An outline of the causes of deforestation in Cambodia

N. Kim Phat (Faculty of Agri., Shinshu Univ.),
S. Ouk (Deptment of Forest and Wild., Cambodia), Y. Uozumi
and T. Ueki (Faculty of Agri., Shinshu Univ.)

The aims of this study are to delineate the Cambodian forest resource and to identify the underlying causes for deforestation. Cambodia possesses a very large area and volume of forest, which represents one of the very few national resources that can be rapidly developed to provide vital foreign input in the reconstruction and rehabilitation of the country following 25 years of political turmoil. The war in the past decades undoubtedly destroyed forests of Cambodia, but it was to the lesser extent than did the peaceful economic development in war-free countries like Thailand. That's why Thailand is now importing a large amount of logs from Cambodia legally and illegally. Two types of forests have been recognized in Cambodia, of which, between 1973-1997, 1.52 million ha of dryland forests and 0.6 million ha of edaphic forests were lost. This was a consequence of war, a rapid increase in population, logging activities, agricultural expansion, shifting cultivation and lack of human resource. Recognizing the danger to its forests, the government of Cambodia has attempted to manage the forest sustainably. Although, many forest management decisions have been and will be made, the political will of the Cambodian government is one of the important keys to ensure the sustainable use and management of forests.

Keywords: Cambodia, deforestation, population growth, illegal logging.

I. Introduction

Although several organizations have criticized the forest management policies that resulted in the rapid deforestation in Cambodia its root causes have not been well documented. The purpose of this paper is to describe the Cambodian forest resource and to identify the underlying causes of deforestation. In 1996 the World Bank, FAO and UNDP (United Nations Development Program), in cooperation with the government of Cambodia, assessed Cambodia's current forest policy. Here an attempt is made to analyze the causes of Cambodia's deforestation and, to make recommendations for current and future forestry actions necessary to reverse this on the basis of current work in Cambodia and similar areas.

II. The forests of Cambodia

1. Geographical Setting

Cambodia is bordered by Thailand, Laos and Vietnam with an area of 181,035 km$^2$ and a population and annual growth rate of 10.3 million and 3% respectively. The climate is divided into dry and rainy seasons. The rainy season is associated with a south-west monsoon which dominates the weather from May to October, while the dry season is associated with north-east monsoon which extend from November to April. The annual average rainfall varies from 1000 mm in the plains to over 2500 mm in mountainous areas.

2. Forestry in general

There are two main forestry institutions in Cambodia, the Royal University of Agriculture (RUA), and Preak Leap Agricultural School (PRLAS). Most of their infrastructure, teaching materials etc. were virtually destroyed during the war, and consequently need to be renovated and equipped.

Based on bioclimatic, floristic and phenological factors, two main types of forests have been recognized; dryland and edaphic forests. Dryland forests include evergreen, deciduous, mixed, coniferous and secondary forests, while edaphic forests include flooded, flooded secondary and mangrove forests. Based on durability and potential utilization tree species are economically classified in 4 classes; the luxury, first, second and third classes. In addition there are a number of tree species, which have been temporarily classified into another class pending evaluation of their potential uses.

The Department of Forestry and Wildlife (DFW) of Cambodia estimated that the forest resource in 1997 covered 10.59 million ha (3) or 58.41% of the total land area. Over the last 24 years (1973-1997) about 17% of the total forest areas have been lost due to civil unrest, over-exploitation, fast population growth, agricultural expansion and so on. Cambodia's forest resource will gradually disappear if no effective measures are taken to
reverse deforestation and to manage on a sustainable basis. Table 1 shows the changes in forest cover in Cambodia from 1973 to 1997.

