

# **Exporting wood harvesting machine to Nepal**

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This report is to evaluate the benefit, advantages and disadvantages for exporting wood harvesting machines from Canada to Nepal, part one of the report about the information about wood harvesting machines, part two about the benefits to Nepal, the

## **Part 1: Information about wood harvesting machines**

### **Woodharvesting machine history**

Timber is a widely used material used by humans for thousands of years(Bangkok, 2009). The way to get these materials is by logging. The planet is covered by 434 billion cubic meters of forests, the wood are used for fuels or building materials(Michael, 2000). Before modern wood harvesting machines were invented, People log the wood by using chain saws or axes. Wood harvesting machines are invented by Sweden and Finland, the first modern harvester is introduced in 1973(Haarlaa, 1992). Canada started producing its own wood harvesting machines from 1992, the company producing the wood harvesting machines is called Tigercat, a company located in Brantford, Canada(Tigercat, 2001).

Tigercat designs and manufactures all kinds of forestry equipments, Drive-to-tree feller bunchers, Track feller bunchers, Track harvesters, Wheel harvester, etc.

### **The working principle**

Wood harvester's working principle is cut-to length logging. This includes felling, delimiting and bucking trees(Haarlaa, 1992).

#### **Felling**

Wood harvester uses the harvest head to log the tree



<http://sverigesradio.se/sida/artikel.aspx?programid=493&artikel=5935074>

## Delimiting

Wood harvesting machine limb the branches from the tree's stem



<http://sd-report.mondigroup.com/2011/performance-against-objectives/employee-wellbeing/harvesting-mechanisation>

## Bucking trees

Wood harvesting machine use saw to cut limbed tree into log



<http://northernwoodlands.org/articles/article/three-logging-systems-matching-equipment-to-the-job>  
comparison between wood harvesting machine and man

The average logging time for a man need few minutes, but the wood harvesting machines only need few seconds.

Log manually		Log mechanically	
Advantages	Disadvantages	Advantages	Disadvantages
Cheap	Labour intensive	Productive	Expensive
No machine required	Not productive	Safe	need training
	Not safe		

### **Benefits**

Nepal has 4.8million hm2 forest area, and other Asia markets like China has 200million hm2 forest area, India has 60million hm2 forest area. These countries have big forest area, and large demand for forest products, but they are lack of forestry equipment and they don't have company design and manufacture these equipment. China for example has a demand for 0.8trillion cubic meters of wood for the use to manufacturing furniture, building materials, and other forest products, and one big resource is from domestic forest(Forest, 2000). Nepal is not an affluent country, it can't import many wood harvesters, but China and India can import many, and they need mechanized logging for their forest.

Exporting product to Nepal can allow more Canadian companies to get access to these foreign Asia markets, previously Canada did a lot of business with United States and European countries, there are a lot of opportunities in the emerging Asia markets, exporting the machine can let people know more about Canada's product and increase Canada's product's brand awareness through markets. And build the relationship between Nepal and Canada. Right now, Tigercat has over 1300 Canadian employees, and once it begins exporting its products to Nepal, it will hire more employees for retailing and manufacturing.

### **The companies design and manufacturing wood harvesting machine**

There are several manufactures for wood harvesting machines, but there is only one company truly owned by Canada.

	Country/ Owned	Price	Contact
<b>Logset</b>	Finland	100,000-200,000	Telephone: 358 10 286 3200 Fax: 358 6 2103 216 Email: <a href="mailto:info@logset.com">info@logset.com</a>
<b>AFM-Forest Oy</b>	Finland	150,000-200,000	Telephone: 358 20 765 90 50 Fax: 358 20 765 90 51 Email: <a href="mailto:sales@afm-forest.fi">sales@afm-forest.fi</a>
<b>Barko Hydraulics, LLC</b>	USA	200,000-350,000	Telephone: 715-395-6700 Fax: 715-392-3931
<b>Caterpillar, Inc</b>	USA	400,000-500,000	Telephone: 309 675-2337
<b>Komatsu Forest</b>	Sweden	100,000-200,000	Telephone: 46 90 70 93 00 Email: <a href="mailto:info@komatsuforest.com">info@komatsuforest.com</a>
<b>Ponsse</b>	Finland	200,000-350,000	Telephone: 358 20 768 800 Fax: 358 20 7698 8690
<b>Tigercat</b>	Canada	100,000-200,000	Telephone: 519-753-2000 Fax: 519-753-8272 Email: <a href="mailto:comments@tigercat.com">comments@tigercat.com</a>
<b>Timberjack</b>	Canada owned by US company	150,000-200,000	Telephone: 936-671-4552
<b>Kesla Oyj</b>	Finland	150,000-200,000	Telephone: 358 10 527 837

