perceptions on the types of wood and other forest products can have a cultural basis and be deeply rooted. Prejudice to an essence, for whatever reason, can be stubborn. It is important to consult, beforehand, local populations prior to the introduction of a gasoline.

Socio-economic problems



17. Large commercial plantations offer a number of socio-economic benefits; they create jobs (less than in agriculture, of course, but more than not in offer the management of natural forests) and often improve the local infrastructure and the social services. Just like the operations of production of softwood lumber in natural forests, they have, on the other hand, negative aspects, particularly in remote areas (see "Management of natural forests" guidelines). It comes to problems related to the workforce from outside (which will not fail to exert pressure on the infrastructure and social services leading to social tensions, sometimes even racial and resulting health problems), to the monetization of the economy and, if road construction is required, an influx of population not controlled and social transformations due to greater exposure to the outside world.

18. The reforestation efforts implemented by the local population, such as the planting of groves and trees around homes are potentially beneficial for it. Similarly, projects whose aim is to produce fuel wood are a time saver and an economy of effort against the collection of wood used in the preparation of meals, time and effort that will be used in other activities. Similarly, the plantations for the production of fodder can facilitate access and availability of food for livestock, particularly during periods of drought. Sale wood, fruits, nuts, fibers or other products extracted from forests provides the opportunity to generate substantial revenues. On the other hand, the time devoted to cuts of wood is somewhat flexible; they may be carried out at the time when market conditions are more favourable or when wood and income requirements are, the more feel. Groves by the community plantations provide jobs in the short term to more poor or landless, mainly at the time of plantations or slaughter. In the meantime, relatively low demand for labour and capital is an advantage for farmers who plant trees on their land. Similarly, because trees can grow on marginal or unsuitable agricultural land



or on small areas of unused land, they do not compete to the more profitable uses of good land.

19. Plantations of relatively large size, they are private and intended for the commercial production of wood or that they are exploited by the community to get the wood fire or other forest products or still serve to protect some places (a watershed or sand dunes, for example) can cause problems related to the occupation of the land and use of resources and land rights. Often, one realizes that planting on communal lands programs lend enough attention or even ignore the traditional rights of use of land or crossing. Plantations aimed at protecting degraded lands can also create social conflicts because, in spite of their State, they are no less a source of wood fire or fodder for local populations, livestock grazing areas and routes of passage for these populations and herd (which, incidentally, are perhaps the origin of this degradation). Although the idea to land of plants on these lands and restrict access aims to help populations, remain, unless an appropriate solution is provided as compensation that these plantations will result in inconvenience.

20. Another mistake, often committed during the development of plantation or reforestation projects, is to overlook the diversity of edible wild products that grow in forests, grasslands and bushes, along roads or on the edge of the fields (fungi, roots and tubers, plants, fruits, honey, nuts, condiments and edible oils, among others) and the harvesting and sale are in principle, reserved for women. In arid and semi-arid regions, in particular, these products represent nutrient inputs essential to household nutrition and a source of income in times of drought. To measure that economies will monetize and is urbanized or that people receive more formal education, these edible products tend to be devalued. Most of the time, projects of forest plantations and even those that boast of wanting to roll back poverty



and who advocate sustainable development objectives, do not exploit the opportunities to increase the production and consumption of these crops and consequently, to ensure the food security of populations. An assessment of impacts on the environment must collect information on the availability of these products and the various uses to which the ethnic and economic groups have used in the past and provide these data to the attention of managers.

21. This neglect is not only on existing resources but also on the future possibilities of developing a wider variety of products. It often happens that the planting projects, whose objective is to protect the forest reserves, do not provide a sufficient range of forest products that can meet the needs of the local populations which, therefore, will continue to exploit these forests. The production of raw materials intended for the generation of revenues from local businesses is rarely integrated into projects on a large scale that the bank runs, to the extent that it is perceived as requiring a institutional basis too important to become profitable and coordinate the needs of scattered businesses.

22. Rights of property on land and trees often represent a problem. In many countries, the fact that the whole of natural forests or plantations owned by the State does not encourage reforestation initiatives. Moreover, the planting of trees on considered land as communal, but on which Aboriginal groups have customary rights, means that products intended for members of the community will be claimed by a limited number of individuals do not, most of the time, to the category of needy.

