

GIS BASED ASSESSMENT OF COCONUT VEGETATION IN THE POLLACHI TALUK: A CASE STUDY

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Introduction

Coconut palms are grown in most of the zones except subtropical and temperate regions, which include 19 states and three union territories in India. Nearly 48-50 per cent of the total area is under coconut cultivation in Kerala, followed by Karnataka, Tamil Nadu and Andhra Pradesh which all together accounts for 90 per cent of total area under coconut cultivation in the country. In Tamilnadu, coconut farming is a major cultivation practice in Coimbatore, Thanjavur and Dindigul districts. Among others, Pollachi taluk in Coimbatore district is well known for coconut cultivation as the land cover in this zone is fully occupied by coconut groves. Further the coconut crop in this region contributes more for the district's as well as state's exchequer. Several changes have been noticed in the land cover and the vegetation status in these areas over the years due to mushrooming industries and also the sporadic outbreak of diseases especially the *Eriophyte* infection in the coconut palms along with erratic monsoon.

In this situation, inventorying coconut vegetation becomes relevant to know its distribution and status in this part of the country. Surveying the extent of coconut vegetation using manual techniques appears cumbersome and hence it is planned to adapt the remote sensing technology for this study. Remote Sensing (RS) plays a significant role in providing geo-information in a spatial format and also in determining, enhancing and monitoring the overall capacity of the earth (Navalgund *et al.*, 2000). Remote sensing data could be used for a number of applications, such as crop inventory and forecasts; drought and flood damage assessment; land use monitoring and management, etc. Using GIS, data can be accessed, transformed and manipulated interactively. The data thus generated serves as a test bed for studying environmental processes or for analyzing the results of trends, or of anticipating the possible results of planning decision (Kulkarani *et al.*, 2001). Considering the importance of RS and GIS in natural resource management, the present study aimed at mapping of coconut vegetation in the Pollachi taluk, Coimbatore using GIS and the information collected

through ground survey. The present study has been proposed in the Pollachi taluk, Coimbatore district, Tamilnadu with following objectives.

- To prepare the thematic map for the land cover in the selected area.
- To document the extend of coconut groves using RS & GIS
- To map land cover and inventorying to detect land cover changes over the years using RS &GIS.

Methodology

Study area

The study area, Pollachi taluk is located in the southern part of the Coimbatore city around 40 kilometers from downtown of Coimbatore with the latitudinal and longitudinal extent of $10^{\circ}40'N$ to $10.67^{\circ}N$, $77^{\circ}01'E$ to $77.02^{\circ}E$ respectively (Fig. 1). This is the second largest taluk in the district after corporation of Coimbatore with a spread over an area of 254 Sq. Km and 292.5mts above MSL It comprises 3 taluks 3 zones, 12 firkas and 132 villages. Agriculture is the major occupation in this area. Located at the foot hill area of Anamalai hills of Western Ghats, Pollachi is very well known for the luxuriant coconut vegetation. Coir-fibre and curled-coir manufacturing is an important industry in Pollachi. It has a pleasant climate influenced by both north east and south west monsoons throughout the year.

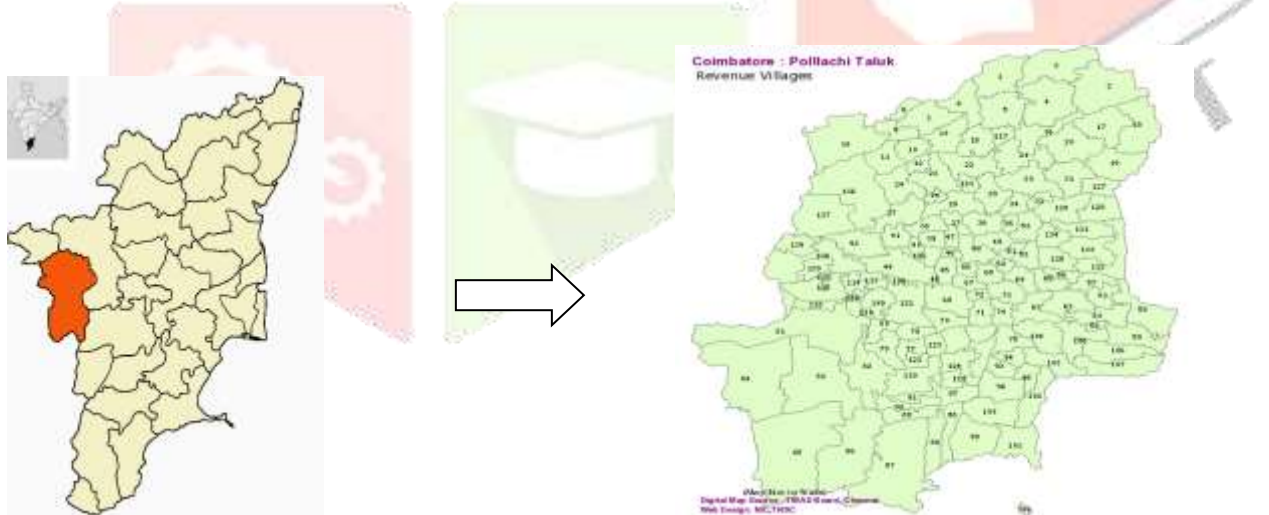


Fig. 1. Pollachi taluk base map.

Collection of ground truth

The proposed work involved two main phases. In the first phase, a broad classification of the general land cover, especially the coconut vegetation was made. Five different blocks viz. Kovilpalayam, Ramapatnam, Kottur, Pollachi south and Anamalai were selected (Fig. 1) and the data for the distribution of coconut farm in

