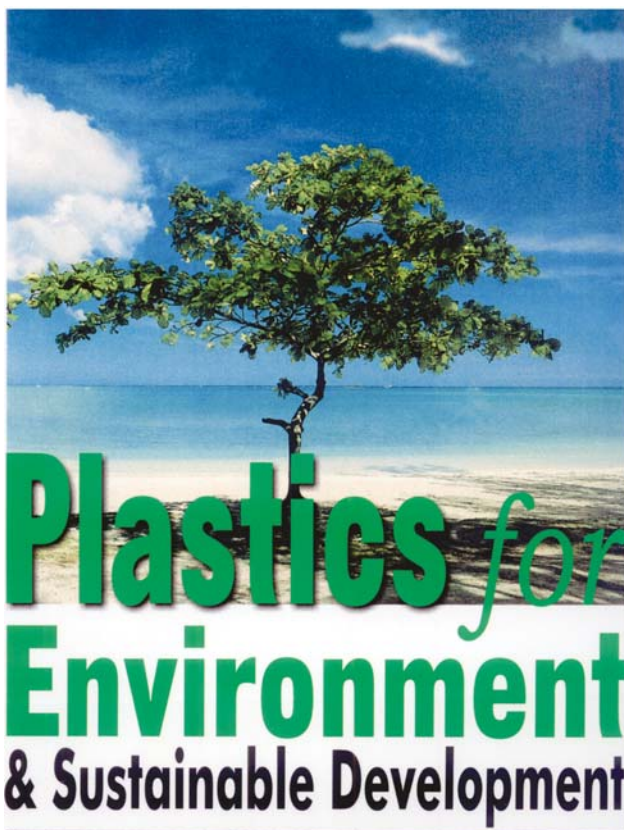
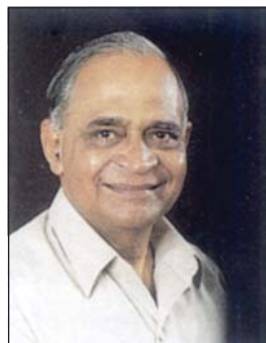


A Programme on “Environmental Management Capacity Building Technical Assistance Project”,  
Sponsored by Ministry of Environment and Forests, Government of India.



### *Plastics for Environment & Sustainable Development*

Plastics have moulded the modern world and transformed the quality of life. There is no human activity where plastics do not play a key role, from clothing to shelter, from transportation to communication and from entertainment to health care. Plastics, because of its many attractive properties, such as lightweight, high strength and ease of processing, meet a large share of the material needs of man. From practically zero in the fifties, humankind today consumes greater than one hundred and fifty million tons of plastics. We truly live in a 'Plastics Age'. Our daily lives would be very much poorer without these benign and environmentally friendly materials. Plastics possess a unique combination of properties. Plastics can be super tough, rigid as well as flexible, transparent as well as



**Prof. M. M. Sharma**  
(F.R.S.)  
Padma Vibhushan



**Dr. R. A. Mashelkar**  
(F.R.S.)  
Padma Bhushan

*At the time of going to publication of this Newsletter, ICPE was informed by the Ministry of Environment and Forests, Government of India, that the Ministry had referred the complete Monograph entitled 'Plastics for Environment and Sustainable Development' published by ICPE and CIPET in 2003, as part of an answer to a Parliamentary Query on plastics and its impact on the environment. While the details of the particular Query and the complete answer by the Ministry would be published in the next issue of ENVIS Newsletter, it was thought appropriate to reprint the 'FOREWORD' of the referred publication of ICPE and CIPET, which gives glimpse of the various benefits that plastics offer and which answer some of the frequently raised issues on plastics.*

opaque and can allow selective permeation or act as a barrier material.

Nature has produced 'plastic'-like materials for centuries. Silk and cellulose are example of natural polymers. Reference to Shellac, a thermoplastic can be found even in Mahabharatha!

Growing population and consumption in India has put severe pressure on our natural resources and fragile eco-systems.



The material needs of our population are growing and plastics offer a cost-effective alternative.

