

ISSN 1848-0071  
UDC 614.7+661.94=111  
Received: 2012-08-23  
Accepted: 2013-04-02  
Professional paper

## ENVIRONMENTAL ECOSYSTEM AND INDUSTRIAL POLLUTION AT THOOTHUKUDI DISTRICT, TAMILNADU

A. ANTONY RAVINDRAN

V. O. Chidambaram College, Department of Geology, Thoothukudi, India  
e-mail: [antonicogeo@gmail.com](mailto:antonicogeo@gmail.com)

The focus of this paper is to investigate the environmental ecosystem in Thoothukudi district. The study area is the small and large scale industrial city of Tamilnadu. Chemical industry and power plant and marine fishing affect the ecosystem of the study area. Airborne emissions emitted from various industries are the cause of major concern. These emissions are of two forms such as, *suspended particulate matter* (SPM) and gaseous emission of sulphur dioxide, nitrogen dioxide, and carbon monoxide. The emission of industrial and petrochemical ozone layer occurs in the part of stratosphere at 10- 50 km above the surface. The chlorofluorocarbons (CFC) process reducing the ocean layer thickness then allows the UV from the sun to affect human beings and ecosystem on the surface. The ozone absorbs the UV radiation without itself being consumed and the UV light converts into heat due to the industrial pollution. In that case, there are increases of temperature with altitude because of by chemical factories. So that, giving inversion layer that traps molecules in the troposphere. The industrial pollution caused by chemicals, power and atomic waste used to affect the ecosystem in the industrial city of Thoothukudi.

**Key words:** industry, pollution, environment, ozone, ecosystem.

**Okolišni sustav i industrijsko zagađenje u području Thoothukudi, Tamilnadu.** Svrha ovog rada je istraživanje okolišnog ekosustava u području Thoothukudi. Istraživano područje je malog razmjera, ali velikog za industrijski grad Tamilnadu. Kemijsko i energetske postrojenje, te morski ribolov utječu na ekosustav istraživanog područja. Zrakom nošene emisije, koje emitiraju različite industrije, uzrok su mnogih briga. Ove emisije mogu biti u dva oblika, kao lebdeće čestice i emisija plinovitog sumpornog dioksida, dušikovog dioksida i ugljičnog monoksida. Emisija industrijskog i petrokemijskog sloja Ozona događa se u dijelu stratosfere kod 10-50 km iznad površine. Klorofluorouglijci reduciraju debljinu slojeva te zatim dopuštaju sunčevom UV zračenju da utječe na ljudska bića i ekosustav na površini. Ozon apsorbira UV zračenje a da se pri tome ne istroši, te UV svjetlost pretvara u toplinu zahvaljujući industrijskom zagađenju. U tom slučaju dolazi do porasta temperature s nadmorskom visinom u atmosferi uzrokovanog kemijskim čimbenicima. Tako nastaje inverzni sloj u koji se zaglavljaju molekule u troposferi. Industrijsko zagađenje, kao što je kemijski, energetske, atomski otpad ima utjecaja na ekosustav u industrijskom gradu Thoothukudi.

**Ključne riječi:** industrija, zagađenje, okoliš, ozon, ekosustav.

### INTRODUCTION

The study area Thoothukudi is an industrial area down the Gulf of Mannar Coast. Thoothukudi district is one of the important coastal districts of Tamil Nadu State. The district is located between 80.19' and 9020'N latitudes and 77040' and

78010'E longitudes. The northern border of the district is bounded by Virudhunagar district and the western, southern and southwestern parts are covered by Tirunelveli district. The eastern part of the district is bordered by the Gulf of Mannar. The district

has semi-arid – tropical climate. Air temperature data indicate that May – August are the hottest months in the district and December – February are the coolest months of the year. The mean annual temperature of the district is 28.3 °C. The mean annual precipitation is 675.71 mm. The major rainfall is received during the northeast monsoon period. The maximum rainfall is received during November.

