

“Evolve a credible mechanism whereby Development is not pursued as threat to people’s lives and habitats but to ensure that it is cost effective, environment-friendly and least disruptive.”  
**Dr. Man Mohan Singh,**  
*Prime Minister of India.*

# ENVIRONMENT Ambassador

A News Paper for Exnora International

உயிரினங்கள்,  
 கூடக் குறைய மாசுபட்ட  
 காற்றுச் சூழலில்தான் தொடர்ந்து  
 புழங்கி வருகின்றன.  
 ஆகவே 100 சதவிகிதம் சுத்தமான  
 காற்று என்பது  
 இன்று காலம் கடந்துவிட்ட  
 கனவாகத்தான் கருத முடியும்.

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## CLEAN AIR, POLLUTED AIR : WHAT AND HOW ?

In the issue of “Environment Ambassador” for February 2006 we had featured a discussion on Carbon Pollution, Global Warming, Climate Change etc., in which we had touched the aspect of atmospheric pollution in the passing. In the discussions hereunder we propose to elaborate features of the Air that surrounds us called the Ambient Air, its pollution, its causes and what we could do about it? Please do join us.

## சுத்தமான காற்று, மாசுபட்ட காற்று : இவை என்ன, எப்படி உண்டாகிறது?

எமது பிப்ரவரி 2006 இதழில் கரிப் புகை மாசு, பூமி வெப்ப அதிகரிப்பு, கால நிலைகளில் மாற்றம் இந்த கோட்பாடுகளைப் பற்றி விவரிக்கும் பொழுது, வாயு மண்டலம் மாசு படுவதைப் பற்றி மேலெழுந்தவாரியாகக் குறிப்பிட்டோம். தொடரும் விவாதத்தில், நம்மை சுற்றியுள்ள காற்றின் தன்மை, அது மாசுபடுதல் எப்படி, அதை தடுக்க நாம் என்ன செய்ய வேண்டும் என்ற விவரங்களை உங்களுடன் பகிர்ந்து கொள்ளுகிறோம்.

### WHAT IS AIR IN ITS UPOLLUTED FORM ?

Air in its pristine natural form is a loose mixture of gases that are necessary to create and sustain life on earth. The gaseous composition of unpolluted clean air as they exist in one million parts by volume is as follows:

**Gaseous composition of unpolluted clean air**

The Gases	Parts per million (vol)
Nitrogen	756,500
Oxygen	202,900
Water	31,200
Argon	9,000
Carbon Dioxide	305
Neon	17.4
Helium	5.0
Methane	0.97-1.16
Krypton	0.97
Nitrous oxide	0.49
Hydrogen	0.49
Xenon	0.08
Organic vapours	Ca.0.02

**The Two moot questions:**

The two governing words in the definition are (1) that it is unpolluted and (2) that it is a loose Mixture. It immediately opens up to two questions whether clean air exists somewhere and whether the structure of its being a loose mixture can allow displacements of the original gases by pollutants entering the mixture.

Unfortunately the answer to the first question is ‘no’ and to the second question ‘yes’. The existence of unpolluted clean air is a theoretical possibility because the air in every limited ambience (surrounding / encompassing) is already polluted to a greater or lesser degree by other gases disturbing its loose structure as a mixture and displacing the original contents to that extent. It is also said to be true that Oxygen in the air is the first or easy target for displacement.

**Polluted Air is depleted of Life sustenance:**

Reasoning, therefore, is that in an ambient surrounding, the air is polluted to a lesser or greater degree and to that extent it is deprived of the natural life forming, life saving and life sustaining components.

### சுத்தமான காற்றின் தன்மை என்ன?

இயற்கை தோன்றியபின், நிலம், நீர், காற்று, வெப்பம், ஆகாயம் என்று உயிர் ஆதாரங்களின் ஐம்பெரும் சக்திகளாக நிலை கொண்டது. உயிர்களின் தோற்றம், வளர்ச்சி, இனப்பரவல் (Bio Diversity) ஆகியவற்றில் காற்றின் பங்கு இன்றியமையாதது. தோன்றிய காலத்தில் காற்றின் சுத்தமான தன்மையைப் பற்றி விளக்கங்கள் உள்ளன.

உயிர்வாழ அடிப்படையான பல முக்கியமான வாயுக்களைக் கொண்ட ஒரு உதிரிக் கலவையாகத் (Loose Mixture) தான் சுத்தமான காற்று பரிணமித்தது. அந்தக் கலவையில் இருக்கும் வாயுக்கள் ஒரு மில்லியன் கன பரிமாண காற்றில் இந்த வாயுக்கள் பரவிக்கிடக்கும் அளவுகளைக் கீழ்க்காணும் அட்டவணை காட்டுகிறது :



வாயுக்கள்	ஒரு மில்லியன் கனபரிமாணத்தில் (vol) பகுதி.
நைட்ரஜன்	756,500
பிராணவாயு	202,900
தண்ணீர்	31,200
ஆர்கன்	9,000
கரியமில வாயு	305
நியான்.	17.4
ஹீலியம்	5.0
மீத்தேன்	0.97-1.16
கிரிப்டான்	0.97
நைட்ரஸ் ஆக்ஸைட்	0.49
ஹைட்ரஜன்	0.49
க்ஸெனான்	0.08
ஆர்கானிக் வாயுக்கள்	Ca.0.02

**முழுவதும் சுத்தமான காற்று , இன்று காலம் கடந்து விட்ட கனவு:**

காற்றில் உள்ள இந்த கலவை வாயுக்கள் இறுக்கமாக இல்லாமல் உதிரியாக இருப்பதால் மற்ற அசுத்த வாயுக்கள் இந்த கலவையை ஆக்கிரமித்து சுத்தமான வாயுக்களை வெளியேற்றி விடுகின்றன. ஆகவே காற்று எப்பொழுதும் கூடக் குறைய அசுத்தக் காற்றுக்களால் மாசு பட்டுத்தான் இருக்கிறது. ஒவ்வொரு சுற்றுப்புற பகுதிக்கும் இடையே அசுத்த வாயுக்களின் ஊடுறுவலைப் பொருத்து காற்றின் மாசுத் தன்மை மாறுபட்டிருக்கும். அதற்கேற்ப அந்த சுற்றுப்புறக் காற்றின் உயிர் ஆதாரத் தன்மையும் மாறு பட்டுத்தான் இருக்கும்.