Plastics are employed in myriad applications where they actually conserve natural resources. For example, aseptic packaging of food in barrier packaging films will render refrigeration unnecessary, saving capital and energy. Edible oils and milk are packaged in flexible packages eliminating the use of tin and glass containers. Rigid HDPE barrels are used for bulk chemical storage instead of steel drums. Apart from conserving natural resources, use of plastics in these applications saves transportation fuel as plastics are substantially lighter than tin, glass or steel.

Safe drinking water packaged in PET bottles are a very common sight now-a-days. They provide confidence to consumer on the quality of water and help reduce waterborne diseases. Advanced polymeric membranes help purify water from viruses and bacteria. They also provide potable drinking water from sea and brackish water through a process of desalination.

The fact that plastics are made from hydrocarbons derived from petroleum, which is non-renewable, has raised questions concerning its sustainability. Nevertheless, the consumption of petroleum hydrocarbon for the production of plastics is less than 5%, the balance being consumed as fuels and energy source. Consequently, the concerns about sustainability of plastic materials is somewhat exaggerated. On the contrary, processing of many natural materials (glass, paper, wood, metals) consume far more energy and thus lead to greater consumption of fossil fuels. Additionally, research and development work currently in progress globally will provide future opportunities to make some of the plastics from biomass and other renewable resources. Thus, plastic manufacture will become even more sustainable in the years to come. It is fair to say that plastics replace several natural materials, which are either scarce, consume more energy for processing or cause damage to the eco-systems during their production. Thus use of plastics makes a positive contribution to the sustainability of earth's resources.



**(Prof. M. M. Sharma)**  
*Kothari Research Professor,  
Jawaharlal Nehru Centre for Advanced Research  
Former Professor of Chemical Engineering  
Director UDCT, Mumbai (India)*

Another issue that is often discussed is whether because of their non-biodegradability, plastics will cause damage to our eco systems. The signature of all natural materials made by biological processes is that they are biodegradable and bio-assimilable. The long life and desirability of plastics, which have made them a material of choice for many applications is seemingly a disadvantage when it comes to their disposal. However, when handled properly, plastics do little damage to our environment.

Plastics have the advantage that they can be easily reprocessed and recycled. In some cases, one can recover even the raw materials that were originally used in their manufacture. Plastics offer the unique advantage that one can recover the fuel value contained in the hydrocarbon polymer after its use. Plastics can also be made environmentally degradable, especially for packaging applications. There are expectations that in the near future plastics will be made even biodegradable and compostable so that waste plastics can be handled the same way as wet food waste and agricultural waste. The overall eco-friendliness of plastics becomes apparent when one evaluates the total 'life cycle', namely, an analysis of raw materials, energy, effluents, methods of disposal, etc., of a material from its origin to its final disposal.

It is, therefore, very appropriate that the Indian Center for Plastics in the Environment and Central Institute of Plastics Engineering and Technology are bringing about a monograph titled "Plastics for Environment and Sustainable Development". This monograph, which has chapters authored by several distinguished scientists and technologists from some of our leading R&D institutes will comprehensively address all issues concerning sustainability of plastics as materials and an assessment of the impact on environment. We do believe that the monograph will set to rest any lingering doubts about the sustainability of plastics as materials or their adverse impact on our environment and will lead to more enlightened discussion on the role of plastics in the armoury of materials used by men.



**(Dr. R. A. Mashelkar)**  
*Director General, CSIR  
&  
Secretary, Department of Scientific  
Industrial Research (Govt. of India)*

## School Programme

## Initiative



Ryan International School



Ms. Mini Nayar, Head Mistress, Ryan International School, along with ICPE official.

An Environmental Awareness programme was organized at Ryan International School, Malad (East), Mumbai, on 28th September, 2006. About 500 students of the



ICPE official addressing the students of Ryan International School

school from standard VII to standard IX attended the programme and viewed the ICPE audio-visual – Living in the Age of Plastics. Later Shri T. K. Bandopadhyay, Technical Manager, ICPE, made a Power Point presentation on Plastics and Environmental Implications. ICPE official distributed ICPE School Book – It's My World – Imagination of a cleaner world, among the students.