table1. The companies make wood harvesting machines. This table shows the wood harvesting machines makers' names, prices, and contact informations.

The wood harvesting machines are manufactured by different companies from different countries, but the countries around Nepal don't produce this kind of machinery. This is good for Canada, because there are no competitors with distance advantage in Nepal. The machines made from other countries are more expensive than Canada's. Tiger cat's machine have the lowest coast per tonne of processed wood due to its fuel efficiency, uptime, longevity.

### **The manufacture process**

The machine made by Tigercat are manufactured in Canada from steel fabrication to assemble. The company owns design and manufacture facilities. The metals used to make the machine are mined from Canada, these metals than shipped to fabrication facility to made to industrial level steel, and forge to shapes demanded, and assemble together at the assemble area(Tigercat, 2001).

### **The model prefer Nepal**

Nepal's terrain is mainly hilly terrain, the machine best works in this type of terrain is the truck harvester, the truck harvester can operate in the hill terrain. The truck harvester made by Tigercat is model LH855D. The model LH855D is a leveling harvester, it's able to be matched most of the world's at-the-stump harvesting and roadside processing applications./ which is ideal for Nepal. The wood harvesting machine LH855D has FH400 leveling undercarriage, it has long track frames,and leveling components. The machine is equipped with high horsepower harvester head with hydraulics, give responsive control, quick feed speed and powerful delimiting. The wood harvesting machine is powered by FPT Tier 2 fuel engine, which has low emissions(Tigercat, 2001).

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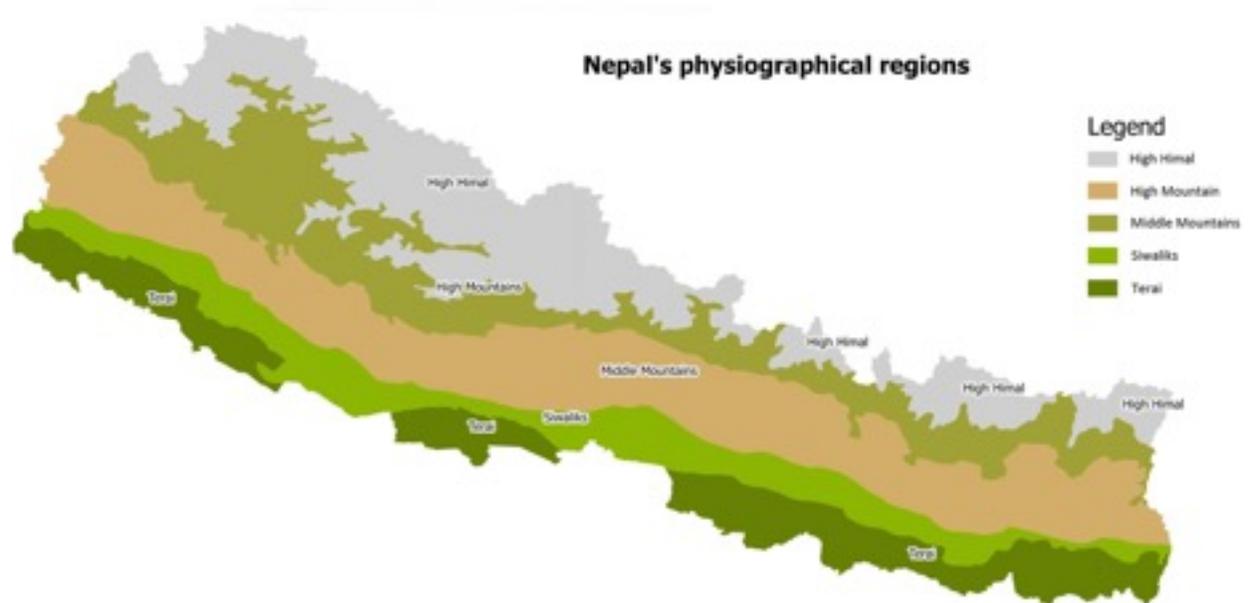
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## Part 2: Benefits to Nepal