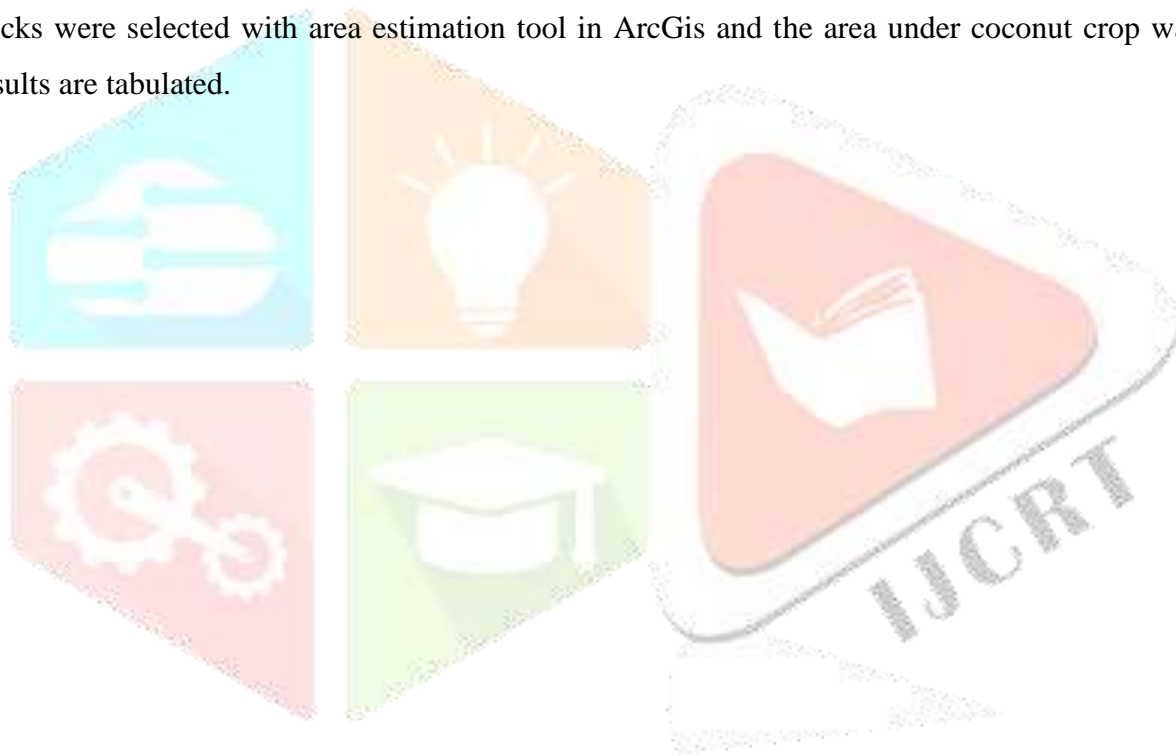
these areas were collected for the period 2004-2005 (Table 1). In the second phase, mapping coconut farms and detection of changes in the selected blocks over the years were made by RS & GIS.

Acquisition of satellite data

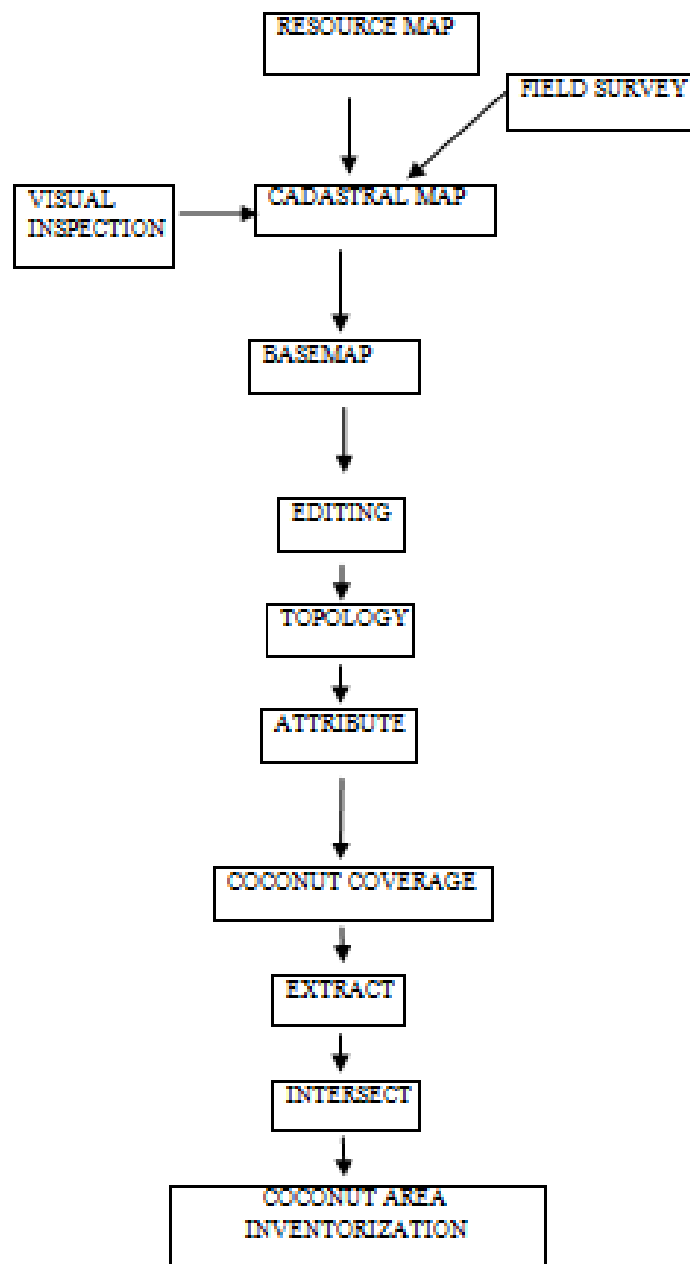
The extent of coconut forms were mapped using Landsat 8 imagery. The imageries for the selected blocks were acquired online from ArcGis online software (<http://www.arcgis.com>).

Mapping and coconut area calculation with ArcGIS

The general methodology for the mapping of coconut vegetation is illustrated below. In this study, Landsat 8 imageries for the selected blocks in Pollachi taluk were processed with ArcGis. The basemap generated for the blocks were selected with area estimation tool in ArcGis and the area under coconut crop was computed. The results are tabulated.



Flowchart of Coconut Area Analysis in a GIS Environment



Results and discussion

The ground data collected for the distribution of coconut vegetation in the Pollachi taluk in the five blocks viz. Kovilpalayam, Ramapatnam, Kottur, Pollachi south and Anamalais are given in Table 1. The data computed using ArcGis for the distribution of the coconut vegetation in the same five blocks are given in Table 2.

The Landsat 8 satellite imageries selected for the 16 villages in the five blocks are given Figs.2-6. The distribution of coconut farms can be quantitatively estimated in free polygons. The major regions which are

covering the coconut plantations are expressed in hectares and the extent of coconut plantations are expressed in such major region are clearly marked. Villages' level distribution of coconut plantation is also expressed. The maps generated can give clear information to find out the villages which are accounting more coconut vegetation.

As per the decade old ground data for the distribution of coconut vegetation (Table 1), the total area of coconut vegetation at that time was reported to be 6390 ha. Ramapatnam block exhibited more area of coconut farms (1834 ha) followed by Kottur (1429 ha), Pollachi south (1142 ha), Anamalai (1090 ha) and Kovilpalayam (895 ha). Among the 16 villages covered more coconut farms were present in Servaikaran palayam (643 ha) and the minimum extent was observed in Sulakkal (400 ha).

