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Competitive Exams: Planatation

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A plantation is a large farm or estate, usually in a tropical or subtropical country, where crops that are not consumed for food are grown for sale in distant markets, rather than for local consumption. Such crops include cotton, coffee, tobacco, sugar cane, sisal, and various oil seeds and rubber trees. Farms that produce alfalfa, Lespedeza, clover, and other forage crops are usually not called plantations. The term “plantation” has usually not included large orchards, but has included the planting of trees for lumber. A plantation is always a monoculture over a large area and does not include extensive naturally occurring stands of plants that have economic value. The use of the term is governed by the linguistic conventions of natural language and does not have the rigorous consistency of formal language.

One of the earliest examples of a plantation was the latifundia. In antiquity, these produced large quantities of wine and olive oil for export.

A plantation efficiently produces its crop because of economy of scale. Protectionist policies and natural comparative advantage have contributed to determining where plantations have been located. Plantation agriculture grew rapidly with the increase in international trade and the development of a worldwide economy that followed the expansion of European colonial empires. Like every economic activity, it has changed over time. Earlier forms of plantation agriculture were associated with large disparities of wealth and income, foreign ownership and political influence, exploitative social systems such as indentured labor, and in the extreme case, an especially pernicious form of slavery. The history of the environmental, social and economic issues relating to plantation agriculture are covered in articles that focus on those subjects.

Industrial Plantations

Industrial plantations are established to produce a high volume of wood in a short period of time. Plantations are grown by state forestry authorities (for example, the Forestry Commission in Britain) and/or the paper and wood industries and other private landowners (such as Weyerhaeuser and International Paper in the United States, Asia Pulp & Paper (APP) in Indonesia) . Christmas trees are often grown on plantations as well. In southern and southeastern Asia, rubber, oil palm, and more recently teak plantations have replaced the natural forest.

Industrial plantations are actively managed for the commercial production of forest products. Individual blocks are usually even-aged and often consist of just one or two species. The plants used for the plantation are often genetically improved, e. g. The seeds used may originate from seed orchards. These species can be exotic or indigenous. Industrial plantations are usually large-scale.

Wood production on a tree plantation is generally higher than that of natural forests. While forests managed for wood production commonly yield between 1 and 3 cubic meters per hectare per year, plantations of fast-growing species commonly yield between 20 and 30 cubic meters or more per hectare annually; a Grand Fir plantation at Craigvinean in Scotland has a growth rate of 34 cubic meters per hectare per year (Aldhous & Low 1974) , and Monterey Pine plantations in southern Australia can yield up to 40 cubic meters per hectare per year (Everard & Fourt 1974) . In 2000, while plantations accounted for 5 % of global forest, it is estimated that they supplied about 35 % of the worlds roundwood.

Growth Cycle

In the first year, the ground is prepared usually by some combination of burning, herbicide spraying, and/or cultivation and then saplings are planted by human crew or by machine. The saplings are usually obtained in bulk from industrial nurseries, which may specialize in selective breeding in order to produce fast growing disease-and pest-resistant strains.

In the first few years until the canopy closes, the saplings are looked after, and may be dusted or sprayed with fertilizers or pesticides until established.

After the canopy closes, with the tree crowns touching each other, the plantation is becoming dense and crowded, and tree growth is slowing due to competition. This stage is termed 'pole stage' When competition becomes too intense (for pine trees, when the live crown is less than a third of the tree's total height) , it is time to thin out the section. There are several methods for thinning, but where topography permits, the most popular is 'row-thinning' where every third or fourth or fifth row of trees is removed, usually with a harvester. Many trees are removed, leaving regular clear lanes through the section so that the remaining trees have room to expand again. The removed trees are delimbed, forwarded to the forest road, loaded onto trucks, and sent to a mill. A typical pole stage plantation tree is 7 – 30 cm in diameter at breast height (dbh) . Such trees are sometimes not suitable for timber, but are used as pulp for paper and particleboard, and as chips for oriented strand board.

As the trees grow and become dense and crowded again, the thinning process is repeated. Depending on growth rate and species, trees at this age may be large enough for timber milling; if not, they are again used as pulp and chips.

Bushfires pose a high risk to Eucalyptus plantations. Around year 10 – 60 the plantation is now mature and (in economic terms) is falling off the back side of its

growth curve. That is to say, it is passing the point of maximum wood growth per hectare per year, and so is ready for the final harvest. All remaining trees are felled, delimbed, and taken to be processed.

The ground is cleared, and the cycle is repeated.

Some plantation trees, such as pines and eucalyptus, can be at high risk of fire damage because their leaf oils and resins are flammable to the point of a tree being explosive under some conditions. Conversely, an afflicted plantation can in some cases be cleared of pest species cheaply through the use of a prescribed burn, which kills all lesser plants but does not significantly harm the mature trees.

