

Hands-On

Generation of Coral Reef map

**Training Course on
'Marine GIS for Operational Oceanography'**

January 18-22, 2016

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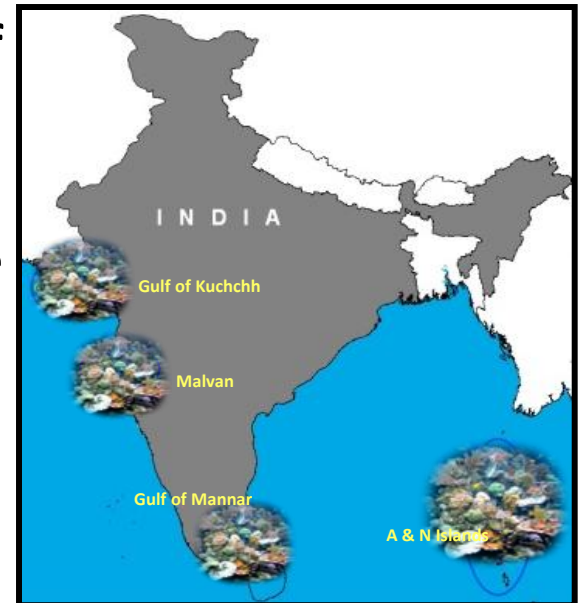
International Training Centre for operational Oceanography(ITCO),

INCOIS, Hyderabad, India



Introduction

- Coral reefs are diverse underwater ecosystems held together by calcium carbonate structures secreted by corals.
- Protect coastlines from the damaging effects of wave action and tropical storms
- Provide habitats and shelter for many marine organisms
- They are source of nitrogen and other essential nutrients for marine food chains
- Assist in carbon and nitrogen fixing
- They help with nutrient recycling.



Overview

- I. Download Landsat satellite data from <http://earthexplorer.usgs.gov/> at North Reef island, Andaman
- II. Composition of each band
- III. Subset Coral reef regions
- IV. Classify morphological zonation of Coral reef based on unsupervised method
- V. Generation of Coral reef Maps

Download Landsat data from <http://earthexplorer.usgs.gov/>

The screenshot shows the Earth Explorer website interface. The top navigation bar includes the USGS logo, the text "science for a changing world", and links for "USGS Home", "Contact USGS", and "Search USGS". The main header area displays "EarthExplorer" and a "Page Expires In 1:59:14" timer. Below the header, there are links for "Home", "Save Criteria", "Load Favorite", and "Manage Criteria". The "Search Criteria" section is active, showing a "Data Sets" tab. The "2. Select Your Data Set(s)" section provides instructions on how to search for data sets. A "Data Set Search" input field is present. The "Data Set Search" results list includes various data sets, with "Landsat Archive" highlighted in a red box. The "Landsat Archive" section lists several data sets, including "L8 OLI/TIRS", "L8 OLI/TIRS Pre-WRS-2", "Landsat Surface Reflectance - L8 OLI/TIRS", "L7 ETM+ SLC-off (2003-present)", "L7 ETM+ SLC-on (1999-2003)", "Landsat Surface Reflectance - L7 ETM+", "L4-5 TM", "Landsat Surface Reflectance - L4-5 TM", and "L1-5 MSS". The "Search Criteria Summary" section shows a map of the search area, with a red polygon indicating the selected area. The map is labeled "North Reef Island" and "Interview". The "Search Criteria Summary" section also includes a "Map" tab, a "Satellite" tab, and a "Clear Criteria" button. The "Search Criteria Summary" section also includes a "Map" tab, a "Satellite" tab, and a "Clear Criteria" button. The "Search Criteria Summary" section also includes a "Map" tab, a "Satellite" tab, and a "Clear Criteria" button.

USGS
science for a changing world

EarthExplorer

Page Expires In 1:59:14

Home Save Criteria Load Favorite Manage Criteria

Item Basket (0) prakash.marine Feedback Help

Search Criteria Data Sets Additional Criteria Results

2. Select Your Data Set(s)
Check the boxes for the data set(s) you want to search. When done selecting data set(s), click the *Additional Criteria* or *Results* buttons below. Click the plus sign next to the category name to show a list of data sets.

☐ Use Data Set Prefilter (What's This?)

