Nutrient Distribution and its Effects on the Biological Fertility of Polluted Coastal Water

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Abstract

The study was carried out in the sewage polluted, fishing harbour Tuticorin coastal water. Different form of nitrogenous nutrients (Ammonia, Nitrate and Nitrite and soluble inorganic phosphorus) were investigated for their temporal distribution. The limiting nutrient of the system was identified using ∆N: P as an index. Mostly phosphorus appeared as the limiting nutrient and temporal variation of silicate was observed to be influenced by the freshwater discharge. The impact of available nutrients on the biota was investigated by tracing temporal distribution of chlorophyll ‘a’ and net photosynthesis. In the light of the data collected, the influence of sewage pollution on the coastal water ecosystems of Tuticorin is highlighted.

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Ennore Mangroves – Biodiversity Unveiled

N. Kannan[1], P. Elayaraja[1] and R. Ramanibai[1]

Abstract

The Ennore creek (Lat. 13 .15'N and Long. 80 .15E) has dense mangrove vegetation, which is unique in its own way. Four locations along the mangrove forest were selected for the present study and monthly sampling was carried out from November 2000 to August 2001. The presence of unique flora and fauna indicates the wealth of the mangrove ecosystems. Along with the three true mangrove species 53 associated plant species were recorded. Three commercially important species of seaweed were identified. 95 species of phytoplankton, 56 species of zooplankton, 6 species of prawn, 8 species of crab, 11 species of molluscs, 12 species of fin fishes, 11 species of reptiles and 53 species of insect fauna were present in various habitats of the mangrove ecosystem. 27 species of birds and 16 mammalian species were also recorded during the study. This study reveals the presence of an array of flora and fauna, which should be conserved for local economic development and their habitat prevented from destruction to maintain biodiversity.

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Abs Nr. PO-043

Coastal Land Use: A Case of Degradational Coast of Valinokkam-Dhanuskodi Coastal Stretch, Tamil Nadu, India

A. Muthukrishnan[1]

Abstract

Coasts are typical environments in which human impacts have led to a whole range of changes with considerable variations in their degree of impact. The coast is typically a highly populated area. The coastal zone experiences intense pressure and demands from various sectors of the community. This pressure and demands from various sectors of the community. This pressure has the potential of change and environmental degradation is not carefully managed. Coastal zone plays an important role in the economy of nations with large shoreline like India. The development of coastal zone involves ecosystem management in the coastal wetlands and the adjacent shore lands. The carrying capacities of coastal zone ultimately challenge is to the coastal Land Use. The present focus have detailed study on the coastal Land Use using remotely sensed data of IRS-1C (LISS III) data was clearly managed the coastal stretch of the Valinokkam-Dhanuskodi Coastal stretch within the radius of 10km using visual interpretation techniques. This techniques adopted by NRSA Land Use Classification systems has prepared by the Land Use of the study area. The demarked Land Use classes gives the positive solution of the coastal zone management.

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Abs. Nr. PO-051

Spatial Distribution of Major and Trace Elements in Madras Harbour, South India

R. Raja[1] and R. Ramesh[2]

Abstract

Sea water and bed sediments samples were collected in and around madras harbour basin and analyzed for major and trace elemental distribution. The major element distribution harbour water show generally lower concentration than average sea water. This is mainly due to the addition of fresh water into the harbour waters. The positive correlation between Na-Cl, Ca-Mg, K-Cl, Na-K, K-Hco_3 shows the conservative nature of the harbour waters. Sulphate show negative correlation with Cl and Na and this may be due to land based pollution. Most of the major elements in sediments are derived due to weathering process. Highest concentration of phosphorous has been observed in the bed sediments which may be due to pollution of phosphorous-based fertilizer handling in the harbour area. The elevated concentration of Zn (179 mg/Kg) and Cu (122.5 mg/Kg) observed at location 6 (Chokhani dry dock) are exclusively contributed by the dry (195 mg/Kg) observed at location. Very high accumulations of Pb due plying of tug boats and regular cleaning operations taking place in this location. The geochemical indices highlight a three fold accumulation pattern for Zn and Cu. The geochemical indices for Pb shows the accumulation pattern ranging from 3 to 12 folds throughout the study area basin show the mean particle size decrease from inside harbour basin (0.98) towards outside harbour (3.2). This trend indicates the increasing fineness with positive skewness. Particles present inside the harbour basin gives moderately sorted trend where as the outside the harbour basin, no such trend is noticed. The study reflects that the harbour sediments are highly polluted with trace elements, suggesting an anthropogenic input.