The data (Table 2) observed by interpreting the Landsat 8 imageries using ArcGis showed that there has been a large scale reduction in the area of coconut vegetation in all the blocks selected for the study. At present, the maximum area of coconut vegetation is reported in Pollachi south (302.8 ha) followed by Kottur (293.1 ha), Anamalai (262.0 ha), Ramapatnam (206.0 ha) and Kovilpalayam (78.4 ha). It is noticed that the coconut farms are dwindled to a larger extent during the last 10 and more years. It is further assured by ground truth assessment. Most of the coconut farms are converted in to various structures including residential area. The total area of coconut farms at present available in five blocks studied is only 1142.3 ha. It is alarming to compute that 5247.70 ha of coconut farms have been wiped out and a drastic change is reported in the landscape in these areas (Table 3).

Table 1. Ground data collected for the distribution of coconut in different blocks of Pollachi taluk during 2004-2005.

Block No./Name	Village name	Ground data collected on coconut area (in hectare)
I. Kovilpalayam	Sangarayapuram	155.0
	Sulakkal	400.0
	Devarayapuram	340.0
	Total	895.0
II. Ramapatnam	Poravipalayam	548.0
	Servaikaranpalayam	643.0
	Vadakkipalayam	643.0
	Total	1834.0
III. Kottur	Thorayur	355.0
	Kambalapatti	608.0
	Pillichinampalayam	237.0
	Kariyanchettipalayam	229.0
	Total	1429.0

IV. Pollachi South	Thondamuthur	354.0
	Veeralapatti	191.0
	Palayur	165.0
	Samathur	432.0
	Total	1142.0
V. Anamalai	Anamalai	470.0
	Pethanaickanur	620.0
	Total	1090.0

Table 2. Area of coconut vegetation computed for different blocks of Pollachi taluk using ArcGis software.

Block No./Name	Village name	Coconut area calculated by ArcGIS (in hectare)
I. Kovilpalayam	Sangarayapuram	2.9
	Sulakkal	32.9
	Devarayapuram	42.6
	Total	78.4
II. Ramapatnam	Poravipalayam	15.2
	Servaikaranpalayam	163.1
	Vadakkipalayam	28.3
	Total	206.6
III. Kottur	Thorayur	204.3
	Kambalapatti	39.8
	Pillichinampalayam	11.3
	Kariyanchettipalayam	37.7
	Total	293.1
IV. Pollachi South	Thondamuthur	28.1
	Veeralapatti	42.6
	Palayur	24.4
	Samathur	207.7
	Total	302.8
V. Anamalai	Anamalai	154.8
	Pethanaickanur	107.2
	Total	262.0

Table 3. Comparative status of the area of coconut vegetation.

Block No./Name	Village name	Ground data collected on coconut area (in hectare)	Coconut area calculated by ArcGIS (in hectare)	Decrease in area (in hectare)
I. Kovilpalayam	Sangarayapuram	155.0	2.9	152.1
	Sulakkal	400.0	32.9	367.1
	Devarayapuram	340.0	42.6	297.4
	Total	895.0	78.4	816.6

II. Ramapatnam	Poravipalayam	548.0	15.2	532.8
	Servaikaranpalayam	643.0	163.1	479.9
	Vadakkipalayam	643.0	28.3	614.7
	Total	1834.0	206.6	1627.4
III. Kottur	Thorayur	355.0	204.3	150.7
	Kambalapatti	608.0	39.8	568.2
	Pillichinampalayam	237.0	11.3	225.7
	Kariyanchettipalayam	229.0	37.7	191.3
	Total	1429.0	293.1	1135.9
IV. Pollachi South	Thondamuthur	354.0	28.1	325.9
	Veeralapatti	191.0	42.6	148.4
	Palayur	165.0	24.4	140.6
	Samathur	432.0	207.7	224.3
	Total	1142.0	302.8	839.2
V. Anamalai	Anamalai	470.0	154.8	315.2
	Pethanaickanur	620.0	107.2	512.8
	Total	1090.0	262.0	828.0



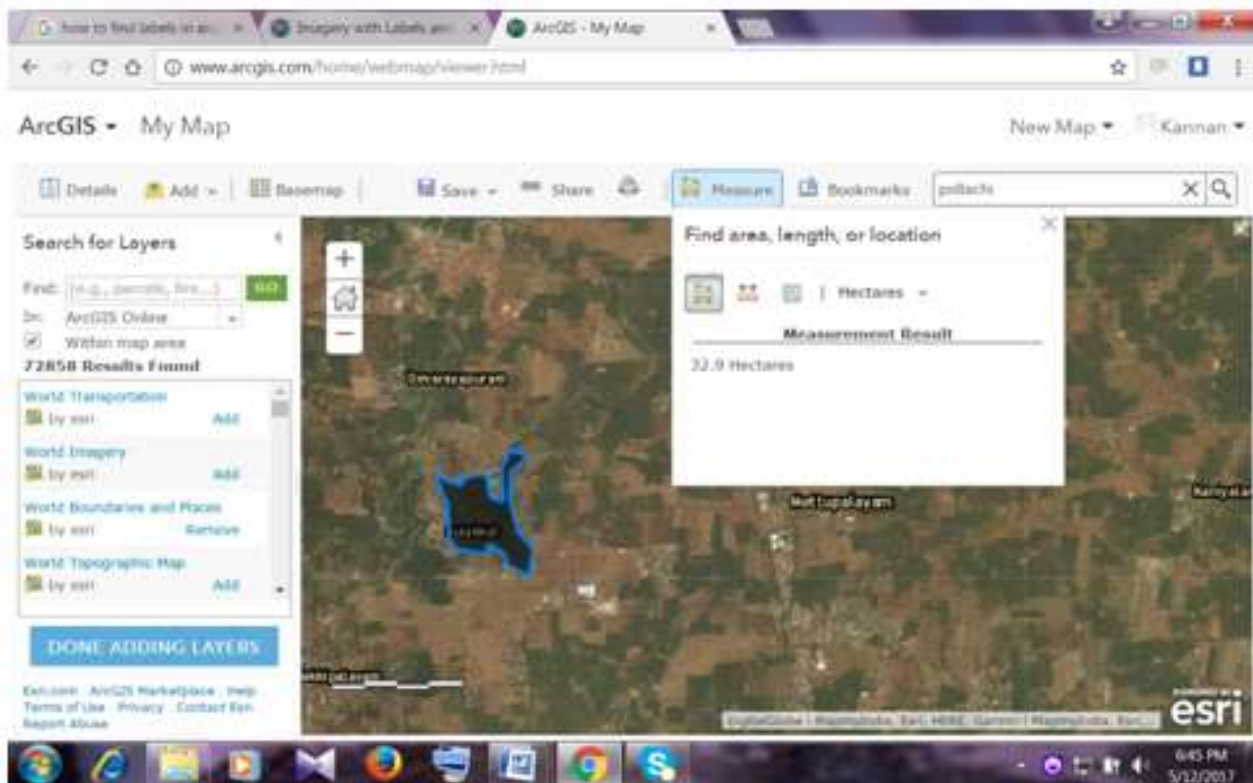
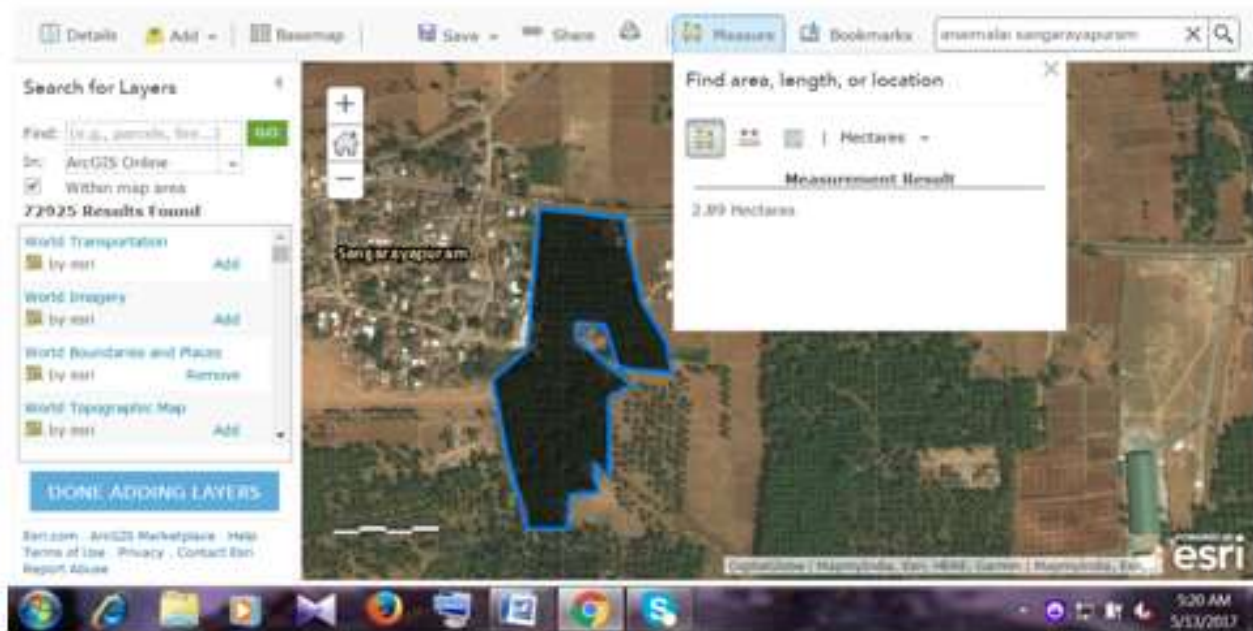