Data Set Search:

☒ Digital Elevation
☒ Digital Line Graphs
☒ Digital Maps
☒ EO-1
☒ Global Fiducials
☒ Global Land Survey
☒ HCMM
☒ ISERV
☒ Land Cover
☒ Landsat Archive
☒ Landsat Legacy
☒ Landsat MRLC
☒ NASA LPDAAC Collections
☒ Radar

☒ L8 OLI/TIRS
☒ L8 OLI/TIRS Pre-WRS-2
☐ Landsat Surface Reflectance - L8 OLI/TIRS
☐ L7 ETM+ SLC-off (2003-present)
☐ L7 ETM+ SLC-on (1999-2003)
☐ Landsat Surface Reflectance - L7 ETM+
☐ L4-5 TM
☐ Landsat Surface Reflectance - L4-5 TM
☐ L1-5 MSS

Search Criteria Summary (Show)

Map Satellite

(12° 57' 18" N, 092° 29' 07" E) Options Overlays

North Reef Island

Interview

Mayabunder

Download Landsat data

The screenshot shows the EarthExplorer.usgs.gov web interface. On the left, a list of data sets is displayed, including 'L8 OLI/TIRS' and 'Entity ID: LC81340512015295LGN00'. The main map area shows a satellite image of a coastal region. On the right, a 'Download Options' panel is open, listing several download options:

- [Download](#) LandsatLook "Natural Color" Image (4.8 MB)
- [Download](#) LandsatLook "Thermal" Image (1.7 MB)
- [Download](#) LandsatLook "Quality" Image (1.0 MB)
- [Download](#) LandsatLook images with Geographic Reference (7.6 MB)
- [Download](#) Level 1 GeoTIFF Data Product (772.9 MB)

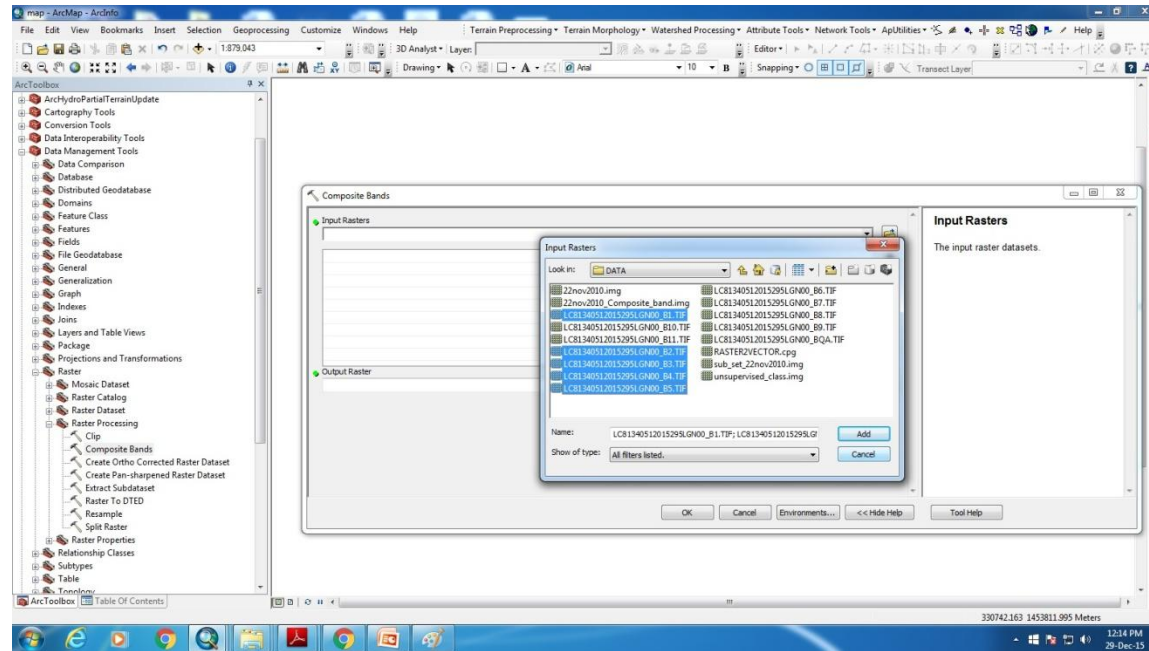
In the foreground, a 'Save As' dialog box is open, showing the file name 'LC81340512015295LGN00.tar' and the save type 'WinRAR archive'. The dialog box also shows the file location 'ADCIRC' and a list of files and folders.

Map data ©2015 Google Imagery ©2015 TerraMetrics - 20 km
Used as a guide for reference and search purposes only.