Table 1 Changes in forest cover in Cambodia from 1973 to 1997

<table>
<thead>
<tr>
<th>Year</th>
<th>Dryland (million ha)</th>
<th>Edaphic (million ha)</th>
<th>Total (million ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973</td>
<td>11.68 (100)</td>
<td>1.03 (100)</td>
<td>12.71 (100)</td>
</tr>
<tr>
<td>1993</td>
<td>10.59 (91)</td>
<td>0.72 (70)</td>
<td>11.31 (89)</td>
</tr>
<tr>
<td>1997</td>
<td>10.16 (90)</td>
<td>0.43 (42)</td>
<td>10.59 (83)</td>
</tr>
<tr>
<td>Annual Change (1993-1997)</td>
<td>-1.1%</td>
<td>-7.2%</td>
<td>-1.6%</td>
</tr>
</tbody>
</table>

Source: Department of Forestry and Wildlife (DFW) (1997) and FAO (1996)

III Causes of deforestation

1. War

1) U.S. Bombardment 1965-1975

As early as 1965, U.S. B52 bomber aircraft secretly dropped bombs on targets located along the eastern border of Cambodia then known as the Ho Chi Minh Trail. At least 800 such missions were carried out in 1968. About 53,000 tons of bombs were dropped in 1972. U.S. fighter bomber activities continued until 1975 during which the highest intensity of bombing occurred from February to August 1973 in which 257,000 tons of bombs were dropped to a level of 3,600 tons per day (15). The eastern part of Cambodia (east of the Mekong river) contains around 4 million ha of forests of which 2 million were devastated by this intense bombardment. In addition continuous fighting between factions led by Lon Nol, president of the US-backed government, and the communist Khmer Rouge from 1970 to 1975 also contributed to the destruction of forests, mainly in Kampong Cham province (15).

2) Democratic Cambodia (Pol Pot) 1975-1979

Approximately 4 million Cambodian people were forced out of urban areas into the forests, mainly in the western part of the country during the Pol Pot regime. Based on an average size of 6 persons per family (15) and a land allocation of 2 ha per family, it has been estimated that 1.33 million ha of dense forest and at least 300,000 ha of edaphic forest were cleared and exploited for fuelwood.

3) Republic of Cambodia 1979-1989

Accidental and/or deliberate burning of forest for security reasons occurred during this regime, known as K5. It has been estimated that hundreds of thousands of hectares were modified to secondary forest or reduced to a form of savanna (12).

2. Impacts of Population growth

Population growth has been estimated to be 2.6% (2) in 1980-1990 period, and 3% (4) in 1991-1995 period, which resulted in the rapid demand for agricultural lands. The changes of forest cover in Cambodia in relation to the population growth from 1958 onwards is shown in figure 1. The rapid increase of population has continuously led to the increase of demands for fuelwood and agricultural lands.
1) Agricultural Expansion

The staple diet of Cambodia is rice. About 92% of Cambodians use either firewood or charcoal for their daily energy needs and about 85% of the population are involved in agricultural activities (3). With the population growth rate increasing faster than ever (3%) and rice production in recent years having stabilised or decreased (Table 2) the population had to increase the area of land cleared to provide more rice and other sources of food.

Table 2 Rice production and productivity in Cambodia from 1979-1992.

<table>
<thead>
<tr>
<th>Year</th>
<th>Rice production (million tons)</th>
<th>Productivity (ton/ha)</th>
<th>Population growth rate</th>
<th>Deforestation rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1979</td>
<td>0.54</td>
<td>0.77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>1.72</td>
<td>1.19</td>
<td>2.6</td>
<td>1.0</td>
</tr>
<tr>
<td>1981</td>
<td>1.49</td>
<td>1.13</td>
<td>2.6</td>
<td>1.0</td>
</tr>
<tr>
<td>1982</td>
<td>1.95</td>
<td>1.20</td>
<td>2.6</td>
<td>1.0</td>
</tr>
<tr>
<td>1983</td>
<td>2.04</td>
<td>1.26</td>
<td>2.6</td>
<td>1.0</td>
</tr>
<tr>
<td>1984</td>
<td>1.26</td>
<td>1.26</td>
<td>2.6</td>
<td>1.0</td>
</tr>
<tr>
<td>1985</td>
<td>1.81</td>
<td>1.25</td>
<td>2.6</td>
<td>1.0</td>
</tr>
<tr>
<td>1986</td>
<td>2.10</td>
<td>1.37</td>
<td>2.6</td>
<td>1.0</td>
</tr>
<tr>
<td>1987</td>
<td>1.81</td>
<td>1.32</td>
<td>2.6</td>
<td>1.0</td>
</tr>
<tr>
<td>1988</td>
<td>2.50</td>
<td>1.36</td>
<td>2.6</td>
<td>1.0</td>
</tr>
<tr>
<td>1989</td>
<td>2.67</td>
<td>1.43</td>
<td>2.6</td>
<td>1.0</td>
</tr>
<tr>
<td>1990</td>
<td>2.50</td>
<td>1.34</td>
<td>3.0</td>
<td>1.6</td>
</tr>
<tr>
<td>1991</td>
<td>2.40</td>
<td>1.39</td>
<td>3.0</td>
<td>1.6</td>
</tr>
</tbody>
</table>
Their activities included forest clearance and the exploitation of high quality trees such as Dipterocarpaceae resulting in a change in the dominant tree species in Cambodian forests to less valuable secondary species. In order to counteract this change an active management policy must be undertaken.