Criticism of Industrial Plantations

In contrast to a naturally regenerated forest, plantations are typically grown as even-aged monocultures, primarily for timber production.

Plantations are usually monocultures. That is, the same species of tree is planted across a given area, whereas a natural forest would contain a far more diverse range of tree species.

Plantations may include tree species that would not naturally occur in the area. They may include unconventional types such as hybrids, and genetically modified trees may be used sometime in the future. Since the primary interest in plantations is to produce wood or pulp, the types of trees found in plantations are those that are best-suited to industrial applications. For example, pine, spruce and eucalyptus are widely planted far beyond their natural range because of their fast growth rate, tolerance of rich or degraded agricultural land and potential to produce large volumes of raw material for industrial use.

Plantations are always young forests in ecological terms. Typically, trees grown in plantations are harvested after 10 to 60 years, rarely up to 120 years. This means that the forests produced by plantations do not contain the type of growth, soil or wildlife typical of old-growth natural forest ecosystems. Most conspicuous is the absence of decaying dead wood, a crucial component of natural forest ecosystems.

In the 1970s, Brazil began to establish high-yield, intensively managed, short rotation plantations. These types of plantations are sometimes called fast-wood plantations or fiber farms and often managed on a short-rotation basis, as little as 5 to 15 years. They are becoming more widespread in South America, Asia and other areas. The environmental and social impacts of this type of plantation has caused them to become controversial. In Indonesia, for example, large multi-national pulp companies have harvested large areas of natural forest without regard for regeneration. From 1980 to 2000, about 50 % of the 1.4 million hectares of pulpwood plantations in Indonesia have been established on what was formerly natural forest land.

The replacement of natural forest with tree plantations has also caused social problems. In some countries, again, notably Indonesia, conversions of natural forest are made with little regard for rights of the local people. Plantations established purely for the production of fiber provide a much narrower range of services than the original natural forest for the local people. India has sought to limit this damage by limiting the amount of land owned by one entity and, as a result, smaller plantations are owned by local farmers who then sell the wood to larger companies. Some large environmental organizations are critical of these high-yield plantations and are running an anti-plantation campaign, notably the Rainforest Action Network and Greenpeace.

Farm or Home Plantations

Farm or home plantations are typically established for the production of timber and fire wood for home use and sometimes for sale. Management may be less intensive than with Industrial plantations. In time, this type of plantation can become difficult to distinguish from naturally-regenerated forest.

Environmental Plantations

These may be established for watershed or soil protection. They are established for erosion control, landslide stabilization and windbreaks. Such plantations are established to foster native species and promote forest regeneration on degraded lands as a tool of environmental restoration.

Ecological Impact

Probably the single most important factor a plantation has on the local environment is the site where the plantation is established. If natural forest is cleared for a planted forest then a reduction in biodiversity and loss of habitat will likely result. In some cases, their establishment may involve draining wetlands to replace mixed hardwoods that formerly predominated, with pine species.

If a plantation is established on abandoned agricultural land, or highly degraded land, it can result in an increase in both habitat and biodiversity. A planted forest can be profitably established on lands that will not support agriculture or suffer from lack of natural regeneration.

The tree species used in a plantation is also an important factor. Where non-native varieties or species are grown, few of the native fauna are adapted to exploit these and further biodiversity loss occurs. However, even non-native tree species may serve as corridors for wildlife and act as a buffer for native forest, reducing edge effect.

Once a plantation is established, how it is managed becomes the important environmental factor. The single most important factor of management is the rotation period. Plantations harvested on longer rotation periods (30 years or more) can provide similar benefits to a naturally regenerated forest managed for wood production, on a similar rotation. This is especially true if native species are used. In the case of exotic

species, the habitat can be improved significantly if the impact is mitigated by measures such as leaving blocks of native species in the plantation, or retaining corridors of natural forest. In Brazil, similar measures are required by government regulations.

Plantations and Natural Forest Loss

Many forestry experts claim that the establishment of plantations will reduce or eliminate the need to exploit natural forest for wood production. In principle this is true because due to the high productivity of plantations less land is needed. Many point to the example of New Zealand, where 19 % of the forest area provides 99 % of the supply of industrial round wood. It has been estimated that the worlds needs for fiber could be met by just 5 % of the world forest (Sedjo & Botkin1997) . However in practice, plantations are replacing natural forest, for example in Indonesia. According to the FAO, about 7 % of the natural closed forest being lost in the tropics is land being converted to plantations. The remaining 93 % of the loss is land being converted to agriculture and other uses. Worldwide, an estimated 15 % of plantations in tropical countries are established on closed canopy natural forest.

In the Kyoto Protocol, there are proposals encouraging the use of plantations to reduce carbon dioxide levels (though this idea is being challenged by some groups on the grounds that the sequestered CO₂ is eventually released after harvest) .

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