ஆகவே உயிரினங்கள், கூடக் குறைய மாசுபட்ட காற்றுச் சூழலில்தான் தொடர்ந்து புழங்கி வருகின்றன. ஆகவே 100 சதவிகிதம் சுத்தமான காற்று என்பது இன்று காலம் கடந்து விட்ட கனவாகத்தான் கருத முடியும். காற்று எவ்வளவு மாசுப் பட்டிருக்கிறது, அதிலிருந்து மீள்வது எப்படி என்ற கேள்வியில்தான் இன்று உயிரினங்கள் வாழ்கின்றன.

COCA COLA AND PEPSI NEED TO PROVE THEY ARE SOCIALLY RESPONSIBLE :

MORE CREDIBLE AS PRO-ENVIRONMENT AND PRO-CONSUMERS:

# Coke Slammed at Shareholders Meeting for Practices in India

Viren, Sunday, April 23, 2006

At a shareholders meeting of Coca Cola in Delaware Wednesday 19<sup>th</sup> April, activists demanded the company to disclose the full extent of its liabilities in India.

• They accused Coca Cola continues to be the prime target of attacks from rights groups in India who consider the multinational soft drink company a consistent violator of the right of local communities to have unhindered access to water.

• People in more than 20 villages are calling for the government to shut down the company's bottling plant

in the town of Mehdiganj, North India.

• The situation is similar in the desert state of Rajasthan, where people in more than 50 villages are facing acute water shortage, allegedly due to Coca Cola operations. Official accounts suggest that water levels in that area have dropped up to 10 meters since 2001 when the company started its operations there.

• In the southern state of Tamil Nadu, thousands of community members are organizing a series of protests against Coca Cola's plans to build a new plant in the town of Gangaikondan. Campaigners fear that

the proposed bottling operations will cause soil pollution and water shortage.

• Activists in the United States claim that more than 100 colleges and universities already have anti-Coke programs in place, and about 20 schools have either banned Coke products or axed their exclusive contracts with the company.

• Also, increased pressure from student bodies throughout Europe is pushing hundreds of schools to cancel their contracts with the company, they say.

**US univ forces Coke to yield on plants in India**

"DNRM" <dnrm@panchayats.org>

S Rajagopalan, Washington, April 13, 2006.

Coca-Cola has agreed to a third-party probe into the controversial water-management practices at its Indian plants. The immediate gain for the soft-drinks giant: it has won back its \$1. million annual contract with the University of Michigan.

But student activists who campaigned for the termination of the arrangement are unhappy at the university's "premature" action. They argue that the probe will not be independent, alleging that the Indian

entity which Coke has proposed to design the investigation is a beneficiary of its corporate sponsorship. Notwithstanding the reputation of the entity - The Energy and Resources Institute (TERI) - student groups, notably the India Resource Centre, have voiced serious reservations over the move.

**Pepsi told to pay compensation: Hindu 27-04-2006**

New Delhi: Soft drink giant Pepsi has been ordered to pay a compensation of over Rs. one lakh by a city consumer court after a man found a condom inside a sealed bottle of the company. PTI

## ENGINEERING HUMAN URINARY BLADDER CAN BE LIFE-SAVING

### A FEAT THAT OVERCAME MANY COMPLEX BIOLOGICAL PROBLEMS TO SUCCEED

Urinary bladder therapy or replacement becomes important in bladder tumours, bladder rupture in injuries and accidents, and disorders due to multiple sclerosis, diabetes or spina bifida (where the spinal cord in the lower end is malformed).

It demands approaches and solutions from biomedical research and advances using methods of tissue engineering.

As an organ, the bladder is far simpler than the heart, kidney or the spleen. It is a hollow vessel with an outer layer of muscle cells and an inner layer of special cells called urothelial cells, which form an impermeable reservoir for urine. While bladder muscle cells grow easily enough in the lab to make sheets, urothelial cells had challenged scientists for long.

Dr. Antony Atala of the Wake Forest Institute for Regenerative Medicine, at Winston-Salem, North Carolina, and his team published the results of their experiments on tissue engineering in this regard on April 4, 2006. They took out a tiny portion (1-2 square cm) of the patients's bladder, isolated the muscle and urothelial cells, and cultured them on a biodegradable scaffold in between. Starting with about 1 million cells, they grew the bladders (containing 1.5 billion cells) in about seven weeks. The engineered tissue was hooked up in each patient with the remaining bladder and helped in the development of full-fledged healthy bladder in course of time. The biodegradable material used in the culture was absorbed in the system.

Tissue engineering is easier and more sure than the Stem Cell route because in the latter one needs to do the cell engineering first, that is to ask the starter cells to make the various cells types one wants in the end, blend them right to make the layers of tissues and connectives, and then the organ.

(Source D. Balasubramanian, dbala@lvpei.org from Science and Technology Feature of the Hindu 21<sup>st</sup> April.

LIGHT-EMITTING PLASTIC SHEETS WILL BE FUTURE LIGHTING SOLUTIONS:

## WILL REPLACE INCANDESCENT BULBS AND TUBE LIGHTS AT LESS COST AND ENERGY:

Dr. Forrest and researchers from the University of Southern California have built up sheets of light-emitting plastics only a few millionths of a millimetre thick. The sheets are seeded with dyes that light up red, green or blue and when an electric current passes through them, the colours combine to produce white light. When the colours are balanced right, the sheets mimic the light coming from the sun. The advantage is that indoors everything will have the same appearance as when one is outside.

These Lighting sheets could brighten up homes and offices by being turned into ceiling tiles and wall panels, and even moulded to cover furnishings.

More than 20 per cent of electricity used in buildings goes on lighting.

The sheets are designed to be transparent but radiate brilliant white light when hooked up to an electricity supply. Because they do not warm up like traditional bulbs they waste far less energy and have a much longer span of life.