In the open house discussions, students interacted freely with ICPE official on the issue of segregation of waste at home by implementing two-bin culture. All realized assured that they would start practicing the system at their homes.

## Recycling technology for composites based on molten salts

During two years the Recycomp project that has gathered numerous French partners was aimed at studying the various available solutions and perspectives for recycling of composites such as glass or carbon fiber reinforced composite wastes. Among the different technologies, the molten salt technology that is widely used for metallic wastes seems very attractive for carbon fiber reinforced materials. This technology is based on

a reaction medium of molten or dissolved salts at temperatures between 20 to 1500°C, the temperature depending on the salt type. The molten salt bath allows to separate the matrix from the reinforcement that can be then recycled and reused. Researches and tests are underway to improve this technology.

(Source: [www.omnexus.com](http://www.omnexus.com))

## **Seminar on 'Plastics in Environment and Solid Waste Management'**

A seminar on 'Plastics in Environment and Solid Waste Management' was organised by Kerala Plastics Manufacturers' Association (KPMA) jointly with All India Plastics Manufacturers' Association (AIPMA), Mumbai, and with active support of Indian Centre for Plastics in the Environment (ICPE), at Calicut on 15th September, 2006. The Seminar was inaugurated by Hon. Mayor of Calicut, Mr. M. Bhaskaran. Keynote address was delivered in the Technical Session by Mr. K. G. Ramanathan, President, Governing Council, ICPE. Other dignitaries who spoke on the occasion were Dr. Jayathilak, District Collector; Mr. Abdul Aziz, G.M., District Industry Centre; Dr. K. E. George, Professor, Department of Polymer Science, CUSAT; Dr. Dwivedi, Chief Manager (BD), Central Institute of Plastics Engineering and Tools, Chennai and others. On behalf of the organizers Mr. P. J. Mathews, President, KPMA, Mr. Ajay Desai, President, AIPMA and Mr. K. K. Murlu, President, North Kerala Plastics Manufacturers' Association deliberated on the occasion.

Welcoming the delegates and other dignitaries, Mr. Mathews outlined the objectives and purpose of the seminar and assured that the KPMA would extend all its cooperation and assistance in removing the myths about plastics and organise awareness programme on appropriate methods of post-consumer plastics waste disposal, recycling and overall solid waste management. He also said that littering in public place should be banned and the local bodies should take initiative in this regard.

Mr. Ajay Desai brought the fact to the notice of the delegates that increasing GDP of India has resulted in increased demands and consequently the significance of appropriate waste disposal through proper solid waste management has increased. Collective efforts of all in the supply chain and authorities is necessary in identifying and affecting solutions.

Mr. M. Bhaskaran, Hon. Mayor of Calicut – declared that Calicut Corporation was one of the earliest civic authorities which banned use of plastic bags (thin). While announcing that the Corporation was not against any material including plastics but he emphasised that the issue of post-consumer waste of plastics and their disposal has raised concern. He observed that adherence to the Ministry of Environment and Forests, Rule of 20 micron



*Mr. P.J. Mathews addressing the delegates.  
Also seen Mr. K. G. Ramanathan (middle) on the dais.*

thickness of plastics carry bags would help in avoiding thin plastic bags in the waste stream, which creates problem of collection.

He invited more meaningful cooperation from the industry to resolve the issue.

Mr. K. G. Ramanathan, President, GC, ICPE, took note of the observations made by Hon. Mayor and expressed that relevance of this should be accepted and plastics fraternity address to these.

He continued that the plastics industry is always open for constructive suggestions and analyse the same for proper implementation. It should be accepted that plastics are widely used primarily because of their versatility, advantages and economic benefits they offer. He cited examples – the water pot made from plastics has replaced the metal helping in reduced fatigue to ladies who in villages have to walk long distances to fetch water.

