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Stream: Forests/Multiple Commons  
Discipline: Environmental Science

## **Mangrove Area Encroachment in Cambodia: Problems and Findings**

About 440 km of coastline covering 83,700 ha (Landset 1988-89/LUMA 1992) of mangrove forests are in dramatic threat of destruction in Cambodia. This is about 12,100 ha lesser than the 95,800 ha in 1970. Over the last few years, severe destruction attitude has been recorded in almost all of the mangrove areas and maximum exploitation has taken place. As mangrove forest is an extended landscape having no private ownership, and no management policy has been developed by the government, the people have open access to mangrove resources considering alternate resource of restricted inland forest, occupied by Khmer Rouge. Although, in compare with the national forest coverage in Cambodia, mangroves are not contributing significant support to environment or remarkable community support, the mangrove forest becomes very important for restoration of some fish species, refuge birds and some other important fauna and flora.

The study along with an *awareness program in restoration of mangrove forest* has found that a number of socio-economic, political and awareness issues are involved in mangrove destruction. Political instabilities along with dishonest opportunist people influence illegal activities resulting in heavy pressure on mangrove forest. The study documented, unusual restricted access to the nearby major common property, that is an inland forest; this forces local people to utilise the resources of the mangrove forest instead, leading to destruction of the resource. The paper will highlight the major problems involved with mangrove destruction in Kampot province, and impacts observed in a mangrove restoration program conducted by APHEDA, a humanitarian NGO supported by Australian Council for Trade Unions working with the assistance of provincial government.

Kampot is one of the three provinces that supports mangrove vegetation. About 7,300 ha of coastland in Kampot is covered by mangrove forest. It has been estimated that, in 1992-93 the mangrove forest declined by 50% due to over exploitation for firewood, expansion of salt beds and shrimp farming projects. It has been reported that 100,000 tons of mangrove timber was exploited in Cambodia in 1992, 10,000 tons of which was exported to Taiwan under a government contract (Asian Wetland Bureau 'AWB' seminar, Phnom Penh 1993). Obscure

management plans for mangrove forest preservation are one of the major factors, although the mangrove forest is under the protection of the decree "Creation and Designation of Protected Areas", signed by the King in 1993. The villagers along coast are compelled to destroy the mangroves for sale as firewood/charcoal to meet their day to day survival needs with the increased market price. In Kampot, about 87% (150 ha) of the standing mangrove resources from three villages and 67% (231 ha) from one district had been destroyed by 1992-93. The reasons for this dramatic destruction have been blamed on the following issues:

- Local poor people did not have any dependable source of income after the long civil war
- There was a sudden marketing scope for fire wood and charcoal
- People were afraid to go to the inland forests for firewood collection because of landmines. As a result, the mangrove forests become the only source for local and adjacent villagers.
- There was sudden expansion of salt beds and shrimp projects after the war

It has been identified, that the lack of awareness among the various groups of people resulted in inappropriate and damaging practices and policies. A program has been undertaken to educate local people, community leaders and government officials to develop a better understanding about the usefulness of mangrove forest and the alternative uses. A **baseline survey** report on 26 coastal villages identified eleven main problems and thirteen associated causes responsible for above problems. The problems are:

1. Food Shortage
2. Infertile soil
3. Lack of fertiliser supply
4. Insufficient income
5. Reduced crop production
6. High percentage of widows
7. Lack of security against KR and bandits
8. Flooding
9. Low fish catch
10. Lack of clothing
11. Bad housing condition

Food shortage has been identified as the main problem within 21 villages. Soil infertility has been reported from three villages, and households from eleven villages referred to the insufficient land ownership that influences use of mangrove resources.

Thirteen causes have been identified as associated with the above problems:

1. Restricted access to the inland forest
2. Inadequate land ownership and limited farming land
3. Coastal environment not suitable for rice farming
4. Widows have no source of income
5. Thieving by bandits and Khmer rouge
6. Poor rice production
7. Limited local resources
8. No employment opportunities
9. Impact of salinity

10. Less scope for animal husbandry
11. Tiredness due to long social unrest
12. Large family size
13. Low literacy levels

Restricted access to the inland forest due to presence of land mines and Khmer Rouge, less employment opportunity, tiredness due to long social unrest, limited local resources and low level of literacy and knowledge, have been identified as the main causes of problems.

The survey also identified seven main uses of mangrove:

- Selling mangroves for income in various ways
- Use of mangroves as firewood for family cooking and palm sugar refining
- Use of mangroves for house construction (pole, shelter etc.)
- Use as fencing materials for agricultural farm, households, salt bed and shrimp projects
- Use for fishing (false shelter, sticks for hooks and line fishing)
- Use for poultry cage
- Clearing for salt bed and shrimp culture expansion

The most common use of mangrove is for firewood, which is the result of restricted access to the usual source; that is the land forests. Coastal people need firewood for two main reasons; one for cooking food and other for extracting palm sugar. Other uses are fencing of households, selling for income, poles or shelter leaves for house construction, poultry cages, fishing instruments and digging channels for salt fields. Major clearing of mangroves had also taken place for extensive shrimp culture, crops and salt beds. It has been observed in a recent survey in four coastal villages, about 40 kg/month firewood, valued 7500 riel (US\$2.2) is needed by a family.