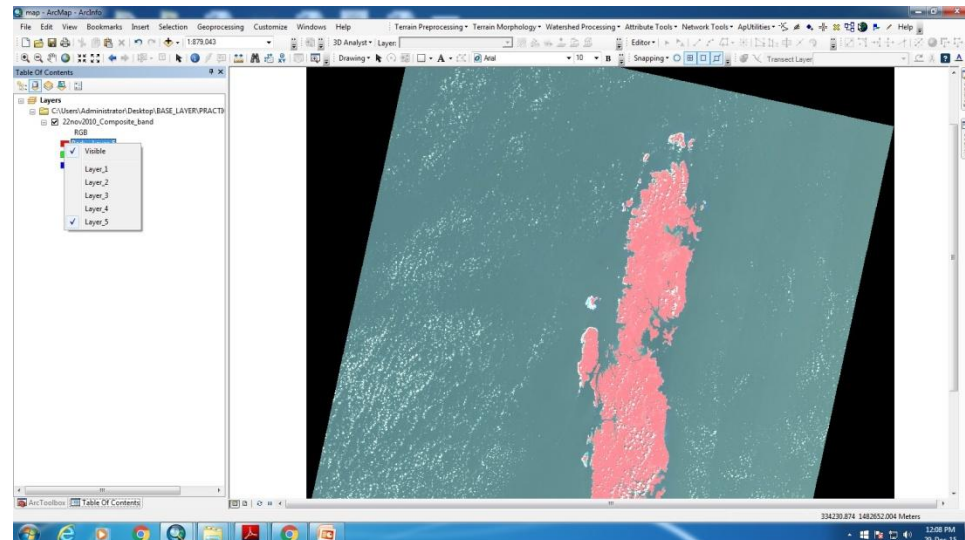
USA.gov

11:24 AM
20-Nov-15

Band Composite

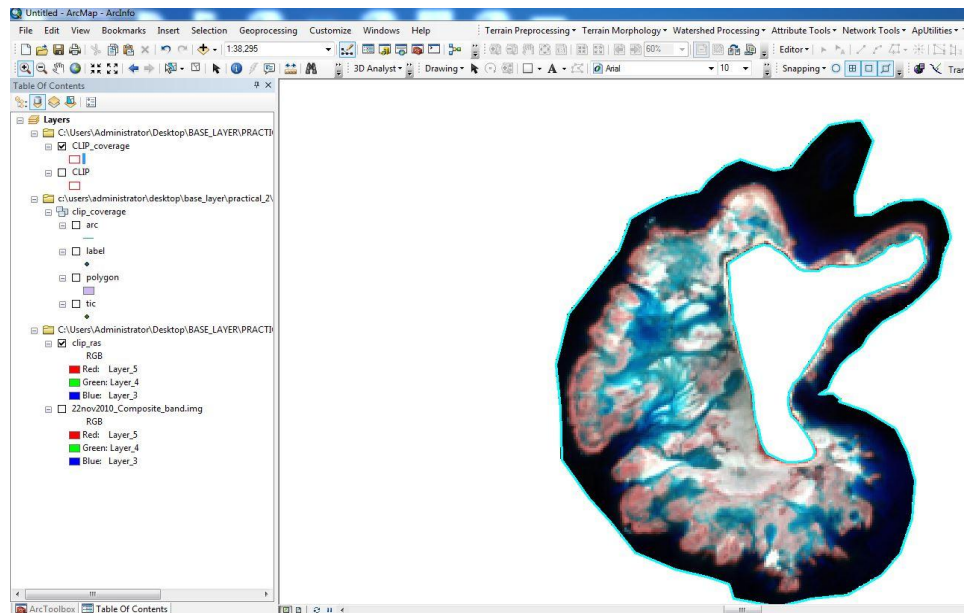
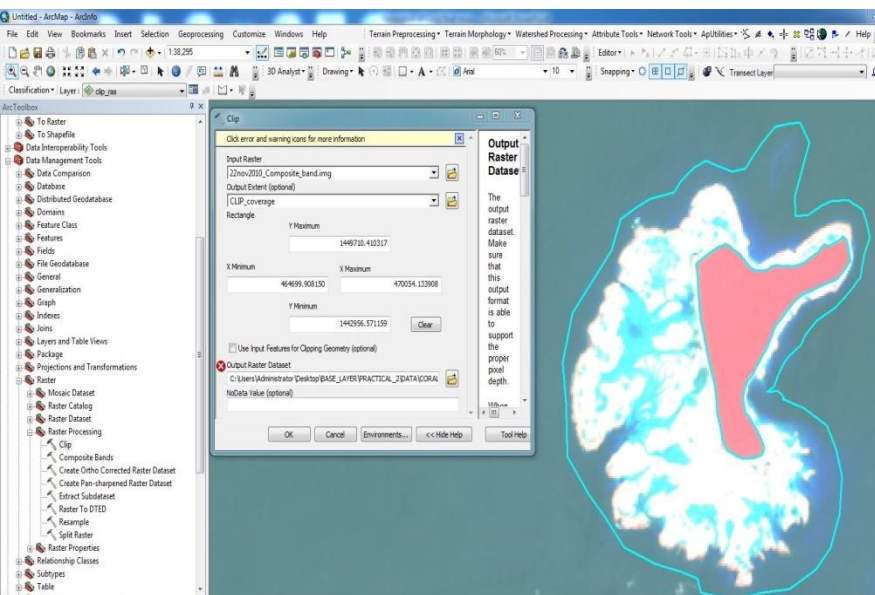