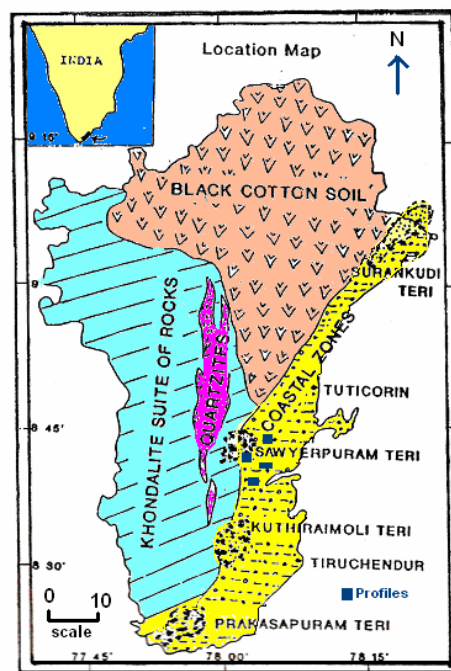
The study area contains soil, clay rich soil, alluvium deposits, sand stone, with kankar/caliche, weathered gneissic rock with basement rock. The ozone molecule consists of three oxygen atoms and a rare

gas. The ozone zones are to reduce or filter the UV rays from the sun and preserve the life on the earth surface. Air pollution reduces the ozone content in the atmosphere and depletion of ozone allows the ultra violet rays reach the Earth and cause skin cancer, snow blindness, cataract and less immunity to infectious disease, malaria, and herpes (1). The radiation of UV rays creates prevents the growth of plants, lower yields, increased toxicity, altered foam and the marine life reduced plankton, fish and larval crabs and shrimps due to industrial pollution( Figures.1 and 2).

## MATERIAL AND METHOD

(i) The study has identified the pollution of ecosystem by the industries in Thoothukudi. (ii) Geochemical industrial wastes such as aluminum, fluoride, urea, ammonium chloride, caustic soda affecting

the coastal pollution were used to estimate chemical pollution.(iii) The estimation of SPM is affected by petrochemical industries studied in pollution studies.



**Figure.1.** Location map of the study area

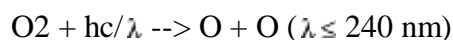
**Slika 1.** Lokacijska karta istraživanog područja



**Figure.2.** Industries in Thoothukudi City and images of evaporated chemicals.

**Slika 2.** Industrije u Thoothukudi City

The atmosphere consists of three main gaseous elements; nitrogen comprises 78 % of air by volume; oxygen comprises 21 % of air by volume and argon the remaining 1%. Stratospheric ozone might be destroyed by chlorine, chlorofluorocarbons, and refrigerators. These inert gases can reach the stratosphere where they are decomposed by high energy UV radiation and reactive with chlorine and bromine. In 1974, Sherwood and Mario Molina described the Chlorofluorocarbon (CFC) drift of stratosphere, where CFC breaks apart by sun high energy radiation and releases large quantities of chlorine in stratosphere. Ozone molecules of oxygen atoms break apart by intensity of ultraviolet radiation (less than 240 nm) into two oxygen atoms. These atoms react with other oxygen molecules to form  $O_2$  molecules, as in the chemical equation



where  $hc/\lambda$  represents the ultraviolet ray or photon, with  $h$  representing Planck's constant,  $c$  representing the speed of light, and  $\lambda$  denoting the wavelength of the photon. The rate at which ozone is formed is slow, since there isn't a lot of solar energy at wavelengths less than 240 nm. If we destroy