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Abs. Nr. PO-086

Industrial Effluent Discharge Mapping through Remote Sensing.

A. Surendran[1], K. Selvavinayagam[1] and S. Ramachandran[1]

Abstract

The monitoring of pollution distribution and transport is one of the most important tasks in marine environmental management. It has been proved that using remote sensing techniques the concentration and distribution patterns of suspended matter, and sometimes the concentration of pigments in the surface layer can be adequately determined in the marine environment. The detection and monitoring of effluent plumes in estuarine and coastal waters continues to be an important area of research. The coastal areas provide many opportunities for industrialization such as marine / inland transportation facilities, availability of manpower, availability of coolant water, easy discharge of wastewater and so on. The pollutants from the industries when discharged into the coastal waters, damage the sensitive, fragile coastal ecosystems. This paper presents the result of a study conducted to map the suspended sediment concentration (SSC) in the industrial effluent discharge area located in North Chennai coast, India. The water samples collected in concurrent with Indian Remote Sensing satellite IRS-1D satellite overpass, in the study area were analysed to determine the concentration of suspended sediment concentration, Dissolved Oxygen (DO) and Chemical Oxygen Demand (COD). Indian Remote Sensing satellite (IRS-1D), Linear Imaging Self Scanner (LISS – III) digital data was analysed to determine the feasibility of quantifying the concentration of suspended sediment concentration (SSC) in the surface water of industrial effluent disposal area. The concentration of suspended sediments ranged from 40.12 to 130.38 mg/l. The measured SSC values are highly intercorrelated with the mean pixel values of the channe1 and 2 of IRS-1D LISS-III data. The dissolved oxygen concentration

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is low in the industrial effluent, which ranged from 3.6 to 4.5 ml/l in the core area. Dissolved Oxygen shows negative correlation with the suspended sediments in the industrial effluent area. For the entire length the plume shows higher concentration in the centre. The periphery area slowly mixes with the seawater. The chemical oxygen demand was 4.3 to 13.0 mg/l. This shows positive correlation with the suspended sediment in the industrial effluent area. The length of the plume was 5200 meters running almost perpendicular to the coastline of the study area.

Abs. Nr. PO-088

GIS and Remote Sensing Applications for Coastal Resources Assessment – A Case Study of Neil Island, Andaman

Marie Irene Preeti Divien[1], A. Surendran[1] and S. Ramachandran[1]

Abstract

The present study aims at assessing the coastal resources of Neil Island in Andaman using remote sensing and GIS. Survey of India (SOI) toposheet (1970) was used to prepare the base map. Geocoded multi-date SPOT (1993), IRS - 1D LISS III (1999) and IRS - 1D LISS III (2003) imageries on 1:50,000 scale were visually interpreted based on image characteristics. The image characteristics were studied using interpretation keys. Neil Island covers a total area of 18.90 sq. km. and a shore length of 18.6 km. It possesses various coastal resources such as forests, corals, mangroves, creeks, sandy beaches and mudflats. The present status of these resources is as follows: Coral reef has an areal extent of 4.59 sq. km., sandy beaches cover 0.47 sq. km., mangroves have an areal extent of 0.09 sq. km., reserved forests cover 5.83 sq. km., mudflats have an area of 0.14 sq. km., built-up area is presently 5.96 sq. km. and agricultural land covers an area of 1.15 sq. km. Coral reefs and mangroves are extremely productive ecosystems with a rich biodiversity. While the fringing reef of this island has increased by 1.59 sq. km., the mangrove forests exhibit a decreasing trend with a loss in area of 0.14 sq. km. Sandy beach area has decreased by 1.12 sq. km., which is of concern as the beautiful beaches at Lakshmanpur, Bharatpur, Sitapur and the natural bridge formations on the seashore are the main tourist attractions in Neil Island. The increasing population has gradually encroached upon reserved forests especially on the western part of Neil Island. The built-up area with plantation thus shows a steady increase and is presently 5.96 sq. km with a part of it coming under the reserved forest area. The main