Fig.2. ArcGis Landsat 8 image for the distribution of coconut vegetation in Kovilpalayam block of Pollachi taluk

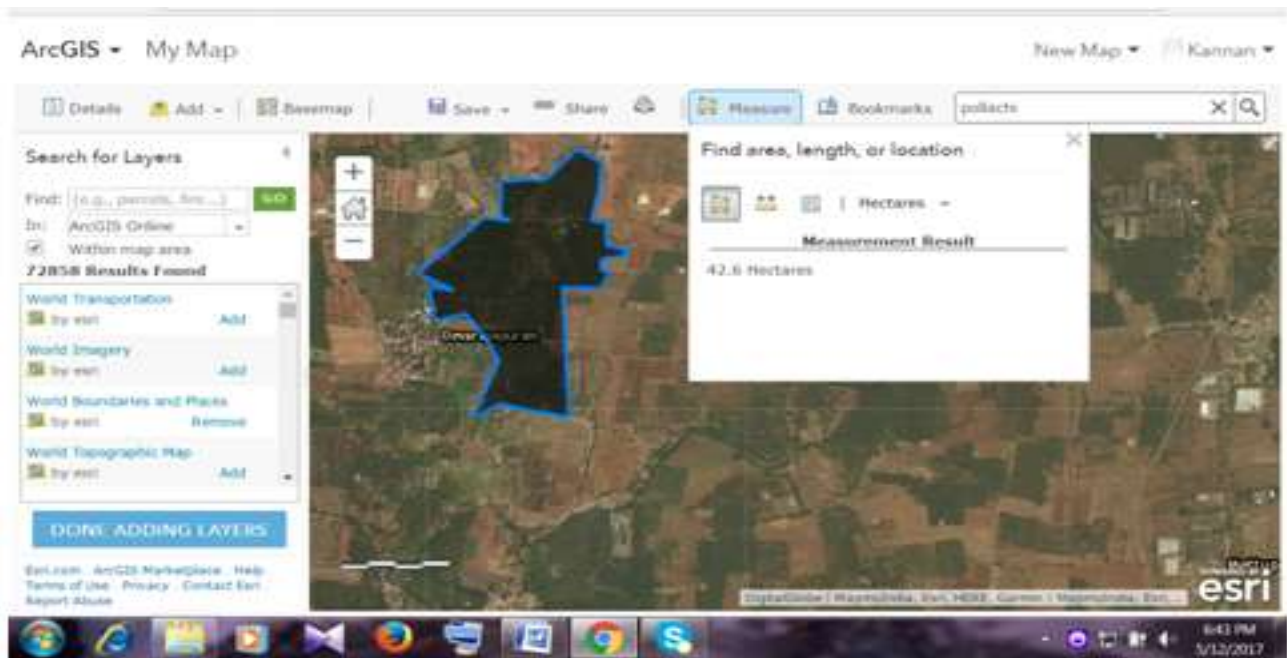


Fig. 2a ArcGis Landsat 8 image for the distribution of coconut vegetation in Kovilpalayam block of Pollachi taluk.