23. The social forestry projects, due to their relative newness, experiencing a number of socio-economic problems. It often happens that the officials responsible for forestry matters, nor the local communities have the skills



required to manage. Participatory social forestry activities require the engagement of rural populations in the Organization of production and exploitation of trees and forests which they are intended. Their participation is not something gained, it is essential that the benefits and costs that it entails must be clearly stated and the benefits to which they were duly right are not subject to constraints. A profound change of behaviour and attitudes is required to switch from the traditional collection of fuel wood and other forest products in natural culture forests trees themselves.

24. Foresters, who have generally been trained in management of natural forests are generally responsible to protect populations. It is rare that they enjoy the confidence of rural communities and their communication and social analysis skills are often insufficient for the needs of social forestry. Consequently many problems. Once the plantations are established, people do not know how to maintain, when clear them or exploit them, and, what cut trees. It may be a plantation which was intended for an activity to be used for other purposes or, in the absence of a clearly determined plan, is not at all exploited. Once the plantations are established, people do not know how to maintain, when clear them or exploit them, and, what cut trees. It may be a plantation which was intended for an activity to be used for other purposes or, in the absence of a clearly determined plan, is not at all exploited. In regards to the equipment necessary for the felling of trees and their transport, it is often lacking.

25. Finally, a number of economic risks are associated with the forest plantation. First, markets that sell forest products are versatile or likely to disappear, if it is a single rotation long. Second, the political and economic conditions are also subject to change can move the priorities and commit funds in other sectors. The fires, the spread of insects and disease can destroy the entire tree crops. The fall of prices in the market, due to low demand, the



increase in transportation costs or the overabundance of products, can cause losses. Finally, the enthusiasm to invest in forestry projects with tangible benefits won't be visible immediately (at least 3 years) will be slow by the short term needs of populations.

Alternatives to the project

26. There are alternatives to forest plantations: (a) develop methods of management of natural forests or savannas is one way to avoid land clearing to establish plantations including direct costs (preparation and maintenance) and indirect (opportunity costs which negate the possibility to consider other uses for the land and resources) can be justified not necessarily; (b) multiply the efforts of conservation of woody resources (by, for example, the promotion of more efficient woodstoves, wood, chipboard, etc., more efficient resources, and recycling of wood residues) and encourage fuel switching (e.g. gas) to avoid the plantations for the production of fire; (c) erecting fences or use monitoring (to limit grazing areas and encourage the establishment of indigenous species) as a less costly and more efficient solutions to stabilize slopes and to restore and improve the land through plantations.

Training and Management

27. Whether it's a plantation for the arboriculture of annuity, a project of small forest stand undertaken by a community or a commercial planting on a large scale, institutional support and training are crucial during the running of the project (see "Management of natural forests" which addresses the General



problems related to the issue of forestry institutions). Classic institutional support takes into account:

- the planning, implementation and evaluation of the project;
- planning work, management of budget, finance and personnel;
- the design of educational and outreach programs for communities;
- the purchase of seeds and equipment;
- mastery of issues related to land tenure, recruitment support groups among local communities and political leaders;
- market development and local capacity to process the products.

28. Technical assistance and a training programme may be necessary in the following areas:

- the choice of location and mapping exercise;
- species selection;
- management of the means of propagation (purchase or seed collection, storage and handling, collection and handling of plant cuttings material, for example-);
- the operation of nurseries;
- methods and planting time;
- management techniques relating to thinning operations, size, fertilizer application, irrigation, monitoring insects and diseases, weeding and protection against damage by livestock and activities poaching;
- the collection of data on the growth rate and performance that indicate the performance of a forest;
- operation and transportation;
- the development of new uses of wood and by-products;



- marketing procedures.

29. Forest operations staff must acquire new skills that will enable them to support the efforts of social forestry.

These include:

- Identification of specific groups of the population who could participate in planting project;
- communication skills and dissemination of knowledge;
- technical knowledge, having regard to the establishment and management of trees that can adapt to various social forestry activities;
- issues relating to the question of the occupation of land and resources.

Monitoring

30. The following factors would be to examine:

- environmental impacts during the site preparation and the quality of seedlings;
- the rate of growth of the plantation;
- the problems of weeds;
- the presence of pests and diseases;
- management methods, if properly applied and, as scheduled;



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- the protection of forests;
- market trends;
- the distribution of income and profits from plantations;
- Transition costs and profits as conditions change;
- pressure on agriculture;
- land use and natural forests;
- Environmental impacts of logging;
- the sustainability of the plantation, from the viewpoint of ecology, economics and management.