2) Reconstruction of war-damaged houses

The Khmer Rouge regime was terminated in 1979 by invasion from Vietnam. Most of the displaced population then returned to their home-towns. Houses, mainly of wood, were mostly destroyed during the war, and needed to be reconstructed or repaired. Wood for reconstruction was extracted from the forests. According to Chhay, 1970, a typical Cambodian family has 6 members, 62% of their houses were damaged (15) and 1 wooden house requires 18 m$^3$ of wood (10) and 4 million people needed to build around 416,665 houses then at least 7.5 million m$^3$ of wood was required. This represented a heavy load on the forest resources of Cambodia.

3) Shifting cultivation

In North east Cambodia where most hill-tribes occur shifting cultivation accounted for 2.5% of the land area each year. This means that 300,000 ha of forest was cleared for agriculture between 1958 and 1964 of which about 10,000 ha of dry Dipterocarp forest was converted into savanna each year due to uncontrolled fire (1). Political instability meant that further information was unobtainable.

3. Illegal logging

1) Domestic demand

As the political instability continues along the Thai-Cambodian border, various political factions need to fund weapon purchase, food supplies etc., in order to support their groups. This is frequently achieved by sacrificing the natural forest. Forest products are also needed to support the resettlement of dispossessed families and refugees. The rapid increase of logging companies in Cambodia clearly shows that forests are needed as raw materials to supply their factories. Amounts of 180,000 m$^3$ (7) and 385,000 m$^3$ (7) were found to have been cut illegally in 1996 and early 1997, respectively. Furthermore, about 92% of Cambodians use firewood and charcoal for cooking energy. In Phnom Penh, the demand for firewood has increased sharply since 1981 (Fig. 2).

![Fig. 2 Estimated firewood consumption in Phnom Penh (1981-1986)](source: Sing (1993))
2) External demand for Cambodian wood

Thailand possesses only 22.8% of forest cover of its total area with an annual change of -2.6% (4). Foreseeing the rapid decrease of its forests, Thailand imposed a national ban and canceled some 300 forest concessions in 1989. This and rapid economic growth (8-13% during 1988-1991) has greatly increased demand for Cambodian wood, including illegal shipments (16). Thailand’s log imports have increased sharply since 1989 (Fig. 3).

![Figure 3: Thailand’s log and sawn timber imports (1977-1991)](source: ITTO (1994))

Rapid economic growth (9.5% between 1995-1997) (8) and deforestation in Vietnam, to a large extent the result of war has dramatically reduced forest cover to 28% of its total land area with an annual change of -1.4% (4), increasing that country’s dependence on Laotian and Cambodian wood (16). Illegally exported logs and sawn timber from Cambodia to Thailand and Vietnam are shown in table 3.