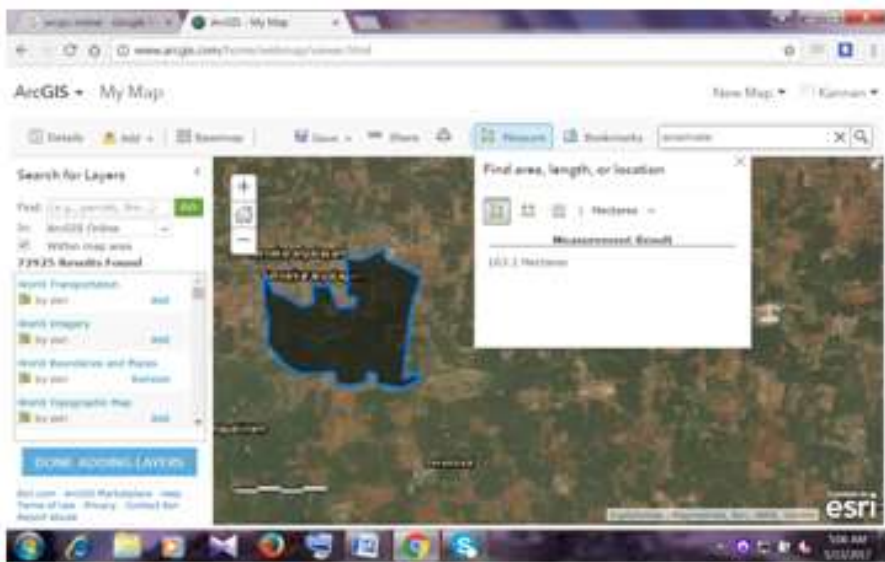
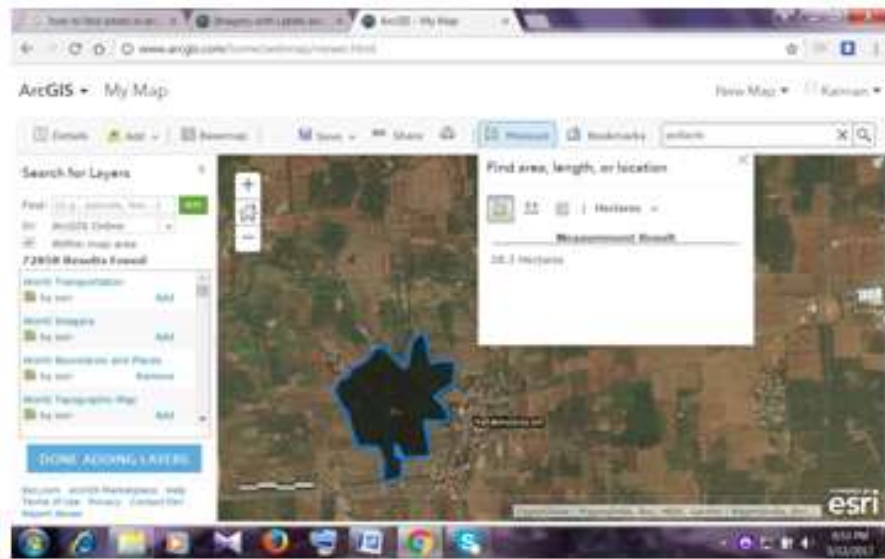


Fig. 3. ArcGis Landsat 8 image for the distribution of coconut vegetation in the Ramapatnam block of Pollachi taluk.

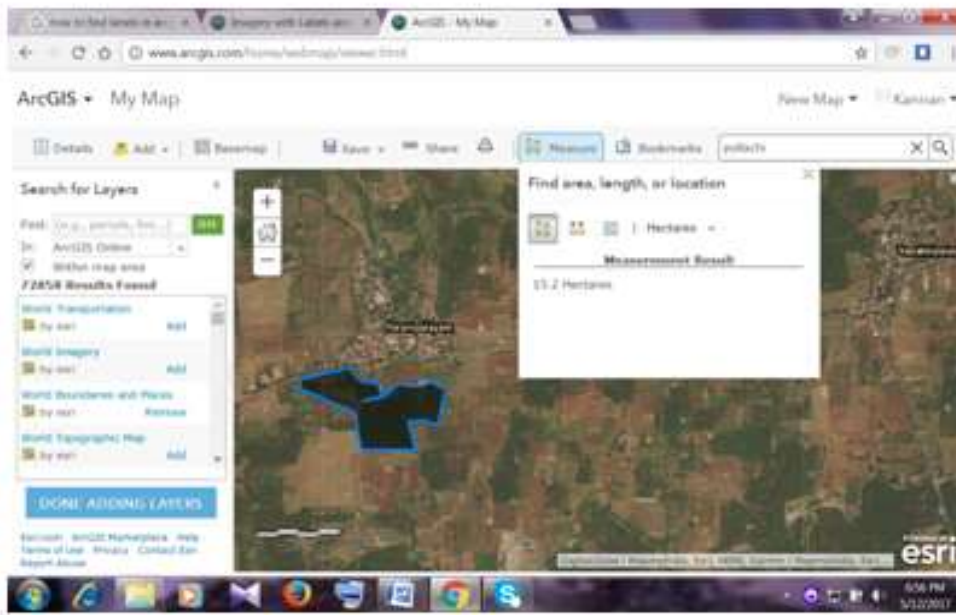


Fig. 3a. ArcGis Landsat 8 image for the distribution of coconut vegetation in the Ramapatnam block of Pollachi taluk.



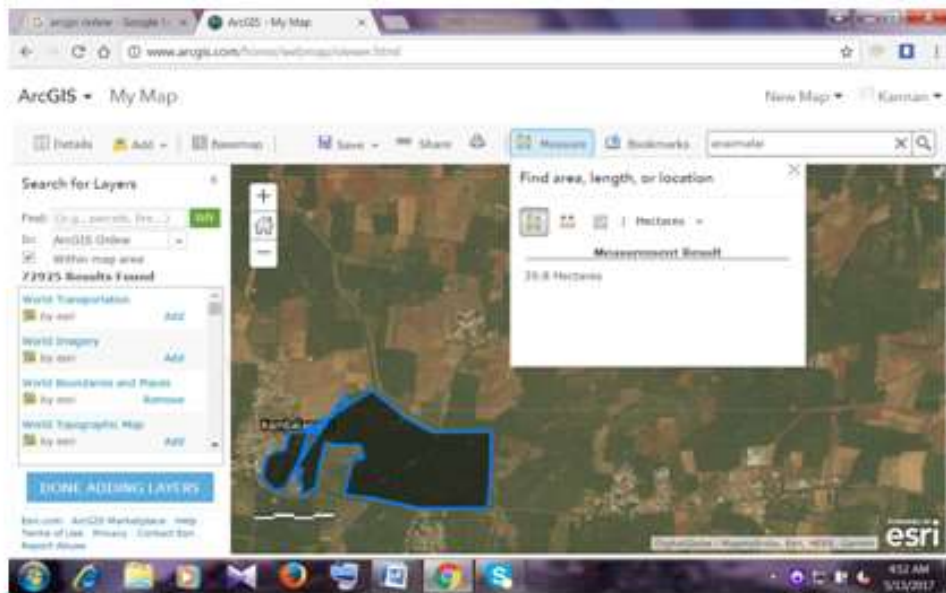
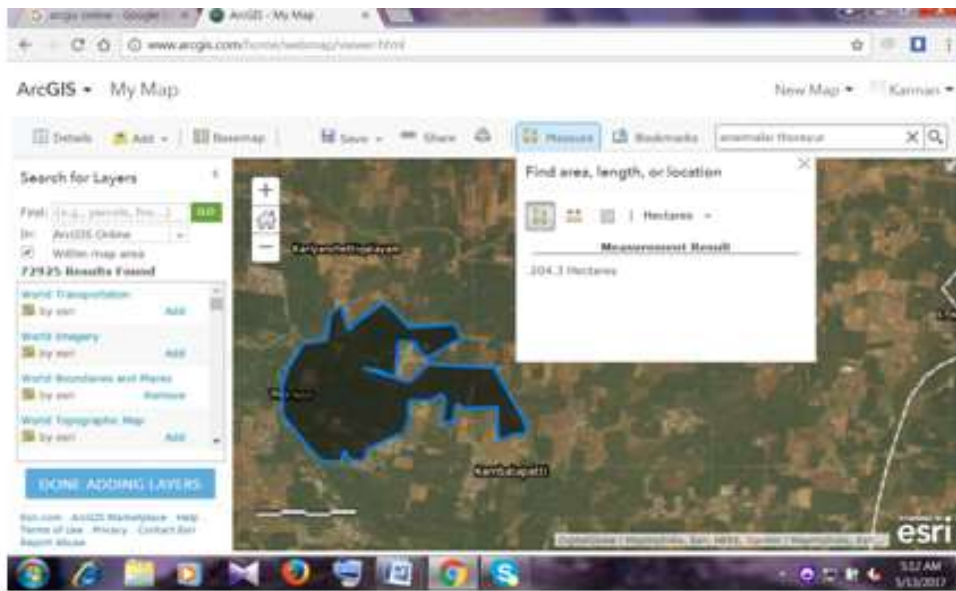