### General informations

Nepal is a mountainous nation located in Asia, bordered by China at the north and India at the south. Nepal has 26.4million people, and a GDP of 19.29billion US dollars. Nepal has 4 different geographic region, Terai region, inner terai region, hill region, and himalaya region(World Bank, 2002).



<http://lt.umn.edu/earthducation/expedition/climate/>

### Nepal's forest

The land, water minerals and forests are the main natural resources in Nepal(Bangkok, 2009). Nepal has a large amounts of forest resources, approximately 4.8millin hm2. The forest covers 40% of the total land area of Nepal(Forest Department, 2001).And it has divers types of trees due to its diverse landscape and altitude.The forest under the altitude of 1000m is tropical forest, the forest at altitude between 1000 to 2000m is subtropical forest, the forest at altitude between 2000 to 3000m is temperate forest, and the forest at altidute between 3000 to 4200 is subalpine forest(Forest Department, 2001). The tropical forest is dominated by *Shorea robusta*, *Acacia catechu* and *Dalbergia sissoo* along the rivers, and *Terminalia* and *Anogeissus* forests in western Nepal(Forest Department, 2001). The subtropical forest include *Pinus roxburghii*, *Alnus nepalensis*, *Schima wallichii*, *Castanopsis sp*, *Pinus wallichiana*, *Quercus semecarpifolia*, *Rhododendron arboreum*, *Acer sp*, and *Pinus wallichiana* etc(Forest Department, 2001). The subalpine forest include *Abies spectabilis*, *Betula utilis* and *Rhododendron* forests and *Juniperus Indica* forest(Forest Department, 2001). There are no trees at himalaya region, but little *Rhododendron* and *Juniperus* are found(Forest Department, 2009).

Scientific name	Common name	Local name	Share in GS of 1960s (%)	Share in GS of 1994 (%)
<i>Shorea robusta</i>	Sal	Sal, Sakhwa	31	28.2
<i>Quercus spp</i>	Oak	Khasru	n.a.	9.3
<i>Terminalia alata</i>	Indian laurel	Asna, Saj	8.2	7.6
<i>Pinus roxburghii</i>	Chir pine	Khote salla	6.9	6.3
<i>Abies spectabilis</i>	Silver fir	Talis patra	9.5	4.4
<i>Rhododendron spp</i>	Rhododendron	Lali gurans	n.a.	4.3
<i>Alnus nepalensis</i>	Alder	Uttis	n.a.	2.9
<i>Schima wallichii</i>		Chilaune	n.a.	2
<i>Tsuga dumosa</i>	Hemlock	Thingure sall	2.4	1.9
<i>Adina cordifolia</i>		Karma, Haldu	n.a.	1.8

table2 types of trees' ground stock. this table shows the different types of trees' ground stock