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economic activity of the people in Neil Island is agriculture. Therefore an increase in population automatically witnessed an increase of 1.38 sq. km. in the agricultural area in the year 1993. The limited supply of fresh water could have been a limiting factor for agriculture and therefore a subsequent decrease of 0.57 sq. km. in agricultural land is seen. There is a very strong need to prepare an integrated coastal zone management plan as many of the resources are on the decline and the livelihood of the people of Neil Island is very much dependant on these coastal resources. Thus this study reveals that GIS and remote sensing are extremely useful tools for assessing coastal resources within limited time durations.

Abs. Nr. PO-089

Remote Sensing and GIS in Coastal Zone Management - A case study in Havelock Island, Andaman, India.

S.Anitha[1], A. Surendran[1] and S. Ramachandran[1]

Abstract

The Integrated Coastal Management (ICM) programs are designed to address some major areas of concern like beach management, coastal erosion, wetland protection, coastal hazards like storms, non-point source of pollution, sea-level rise, coastal and estuarine water quality, threatened and endangered species, mangrove forest management and coral reef management. Tools like Remote Sensing (RS) and Geographical Information System (GIS) could assist in generating data and information that are required for micro and macro-level planning of coastal management on a sustainable basis. Havelock Island was chosen as the study area, which is located between latitudes 11°52'44” and 12°02'59” N and longitudes 92°55'29” and 93°03'26” E, south of South Andaman and north of Little Andaman. Different thematic informations that are required for the preparation of the coastal zone management plan were prepared. The total population of Havelock Island is 3681 according to 1991 census. Multi-temporal satellite data of SPOT (1993) and IRS 1D- LISS III (1999, 2003) along with SOI toposheet (1967) were used to prepare different thematic layers like coral reef, mangroves, sandy beach, and built-up area with plantation. The Digital Elevation Model (DEM) was created using SOI toposheet, 1967 for contour details. The total area of Havelock Island is about 6766.11 ha according to IRS-1D LISS III 2003 imagery. The sandy beach occupy an area of about 97.06 ha, mangroves with an area of 967.34 ha, coral reef occupy an area of 1618.86 ha and settlement with plantation with an area of 1370.80 ha. The SOI toposheet, 1967 was compared with 2003 data and it was found that the reserved forest and mangroves have decreased by 11.54% and 15.1% respectively. The settlement

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area with plantation has increased by 297.78%. All the details are added to GIS as thematic layers. Socio-economic data such as the demographic details, the extent of social dependence, cultural and social aspects were collected and incorporated in GIS to find the issues and the causes for the issues. After analysing all the information developmental potential in the two sectors namely tourism and fisheries were identified. For the development of tourism Radha Nagar beach is suitable. Further, certain changes in the existing CRZ regulations were also suggested to encourage the tourism activities. The study revels that remote sensing data can be used to derive various thematic layers which are required to develop a coastal zone management plan and GIS is a very helpful tool for the analysing spatial data with aspatial data.

Abs. Nr. PO-091

Coastal Ecosystem Changes in Interview Island, Andaman Using Remote Sensing and GIS