Fig.4. ArcGis Landsat 8 image for the distribution of coconut vegetation in the Kottur block of Pollachi taluk.

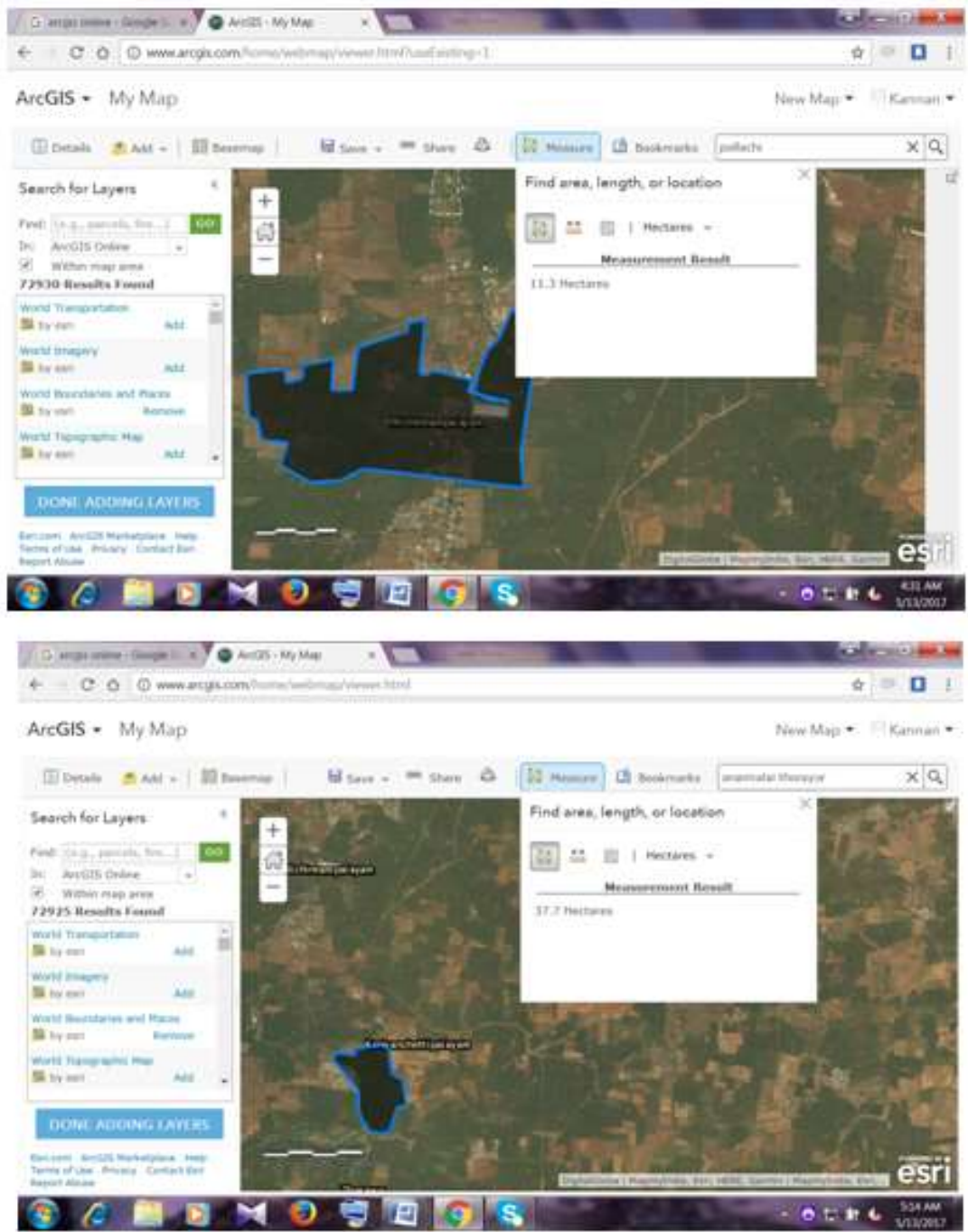


Fig. 4a. ArcGis Landsat 8 image for the distribution of coconut vegetation in the Kottur block of Pollachi taluk