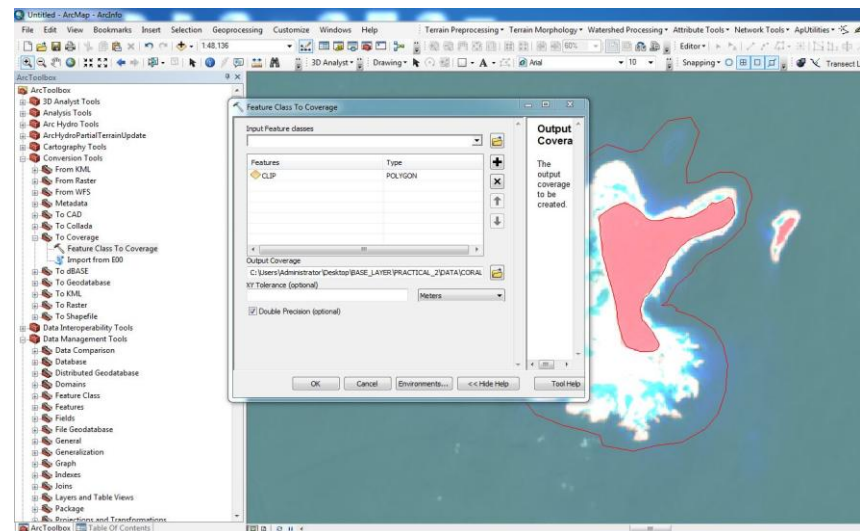
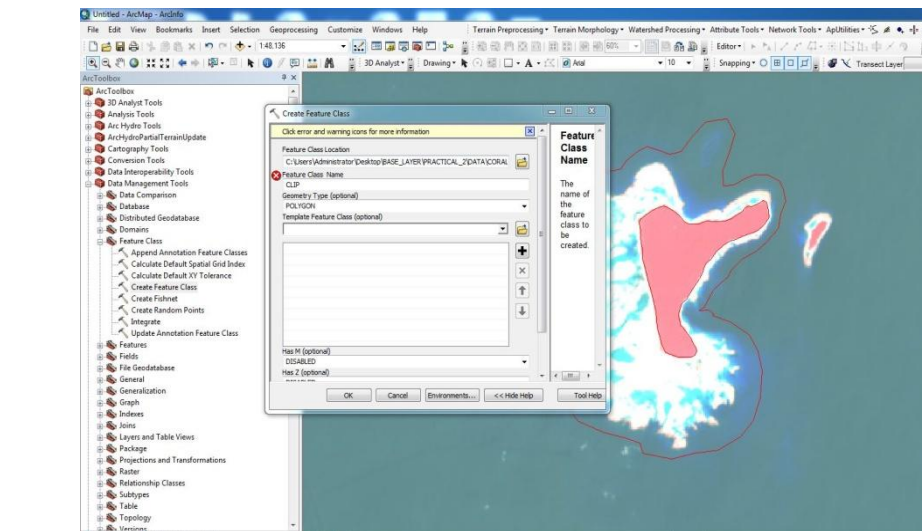


Go to Data Management Tool → Raster → Raster Processing → Composite Bands then select band1,2,3,4 and 5