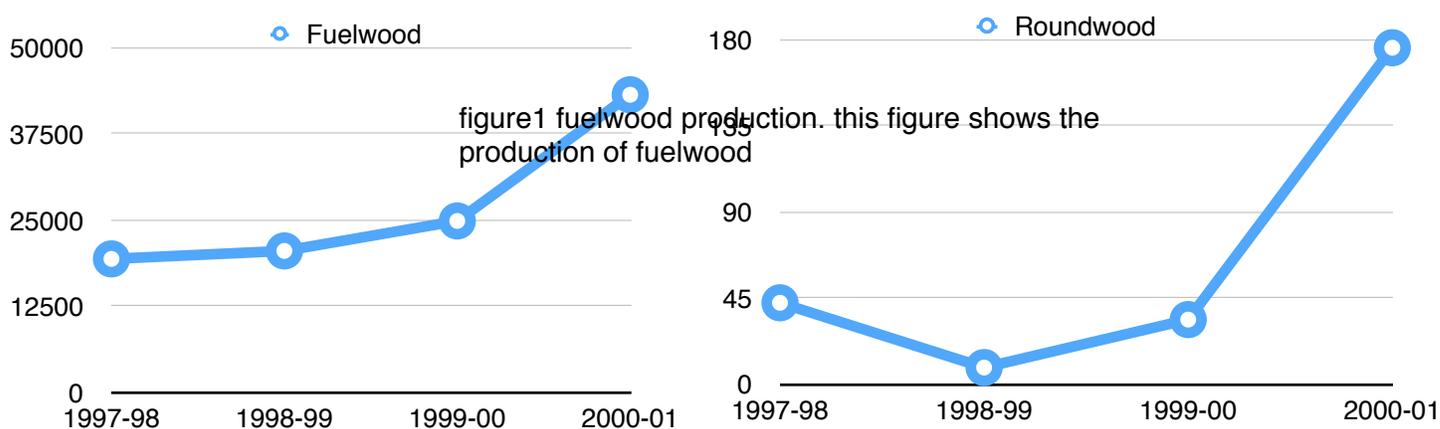
### The usages of woods in Nepal

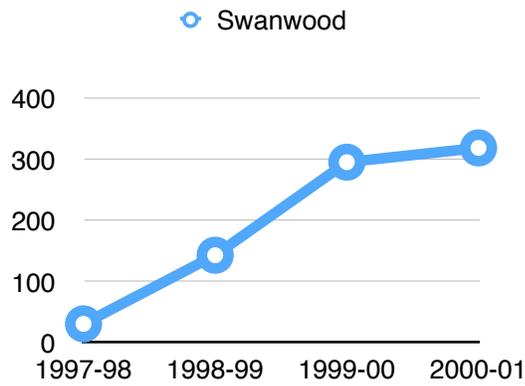
The nation is rich in wood resources, it's covered by 4.8 million hm2 of forest, covers 40% of the total land area. The woods are use as roundwood, fuelwood, swallowed and wooden poles(Forest, 2000).

Production m <sup>3</sup>				
Year	Roundwood	Fuelwood	Poles	Swanwood
1997-98	42.48	19370.88	3520.67	31.35
1998-99	8.61	20532.00	1695.27	143.56
1999-00	33.70	24879.12	2056.84	295.64
2000-01	175.90	43202.16	3403.29	319.00

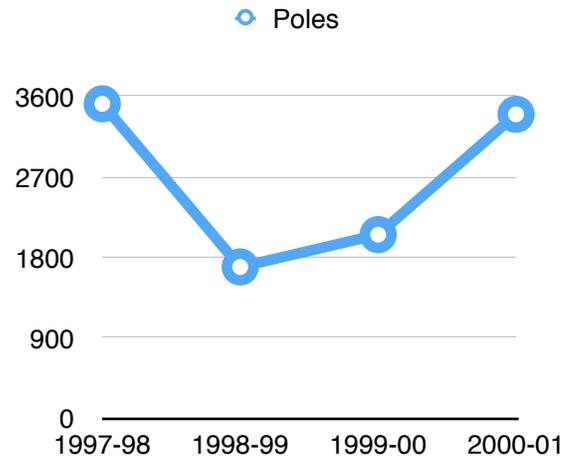
table3 wood production. this table shows the wood production for roundwood fuelwood poles and sawnwood

From the tables we can see the increase of wood production in Nepal. The sawnwood is the main product from hardwood species, for example *Shorea robusta*/. These wood can be made to furniture, building material, and other wood products. Nepal has a few modern factories for producing plywoods and furnitures, which are high added value products. These factories have a production capacity of 62.3 thousand cubic meters, but due to lack of raw materials these factories' actual production capacity is only 52%( Forest Department, 2001). To fit the future demand, there will be more factories added, but the lack of raw materials is a problem in Nepal need to be solved. Export furnitures and plywood to the other countries is a good idea. The high