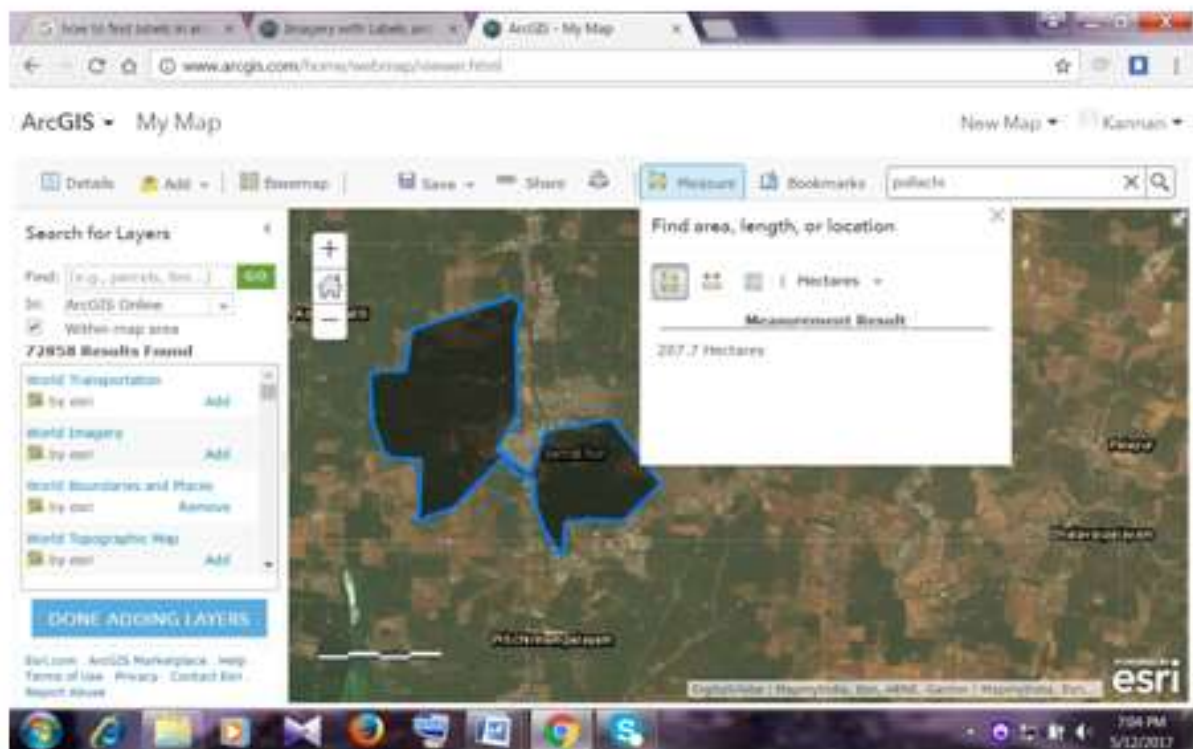
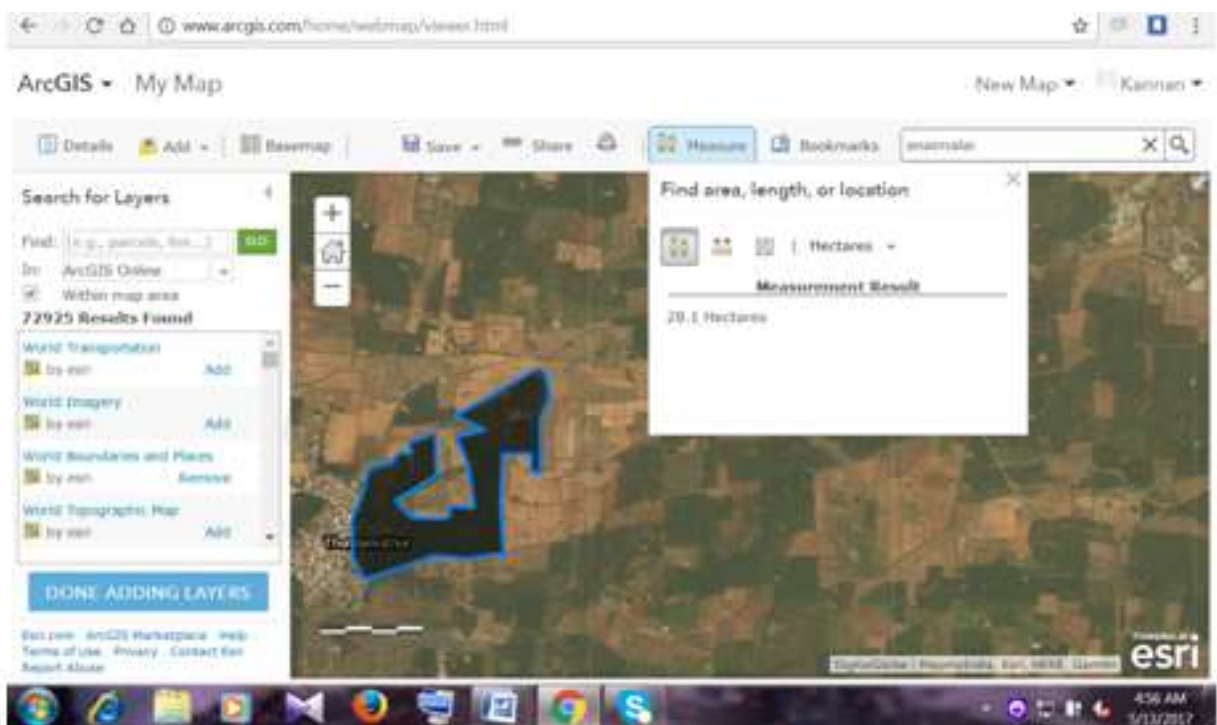


Fig. 5. ArcGis Landsat 8 image for the distribution of coconut vegetation in the Pollachi south block of Pollachi taluk.