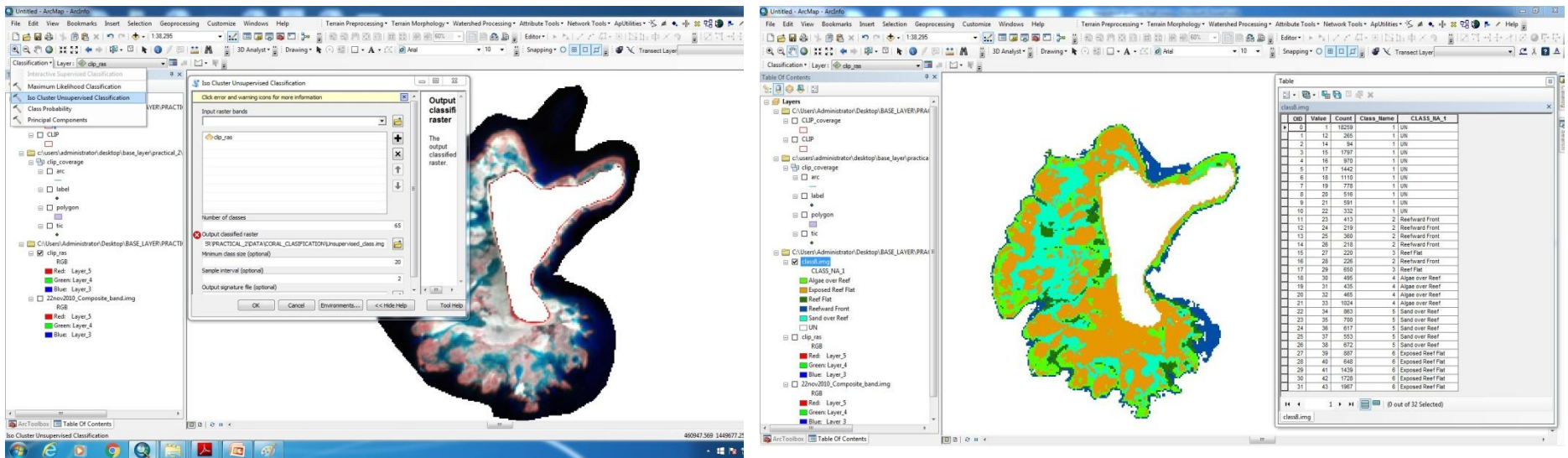
FCC Landsat Image

Clip Coral Reef Zone



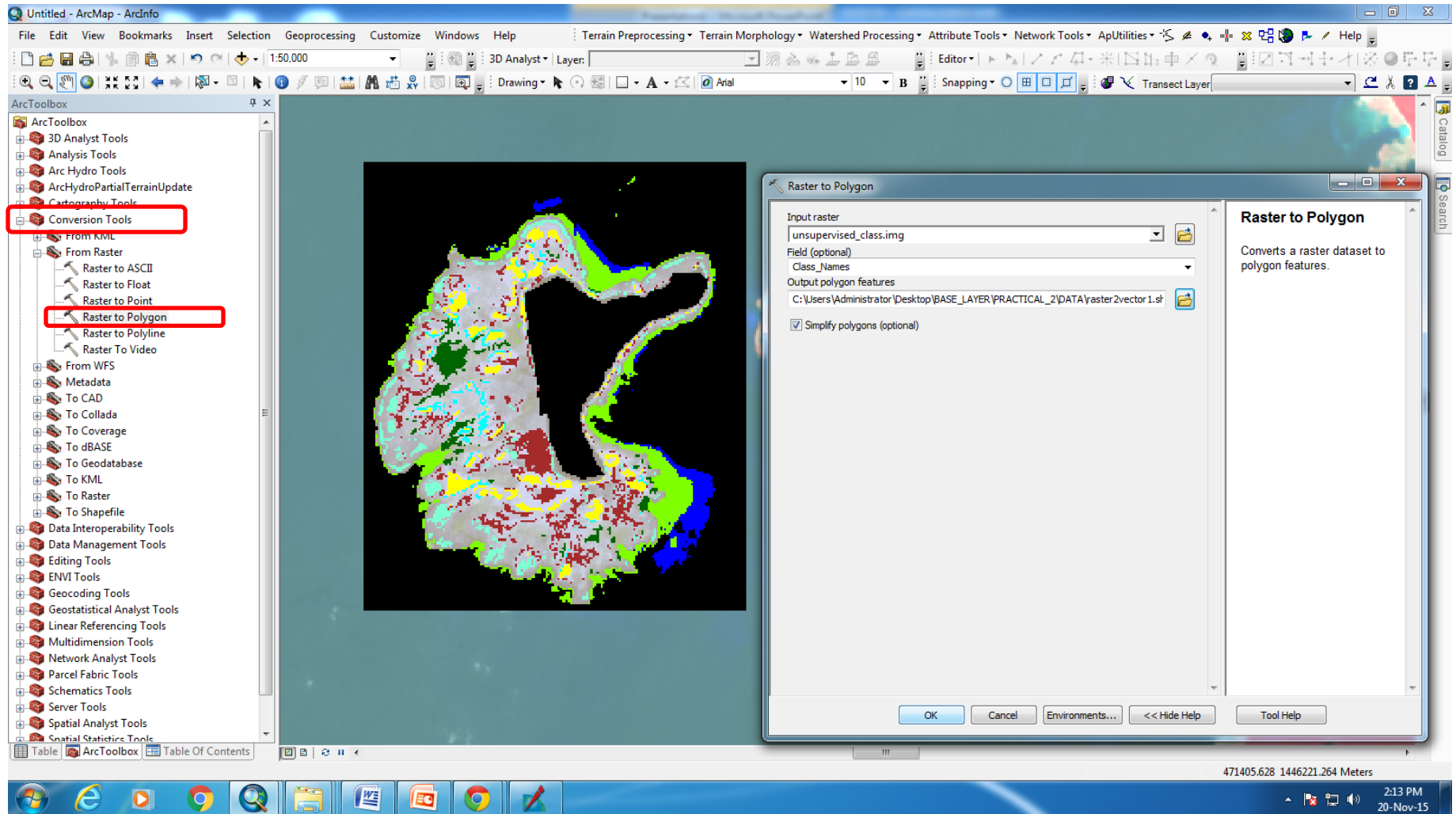
Create new polyline feature → digitized on interested area → Converted to Coverage → Clip raster image