An **awareness program** focusing on long-term ecological damage resulted from mangrove destruction has been outlined in relation to the importance of livelihood conditions of coastal villagers. Representatives from different departments and organisations from the districts, communes and village leaders, teachers, monks, imams and other community leaders were invited to provincial workshops. Fifteen people from each village were included in the village-level workshops. The following three issues were discussed deliberately in the workshops:

- Ecologically preferable alternate cooking fuel and stoves
- Relationships between mangroves and other resources
- Contribution of mangroves in restoration of local as well as global environment

An educational cartoon booklet, colourful posters, leaflets, stickers and t-shirts were distributed among the villagers. Documentary video on mangrove conservation was displayed in different community centres. A special workshop was organised for local teachers for transferring the information to students.

A **pilot plantation program** was undertaken to demonstrate and to motivate people for mangrove restoration and regeneration. Locally available *Rhizophora mucronata*, *Rhizophora apiculata* and *Xylocarpus granatum* seeds were planted in mid (June-July) 1995. The survival rate is 70%, and average growth rate for *R. mucronata* is 1.2m, ranging from 0.7m to 1.4m,

for *R. apiculata* is 1.7m, ranging from 1.4m to 2.3m and *X. granatum* is 0.5m, ranging from 0.4 to 0.7m by 30 months. The canopy and rooting of *R. mucronata* observed to be better, while *X. granatum* shows unexpected lower growth rate. The pilot plantation program motivated people tremendously in the restoration of mangroves around the planted area, Koh Smao island. No encroachment has taken place in the planted island during last thirty months, since plantation taken place. Although it is difficult to prevent poor people, who are living below poverty level, from mangrove destruction, the mangrove restoration program has created significant interest among the coastal villagers.

The results of the **evaluation workshop**, attended by 67 villagers from 17 villages, organised in December 1996 suggested that overall destruction of mangrove forests reduced by 50% in 14 villages. Representative from three villages reported a worsening situation than before. Almost all participants responded well about environment and importance of mangrove vegetation in maintaining sustainability. Only the restriction on open access to the main forest forced the poor people to destroy mangroves for firewood or other day to day needs. Salt producers and the shrimp culturists tend not to care for mangrove restoration. The workshop recommended:

- More pilot plantation plots in different locations
- Assistance for civic and domestic plantation
- Special monitoring responsibility to the village and commune chiefs

Following the recommendation, a civic and domestic plantation program in twenty-six mangrove villages has undertaken for 1997-98, and sixty thousands *Acacia auriculiformes* saplings were distributed to the coastal villagers free of charge following a workshop named "*Nursing of Planted Saplings*" in late 1997.

A random survey in late February 1998 in four mangrove villages suggests that mangrove destruction has been reduced by more than 80%. With a few exceptions almost all poor people now collect firewood from the inland forest as there is now no Khmer Rouge present there. It has been found that around fifty families (25% of average households) from each village need to collect firewood from any of the common property resources either for household consumption or for income. A group discussion of 17 people from the four villages estimated the average value of firewood collected by one village @40 kg/household/month (equivalent to US \$110), and total consumption per village per month is around 2 metric tons. It has been found that, traditionally villagers who used to collect firewood from the inland forest those were forced to the mangrove forest only because of long war and restricted access to the forest.

Following the above estimation, it has been found that only about 624 mt/year, (valued US \$34,320) firewood had been exploited by 26 villagers from 7,300 ha of mangrove forest as a result of the political situation. Such a severe pressure on the critical mangrove environment is, therefore, an outcome of the restricted access to a large inland forest.

The findings of this program suggested the need for *an integrated management policy* for all similar resources existing in a specific geographical area with the consideration of community needs and rights. It is important to consider a thorough study for all other critical resources existing nearby the targeted resource area, before declaring or approving a decree for reserve and/or for national forest, or for sanctuary program in the name of resource conservation. It

has also been suggested that the study should consider socio-economic impacts on local communities resulting from restrictions imposed by the conservation policy. The study should have clear indication about whether alternate sources of restricted resources are available for community use without creating a new threat to other similar resources. Otherwise, there is a chance for severe over-exploitation, even might be an endanger and or a rare situation for different species could be occurred in a smaller but very important adjacent resource area resulting from conservation policy for a larger resource area.

**Acknowledgement:**

This paper is the result of APHEDA's commitments in restoration of environment assisted by *AusAID* and Australian Council for Trade Unions(*ACTU*). I would like to thank APHEDA authority for providing me the opportunity to work in this specific field and for encouraging me to present this paper. The contribution of Kampot Department of Agriculture, Forestry and Fisheries was essential in realising the importance of mangrove resources in time and continuous assistance in program implementation.