Environmentalists believe that when you save energy you save on burning Coal, and prevent Air pollution to that extent.

(By Ian Sample, from Science and Technology feature of the Hindu April 21)

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# Air and its major pollutants

INJURIOUS TO HUMAN, ANIMAL & PLANT LIFE:

One of the formal definitions of air pollution is – ‘The presence in the atmosphere of one or more contaminants in such quality and for such duration as is injurious, or tends to be injurious, to human health or welfare, animal or plant life.’ It is the contamination of air by the discharge of harmful substances. Air pollution can cause health problems and it can also damage the environment and property. It has caused thinning of the protective ozone layer of the atmosphere, which is leading to climate change.

Hereunder is listed some of the Major Pollutants of the air. This is observed as the National Ambient Air Quality standards for concentrations of Micro Grams found in a cubic metre of air, for annual and 24-hour averages. This may be a tool to measure how more or less polluted the air is in a surrounding Environment with respect to each of the polluting components.

National Ambient Air Quality Standards		
POLLUTANTS	CONCENTRATION Annual average $\mu\text{g}/\text{m}^3$	CONCENTRATION 24 hour average $\mu\text{g}/\text{m}^3$
Sulphur dioxide (SO <sub>2</sub> )	60	80
Oxides of Nitrogen (NO <sub>2</sub> )	60	80
Suspended Particulate Matter (SPM)	140	200
Lead	0.75	1.00
Carbon Monoxide	2.00	4.00
Respirable Particulate Matter (RPM)	60	100

## Source of Pollutants:

Prospecting for more and more fossil fuel and petro-chemical based energy as a requirement for Development, ends up in more and more of these pollutants in the air. Industries, vehicles, increase in the population, and urbanization are some of the major factors responsible for air pollution. The following industries are among those that emit a great deal of pollutants into the air: thermal power plants, cement, steel, refineries, petro chemicals, and mines.

Air pollution is aggravated because of four developments: increasing traffic, growing cities, rapid economic development, and industrialization. The Industrial Revolution in Europe in the 19th century saw the beginning of air pollution as we know it today, which has gradually become a global problem.

Air pollution results from a variety of causes, not all of which are within human control. Dust storms in desert areas and smoke from forest fires and grass fires contribute to chemical and particulate pollution of the air.

The source of pollution may be in one country but the impact of pollution may be felt elsewhere. The discovery of pesticides in Antarctica, where they have never been used, suggests the extent to which aerial transport can carry pollutants from one place to another.

Probably the most important natural source of air pollution is volcanic activity, which at times pours great amounts of ash and toxic fumes into the atmosphere.

# காற்றை மாசு படுத்தும் வாயுக்கள், பொருட்கள்:

காற்று மாசு படுகிறது என்றால் காற்றுக்கு இயற்கையாக சொந்த மில்லாத சில அந்நிய வாயுக்களும், பொருட்களும் அதனுள் ஊடுருவி, காற்றை அசுத்தப் படுத்துகிறது என்று ஏற்கனவே நாம் அறிந்து கொண்டோம். சில சமையங்களில், இத்தகைய அந்நிய வாயுக்களும், பொருட்களும் சுத்தமான காற்றின் வாழ்வுக்கு ஆதாரமான சொந்த, இயற்கை வாயுக்களை வெளியேற்றி அவற்றின் அளவுகளைக் கணிசமாகக் குறைத்து, காற்றையே பயனற்றதாகச் செய்து விடுகின்றன என்பதையும் புரிந்து கொண்டோம். இப்படி அந்நிய வாயுக்களால் பாதிக்கப்பட்டு சுத்தமான காற்றிலிருந்து அதிகமாக வெளியேற்றப் படுவது உயிர்களுக்கு ஆதாரமான பிராணவாயு (Oxygen) என்றும் அறிஞர்கள் கண்டறிந்திருக்கிறார்கள்.

இப்படி காற்றை மாசுபடுத்தும் அந்நிய வாயுக்கள், பொருட்களில் முக்கியமானவை எவை என்பது கீழே காணும் பட்டியலில் கூறப்பட்டிருக்கிறது. இவை ஒவ்வொன்றும், வருடாந்திர, மற்றும் 24 மணி நேர சராசரி தேசிய அளவில், ஒரு கன மீட்டர் பரிமாண சுத்த காற்றில் எவ்வளவு மைக்ரோ கிராம் திறன் (Concentration), இருக்கிறது என்பதும் குறிப்பிடப் பட்டிருக்கிறது :

## சுற்றியுள்ள காற்றில் மாசு வாயுக்களின் அளவு தேசியக் குறியீடு.

மாசு படுத்தும் வாயுக்கள், பொருட்கள்	அளவு தேசிய சராசரி $\mu\text{g}/\text{m}^3$	ஆளவு 24 மணி நேர சராசரி $\mu\text{g}/\text{m}^3$
சல்பர் டை ஆக்சைட்	60	80
நைட்ரஜின் ஆக்சைடுகள்	60	80
காற்றில் மிதக்கும் திட அணுக்கள் (SPM)	140	200
ஈயம்	0.75	1.00
கார்பன் மாநாக்கலைட்	2.00	4.00
மூச்சுக் காற்றில் புகுந்து விடும் திட அணுக்கள் (RPM)	60	100

மாசு படுத்தும் இந்த அந்நிய வாயுக்கள் மனித சமூகத்தின் அன்றாடத் தேவைகளுக்காகவும், சமூகப் பொருளாதார வளர்ச்சிக்காகவும் தேவைப்படும் எரி சக்தியை (Energy) உற்பத்தி செய்ய, கட்டை, கரி, மற்றும் பெட்ரோலியப் பொருள்களை எரிப்பதால் உண்டாகும் கரிப் புகையால் (Carbon Smoke) உண்டாகின்றன. மேலும் பெட்ரோல், டீசல் வாகனப் போக்குவரத்துக்களாலும், தொழிற்சாலைகளில் முக்கியமாக ரசாயன தொழிற்சாலைகளில் ஏற்படும் வாயுக் கழிவுகளாலும் காற்று மாசுபடுகிறது.