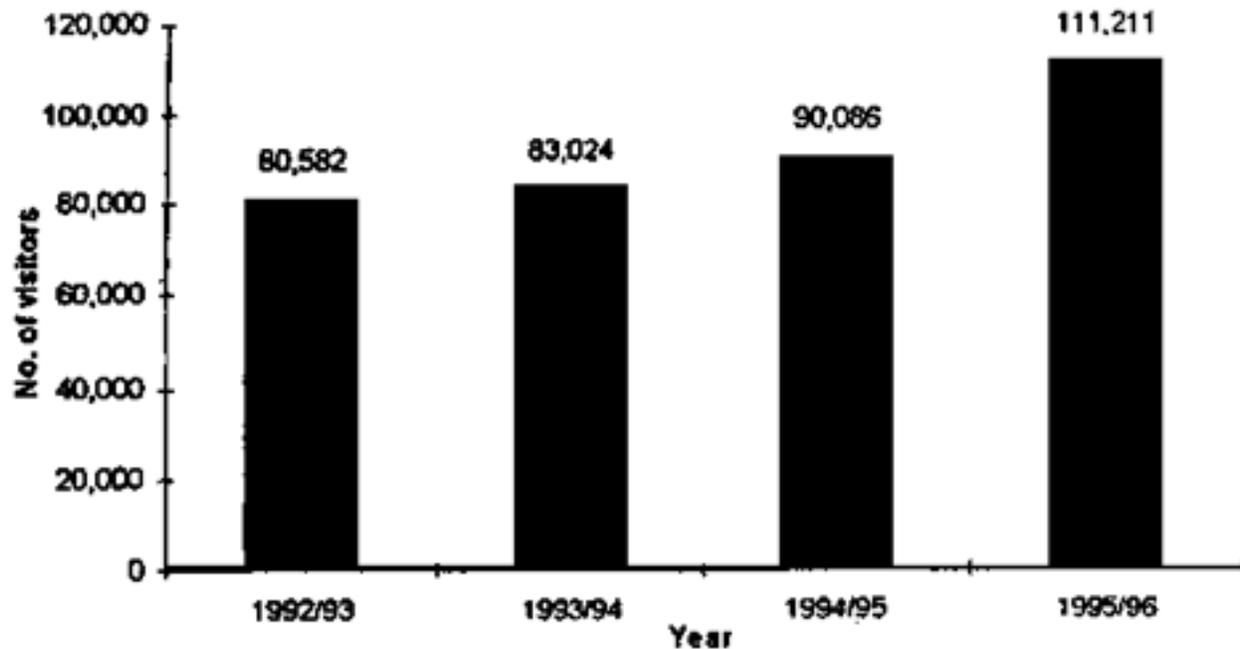
profit for the furniture can cover its



transportation cost. The demand for raw wood materials are 490 thousand cubic meters (Forest, 2000), and one main resource is the domestic forest. But due to lack of forestry equipment the wood industry has very low production. The main way to log the wood is by man, it is a very inefficient way, the machine is 10 times efficient than man, which only needs 3 seconds to log a wood.

### Forest tourism

The protected areas play an important role in the tourism industry of Nepal, both by attracting people to visit the country and by providing activities for them, once they are here. Many of the mountains including Everest, Makalu, and Langtang, the key species of wildlife and examples of cultural diversity are found in and around the protected areas. Protected areas are therefore, important in promoting Nepal as a tourist destination. The parks and reserves of the mountains are popular for trekking and mountaineering activities while those in the Terai are renowned for



wildlife watching (Forest Department, 2001).

## The forest management

The national forest are divided to five categories according to management and ownership as follows: Government managed forests, Community forests, Religious forests, Leasehold forests, and Private forests(Forest Department, 2001).