Mr. Ramanathan observed that plastics is the product of discovery of the last century. It has gained widespread application from common household goods to high technology instruments. However, there are three or four criticisms against plastics. First, it is said that plastics are derived from non-renewable resources, viz., oil and hence the usage of plastics should be curbed. Mr. Ramanathan pointed out that only 4% of crude oil is used in the entire chain of petrochemicals of which plastics is only a part. While the economy of usage of

crude oil is always welcome, curbing the use of plastics is not the solution. The second aspect of criticism always relates to the alleged health hazards arising out of usage of plastics. Mr. Ramanathan explained that plastic products are being subjected to in-depth scientific analysis and they have clearly proved that plastics do not cause any such health hazards. In fact, plastic products have been implanted into vital organ like heart, clearly disproving the myths. Moreover there are clear international and national regulations / standards for usage of plastics that come into contact with food, water, etc. Therefore, much of the alleged health hazards is pure scare mongering and not based on scientific facts. The issue of dioxin emanating from burning of plastic have also been well studied and documented.

The third major criticism against plastics is its non-biodegradability. While it is true that plastics are not amenable to biodegradability like other organic matters, many alternate materials such as glass, metals are also not biodegradable. Moreover, many of the applications for plastics arise from the need for the product to be long lasting. Again, LCA studies carried out the world over clearly prove that the energy required for production of plastics is relatively lower than other competing materials. Thus, the production and usage of plastics demand minimum energy in comparison to other materials and therefore non-biodegradability alone cannot be a consideration while deciding on the appropriate needs of a material.

Lastly, management of plastics waste is held against the usage of plastics. Undoubtedly this is a serious issue mainly due to the social habit of our people and poor infrastructure for management of solid waste. The solution lies in segregation of dry and wet solid waste at the source, creation of efficient solid waste management infrastructure coupled with establishment of recycling centres as plastics can be recycled several times before it reaches its end of life. This is where a fruitful partnership between Government agencies, plastics industry and consuming public will have to be developed. Educational programmes against littering and segregation and disposal of plastic waste will have to be launched. Creation of an efficient solid waste management system can be attempted with the partnership of industry. The recycling industry also needs to be upgraded by technical inputs and financial incentives. Mr. Ramanathan also referred to energy recovery from plastics through properly run incinerators, usage of plastics in cement kilns, blast furnaces, etc., so that the energy contents in plastic waste are not allowed to go underutilized.

Prof. Narayanan reiterated the various points shared by Mr. Ramanathan. He also pointed out the brief of District Collector. It is necessary to identify the right and make use of the best for economic benefits. It should be understood that the consumers today in the country are costs-oriented and hence packaging needs to be optimised, so far it is functionally sound. He also pointed out the quantum of forest depletion due to use of wood for packaging of fresh produce that creates environmental imbalances and how best plastics, particularly recyclable packs can help conserve natural resources. He also pointed out the use of plastics pallets in place of wooden pallets and the increasing demand of international regulations on the use of wood. Disposable syringes and sterilisable plastics are other examples shared in the context of health issues and benefits offered by plastics. He added that the waste collection process thereof is a management challenge and all concerned should collectively address and resolve.

Dr. George shared the basic chemistry of the thermoplastics emphasising the fact, under proper recycling conditions no harmful gases are emanated. He also reemphasized that the prime issue is low gauge polyethylene bags and their collection and recycling. This should not be mixed with other plastics like PVC. In case of poly bags recycling, there is no chance of emanation of Dioxin considering their basic structure. Also, recycling should be done at controlled conditions of heat with oxygen supply. It is a need of education and understanding. The polymer institutions will be most happy to extend their inputs to the associations and agencies.

The Open Forum followed was very lively with constructive discussions and suggestions as well as possible line of actions. These could be summed up as:

- The government and authorities should consult the technical institutions and subject experts before arriving at any decisions.
- Burning of poly bags are to be done under optimum conditions.
- Decentralised recycling of plastic wastes should be encouraged.
- On the specific point made by the Hon'able Mayor, the action has already been initiated by ICPE to entrust a detailed project on the mix of waste poly bags in the tar for Tar Road laying to the Central Road Research Institute. The studies are expected to highlight all relevant issues, also provide the optimum mix ratio and applying conditions.
- Mr. Kalanathan, Ex-Panchayat President said that waste poly bags is not a major issue as many other

industries – particularly unorganised, cause more problems. He observed that most studies, discussions, etc., are today confined to urban sector and very little attention is paid to rural sector and villages. Most villagers are not aware of the problems of burning and often the used bag and containers are misused.