Planting and reforestation

Potential Negative impact

Mitigation measures

Direct impacts: site preparation

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| <p>1. Soil erosion due to the clearing of the site.</p> <p>2. Soil erosion due to the clearing of the site.</p> <p>3. • Loss of organic matter and nutrients due to the removal of vegetation and leaching of the soil.
• Formation de croûtes calcaires et latérisation.</p> <p>4. Pollution caused by the smoke of the burning.</p> | <p>1. • Restore forest cover as soon as possible after clearing.
• Implement tree crops fast or intermediate growth or mulch the soil discovered.
• Do not clear slopes, unstable soils or land subject to erosion.
• Limiting the extent of plantations and groves.
• Avoid site preparation outside the dry periods.</p> <p>2. • Limit the use of mechanical methods.
• Prepare the location of manually.</p> <p>3. • Revegetate quickly.
• Planting trees for cover.
• Proceed to mulching.</p> <p>4. • Limit, as far as possible, recourse to the fire and restrict the surfaces subjected to burning.
• Practice the method of burn during the wet seasons.</p> |
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Potential negative impacts

Mitigation

Direct impacts: plantation management and operation

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| <p>5. Soil erosion caused by logging.</p> <p>6. Loss of nutrients due to cuts of thinning and clear-cutting, as well as the whole-tree harvest.</p> <p>7. Use of fertilizers, pesticides and herbicides that have adverse effects on the location and quality of local waters.</p> | <p>5.</p> <ul style="list-style-type: none">• Replant as soon as possible after the cuts.• Avoid clear-cutting and call to the method of exploitation by "small cuts" (whose shape resembles a checkerboard alternating small cuts and places non-operated).• Limit logging to dry seasons or weak rainy season.• Planning the felling of trees to reduce the skid and avoid the parallel to the slope dragging.• Stabilize the wood transportation routes after use.• Replace the tractors by animal traction for longshoring. <p>6.</p> <ul style="list-style-type: none">• Leave ground tailings and not proceed to clearcuts.• Planting trees of coverage between rotations and fertilizers in compensation for the loss of nutrients. <p>7.</p> <ul style="list-style-type: none">• Mitigate the risk of spread of pests and diseases by selecting resistant species.• Use chemicals as harmless as possible for the environment.• Exercise control over the use of these chemicals. |
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Potential negative impact	Mitigation
Direct impacts: plantation management and operation	
8. Processing chemical and biological soil as litter consisting of one or a few predominant species alters the process of decomposition.	8. Limit the scope of the plantations and alternate with natural stands.
9. <ul style="list-style-type: none">• Operations of skidding of wood causing soil compaction.• Localized soil erosion and uneven distribution of residues and organic matter.	9. <ul style="list-style-type: none">• Use manual methods or animal traction rather than mechanical means.• In short-rotation plantations, follow the same paths and unloading to protect in the best location.
10. Lowering of the moisture contained in the soil and groundwater presents in semi-arid regions.	10. <ul style="list-style-type: none">• Choose species including water demand is low. Implement the techniques of capture and water conservation that mitigate runoff and evaporation losses and that maximize the infiltration.
11. Risk of fire caused by the accumulation of organic matter on the ground of the plantations.	11. Remove or burn residues to the soil to reduce the accumulated quantities periodically,.
12. Increased sedimentation in streams and rivers.	12. <ul style="list-style-type: none">• Establish buffer zones intact forest of 20-40 m wide along watercourses.• Avoid the construction of Earth dams through rivers for their crossing.• Install sediment traps in water courses. Avoid log skidders wood by water courses.



OPERATIONAL GUIDELINES OF BOAD

Potential negative impacts

Mitigation measures

Direct impacts: plantation management and operation

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| 13. | Accumulation of organic matter in the form of sheets or residues, in surface waters or from the transport of timber on the watercourse leading to qualitative alteration of the water, and even risks for navigation and eutrophication. | 13. | <ul style="list-style-type: none">• Establish buffers along waterways.• Space in time the timber floating. |
| 14. | Soil erosion caused by logging roads. | 14. | <ul style="list-style-type: none">• Locate the paths at the top of hills or in valleys Fund avoid creating significant drop-offs on the slopes of hillsides.• Provide proper drainage.• Consolidate paths using mulch and wood chips.• Reduce materials extractions or redevelop borrow after use.• Ensure proper maintenance of the railways.• Borrow the rivers and streams for the transport of wood |
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