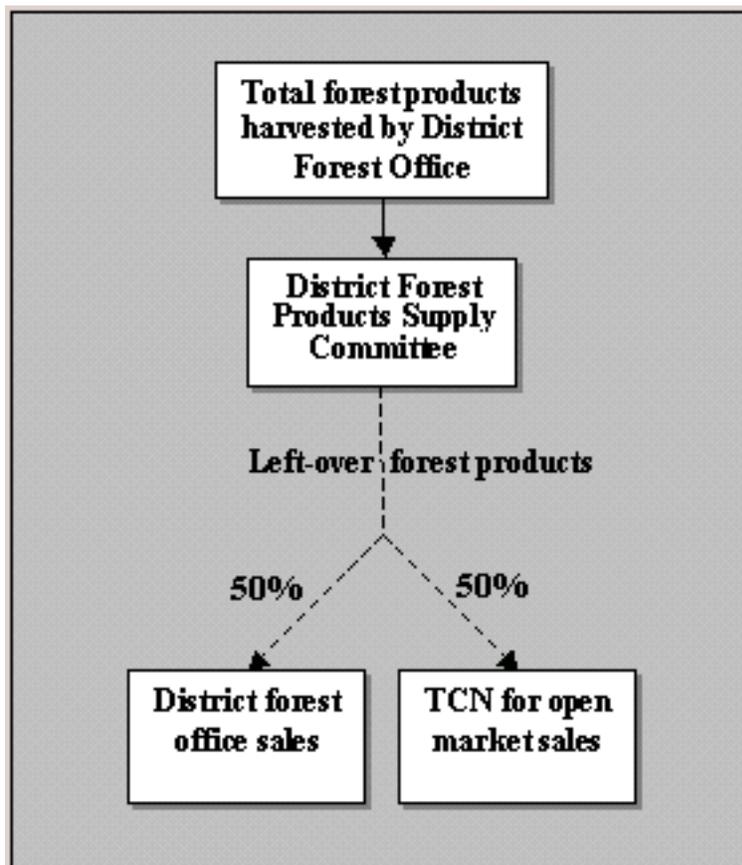
Category	Subcategory	Unit	Area
National Forest	Government-managed forest*	000 ha	3902.27*
	Community Forest**	000 ha	1200
	Leasehold Forest***	000 ha	14.73
	Religious Forest+	000 ha	0.543
	Protected Forest@	000 ha	711
Private Forest	Private Forest#	000 ha	2.3

table4 area of forests. this table shows the forest area for different types of forest.

There are some departments manages the forests in Nepal. The Department of Forests has the main responsibility for producing wood products such as roundwood, fuelwood, timber to fit the national demand. The Timber Corporation of Nepal, acquires roundwood from Department of Forests and produces sawn timber. The Forest Products Development Board sells roundwood, fuelwood, and poles from its own plantations. The Community Forest User Groups and private tree growers also produce forest products such as roundwood, fuelwood and timber(Forest Department, 2001). There are other departments and they are listed below.

The forest products supply follows a standard to distribute. The district level Forest Products Supply Committee first satisfy district demands, then the District Forest Supply sells 50 percent of the left stock, and provides another 50 percent to the Timber Corporation to the sale to the open market(Forest Department, 2001).

There are two types of timber harvesting in Nepal. The first is the manual harvesting by the villagers. The second is the government harvesting. The harvesting techniques in Nepal are labour intensive and little more mechanized than the villages. Hand saws and axes are used for felling, delimiting, and cross-cutting. Bullock carts are used for transportation(Forest Department, 2001).



Departments	Type
Ministry of Forests and Soil Conservation	Government
Ministry of Finance	Government
Ministry of Local Development	Government
National Planning Commission	Government
Department of Forests	Government
Department of Forest Research and Survey	Government
Central Bureau of Statistics	Government

Departments	Type
Forest Products Development Board	Semi-autonomous
District Forest Products Supply Committee	Government
District Development Committee	Government
Federation of Nepal Chamber of Commerce and Industries	NGO
Timber Corporation of Nepal	Semi-autonomous
Forest Products Business Bureau	Company
Federation of Community Forests in Nepal	NGO
Community Forest Users Committee	NGO
Nepal Foresters Association	NGO
Trade Promotion Centre	Semi-autonomous

table5 forest manage departments. this table shows the forest manage departments

### **The benefits to Nepal and the transportation**

The country is not very affluent, and can not afford very expensive machine, but the machine made by the Canada Tigercat has the lowest cost per tone logging. The buyer will be the Nepal government departments which manages the forest products, the villages and private forest owners don't need the wood harvesting machine, since they don't need to produce large amount of timber, and they don't own large amount of forest. Nepal's government the ministry of forestry and soil conservation manages the forest industry, and wood harvesting machine would replace the labor intensive way of logging Nepal is practicing, and allow them to access The forest in the north and east of Nepal.