மாசுபடுத்தும் வாயுக்களை குறைப்பது எப்படி?

மாசுபடுத்தும் வாயுக்களை குறைப்பதன் மூலம்தான் சிறிதளவாவது அகற்ற முடியும். காற்றை ஓரளவாவது சுத்தப் படுத்தமுடியும். இதற்கான வழிகள் :

- கரிப்புகை உண்டாக்கும் கட்டை, கரி, குப்பை ஆகியவற்றை எரிப்பதைத் தவிர்க்க அல்லது குறைக்க வேண்டும்.
- பெட்ரோல், டீசல் வாகனங்களில் சுத்திகரிக்கப் பட்ட எரி வாயுக்களை பயன்படுத்த வேண்டும்.
- கரிப்புகை, மற்றும் ரசாயன வாயுக்கள் உண்டாகும் இடங்கள், தொழிற்சாலைகளில் அவற்றிலிருந்து மாசுபடுத்தும் வாயுக்களை கழிக்கும், சுத்தப் படுத்தும் தொழில் நுட்பங்கள் தவறாது கடைபிடிக்கப் படவேண்டும்.
- ஒட்டு மொத்தமாக, அன்றாடத் தேவைகளுக்காகவும் வளர்ச்சிப் பணிகளுக்காகவும் கையாளப்படும் எரிசக்தி (energy), மற்றும் உபயோக, உற்பத்திப் பொருட்கள் (Manufacture of consumer and Producer goods) தயாரிப்பில் சுத்தமான அணுகு முறைகள் (Clean Practices) தவறாது கடைபிடிக்கப் படவேண்டும்.

## AIR POLLUTION RELATED DISEASE DIAGNOSTIC CENTRE AT CHENNAI:

The Sri Ramachandra Medical College (SRMC) and Research Institute Chennai on 24<sup>th</sup> April opened an Air Pollution Related Disease Diagnostic Centre (APRDC) with the support of the Gas Authority of India (GAIL). The centre will combine surveillance and data gathering with diagnosis and treatment.

The APRDC is the 17th GAIL unit established in key cities across India as part of the 'corporate social

responsibility initiative to tackle increasing levels of air pollution.

The initiative extends diagnostic and treatment facilities to the poorer sections of society.

The centre at SRMC will operate from the Departments of Environmental Health Engineering headed by Kalpana Balakrishnan and Chest Medicine led by Vijayalakshmi Thanasekaran.



நம் பத்திரிக்கை உங்கள் வியாபார பெருக்கத்திற்கு உதவும்

உங்கள் "என்விரன்மெண்ட் அம்பாசிடர்" மாதம் ஒரு முறை சென்னையிலிருந்து-குமரி வரை மூலை முடுக்குகளையும் பலதரப் பட்ட மக்களையும் சென்றடைகிறது. உங்கள் வியாபாரப் பொருட்களும், சேவைகளும் இந்த இலக்குகளைச் சென்றடைய வேண்டாமா? இந்த பத்திரிக்கை மூலம் எங்கள்

வாசகர்களுக்கு அவைகளை பிரபலப்படுத்துங்கள். ஒரு பத்தி x ஒரு செ.மீ அளவு விளம்பரம் ரூபாய் 60/- மட்டுமே. உங்கள் விளம்பர வாசகம், லோகோ இவற்றை பத்திரிக்கையின் 2ம் பக்கத்தில் கண்ட விவாசத்திற்கோ அல்லது ஈ-மெயில் மூலமோ அனுப்பங்கள்.

# CRITICAL FACTS ABOUT MAJOR AIR POLLUTANTS. THEIR SOURCES AND TOXICITY:

Carbon monoxide (CO) is a colourless, odourless gas that is produced by the incomplete burning of carbon-based fuels including petrol, diesel, and wood. It is also produced from the combustion of natural and synthetic products such as cigarettes. It lowers the amount of oxygen that enters our blood. It can slow our reflexes and make us confused and sleepy.

Carbon dioxide (CO<sub>2</sub>) is the principal greenhouse gas emitted as a result of human activities such as the burning of coal, oil, and natural gases.

Chlorofluorocarbons (CFC) are gases that are released mainly from air-conditioning systems and refrigeration. When released into the air, CFCs rise to the stratosphere, where they come in contact with few other gases, which leads to a reduction of the ozone layer that protects the earth from the harmful ultraviolet rays of the sun.

Lead is present in petrol, diesel, lead batteries, paints, hair dye products, etc. Lead affects children in particular. It can cause nervous system damage and digestive problems and, in some cases, cause cancer.

Ozone occurs naturally in the upper layers of the atmosphere. This important gas shields the earth from the harmful ultraviolet rays of the sun. However, at the ground level, it is a pollutant with highly toxic effects. Vehicles and industries are the major source of ground-level ozone emissions. Ozone makes our eyes itch, burn, and water. It lowers our resistance to colds and pneumonia.

Nitrogen oxide (Nox) causes smog and acid rain. It is produced from burning fuels including petrol, diesel, and coal. Nitrogen oxides can make children susceptible to respiratory diseases in winters.

Suspended particulate matter (SPM) consists of solids in the air in the form of smoke, dust, and vapour that can remain suspended for extended periods and is also the main source of haze which reduces visibility. The finer of these particles, when breathed in, can lodge in our lungs and cause lung damage and respiratory problems.

Sulphur dioxide (SO<sub>2</sub>) is a gas produced from burning coal, mainly in thermal power plants. Some industrial processes, such as production of paper and smelting of metals, produce sulphur dioxide. It is a major contributor to smog and acid rain. Sulfur dioxide can lead to lung diseases.

## SOME HINTS FOR REDUCING AIR POLLUTION

The task of cleaning up air pollution is difficult, but it is possible to observe certain important hints at reducing the air pollution. The efforts in this regard can come from the individuals, the families, the communities and the society at large.