Vibha Sandlas Sharma[1] and S. Ramachandran

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Abstract

The Andaman and Nicobar Islands comprise a chain of 572 islands, islets, reefs and isolated rock outcrops spread in the Bay of Bengal. They extend to a length of 700 km between the lower Myanmar and the upper Sumatra region of Indonesia. Coastal ecosystem changes were studied in Interview Island, located in the Mayabunder tehsil of North Andaman, over a period starting from 1969 to 2003. Coastal landuse and land cover maps were prepared using SPOT 93, IRS -1D LISS III 2003 satellite data for the study area. Survey of India toposheet 1969 was used as a baseline data. Interview Island is located between latitude 12°59'47" and 12°45'47" N and longitude 92°43'36" and 92°38'49" E. The island covers a total area of about 133.40 sq .km. and has been declared as a wild life sanctuary. Interview Island has an active coast with a total length of 97.09 km and according to SPOT 1993 imagery the island has various ecosystems such as protected forest, coral reefs and mangroves. The coral reef area mapped from SOI toposheet 1969 was 2810.58 ha where as, it has decreased by 35% in 1993. The coral reef, however showed an area of 2764.51 ha when mapped from the IRS-1D LISS 2003 data. An increase in coral reef by 52% can thus be seen in the period from 1993 to 2003. The mangrove area mapped from the SOI toposheet had an areal extent of 1526.59 ha and 1302.46 ha for SPOT 93 data, showing a decrease of 15%. The mangrove area as mapped from IRS-1D LISS III 2003 was 1116.26 ha. The loss of mangroves has been found to be 14% between this time frame of 10 years. Degradation in mangroves observed in the northern part of the island is due to natural process. The area covered by sandy beach was 133.19 ha as mapped by SOI toposheet, 86.67 ha as mapped by

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SPOT 93 and 34.16 ha as mapped by the IRS1D 2003 data. This shows a decrease of 35 % from 1969 to 1993 and a decrease of almost 60% from 1993 to 2003.It is evident from the data that some amount of sand has been lost which could be due to the natural processes. The protected forest as seen from the SOI toposheet 1969 is 8502.69 ha and 8185.90 ha when compared to the SPOT 93 data. Thus, it shows a decrease of 4 %. Feral elephants are found in this island. An estimated 40 animals were released in 1960 here, and these have formed a breeding population. A study in 1993 estimated the population as 70 (Sivaganesan & Kumar, 1995). The debarking of large trees by elephants has led to the opening up of canopy and the continued existence of elephants has led to further vegetation degradation / loss. Past logging operation, since abandoned, is responsible for their increase .The foraging of these elephants exerts severe pressure on the environment and causes considerable damage to the flora and fauna of the island (Dagar et. al., 1991). The areal extent of the protected forest is however 8274.34 ha when mapped from the IRS 1D 2003 image showing an increase of 1% in the last 10 years .The forest area of the island comes under the Wildlife Protection Working Circle. The Wildlife Protection Working Circle includes all protected areas such as Wildlife Sanctuaries and National Parks and no forestry operation is undertaken in this Circle. Various measures aimed at conserving wildlife and their habitats are taken up (Forest Management in the Andaman & Nicobar Islands, 2003).

Abs. Nr. PO-096

Coastal Ecosystem Changes in Long Island, Andaman Islands Using Remote Sensing and GIS

V.P. Sathiya Bama[1] and S. Ramachandran[1]

Abstract

Long Island is located between latitude of 12°21'14" and 12°26'16" N and longitude of 92°55'06" and 92°57'55" E. The Island covers a total area of about 17.90 sq. km. The total shore length was found to be 25.44 km according to SPOT, 1993. The island has various coastal systems such as forest, coral reefs and mangroves. The coral reef area mapped from SOI toposheet 1969 was 345.85 ha where as it has decreased to 232.45 ha in 1993. The coral reef however showed an area of 179.43 ha when mapped from the IRS-1D LISS 2003 data, thus showed a decrease of 23% in the last 10 years. The mangrove area mapped from the SOI toposheet had an areal extent of 103.66 ha and 78.07ha for SPOT 1993 data, showing a decrease of 25%. The mangrove area as mapped from IRS-1D LISS III 2003 was 40.11 ha. The loss of mangroves has been found to be 49 % within this time frame of 10 years. The area covered by sandy beach was 39.35 ha as mapped by SOI toposheet, 15.06 ha as mapped by SPOT 93 and 14.38 ha as mapped by the IRS1D 2003 data. This shows a decrease of 62 % from 1969 to 1993 and a decrease of 4.5 %from 1993 to 2003. The protected forest area as seen from the SOI toposheet 1969 is 1192.34 ha and 1175.68 ha when compared to the SPOT 93 data. Thus it shows a decrease of 1%. The areal extent of the protected forest is however 1072.78 ha when mapped from the IRS 1D 2003 image showing a decrease of 9% in the last 10 years. The forest area of the island falls under the Eco-restoration Working Circle, Protection Working Circle and Mangrove & Littoral Swamp Coastal Belt