The machine price around 100,000 dollar, Canada can provide loan to the buyer. The Canada's export credit agency provide solution for transactions under 10 million dollars. It provides financing option to the international business partners to buy products. The product will manufacture in Canada, and ship to Vancouver using land transportation, which cost around 50

dollars, and ship to Nepal using sea transportation which is the cheapest around 300dollars, the machine don't fall into the Canada export control list, so it don't need permit for export, but export to Nepal require permit for import, and 5% import tax. Exporting Canada products to Nepal will increase the trade between two nations and benefit the two nations' economies.

### **The forest state at Nepal**

The deforestation problem in Nepal is mainly in the south and east terai region due to the agriculture activities and over cutting for wood fuel. Nepal has been strive to protect the forest, such as planting trees, and community forestry, and the forest has been recovered. Annual government and community planting has been 5,260 ha during the 1992-96 period. Reliable figures for private planting, however, are not available. *Dalbergia sissoo* is the most common plantation species in the Terai. *Eucalyptus camaldulensis*, *Acacia catechu*, *Tectona grandis* and *Albizia* sp. have also been planted. In the mountains, *Pinus roxburghii* has been the most commonly planted species. In recent years a number of other species such as *Alnus nepalensis*, *Ficus* sp. and *Primus cerasoides* have also been planted(Forest Department, 2001).

Nepal's future plan is To increase forest production and productivity without damaging resources; reduce resource pressures through improved resource use, develop alternative sources of energy, restore degraded forest lands, and promoting private forestry,

The national forests degradation is a problem due to over-cutting, agriculture activities, and timber smuggling has long been recognized and the government of Nepal made a plan for bringing the situation under control and recover the forest. The Master Plan for the Forestry Sector is established. To facilitate implementation of the Plan, Forest Act 1993 and Forest By laws 1995 are in place(Haarlaa, 1992).

The Master Plan outlines broad strategies for sustainable management of the nation's forest resources in line with Nepal's economic, social and environmental goals. These are further elaborated in the Eighth Five Year Plan (1992-97) (Forest Department, 2001).

The first priority is to increase forest production and productivity without permanently damaging the resource base. The second is to reduce pressure on the resource through increasing efficiency in resource use, development of alternative sources of energy, rehabilitation of degraded forest land, promotion of private farm forestry and enforcement of legislation(Forest, 2000).

According to MPFS (1988), the approved forestry policy of Nepal is as follows:

#### a) Production and Utilization

- The forest resource to be managed and utilized for the basic priority products of fuelwood, fodder, timber, and medicinal plants.
- Forests near villages to be managed with the people's participation.

## b) Conservation of ecosystems and genetic resources

- Land and forest resources to be managed and utilized according to their ecological capability so as to conserve the forests, soil, water, flora, fauna and scenic beauty.

## c) Social aspects of land use

- The principles of decentralization policy to be applied in the forestry sector by community forestry as the priority forest management strategy.
- If the availability of forest land exceeds the needs of the local communities, the excess will be allocated for forest management in the following priority sequence: people living below the poverty line, small farmers and forest-based industries.
- Emphasis will be given to the multiple utilization of land for integrated farming systems by strengthening soil conservation and watershed management, agroforestry and other related activities.

## d) Role of the private sector

- Establishment of private forests on leased and private land to be promoted.
- The Government to lease land to forest based enterprises for growing raw materials. New industries to be established only if their plans for the production and acquisitions of raw materials are acceptable to the Ministry of Forests and Soil Conservation(Haarlaa,1992).

## **The forest future estimates**

Nepal will face challenges in the forest industry, like the other countries in the region. The increase of population put pressure among the forest. And because of the economic pressure, the money to the Forest Department wont be a lot(Forest, 2000).

The intense commercial forest in the south terai region is increasing, this will propel the wood products markets forward. Because of this, the government must think about amend the wood products export prohibition.

The community forest users start sell the wood products, and private and leased forest users will have more close relationship with forestry companies.

The land and water protection will be a national scale.

There will be more area become national park and wild animal protection area, and these area will be popular tourist area.

## **Recommends**

The company is recommended to produce cheaper wood harvesting machines. The wood harvester need to be cheaper for a not affluent nation like Nepal, smaller for the Nepal's road and landscape, and easy to use for Nepal people with not many training. The Canada companies can also provide fast grown tree species to Nepal for the nation's forest protection.

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