### From the Society:

- Can shift to less polluting forms of power generation, such as solar energy, wind energy, geothermal, tidal and other forms of renewable energy in place of fossil fuel.
- Resort to non-burn techniques of solid wastes such as methanisation, Composting, pelletisation, disposal at scientific land fills etc
- Pollution control devices for vehicles such as catalytic converters and use of unleaded petrol, CNG, Bio-Fuels etc.
- Exploring Public Private partnerships in organizing Common Effluent Treatment Plants (CETPs) in industrial complexes.

### From the Individuals and the Community:

- Can contribute by conserving energy. Walk or ride a bicycle to nearer places. Take a bus to distant places. Organize a car pool. See that the use of aerosols is reduced in the houses. Make sure to get regular pollution checks of the car. The car should be well maintained.
- Trees give out oxygen and take in carbon dioxide and thereby clean the air around us. Look after the trees in the neighborhood. Begin a tree watch similar to a neighborhood watch. Plant more trees and tend them too.
- Switch off the lights and fans in unattended rooms. During the day, use only the required number of lights. During hot summer months when one tends to use an airconditioner or a cooler or a heater on very cold winter days, to share the room with other members of the family.
- Do Home Composting of bio degradable solid waste.

## WILL MORE TREES CONTROL CO<sub>2</sub> LEVELS IN THE ATMOSPHERE?

(From The Hindu, Science and Technology Feature of May 4)

It is generally believed that since trees breathe in carbon Dioxide, planting more Trees will control/reduce CO<sub>2</sub> levels in the atmosphere, and thereby contribute to lesser air pollution.

How much of this belief is correct?

Trees breathe CO<sub>2</sub> through fine pores in the leaves called "Stomata", to take up excess CO<sub>2</sub> to produce carbohydrates which is their stored energy source.

Now biologists at the University of California, San Diego have found that the pores do not remain open all the time to let in CO<sub>2</sub> but alternately open up and narrow down to control entry of CO<sub>2</sub> enough to accelerate plant growth depending on the Plant's Carbohydrate reserves.

According to the University press release, the biologists discovered that in the cells surrounding the leaf stomata calcium ion 'spikes' - rapid increases and then decreases in calcium ion concentrations within cells- changed in frequency according to atmospheric CO<sub>2</sub> levels. High CO<sub>2</sub> seemed to prime the calcium sensors in the leaf and narrow the pores. In the presence of low CO<sub>2</sub>, the stomata opened, rather than closed.

This appeared to be an important source of uncertainty in predictions about global warming based on how plants will respond to increasing atmospheric CO<sub>2</sub>. But Biologists say that even if a plant closes its pores a little in response to increasing atmospheric CO<sub>2</sub>, it would still have access to CO<sub>2</sub>. But less water would be escaping through the pores, so the response might help plants use water more efficiently.



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## AMBIENT AIR QUALITY MONITORING IN TAMIL NADU: THE TAMILNADU POLLUTION CONTROL BOARD (TNPCB) IS THE AUTHORITY.

With the increased industrial and commercial activities in the vicinity of major cities, the ambient air quality is affected by emissions from the industries and from the ever increasing vehicular population. As per the provisions of Air Act, 1981 the entire state of Tamilnadu has been declared as air pollution control area.

### AMBIENT AIR QUALITY MONITORING

TNPCB is monitoring the ambient air quality in Chennai (3 stations), Coimbatore (3 stations), Thoothukudi (3 stations), Madurai (3 stations) and Salem (1 station) under the National Ambient Air Quality Monitoring Programme. TNPCB has established 5 ambient air quality monitoring stations in Chennai city from its own funds and monitors the air quality in residential, commercial and sensitive zones of the city. The results of the programme are published every week in a leading newspaper. TNPCB has also commissioned the ambient air quality monitoring programme at 4 locations in Tiruchirappalli.

The major industrial complexes, especially the clusters of chemical industries, are to be monitored continuously. With this in view, TNPCB has established 6 continuous ambient air quality monitoring systems at Cuddalore, Thoothukudi, Ranipet, Manali-Chennai, Royapuram-Chennai and Kathivakkam-Thiruvallur at a cost of around Rs.40 lakh each to assess the level of pollutants such as suspended particulate matter, sulphur dioxide, oxides of nitrogen, carbon monoxide, ammonia, chloride, flourine, etc in the ambient air and the adequacy of air pollution control measures provided by the industries. The Board instructs the concerned industrial units to improve the air pollution control measures, whenever the levels exceed the standards prescribed.

Highly polluting industries have been asked to establish continuous air quality monitoring systems so as to have continuous check on the ambient air quality around the industry. Industries have already installed these air quality monitoring systems.

### VEHICLE EMISSION MONITORING

Urbanisation and industrialisation have resulted in increased vehicular traffic in cities, resulting in increase in automobile emissions and toxic smoke emissions. TNPCB is carrying out the vehicle emission monitoring since 1.5.92 for testing the emissions from goods transport vehicles in Chennai City in 3 locations at Guindy, Ambattur and Vyasarpadi. In addition, 102 private agencies have been authorised by the Transport Department in Chennai city to check the emission level of the vehicles. Further, TNPCB has established vehicle emission monitoring stations at Dindigul, Palani, Udhagamandalam, Katteri, Chengalpattu and Kancheepuram.

During the year 2000-2001, out of 45,292 vehicles tested, 1,767 vehicles did not satisfy the standards. TNPCB has initiated action to check the emission status of the buses run by Metropolitan Transport Corporation of Chennai Ltd. (MTC) and smoke meters have been provided by the Board.

### STATE OF AMBIENT AIR QUALITY IN MAJOR CITIES OF TAMIL NADU 2003-04 (ANNUAL AVERAGE)

City	SO <sub>2</sub> (60/80)	NO <sub>x</sub> (60/80)	SPM140/200	RSPM
<b>Chennai :</b>				
1. Industrial	24	32	163	90
2. Residential	22	34	214	109
3. Mixed	20	32	151	95
<b>Madurai :</b>				
1. Industrial	22	29	163	72
2. Mixed	9	31	416	154
3. Residential	8	25	135	60
<b>Coimbatore :</b>				
1. Mixed	10	51	108	43
2. Residential	10	46	111	46
3. Industrial	13	56	151	62
<b>Salem : 1.</b>				
1. Mixed	8	37	66	28
<b>Thoothukudi : 1.</b>				
1. Industrial	20	22	35	29
2. Mixed	19	20	41	34
3. Residential	20	19	38	30

Source : Tamil Nadu Pollution Control Board, Chennai-32.

