THREATS OF MANGROVE FLORA AND THE MANAGEMENT ACTIONS; A CASE STUDY IN KALUWANCHIKUDY AREA.

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ABSTRACT: Mangroves are the valuable resource estimated the extent of 8,000 hectares in Sri Lanka, of these, about 1421 hectares occur in Batticaloa District including Kaluwanchikudy area. The dominant mangroves present in this area are *Excoecaria agallocha, Sonneratia caseolaris, Acrostichium aureum, Pandanas tectorius, Cerbera odollam, Thespesia populnea and Ceriops tagal*. At present, the mangrove stands in Kalawanchikudy area are threatened by anthropogenic activities including mangrove deforestation.

The study was carried out at Kaluwanchikudy area to assess the impact of mangrove destruction with a view to propose management activities for the mangroves in this area. This study included the collection of primary and secondary data, the primary data has been collected through questionnaire survey with the stakeholder parties of the mangroves in the area including fishermen and other persons. The secondary data with respect to land use patterns and the extent of mangroves has been collected from maps, internet based surveys and Forest Department. MS Excel and GIS software were used for the study.

Based on the study, management actions for the mangroves in Kaluwanchikudy area are proposed, these include declaration of mangrove protected zones, restoration of mangrove denuded areas, launching mangrove re-plantation programs, and holding public awareness programs to stakeholder parties in the area including fishermen community and school children on the importance of mangroves.

Keywords: Mangroves, Deforestation, Survey, Restoration, Anthropogenic

1. INTRODUCTION

Mangroves are various large and extensive types of trees up to medium height and shrubs that grow in saline coastal sediment habitats in the tropics and subtropics. The mangrove flora ecosystem occurred Lagoons and Estuary, they were mostly found on the small islands of the lagoons that is True mangroves (NECCEDP, 2010).

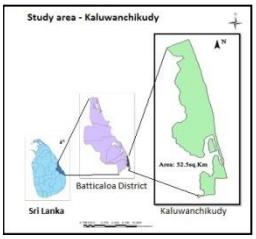
The mangrove ecosystem is composed of two main parts, the terrestrial component and aquatic components. The aquatic part is also composed of marine and freshwater components, which cover along the bank tropical and subtropical rivers and coastline in the South, South-east and many other parts of the world (Kaleel, 2013).

According to this, the amount of mangroves in Sri Lanka rated about 8,000 hectares. The world has 64 types of true mangroves but, this unique ecosystem is home to over 20 true mangroves and the mangrove

associates species of Sri Lanka. They remained about 8,000 hectares ground now. In these lands, we can see about 1,421 hectares in Batticaloa district including Kaluwanchikudy (CC&CRMD, 2014).

Less population area in the Eastern and the Northern west part of Sri Lanka has the highest amount of mangroves. They grew only a few hectares in the total lands of Sri Lanka. It has very less when compare with Thailand, Malaysia and Indonesia.

2. STUDY AREA



The study was based on Kaluwanchikudy, the partial area of Batticaloa, situated in South East part of Batticaloa district. This is in the North latitude 7° 31' 3" and the East longitude 81° 47' 13". It consists of 45 Grama Niladhari divisions and its population is 59,450 and consists of 15,466 families. It has an extent of 52.5 Sq.Km.

3. OBJECTIVES

- ✓ Identifying the mangroves flora and its destruction of the study area
- ✓ Finding the reasons of mangrove destructions in the study area
- ✓ Formulating the solution of this problems in future generation

4. METHODS AND MATERIALS

4.1. Primary Data

Required data and information related to Mangrove flora has been collected from the primary and secondary data sources. Sampling method has been used to collect primary data. Fifty samples have been collected by Questionnaire survey. These 50 samples were distributed to different stakeholders as follows; 20 government officials, 20 fisher man and 10 farmers. The lagoons area was observed by naked eye and identified the changes of a few years with stored data.

4.2. Secondary data

Secondary data has been collected from Forest Department report, Coastal Resource Management Department report, Census report of Sri Lanka, images, and published research reports.

4.3. Data Analysis

To examine the diminishing of Mangroves by flood, rainfall for the period of 10 years obtained from Meteorological department were analyzed. MS Excel, and GIS software were used for the study.