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Conservation Working Circle. The objective of management of the Eco-restoration Working Circle is to bring back the forests to their natural profile and also simultaneously carry out timber extraction only for meeting the requirements of the local people. No forestry activity is to be undertaken in this Working Circle. The Department of Environment and Forest has identified potential circuits for the promotion of eco-tourism. The degraded forest areas are proposed to be developed using the 'Canopy Lifting Shelter wood System' to minimize degradation of natural canopy. Beach resorts to the maximum extent should develop captive sources for water and power, and facilities for in-house sewage treatment and solid waste management to avoid strain on the existing and proposed facilities. Environmental education on the conservation of natural ecosystems and sustainable utilization for the enhancement of economy must be stressed upon. Treated sewage should be utilized for irrigating plantations near Lalaji Bay beach resorts. Disposal of waste into the sea must be prohibited. The tourism zone should develop a green belt through afforestation and mangrove plantation along coastal areas. In order to safe guard the coral reef, a safe route should be earmarked for those who go on excursions. There should be a regular monitoring and control of the coral predator, crown of thorns starfish, in all areas in order to protect and conserve the reef.

Abs. Nr. PO-097

Coastal Zone Mapping – A Case Study in Ross and Smith Islands, Andaman Islands

K. Ezhil vendan[1], K. Selvavinayagam and S. Ramachandran

Abstract

Coastal Zone mapping is carried out for Ross and Smith Islands with respect to Landuse/landcover, digital elevation model and socioeconomic parameters. Ross and Smith Islands are located between latitude 13°17'35” to 13°22'56” N and longitude 93°02'17” to 93°05'39” E, situated on the eastern side of north Andaman island. For landuse mapping, Survey of India toposheet (1969) and IRS 1C-LISS III 2003 imagery were used. Landuse maps were interpreted, digitized and analysed using ArcInfo and Arcview GIS softwares. Landuse change over a period of 30 years showed the following. Reserved forest has decreased from 1580.82 to 1393.53 ha, Sandy area has decreased from 21.70 to 11.72 ha, Mangroves has decreased from 290.51 to 203.24 ha. The decrease observed in the above landuse categories are due to increase in habitation and socio-economic activities. Landuse change over a period of 30 years showed increase in the following categories. Habitation increased from 43.91 to 231.22 ha. Increase in habitation is due to increase in population, developmental activities and conversion of forest area into habitation. Development activities are responsible for degradation in the mangroves and waterquality. In order to sustain the environment and to regulate the coastal activities Coastal Regulation Map is prepared using IRS 1C-LISS III 2003 imagery. According to the Coastal Regulation Zone map, CRZ I occupies an area of 1054.74 ha, CRZ II occupies an area of 154.23 ha, and CRZ IV occupies an area of 11.71 ha. The Slope of the island observed through digital elevation model is as follows: north portion 0° – 30°, central 20° – 40°, eastern 0° – 30°, western 30° - 40°, southern 20° – 40° and southeastern portion 0° – 10°. For developing ICZM plan and to implement development activities integration of Landuse map, CRZ map and 3Dimensional

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elevation map using GIS is carried out. This management plan will help in regulating development activities in a sustainable manner. Based on ICZM the following areas were proposed for promoting developmental activities. The beach lying between Back bay and Mangrove Point could be promoted as tourism site (Latitude/Longitude 13° 19' 06" N / 93° 04' 24"E; Latitude/Longitude 13° 20' 04" N / 93° 05' 31"E). Construction of resorts can be permitted in the beaches after relaxing the NDZ from 200 to 50m in CRZ notification.