Mr. Kalanathan proposed:

- Can we create an organised segregation with education to the villagers?
- Can we create the bin culture for each family (for plastics waste)?
- Can we work with the Panchayats and through them achieve organised collection and reach these to a centralised recycling centre?

The above has to be taken up as a project with the chain of involvement of Panchayat groups, MLAs, MPs, State to Central.

The KPMA reacted to say that they had earlier initiated a 2-bin culture but would take up Mr. Kalanathan's suggestions.

Mr. Ramanathan, President, ICPE considered Mr. Kalanathan's suggestions very valuable and ICPE will be happy to set up a pilot project with the help of KPMA.

- Mr. Kalanathan also suggested that a techno economical project report should be prepared and made available to all panchayats. The project report also should identify the financing and other sources who can help in implementation resources.

- Mr. Krishnakumar, Health Inspector and Coordinator – Solid Waste Management, Corporation of Calicut, threaded his observations to the Hon Mayor and emphasised the need for extensive education among the masses. Probably only 15 per cent of the population is in the awareness bracket. He said that the Corporation is already in touch with industry group in Bangalore and Mumbai. Mr. Krishnakumar expressed that the Corporation will be willing to give space for establishment of recycling plants.

The KPMA readily agreed to consider the suggestion for implementation.

- Mr. Rishidharan emphasised the need for education, implementation of MoEF regulations and mass propaganda of the system and involvement of all concerned. He also added that the myths surrounding the issues should be removed.
- The industry in general observed that while KPMA takes efforts to discourage their members not to produce poly carry bags of less than the stipulated size and thickness, it appears that thinner poly bags with improper marking come from outside Kerala. This problem has to be sorted out with the help of All India Plastic Manufacturers' Organisation and the Government agencies.

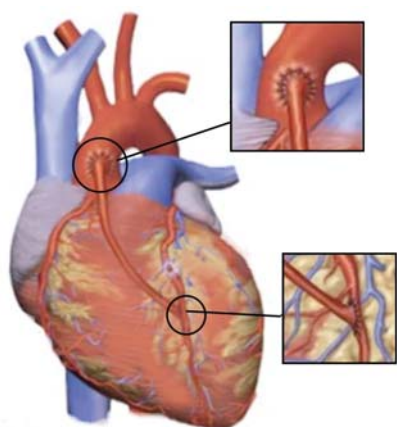
Mr. Ramanathan and Mr. Ajay Desai assured the group that the ICPE and AIPMA will be most happy to extend all assistance and help in the interest of the industry growth and conforming to all stipulations.

## Did You Know?

A team of heart specialists and space engineers from NASA have devised a radically new plastic-based solution to assist the heart

and extend a patient's life until a donor organ becomes available for transplant or until the patient's own heart is sufficiently recovered for successful surgery.

pen. This propeller is based on the same principle as pumps used in the space shuttle to move large amounts of fuel at low pressure.



Instead of designing a device that mimics the heart, it developed a propeller in the size of a fountain

The device is sewn onto the heart so that blood can bypass the heart's main pumping chamber.

[www.envis-icpe.com](http://www.envis-icpe.com)

Website hits for June-September 2006

Months	Hits
July	: 43,590
August	: 55,239
September	: 58,141

## Recycling of Multi-layer/ Laminated Plastics Waste

As per ongoing interaction process between ICPE and Central Pollution Control Board (CPCB) on safe environmental practices for plastics waste management and recycling (among other related matters), a visit was organised by ICPE for CPCB official for the inspection of special plastics recycling plants near Mumbai.

The CPCB official was shown the manufacturing facilities of plastic chip boards made from multi-layer/laminated plastics waste by Deluxe Recycling (India) Pvt. Ltd., Manor, near Mumbai.

The company manufactures the chip boards, which are used as alternative to wooden ply boards and are used in all applications, where wooden ply boards are used.