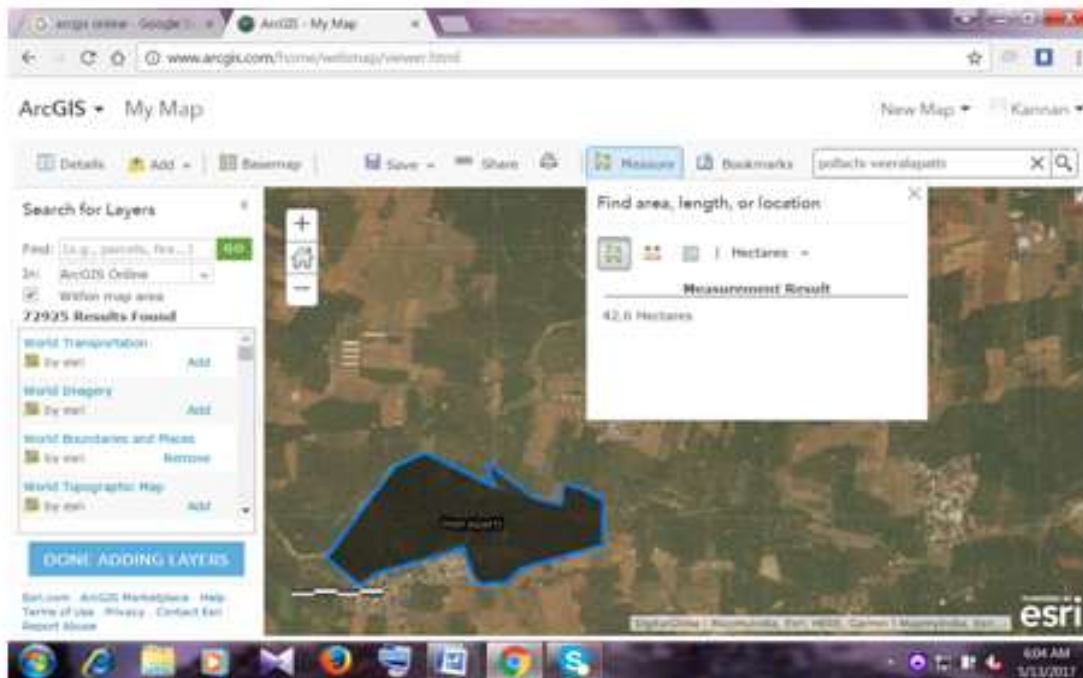
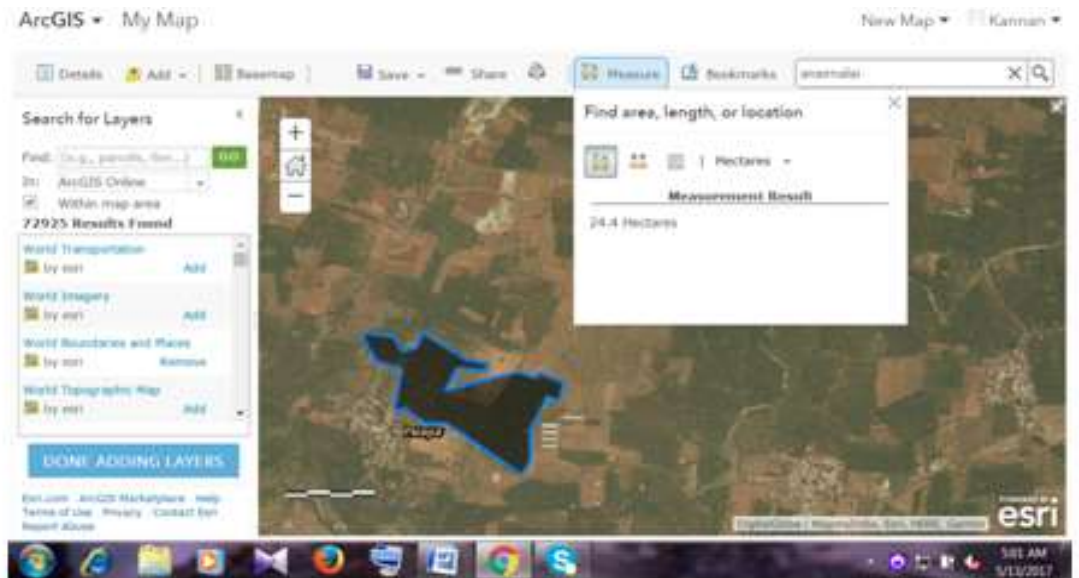


Fig. 5a. ArcGis Landsat 8 image for the distribution of coconut vegetation in the Pollachi south block of Pollachi taluk

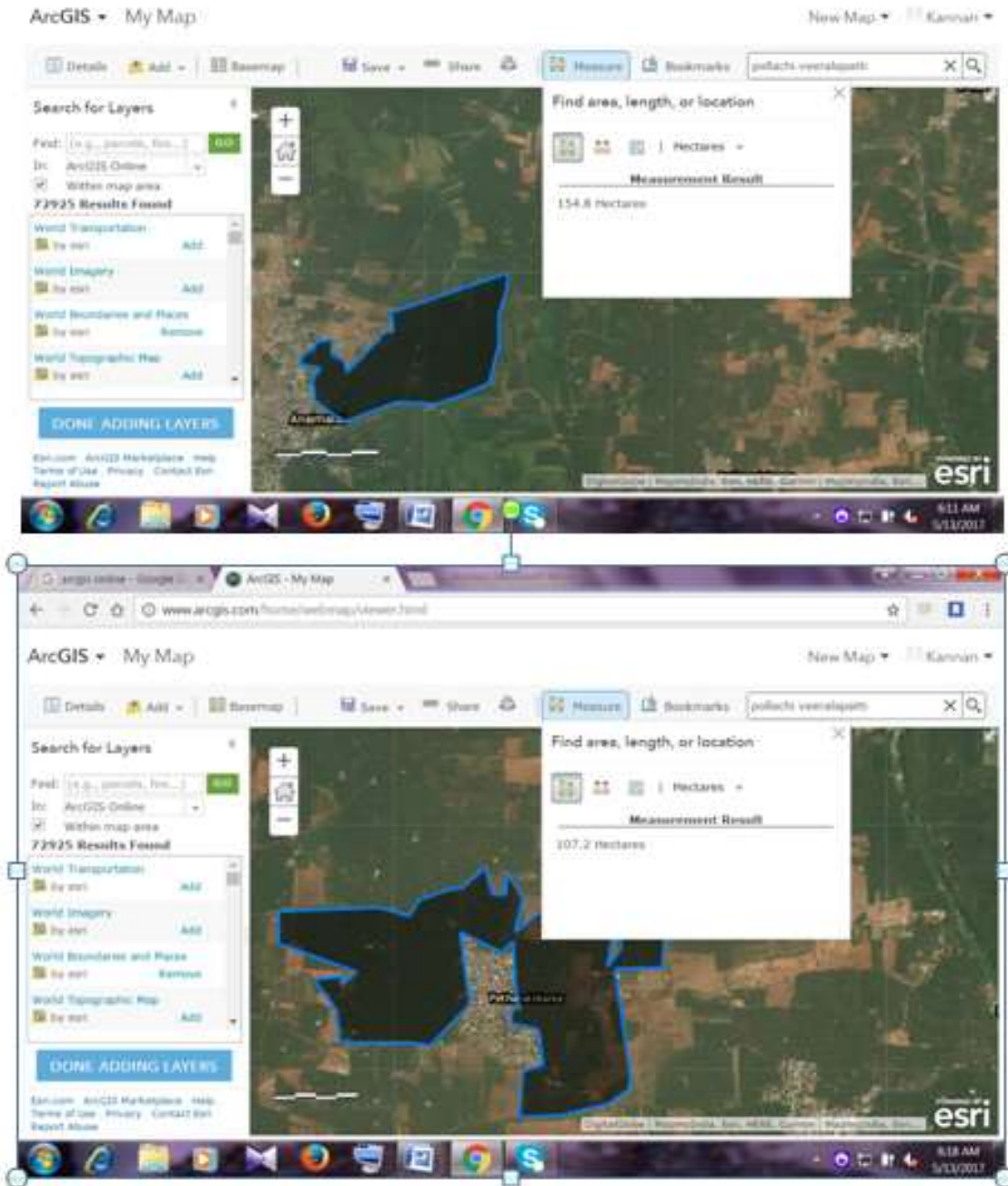


Fig. 6. ArcGis Landsat 8 image for the distribution of coconut vegetation in the Anamalai block of Pollachi taluk.

Summary and conclusion

Considering the importance of RS and GIS in natural resource management, the present study aimed at mapping of coconut vegetation in the Pollachi taluk, Coimbatore using GIS and the information collected through ground survey. Further, the study focused to document the extend of coconut groves using RS & GIS. The ArcGis software was used for the study. The results obtained are analysed for inventorying the land cover changes in the selected blocks of study in the Pollachi taluk.

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