Abs. Nr. PO-099

Landuse Change Detection Using Remote Sensing and GIS – A Case Study in Tuticorin, Tamilnadu, India

K. Selvavinayagam[1], A. Surendran[1] and S. Ramachandran[1]

Abstract

Information on existing Landuse/landcover, its spatial distribution and changes are essential prerequisite for any kind of planning activities. One of the constraints which planners are faced with is the unavailability of reliable data. Remote sensing, because of its capability of synoptic viewing and repetitive coverage, provides full information on Landuse/landcover dynamics on a very large scale. In this study, Landuse maps were prepared using IRS 1A 1990, LANDSAT 5 TM 1994 and IRS 1C 1998 data. The Survey of India toposheet (SOI) 1969 was used as a base map. The Landuse maps prepared from remote sensing data were interpreted, digitized and analysed. Accuracy check and accuracy matrix is developed for Landuse/landcover and for landuse change. It is found that the accuracy is more than 95%. Landuse change maps were prepared by adopting Arc-Overlay techniques using Arc Info software. The major landuse changes that have occurred in Tuticorin area during a 30 year period (1969-1998) are described. The urban area has increased from 943.53 ha to 1776.21 ha, Settlement has increased from 103.33 ha to 774.30 ha, Industrial area has increased from 93.90 ha to 109.82, Salt pan has increased from 2198.08 ha to 3354.99 ha, Harbour area has increased from 101.73 ha to 121.32 ha, Fallow land has increased from 27.03 ha to 99.80 ha, Mangrove has increased from 38.09 ha to 42.34 ha, Marshy/Swampy land has increased from 70.74 ha to 95.18 ha and Fly ash has increased from 193.02 ha to 273.35 ha. Increase in Urban area, Settlement, Industries, Saltpan and Habour area are attributed to increase in population and development activities. During the same

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the following Landuse have decreased in Tuticorin area. Land with/without scrub has decreased from 4943.56 ha to 2261.20, Cropland has decreased from 1176.79 ha to 978.49 ha, Open scrub has decreased from 1142.58 ha to 684.39 ha, Wasteland has decreased from 302.59 ha to 105.99 ha, Mud flat has decreased from 142.75 ha to 21.26 ha, Sandy area has decreased from 92.88 ha to 55.41 ha, Water body has decreased from 242.87 ha to 179.47 ha and Sand spit has decreased from 21.52 ha to 7.22 ha. Decrease in Landwith/without scrub, Open scrub, Crop land, etc were attributed to the conversion of the above landuse categories into urban area, settlement, industries and salt pans. Landuse change analysis reveals that there is a predominant increase in urban area, settlement, industrial area, fly ash and saltpans. These changes cause large increase in pollution load, increase in suspended sediment concentration, degradation in water quality and degradation in coastal marine resources. So in order to manage the coastal resources proper landuse planning is required. Hence, this study is aimed at estimating the landuse change and suggesting planning measures to protect the water and marine resources.

Abs. Nr. OR-104

Changes in Land Use of a Coastal City - Pondicherry

K.Nagamani[1] and S.Ramachandran[1]

Abstract

The objective of this study was to apply thematic mapping using satellite imagery in assessing landuse patterns in Pondicherry. Various landuse classes of Pondicherry were mapped by using visual interpretation of false-color composites based on LANDSAT(TM)(1990) and IRS LISS III (2002)data.

Pondicherry has a total area of about 227.00-sq. km. and a total population of about 9,73,829 people. The dominant landuse categories in 1990 were settlement with plantation, which occupied 17.77% of the study area, plantation covering an area of 14.10%. Settlement occupying 12.01%, cropland covering 8.59% while other landuse classes (fallow land, barren land, gully erosion, water bodies, sand, sand dunes, scrub land, tank, rocky coast, industrial area, mud flat) occupied a negligible area.

The trend of the landuse and land cover continued in the same manner in 1998 with the same order of importance. However, settlement with plantation, plantation and settlement have increased in hectarage while cropland showed a significant reduction. In 2002, the three-landuse classes continued to dominate the area (settlement with plantation 20.30%, settlement 16.84%, and plantation 7.72%) except that cropland cover continued to decrease to 6.39%. For landuse changes in Pondicherry could causes be attributed to two main factors, which are socio - economic and government policy factors.