### STATE OF AMBIENT AIR QUALITY IN CHENNAI - 2003-04

Station	SO <sub>2</sub> "µg/m <sup>3</sup>	NO <sub>x</sub> "µg/m <sup>3</sup>	RDS "µg/m <sup>3</sup>	SPM "µg/m <sup>3</sup>	Pb "µg/m <sup>3</sup>
1. T. Nagar *	6.4	24.2	86	233	0.05
2. Vallalar Nagar *	6.8	29.2	94	211	0.03
3. Anna Nagar	4.8	14.1	64	94	0.04
4. Adayar	3.8	10.0	41	61	0.01
5. Kilpauk *	6.8	25.2	108	237	0.05

Traffic intersection areas

Source : Tamil Nadu Pollution Control Board, Chennai-32.

### Finding:

• It is seen from the figures above, that compared to the National Air Quality Standards indicated within brackets in the headline, the Air Pollution due to Sulphur and Nitrous Oxides are fairly under control while the pollution due to Suspended Particulate Matter (SPM) is far above the standards in almost all places in the state and in Chennai City. This is not a healthy situation and requires further stringent control by the TNPCB on emissions by industries and vehicles.



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INITIATIVE BY THE APEX COURT :

# SUPREME COURT MONITORING COMMITTEE ON HAZARDOUS WASTE AND CHEMICALS

THE REVEALING WORK BY THE "LOCAL AREA ENVIRONMENT COMMITTEE (LAEC)", MANALI, 2005



**Back Ground :**

While the Tamil Nadu Pollution Control Board (TNPCB) is the authorized agency to monitor the Ambient Air Quality in various cities in the state, studies commissioned by the Supreme Court of India in 2005 to monitor the Hazardous Waste and Chemicals in Manli Industrial Area and SIPCOT, Cuddalore were of particular significance because the studies contemplated a holistic environmental monitoring of the two complexes, including Air Quality Monitoring which we intend to particularly project here with reference to Manli Industrial Area .

**Constitution of LAECs:**

With the Supreme Court order of 14.10.2003 forming the basis for the functioning of the LAECs, the Manali

LAEC was constituted by The Supreme Court Monitoring Committee on Hazardous Waste by letter of 28.1.2005 and convened by the Tamil Nadu Pollution Control Board with Mr. T.K Ramkumar as Chairman, Dr. V.N Rayudu as Convenor and Five other members.

**Broad Terms of Reference:**

- Carry out or cause to carry out environmental audit of all industries within and in the vicinity of Manali Industrial Area.

- Use environmental audit process above to focus on industries contributing to air pollution to characterise air emissions of toxic chemicals – particularly, volatile organics and sulphur compounds.
- Pollution by Small Scale Industries
- Accumulated waste discharged in unauthorised areas
- Effluent discharge
- Ground water deterioration
- Poor ambient air quality
- Flares
- Odours and Fugitive emissions

**Role of the Community :**

The LAEC has been instrumental in bettering community involvement and capacity-building through the following measures:

- LAEC gave the Community representatives the opportunity of accompanying LAEC on all the periodic visits to industries which helped them to understand process and waste disposal practices of the industries.
- Three workshops for community volunteers to equip them to continue the monitoring.
- Formation of 'Manali Environment Protection Committee' (MEPC) with persons nominated by the community from each village/community in the Manali Area.
- Formation of a smaller youth groups to do the 'leg work'.
- The LAEC has helped in getting a one year fellowship from Exnora International for a community youth to take on MEPC work part time.

**Results of the Study:**

The results of the study conducted by the LAEC, Manali on Air Pollution monitoring in the Manali area are tabulated hereunder. The significant factors of the study are outlined :

- Col.5 of the Table showing the number of times that particular polluting gases have exceeded the screening levels, show the enormous extent of pollution;
- Col.7 shows the Health Effects of particular polluting gases;
- Col.8 shows the target organs affected by the Pollutant gases; and finally
- Col.9 shows whether the particular polluting gases are carcinogenous (cancer causing).