5. RESULTS AND RECOMMENDATIONS

The extent of mangroves in Sri Lanka is small compared to those Asian countries. Not only the area of mangroves in Sri Lanka is small, but also the mangrove extend as a percentage of available land is lowest in the region. That means there is plenty of non mangrove land available for agriculture and development projects (Kaleel, 2013).

The lagoons area has been remained some different kinds of species including mangroves. The comment of people around 70%, nowadays, density of *Sonneratia caseolaris, Excoecaria agallocha* was highest in all these sites when compared with other species like, *Cerbera odollam, Acrostichium aureum, Pandanas tectorius and Thespesia populnea*. *Excoecaria agallocha* has poisonous latex exudates, which produce skin rash in humans when it touched. This poisonous plant is not popular for firewood, since the smoke is harmful to humans. Their leaves were not preferred by animals or livestock. This may be the reason for high density of *Excoecaria agallocha* in the study areas. The people use the *Sonneratia caseolaris'* fruit to eat and make the juice, they sold them on the road side and earn more money.

5.1. Identified Mangroves Flora

		
Cerbera odollam	*Excoecaria agallocha*	*Acrostichium aureum*
		
Sonneratia caseolaris	*Pandanas tectorius*	*Thespesia populnea*

(Source: Field visit in Kaluwanchikudy area, 2014)

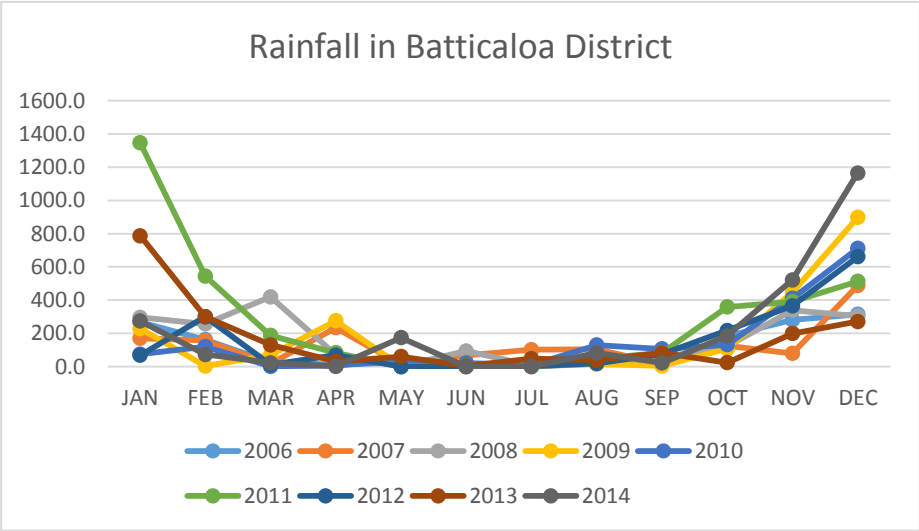
According to the sample, 69% told, the density of mangrove species like, *Cerbera odollam, Pandanas tectorius and Thespesia populnea* and saplings were low in Onthachimadam, Kurumanvely and Periyakallar area. Two main reasons were noted. Firstly, impacts of tsunami and flood had destroyed mangrove cover. Secondly, pre-tsunami clearances of certain portion of mangroves by people as mangroves were thought as

sites for mosquito breeding and hiding place for thieves (CC & CRMD, 2014).

Then, they use these areas to dump the garbage and grazing the livestock such as cow, goat. In addition, they cut the barks to get the color for their fishing nets. The major problem is inadequate protection and the administrative failure (Kaleel, 2013).

Most of the stumps were not allowed to regenerate due to repeated cutting (during rainy days) and burning (during dry periods) for security reasons, this in turn prevents natural regeneration of mangroves. It appears, some people took advantage of the security situation for uncontrolled cutting and felling of the mangroves. Moreover, encroachment took place by means of cutting mangroves, fencing and they used them for farming and cultivation. These activities seriously threaten biodiversity of mangroves (Kaleel, 2013).

Figure 1. Rainfall in Batticaloa



High rainfall caused to the flood. The Rainfall trends (Figure 1) clearly show the differences of annual changes, and monthly changes. According to this, we experienced the huge rainfall in January 2011, 2013, December 2009, 2014 because of the climate change. During this period, we had experienced high flooding caused to the mangrove destruction

Koddaikallar, Onthachimadam and Mahiloor area's past and present Google Earth images are given below to identify the changes in between 2006 and 2014.