The socio economic variables taken in account for this are as follows : population growth rate (1991-2001), percentage change in population density (1991-2001), percent of the population with secondary education and reducing the labour force in cropland. Using regression analysis, the five variables are found to be significant in explaining the change in landuse categories.

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In explaining the change in cropland and settlement with plantation and plantation, it is found that labour force in agriculture and population growth, are the most important human driving forces. Changes in population density, labour force in agriculture and population growth are responsible for the change in settlement (housing, industries, and towns). In short, the most common variable explaining the changes in landuse and landcover in Pondicherry is population growth. Population growth due to natural increase , migration and government policies which allow various landuse features to be easily converted and developed into housing estate, townships, industrial estates and recreational facilities are the using in reasons for changes in landuse. Such developmental process causes an increase in the education level, which simultaneously causes a decrease in agricultural labour. No other method could realistically do this. With some caution, such methods might be adopted for routine operational use.

An evaluation of these landuses is presented

<u>*Abs. Nr. PO-117*</u>

Wetlands and Constructed Wetlands a Comparative Study.

S.Devika[1], M Manu Vaasathi[2], A.S.Bharath Ram[2]

Abstract

Wetlands include a wide variety of habitats such as marshes, peatlands, floodplains, rivers and lakes, and coastal areas such as saltmarshes, mangroves, and seagrass beds, but also coral reefs and other marine areas no deeper than six metres at low tide, as well as humanmade wetlands such as waste-water treatment ponds and reservoirs. Wetland ecosystems are diverse, both in terms of their physical characteristics and their geographical distribution. Only recently have the many benefits of wetlands come to be widely recognized. Wetlands are a crucial part of the ecological chain, providing resting places for birds and habitats for an astounding variety of species, transforming runoff water from an environmental hazard to a productive part of the ecosystem, and helping to protect clean water. In fact, 1/3 of all bird species rely on wetlands as homes or migration stop-over places. Wetlands are found in flat vegetated areas, in depressions on the landscape, and between water and dry land along the edges of streams, rivers, lakes, and coastlines. Wetland areas can be found in nearly every county and climatic zone. Inland wetlands receive water from precipitation, ground water and/or surface water. Coastal and estuarine wetlands receive water from precipitation, surface water, tides, and/or ground water. Surface water sources include runoff and storm water. This paper deals with the types of wetlands, its components, wetland ecosystems, and the functioning of wetlands. From the available literature it is evident that, in order to manage wetlands, it is necessary to have adequate knowledge of their functioning. To promote and apply the wise use of wetlands, inventory, research, monitoring and training activities should be undertaken. The values of wetlands need to be much more widely promoted in educational programmes and to the general public. Special

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attention should be devoted to targeting audiences by taking geographical, economic, and political considerations into account. Different mechanisms should be used to approach each target audience.

Constructed wetlands are both worldwide spread extensive techniques to treat wastewaters; they offer quite similar advantages, very low energy consumption, low O&M costs, low required O&M skills, while providing high treatment efficiency. In addition there is a growing interest in the possibilities offered by combinations of stabilization ponds and constructed wetlands for treatment improvement and better environmental insertion. Constructed wetlands are engineered marshes that duplicate natural processes to cleanse water. Natural wetlands and soil filters such as sand dunes do not have the capacity to clean water contaminated by human beings and industry. For this purpose, we can learn from nature and imitate her by building constructed wetlands, contained soil filters, and other designed ecosystems for the purpose of purifying human, agricultural, and industrial wastewater. The engineered aquatic treatment systems of constructed wetlands are classified into two basic types: free water surface (FWS) and subsurface flow (SF) wetlands. Both types consist of a channel or a basin with some sort of barrier to prevent seepage and utilize emergent aquatic vegetation as part of the treatment system. The difference between FWS and SF is the fact that the second type uses some kind of media as a major component. In FWS wetland, soil supports the roots of the emergent vegetation and water at a relatively shallow depth, generally less than 0.5m flows through the system with the water surface exposed to the atmosphere. A SF wetland bed contains a suitable depth (0.4 -0.8m) of permeable media through which the water flows. The media also supports the root structure of the emergent vegetation. The surface of the flowing water is beneath the surface of the top layer of medium, determined by proper hydraulic design and appropriate flow control structures. Wastewater undergoes physical, biological, and chemical treatment processes as it flows through the wetlands. The basic inspiration for the present study is the fact that any new finding or any better understanding pertaining to the natural processes contributing to the waste decomposition taking place within a constructed wetland will be of value in perfecting the design procedure for an effective wastewater treatment system using constructed wetlands. The paper includes the current state of the art in constructed wetland configurations and constructions along with the physiochemical processes responsible for the waste treatment mechanism.