SNo	Chemical found	Levels detected (ug/m3)	Health based Screening levels (ug/m3)	Number of times exceed the screening levels	Odour	Health Effects	Target Organs	Carcinogen
1.	Hydrogen Sulphide	19.1	1.00 (US EPA Region 6 Screening Level)	19.1	A strong odour of rotten eggs	respiratory system; convulsions; conjunctivitis, eye pain, dizziness, headache, weakness, exhaustion, irritability, gastrointestinal disturbance	Eyes, respiratory system, central nervous system	No
2.	Carbon Disulphide	46.1	3 (Texas Long-Term Screening Levels)	15.3	A sweet ether-like odour	Dizziness, headache, poor sleep, weakness, exhaustion, anxiety, weight loss; gastritis; kidney, liver injury; eye, skin burns; dermatitis; reproductive effects	central nervous system, peripheral nervous system, cardio vascular system, eyes, kidneys, liver, skin, reproductive system	No
3.	Ethanol	180	—	—	Pungent fruity odour	Irritation eyes, nose, throat; eye, skin burns; dermatitis; conjunctivitis; cough; central nervous system, depression in animals: kidney reproductive, teratogenic effects; [potential occupational carcinogen]	Eyes, skin, respiratory system, kidneys, central nervous system, reproductive system Cancer Site [in animals: nasal cancer]	Yes
4.	Acetone	3400	370 (EPA Region 6 Screening Level)	9.1	A fragrant, mint-like odour	Irritation eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis	Eyes, skin, respiratory system, central nervous system	No
5.	Isopropyl Alcohol	5.2	—	—	Odour of rubbing alcohol	Irritation eyes, nose, throat; drowsiness, dizziness, headache; dry cracking skin	Eyes, skin, respiratory system	No
6.	2-Butanone (Methyl Ethyl Ketone)	8.1	1000 (EPA Region 6 Screening Level)	—	A moderately sharp, fragrant, mint- or acetone-like odour	Irritation eyes, skin, nose; headache; dizziness; vomiting; dermatitis	Eyes, skin, respiratory system, central nervous system	No
7.	n-Hexane	6.7	210 (EPA Region 6 Screening Level)	—	A gasoline-like odour	Irritation eyes, nose; nausea, headache; muscle weakness; dermatitis; dizziness	Eyes, skin, respiratory system, central nervous	No
8.	Benzene	6.2	0.250 (EPA Region 6 Screening Level)	24.8	An aromatic odour	Irritation eyes, skin, nose, dizziness; headache, nausea, exhaustion; bonemarrow depression; [potential occupational carcinogen]	Eyes, skin, respiratory system, blood, central nervous system, bonemarrow Cancer Site [leukaemia]	Yes
9.	Toluene	520	400 (EPA Region 6 Screening Level)	1.3	A sweet, pungent, benzene-like odour	weakness, exhaustion, confusion, euphoria, dizziness, headache; discharge of tears; anxiety, muscle fatigue, insomnia; liver, kidney damage	Eyes, skin, respiratory system, central nervous system, liver, kidneys	No
10.	Ethylbenzene	25	1100 (EPA Region 6 Screening Level)	—	An aromatic odour	Irritation eyes, skin, mucous membrane; headache; coma	Eyes, skin, respiratory system, central nervous system	No
11.	m,p-Xylenes	17	—	—	An aromatic odour	Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; nausea, vomiting, abdominal pain; dermatitis	Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys	No
12.	o-Xylene	6.4	730 (EPA Region 6 Screening Level)	—	An aromatic odour	Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait, nausea, vomiting, abdominal pain	Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys	No

**RECOMMENDATIONS :** The following were some of the important recommendations of the study:

- Immediate installation and operationalisation of air monitoring station at Manali residential area. Electronic display boards at every factory gate displaying online data of hazardous gases (organic and inorganic), VOCs, PAHs (Poly Aromatic Hydrocarbons) to be made mandatory

# “FLARES” – ANOTHER AIR POLLUTION RISK AT MANALI INDUSTRIAL AREA

**SHOULD BE DESIGNED FOR FULL COMBUSTION AND ONLINE MONITORING.**



“Flares” are techniques for burning of gases in stacks by industries, of unwanted gases or gas leaks from industrial operations etc., and are therefore outside the regular manufacturing process.

The system is used to dispose off unwanted gases. However, during the study by the Local Area Environmental Committee (LEAC) of the Manali Industrial Area, it was found that in addition to the staggering Air Pollution by gas emissions of the regular manufacturing processes, the flaring of unwanted gases outside the process has also been yielding toxic emissions which added to the polluted ambient air.

**Flares are necessary Evils but should be designed and managed :**

Flares are necessary evils of Chemical Industries, but the problem arises because Industries take the freedom of using flares for burning gases that their regular processes generate continuously. Flares need to be controlled by the following guidelines:

- Flares should be designed to take the maximum load in the worst case scenario and to ensure full combustion.

- Only combustible gases should be sent to flare stacks.
- Ideally only hydrocarbons were burnt in flare stacks.
- Disposing of non-combustible gases through flare-stacks causes more Pollution because burning would not be complete, giving rise to particulate matter.

- Flares should not be taking place all the time since they are a high-temperature oxidation process for burning combustible components of only gas-leaks from industrial operations.

**Community Monitoring of Flares by Youth Volunteers:**

Such being the case, the practices of flaring were found to be followed by the industries in Manali Area most of the days and at all odd times. Therefore, with the help of the Manali Environmental Protection Committee the LEAC unobtrusively monitored the flaring by the industries through youth volunteers randomly and recorded the following findings :

- 11-10-2005 : TPL, Caltex Petrochemicals, Koathari Sugars, Madras Fertilisers Ltd.
- 14-10-2005 : Cpcl.

- 17-10-2005 : Madras Fertilisers Ltd.
- 18-10-2005 : Cpcl
- 21-10-2005 : Madras Fertilisers Ltd., Cpcl, Papl.
- 22-10-2005 : Koathari Sugars, Cpcl, Futura Polymers.

Generally in all these cases it was recorded that the flares discharged highly black colored flame and smoke causing Irritation in eyes, nose and throat, and nervous problem.

**Systematic Monitoring absent:**

A regular systematic monitoring of the gas flares by individual industries is not in place and therefore it is not known how much more air pollution results out of the incomplete oxidation in the flare stacks.

A community monitoring of the air through a Tedlar bag sample was taken on the night of 25th July 2005 from opposite the Futura Polymers, a PET recycler and polyester manufacturer at Manali. The results revealed the following :

Twelve chemicals were found: Hydrogen Sulphide, Carbon disulphide, ethanol, acetone, iso propyl alcohol, 2-butanone, n-hexane, benzene, toluene, ethyl benzene, m,p-xylenes and o-xylene.

None of these, except Acetone, is reported to be stored, used or produced on site by Futura Polymers which confirmed that the study revealed pollutants not only from other industries but also from flares from these industries.

This is the finding, given the high levels of prevalent air pollution from multiple sources, including other large sources like refineries. The study however could not measure the levels or the quantum of gases detected.

**Recommendation:**

- Every industry should have efficient flare gas recovery systems.
- The Timing and the quality and quantity of gases from Flares should also be subjected to regular and systematic online monitoring.

## Unmanned aircrafts take to skies to track air pollution over Indian Ocean



Arlington, VA — A research consortium funded by the National Science Foundation (NSF) and led by the Scripps Institution of Oceanography at the University of California, San Diego, has successfully sent a fleet of aerial drones through the pollution-filled skies over the Indian Ocean, thereby achieving an important milestone in the tracking of pollutants responsible for dimming Earth’s atmosphere.

The instrument-bearing autonomous unmanned aerial vehicles (AUAVs) completed 18 successful data-gathering missions in the vicinity of the Maldives, an island chain nation south of India, said scientist V. Ramanathan.