all of the ozone that now exists at around 20 km, this production process would take about 1 year to replace the destroyed ozone. Total amount of ozone between the surface and top of the atmosphere is measured by satellite total ozone mapping spectrometer (TOMS). Stratospheric ozone might be destroyed by chlorine, chlorofluorocarbons and refrigerate. These inert gases can reach the stratosphere, where they are decomposed by high energy UV radiation and reactive chlorine and bromine. The ozone measurements are typically reported in one of four units as mixing ratio in parts per million by volume (ppmv), number density (molecules per cubic centimeter, partial pressure in nanobars (nb) and total column amount in Dobson Units (DU). The catalyst of chlorine, nitrogen, bromine or hydrogen is reformed to destroy another ozone molecules by catalytic process by molecules is lost. Stratosphere are polluted by the injection of material occurs naturally and explosive eruptions. The variability of ozone layer with 27 days of solar rotation, the 11 year sunspot cycle is happens. The time scale of atmosphere circulation affected ozone in different time scale. The ozone atmosphere seasonal variations occur every 27 – 30 months. It is a quasibiennial oscillation. The major volcanic eruptions are to produce a

short term variation in the atmosphere above the ocean. These processes of photochemical adjustment are anticorrelated with temperature. The instrument weather balloon is used to measure the Ozone vertical profiles. It transmits values of air temperature and air pressure. Relative humidity, detector current, detector temperature and pump speed are measured at the ground receiving station. The ozone sample is pumped through a solution which is oxidized by the ozone producing an electric current. The electrical current is proportional to the flow of the ozone.

## CONCLUSION

The preparation of the evidences of UV radiation for the slowdown in loss in the upper stratosphere in the previous year evidences is carried out. Stratosphere is to be monitored continuously by using equipment weather balloons or satellite remote sensing technique and determine the UV- radiation frequency study. Air pollution ranges from 68 and 72, SO is 15 and 19.5 and NO is 11 and 22.5 were recorded. The study area is mostly polluted by chemical, petro-chemical and other industries like Tuticorin Alkali Chemicals & Fertilisers Ltd (fertilizers such as alkali chemicals, soda ash, ammonium chloride, sodium bicarbonate, pesticides, formulations and bi pesticides). Fertilizers

The satellite remote techniques are the back scatter Ultra Violet (BUV), the occultate technique, the limb emission technique and limb scattering technique involving a different measurement factor of atmosphere(2) and (3). The measurement of atmosphere radiation geometry are to be carried out by the satellite remote sensing technique such as the back scatter Ultra Violet (BUV), the occultate technique the limb scattering technique and the limb emission techniques.

industry of SPIC, deuterium oxide, D<sub>2</sub>O and radiation of garnet and monazite industries are also located in the study area. The statistical modeling is used to determine the variability and the probability of future scenarios of the ozone depletion. The coastal oil spill is one of the factors polluting the coastal environments (5). The awareness of the ozone layer in the future increase of green house gases is to be established and the control of the ozone depletion. The scientists should be encouraged to further research the climate change and promote understanding of the ozone depletion and prevention.

## Acknowledgement

*The author express his sincere thanks to Mr. A.P.C.V. Chockalingam, Secretary and Principal, V.O.C. College, Tuticorin.*

## REFERENCES

1. Frederick, J.E. and Alberts,. Prolonged enhancement in surface ultra-violet radiation during the Antarctic spring of 1990. *Geophysical Research Letters* (1991)18,1869-1871.

2. National Allocation Plan for CO<sub>2</sub> Emissions, [www.mos.gov.pl](http://www.mos.gov.pl), 12. 01. 2009.
3. M. Kieloch Kieloch, Jaroslav, Boryca, The influences of the increase rate of temperature of stell charge on CO<sub>2</sub> emission. *The Holistic Approach to Environment* 1(2011)1, 19-27.
4. D. Ciepiela, R. Dudała, *Gospodarka limitowana CO<sub>2</sub>*, <http://hutnictwo.wnp.pl>, 12. 01. 2009.
5. A. Antony Ravindran, N. Ramanujam And D. Juliya amarishContinuous Monitoring of Salinity Structures and Coastal Environmental Study Using 2D ERI in Vellappatti Beach, Thoothukudi, Tamilnadu. (2012) 1(3), 038-044.