Unsupervised classification to extract coral reef zone

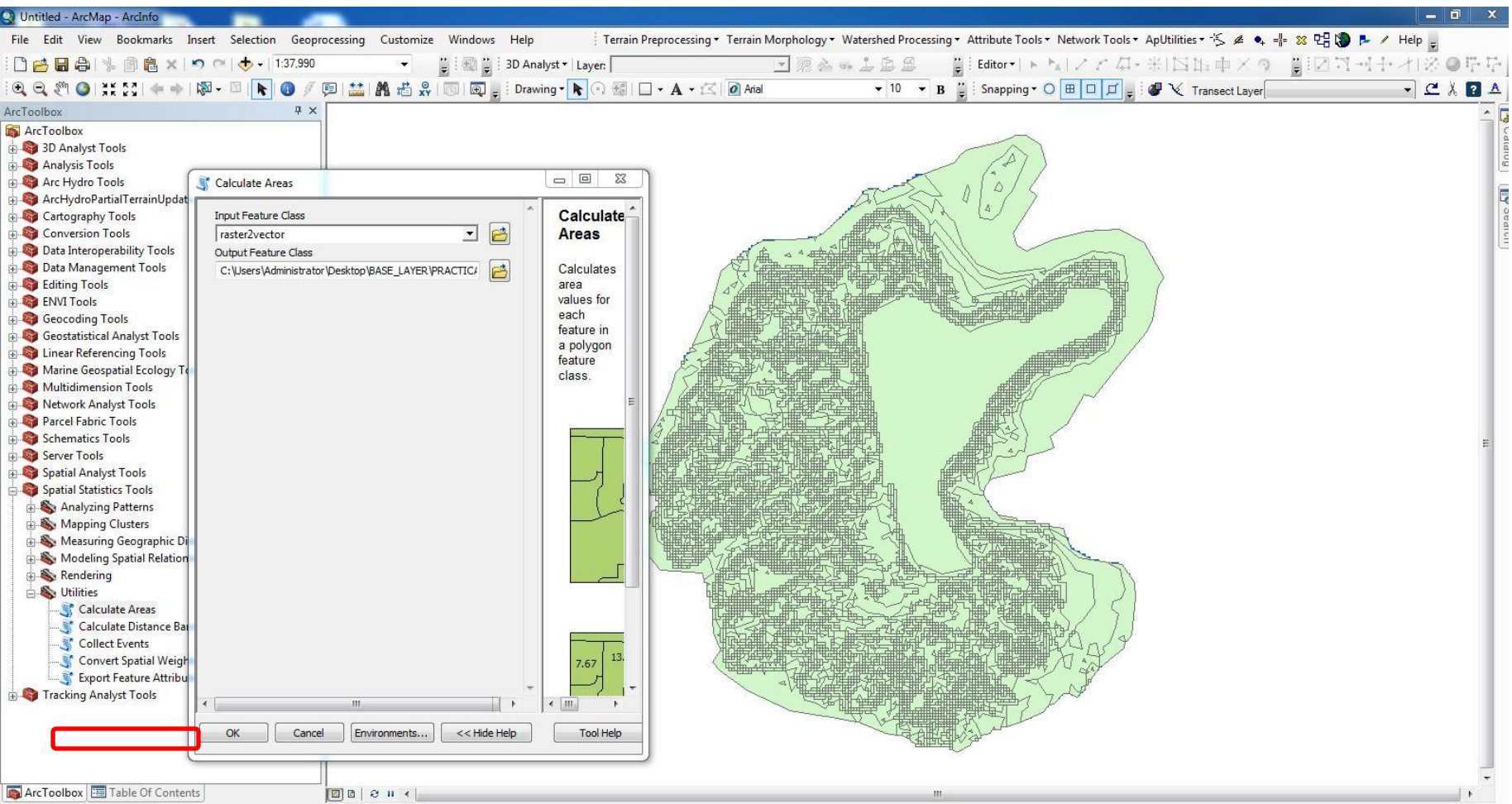


Add image Classification tool → Classify image using Iso Cluster Unsupervised classification method → Extract coral reef features based on visual interpretation

