A

Seminar report

on

Remote Sensing

Submitted in partial fulfillment of the requirement for the award of degree of Civil

SUBMITTED TO: **SUBMITTED BY:**

www.studymafia.org www.studymafia.org

Preface

I have made this report file on the topic **Remote Sensing,** I have tried my best to elucidate all the relevant detail to the topic to be included in the report. While in the beginning I have tried to give a general view about this topic.

My efforts and wholehearted co-corporation of each and everyone has ended on a successful note. I express my sincere gratitude to ……..who assisting me throughout the prepration of this topic. I thank him for providing me the reinforcement, confidence and most importantly the track for the topic whenever I needed it.

Content

INTRODUCTION

Remote sensing is the art and science of recording, measuring, and analyzing information about a phenomenon from a distance. Humans with the aid of their eyes, noses, and ears are constantly seeing, smelling, and hearing things from a distance as they move through an environment.

Thus, humans are naturally designed to be remote sensors. In order to study large areas of the Earth's surface geographers use devices known as remote sensors. These sensors are mounted on platforms such as helicopters, planes, and satellites that make it possible for the sensors to observe the Earth from above.

What is remote sensing?

- **Remote Sensing:** remote sensing is science of
  - acquiring,
  - processing, and
  - interpreting

  images and related data that are obtained from ground-based, air-or space-borne instruments that record the interaction between matter (target) and electromagnetic radiation.

- **Remote Sensing:** using electromagnetic spectrum to image the land, ocean, and atmosphere.

- **In this class,** we will mostly focus on the
  - principles and techniques for data collection and the interaction of electromagnetic energy with the Earth's surface
  - some application examples
  - also you will get familiar with ENVI, an image processing software.

History of Remote Sensing

- Aerial photography is the original form of remote sensing (using visible spectrum) started in 1909
- Aerial photographic reconnaissance was widely used after 1915 in WWI.
- *Photogrammetric Engineering*, the official monthly publication of the *American* Society of Photogrammetry, was first published in 1934.
- Color infrared photography began 1931, then was widely used in agriculture and forestry.
- Development of radar (1930-1940).
- During WWII, non-visible spectrum (infrared and radar) were used as tools in remote sensing.
- After the first man-made satellite (*Sputnik 1) was launched on* 4 October 1957 by Soviet Union, remote sensing moved to outer space, ignited the Space Race within the Cold War.
- The United States' *Explorer 6* transmitted the first space photograph of the Earth in August 1959.
- The first systematic meteorological satellite observation came with the launch of the United States' *TIROS 1* in 1960.
- *Landsat 1* (originally called the Earth Resources Technology Satellite or *ERTS*) was the first satellite to collect data on the Earth's natural resources. It was launched on 23 July 1972.
- Hyperspectral remote sensing emerged (1980s), widely used in mineral, oil, etc. exploration.
- Since then, a large number and advanced types of remote sensing systems have been developed.

Applications of Remote Sensing

Surface Temperature

Sea or lake surface temperature (SST or LST) is derived from satellites orbiting the earth. One such useful device is NOAA's (National Oceanographic and Atmospheric Administration) AVHRR or Advanced Very High Resolution Radiometer.

The AVHRR operates over a very large bandwidth which ranges from visible to thermal infrared waves. Using algorithms and differences in wavelengths, surface temperature can be calculated.

Surface temperature is important because it influences circulation patterns and the rates of chemical reactions, including carbon fixation rates of primary production. Without primary production, a lake's food web and biodiversity would not exist.

Productivity

As mentioned above, primary production is of vital importance in maintaining lake biodiversity. But what is primary production and how is it remote sensing used to measure it? Primary production is the basis of life and the beginning of the food web for higher organisms.

Single celled chlorophyll containing plants called phytoplankton convert the sun's energy into fuel which it uses to produce more plant material. This process is known as photosynthesis. Higher organisms such as zooplankton feed on the phytoplankton and in turn are fed upon by small fishes.

Remotely sensed images are used to determine productivity. What the satellite sensor "sees" indirectly when it takes pictures of a body of water is the color of the water, which can then be related to the concentration of chlorophyll. It appears green because chlorophyll absorbs the other colors of the visible light spectrum and reflects green.

So, by knowing the chlorophyll concentration of a body of water, we can get an idea of it's productivity. Satellite sensors such as NASA's SeaWiFS (Sea viewing Wide Field-of-view Sensor) and MODIS (Moderate Resolution Imaging Spectroradiometer) use similar techniques mentioned previously to calculate chlorophyll content.

Suspended Materials

The biogeochemical makeup of a body of water can be greatly affected by the distribution of sediments within it. River runoff, urban/industrial discharge, and resuspended sediments can all determine the health of a body of water.

Organic and inorganic suspended sediments also affect the color of a lake or ocean. Episodic events such as storms stir up sediments to give a body of water a brownish color.

Resuspended sediments can carry heavy metals and other pollutants to areas that may affect the health of a population.

Redistribution of sediments can cause problems in the shipping industry by changing the depth of canals and harbors. Fish productivity can be hurt when sediments cover their nesting grounds.

The SeaWiFS sensor can also estimate the amount of suspended materials associated with sediment plumes, which can then be tracked and monitored remotely.

Why is remote sensing important?

- Remote sensing makes it possible to collect data on dangerous or inaccessible areas.

- Remote sensing provides real time updates, and does not require active human assistance (i.e. you can collect data at any time, at any frequency, as long as the equipment allows it)

- Remote sensing can detect things that are not normally present in the visible spectrum - for example, temperature, or by detecting landforms underneath the surface of the ground or ocean

- Remote sensing can scan large areas of land by satellite - much more quickly than a ground survey ever could

Components

- **Energy Source or Illumination (A) -** The first requirement for remote sensing is to have an energy source which illuminates or provides electromagnetic energy to the target of interest.

- **Radiation and the Atmosphere (B)**– as the energy travels from its source to the Target, it will come in contact with and interact with the atmosphere it passes through. This interaction may take place a second time as the energy travels from the target to the sensor.

- **Interaction with the Target (C)**- once the energy makes its way to the target through the atmosphere, it interacts with the target depending on the properties of both the target and the radiation.

- **Recording of Energy by the Sensor (D) -** after the energy has been scattered by, or Emitted from the target, we require a sensor (remote - not in contact with the target) to collect and record the electromagnetic radiation.

Advantages

A) Provides data of large areas

b) Provides data of very remote and inaccessible regions

c) Able to obtain imagery of any area over a continuous period of time through which the any anthropogenic or natural changes in the landscape can be analyzed

d) Relatively inexpensive when compared to employing a team of surveyors

e) Easy and rapid collection of data

f) Rapid production of maps for interpretation

Disadvantages of remote sensing are:

a) The interpretation of imagery requires a certain skill level

b) Needs cross verification with ground (field) survey data

c) Data from multiple sources may create confusion

d) Objects can be misclassified or confused

e) Distortions may occur inanimage due to the relative motion of sensor and source

Reference

- www.studymafia.org
- www.wikipedia.com
- www.google.com