Figure 2. Changes of Mangroves

(Source: Google earth pro, 2015)

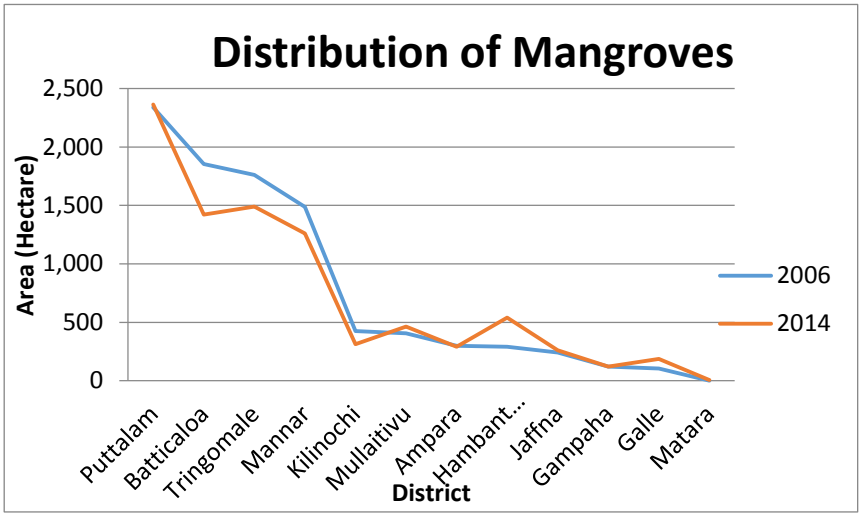
Mangroves forest diminished by 434 ha in Batticaloa, the main cause of this is the human activities as well as the natural disaster especially flooding.

Table 1. Distribution of mangroves

District	Area (Hectare)	
	2006	**2014**
Puttalam	2,338	2,364
Batticaloa	1,855	1,421
Tricomalee	1,762	1,491
Mannar	1,486	1,261
Kilinochi	424	312
Mullaitivu	405	463
Ampara	299	292
Hambantota	292	539
Jafna	242	260
Gampaha	121	122
galle	104	187
Matara	1	6
Total	**9,330**	**8,718**

(Source: Coastal Conservation and Coastal Resource Management Department – 2014)

Figure 2. Distribution of Mangroves



The study has been identified, mangrove is important for the bio eco-system and the study suggests some solution to protect mangroves for the reason of smooth functioning of ecosystem at this area. It is required to take following measures;

1. Mangrove restoration
2. Prevention of habitat destruction through legislation
3. Creating awareness programs (School, University & Society level)
4. Mangrove re-plantation
5. Create the rehabilitation for destroyed mangroves
6. Declare as a protected zone
7. Maintain with public support especially fisherman.
8. Increase the fish production.
9. Do the competition to the students (Art, Essay)

5. CONCLUSION

Mangroves are of particular significance in the context of coastal forests. Mangroves in Sri Lanka are the wealth of our nation. It provides many resources us in many ways. When we increase the growth of mangroves, we can also improve the tourism. In addition, the fishing is the main purpose of the fisherman, they are constantly sustaining the mangrove resources. Recently, Human activities and the natural disaster interferes the mangrove forest environment of Sri Lanka (Kaleel, 2013).

Although this area has the largest mangrove tracts in the district and this region is seen as a centre for mangrove diversity, this is also the area in which the rate of loss of mangroves in recent areas. Less than half of the original extent of mangroves remains in area today. As a result, mangroves are most threatened ecosystems in the area. The following major issues are subjected to threads caused to Mangroves in Kaluwanchikudy area.

Mangroves have poor capacity to regenerate again in the cleared area over the last two decades. The overall tree density was low in Onthachimadam, Mahiloor and Kurumanvely when compared with other sites due to pre and post tsunami and flood impacts. The substratum for the establishment of mangroves was yet to be developed in a reasonable stage. Therefore, measurer must be taken to protect the mangrove forest in our country by the government of Sri Lanka, NGOs and environmental well-wishers.

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