Convert coral reef class from Raster to Vector

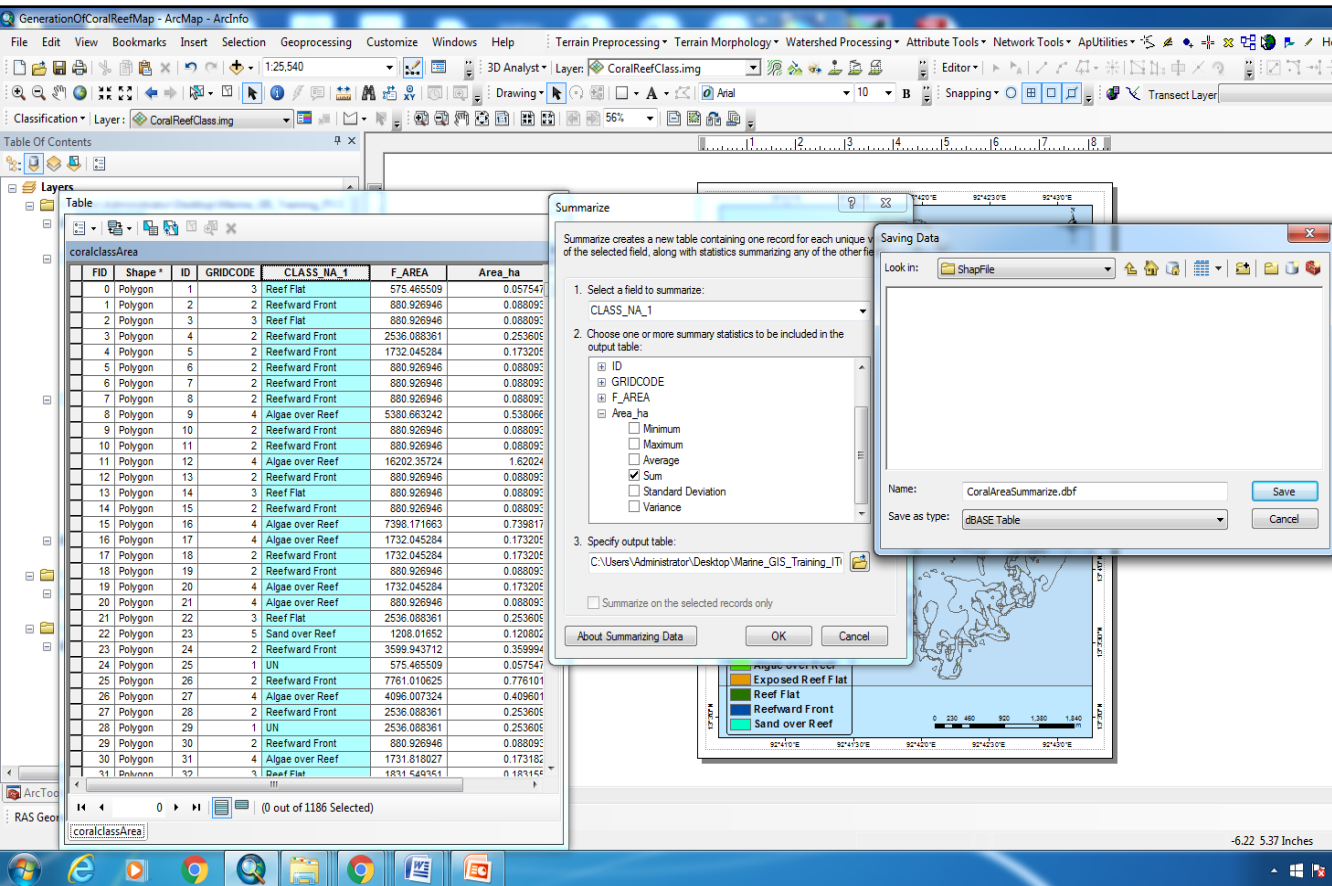


Calculate Area of each Coral Reef Class



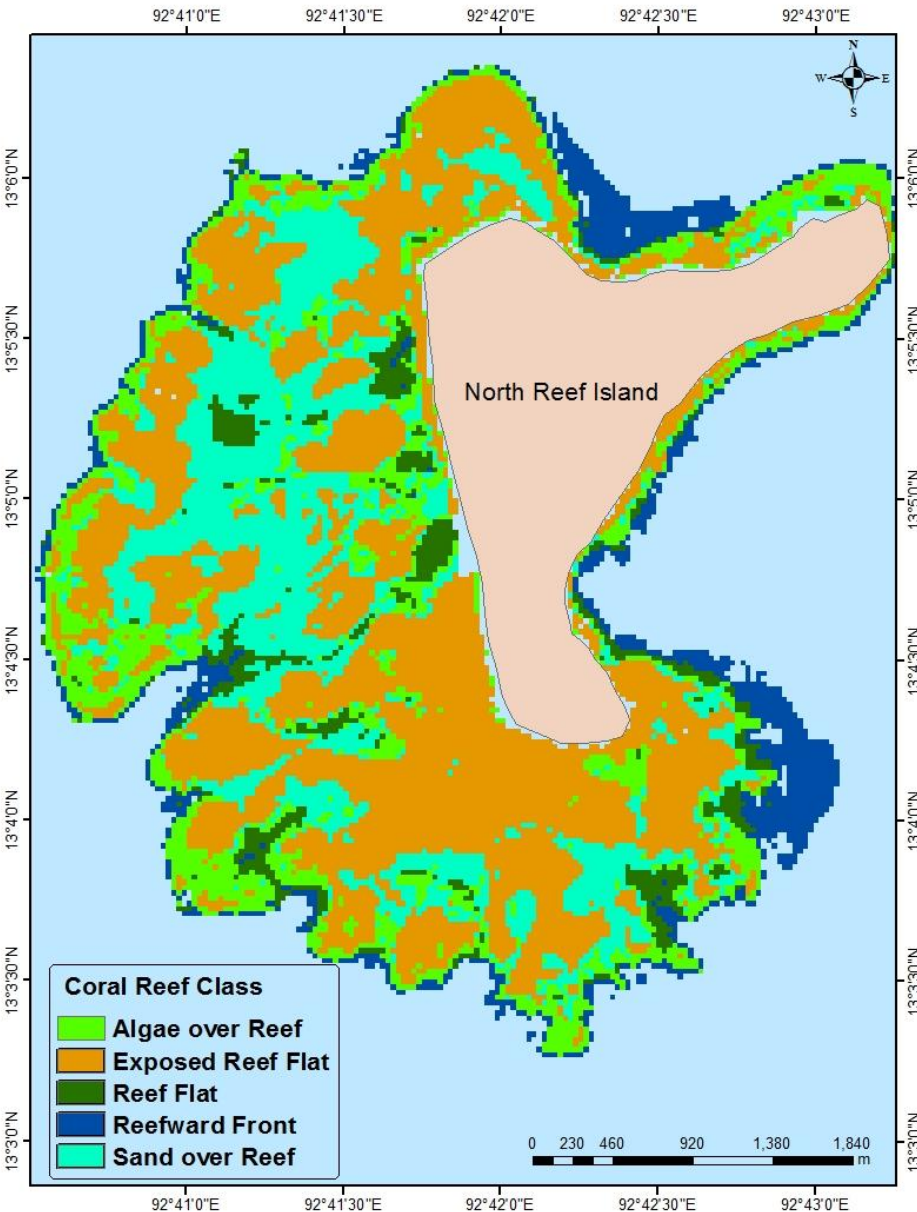
Go to spatial analysis tool → Utility → Calculate area
Open Table of the coral reef layer and find out the area of each class

Summarize Coral Reef Area



Coral Reef Class	Area (ha)
Algae over Reef	211.2115
Exposed Reef Flat	598.9693
Reef Flat	75.3090
Reefward Front	124.8697
Sand over Reef	302.4967

Coral reef Maps



Generation of Coral Reef Map:

- Click on Layout View → Right click on layout window → go to properties and click on grid.
- Insert → click on legend, North Arrow and scale bar and other marginal details.
- File → export map to generate final Coral reef map

Thank You