This comparative study concludes by highlighting the necessity of the understanding of the basic functioning and components of both natural and constructed wetlands from the specific point of view of functional utility in environmental protection.

Organic Carbon and Nitrogen Fluxes from Mangrove Sediments

B. Senthil Kumar[1], A. Nirmal Rajkumar[1], R. Selvarani[1], R. Purvaja[1] and R. Ramesh[1]

Abstract

The increased concentration of CO_2 in the atmosphere, and the possible climate consequences of this increase have heightened interest in the study of the global carbon cycle, especially in the role of coastal zone and mangroves as a sink for fuel and land use CO_2. The coastal zone has a higher productivity, because of river inputs of nutrients, upwelling of fertile deep waters, the absence of losses of nutrients below the compensation depth and the close coupling of the pelagic and benthic systems. This biological production has increased during last decades due to increased nutrients inputs by the rivers. Owing to shallow a depth, which is characteristic of continental shelves, a significant fraction of the organic matter produced there rapidly reaches the bottom, enriching the sediment where intensive biodegradation processes occur. This strongly influences the fluxes of particulate and dissolved materials discharged into the mangroves by rivers. Nitrogen is usually chemically related to organic carbon and often a limiting nutrient, so that its loss from the ecosystem can significantly reduce biological productivity and thus may impact organic matter formation. In the present study, three major mangrove ecosystem of India (Muthupet, Pichavaram and Andaman) have been studied in detail for the C_{org} and total nitrogen concentration in the sediments. The average C_{org} in the surficial sediments of Muthupet mangroves ranges from 0.93% to 2.35% and the total nitrogen varies from 0.07% to 0.15%, In Pichavaram the average concentration of C_{org} varies from 0.06% to 1.71% and the total nitrogen varies from 0.04% to 0.14% and in Andaman mangroves, the C_{org} ranges from 1.42% to 2.52% and the total nitrogen varied from 0.05% to 0.17. The high concentration of both C_{org} and total nitrogen was recorded in estuarine regions and it is indicating the sink

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of organic matter in coastal sediments. The core sediments collected in three mangrove ecosystems indicate that the gradient of C_{org} was correlated to total nitrogen.

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Need for Landscape Guideliness on Urban Coastlines (Beaches) for Tourism and Recreation

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Abstract

This paper emphasis the importance and the need for Coastal landscape and Visual Quality assessments to arrive integrated coastal management. Indian society in the process of Globalization and post materialism will follow closely, where clear-cut environment quality would be the basic decisive factor, nevertheless the visual and Landscape quality criterion, though a matter of subjectivity, would play major role in management of coastlines for tourism and recreation. As said by Sack(1992)" in the literal sense a coastal (resort)landscape is arranged to encourages consumption and indeed the appearance of that place – its landscape – is often the element that is consumed". If appearance of the coastal landscape is the commodity or element that to be consumed, concept of post materialism hold good for coastal landscape where the qualitative aspect of landscape 'ie' the visual quality other than the quantitative element s of coastal environment, play a major role for sustainable coastlines. The author would limit to reinstate the importance of Visual and Landscape assessments as part of Environmental (Impact) Statement through analogy. Since more detailed examination of post material issues and Landscape and visual quality of coastlines would require more detailed data.

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