<table>
<thead>
<tr>
<th>Year</th>
<th>Thailand (m³)</th>
<th>Vietnam (m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>378,000</td>
<td>250,000</td>
</tr>
<tr>
<td>1995</td>
<td>893,855</td>
<td>No data</td>
</tr>
<tr>
<td>1996</td>
<td>910,000</td>
<td>35,000</td>
</tr>
</tbody>
</table>


4. Forestry administrative system

1) Lack of trained human resources

The capacities of both central and provincial authorities to develop and implement management activities are greatly hampered by a lack of properly trained staff (1). This report also indicates that there are numerous obstacles to develop and implement rational resource management practices owing to the lack of trained human resources, funding, socioeconomic development and control of forest areas. There are only two forestry institutions i.e. RUA and PRLAS as mentioned in the first section, from which, respectively, only 17 students and 24 trainees graduated annually between 1985-1992.
2) Access and security

The transport infrastructure of Cambodia was partially destroyed during the recent war, with most of the damage affecting roads in the north and east. Since that period access to forest areas has not improved and this presents a major impediment to forest development. Relevant research and the conducting of fieldwork in Cambodian forests is hampered by difficulties in gaining access due to security problems. The first broad estimation on the frequency of minefields by the Cambodian Mine Action Center (CMAC) shows that 35 to 40% of forested areas could be classified as dangerous due to the presence of mines, political fighting or uncontrolled gang warfare.

3) Forest monitoring and control

Cambodia's forest management policies, as they are written, are sound. Actual practices are not sustainable. While forest concession contracts require forest cleaning and preparations for regeneration, there is no effective mechanism to enforce or monitor the terms of such forest concessions. In many parts of the country, logging rights are sold on an ad-hoc basis by those immediately in control of concession areas, generally without provisions, capabilities or interest in monitoring the long-term management of the land (14). As of April 1997, the exploitation of 6.333 million ha or about 65% of the total forest areas were granted to 24 logging companies (8).

IV Discussion and Conclusion

There are several reasons for deforestation in Cambodia. The rapid population growth is not only Cambodia's problem, but also of all other global areas. Although war was over, enrichment planting must be applied to the bombarded forest areas. The demand for food to feed Cambodia's increasing population will continue to exert pressure on forest lands. One possibility for overcoming this problem is an intensification of production on existing agricultural land. The development of human resources is of prime importance in order to achieve sustainable forest management in Cambodia.

In order to reduce the pressure on natural forests, the government should, as in other neighboring countries, focus on reforestation of depleted and degraded forest areas. According to Japan Forest Technical Association (JAFTA) (1993-1994) there are 1,025,070 ha of land potentially suitable for the development of plantations. The following species have already been planted in Cambodia: Tectona grandis, Pinus merkusii, Peltophorum spp., Hopea odorata, Dipterocarpus spp., Pinus khasya, Pinus massoniana (5). The fast growing species of Eucalyptus, Acacia, Albizia, Sesbania grandflora and various conifers that have been successfully planted in tropical areas should be adopted and introduced into Cambodia's plantations in order to relieve the pressure on the natural forests. Meanwhile, the market for plantation forest products must be established.

Foreseeing the danger to Cambodia's forests, the present government has concentrated its efforts on the management of forests on a sustainable basis. These efforts include the revision of present forest policy, the implementation of a forest inventory throughout the country, the development and strengthening of an educated human resource in forestry institutions and central and provincial forestry offices. A termination of round log exports has been established together with a call for support from international communities. The assistance from four international companies under the World Bank Technical Assistance Projects (TAP) in Cambodia has been elicited (Table 4).

Another aspect of the Cambodian government's policy to maintain and manage its forests lies in the establishment of National Protected Areas. Since 1993, 3.4 million ha (13) of forests have been designated as protected areas. This accounts for 18.8% of the total land area.

Table 4 International companies and their assignments under TAP

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Assigned</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illegal logging control and log verification</td>
<td>DAI</td>
<td>USA</td>
</tr>
<tr>
<td>Forest concession management</td>
<td>Fortech</td>
<td>Australia</td>
</tr>
<tr>
<td>Forest policy reform process</td>
<td>ARD</td>
<td>USA</td>
</tr>
</tbody>
</table>
Literature cited