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THE P.M GIVES THE CALL:

# “DEVELOPMENT, DISPLACEMENT, ENVIRONMENT” SHOULD BE ADDRESSED SQUARELY :

## CONSOLIDATE EXISTING POSITIONS BEFORE LAUNCHING IMPROVEMENTS

Prime Minister Dr. Manmohan Singh addressing the annual session of the Confederation of Indian Industry (CII) at Delhi on 18<sup>th</sup> April gave a call that issues relating to “Development, Displacement and Environment” do not generate into confrontations between sections of our society but should be addressed squarely in a manner whereby all stakeholders benefit to some degree from development. He appealed for evolving a credible mechanism whereby Development is not pursued as threat to people’s lives and habitats but to ensure that it is cost effective, environment-friendly and least disruptive.

There cannot be better elucidation of the expectations in society of the paramount need for the Development of the Country’s economy to proceed coexistent and concurrent with the protection of the Environment, rehabilitation of the Habitat and restoration of other natural wealth that could be put to axe. The PM’s call which was made at the appropriate Forum came in the wake of the Supreme Court order in the Narmada dam case on 17<sup>th</sup> April.

The anguish and concern of the Prime Minister was due to the fact that in the Narmada Dam issue the authorities worked with a scheme that Development can outpace Rehabilitation while the agitators wanted both to be coextensive. The Supreme Court saw logic in the demand of the agitators that work on the further increase in the height of the Sardar Sarovar Dam should not be taken up until the failures and deficiencies in rehabilitation work with reference to the existing height have been remedied, and the



prescribed advance steps have been completed with reference to the proposed further increase in height.

This principle *pari passu* should apply to all Development Projects big or small. While Governments, the Public and Private Sectors rightly follow the practices of constructive development of the infrastructure and material resources of the country, it is enshrined in the work book that the consequential dislocation of people and the habitat, the damage to the existing resources and the environment are repaired and remedied on an equal footing and time with the development.

Even in simple cases of development such as road and other civil works, Sewer Line servicing, etc., the debris, the sludge, the residue of the materials etc., are left uncleaned or uncleaned long after the works are over contributing to structural and environmental damage. This happens because the agencies concerned do not consider that the consequences or damages of Development should have to be attended to and rectified at the same time and in tune with the projects themselves.

The Environmental and Social Activists are happy that such an awareness should have to be brought home to the developmental advocates from the words of the highest executive as the Prime Minister of our country. It needs to be seen that the follow up on these sentiments reaches the ultimate objective of Development with due attention to displacement and proper improvement to Environment. This should be the underlying goal of any Environmental Impact Assessment (EIA).

## India’s first community Ecosan Compost Toilet System in Musiri

*All wastes from the toilet are individually recycled and used to advantage*

(V.Ganapathy, Advisor, Trichy District EXNORA and Liaison officer, SCOPE.

These toilets are called “EcoSan” because they ensure eco-sanitation by completely recycling all the wastes out of the toilet to be used to advantage. The fecal matter gets composted and the wash water and the urine are separately collected, treated and used for watering plants. These toilets have grown out of the old twin compost chamber toilets propagated widely in rural India. Until recently these toilets were constructed and used as individual units, but now is a welcome departure that for the first time in India a system of community EcoSan toilets has been put up on the banks of the River Cauvery in Musiri Special Village Panchayat in Thiruchi District of Tamil Nadu.

This system of Community Toilets was declared open by Dr. N. Maarkandan, Former Vice Chancellor of Gandhi Gram University on April 11<sup>th</sup> under the presidency of Prof. K. Nammalwar noted organic farming specialist.

This pilot Eco Sanitation Project aims at substantial reduction in the use of water in toilets, prevention of contamination of water sources and use of urine and human excreta for composting to enhance soil fertility and agricultural productivity.

Society for Community Organisation and Peoples Education (SCOPE) an NGO of Trichy, a pioneer in the field of Sanitation and Eco-sanitation has entered into an agreement with WASTE Netherlands, to establish for the first time in the country 500 Household -Centred Environmental Sanitation toilets (HCES) and two Community Compost Toilets. Solid Waste Management (SWM) with source segregation is an integrated part of the Musiri ECOSAN Pilot Project (MEPP). An ECOSAN toilet exclusively for physically handicapped and elderly persons has also been constructed.

The Community Compost Toilet has two blocks, one for men and other for women said Mr. M.Subburaman, Director, SCOPE. Each block has seven cubicles. HCES and each cubicle of the community compost toilet are identical and have two compost chambers. The compost chambers are used alternatively and the one which is not in use is sealed. The wash water from the compost toilets is collected in the filter bed to be used for cultivation of banana by a farm owner close to the toilet. The urine collected separately in cans will be used for irrigating banana, paddy, sugarcane and plantations in farms near Musiri. The compost will be used as a soil conditioner in agricultural farms. In the HCES the urine and wash water are used for raising kitchen gardens.

ECOSAN is an environmentally friendly way to recycle human waste to protect water sources and conserve the water. It is highly decentralized and managed by the beneficiaries themselves. ECOSAN makes use of dry composting toilets, in order to break the link between water use and sanitation. It eliminates large quantities of water used for flushing. It is a significant improvement over the pit toilets and septic tank. It will end open urination or defecation. It offers increased privacy, comfort and security to all users especially women users.

With the support of Trichy District Rural Development Agency and UNICEF, SCOPE has constructed over 300 HCES toilets in Kaliyapalayam and Sevanthilingapuram villages near Musiri. SCOPE has constructed 40 ECOSAN HCES in highwater table, sandy coastal areas of Tsunami hit Nagapattinam.

In collaboration with the EXNORA International the Musiri Panchayat is establishing a DEWATS to the toilets in compost yard at Musiri at a cost of about Rs.5 Lakhs by which treated black water from the toilet will be used for spraying on the biodegradable garbage for composting and recycling.



Squatting pans inside the ECOSAN compost toilets at Musiri



First ECOSAN Community compost Toilet in the country at Musiri