Variety of plastics waste is used for manufacturing the chip boards, which include waste of:

- Tetra pack pouches of fruit juice and other liquid products
- Multi-layer plastic laminates used for packaging wafers, coffee, tea, etc.
- Lamitubes used for toothpaste packaging, etc.

Various applications of these chip boards include:

- Door panels
- Industrial pallets
- Hospital & school furniture
- Furniture and interiors for home & office, etc.

Typical properties of these chip boards, as claimed by the manufacturer, are given in the table.

CPCB official was satisfied with the manufacturing process of the facility.

As per industry report, there are 3 or 4 such recycling facilities in the country at present.



## Feature

**Features and Advantages of the Boards are:**

- Easy to cut, normal wood working tools and machinery can be used.
- Will not rot, crack, warp or splinter and unlike wood there are no knots.
- Do not get affected by termite, borer, bacteria, etc.
- Resistant to mild chemicals, oil, gasoline, pathogens.
- Resistant to water and salt water.
- Not affected by exposure to most substances.
- Denser than wood and have high compression strength.
- Can be sawn, moulded, screwed like other wood products.
- Virtually maintenance-free, hence saves valuable cost.
- Do not expand under varying climatic conditions.
- Impervious to insects.
- Stain resistant.
- Aesthetically pleasing.
- Have long life.
- Cost-effective.
- Recyclable.

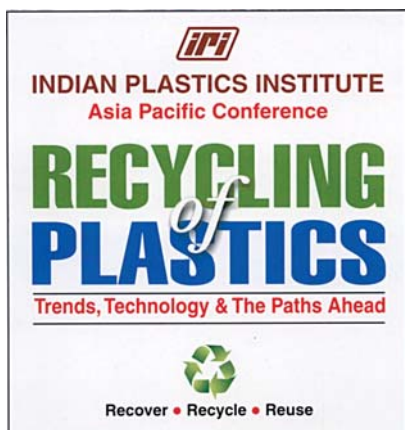


*Dr. Sunil Nigam of CPCB seen with Mr. Jignesh Shah, M.D. of Deluxe Recycling (India) Pvt. Ltd. Seen in the background – samples of Chipboard.*

CPCB official also visited a large capacity plastics recycling plant, Shakti Plastics Industries in Manor near Mumbai.

The unit recycles various kinds of plastics waste including polythene bags and moulded articles, polypropylene jumbo bags (woven sacks), nylon rods, ABS parts, polystyrene, SAN articles, etc. All the machines including grinding, agglomerators, extruders, granulators, etc., have been designed and manufactured indigenously. The appropriate heaters and temperature controllers ensure that the plastics materials are not overheated during extrusion operation. The well-ventilated, spacious and airy shop floor ensures no untoward emission of undesired gaseous products.

CPCB official was satisfied with the clean operation of the large recycling unit.



### About the Conference

IPI Plastics Recycling Conference has been scheduled for 23rd & 24th February, 2007 in Mumbai and in New Delhi on 26th & 27th February, 2007. The programme will offer presentations by experts on latest trends and technologies and machinery developed worldwide for recycling different types of plastics waste and offer opportunities for recyclers to upgrade, scale up and expand their operations. It will offer industries using plastics for packaging, as components or parts in their products to know how best they can improve waste management and recovery and reuse. Experts will address concerns of local authorities in processing and managing plastics waste economically, safely and efficiently and deal with facts about plastics and environment protection. Technical specialists will share information on the latest research and developments worldwide in recycling and applications of variety of recycled materials by the industry, ideas for material and energy saving vital to every developing economy. It will deal with novel systems of waste collection and successful programmes and policies that have helped to change outdated practices and minimise plastic litter and waste nuisance in societies & creating wealth by innovations.

### Mumbai:

**23rd-24th February, 2007**

University Institute of Chemical Technology (Formerly UDCT),  
University of Mumbai, N. M. Parekh Marg,  
Matunga, Mumbai - 400 019.

### New Delhi:

**26th-27th February, 2007**

Punjab Haryana Delhi Association,  
PHD House, 4/2, Sirifort Institutional Area,  
August Kranti Marg, New Delhi - 110 016.



### Topics of Discussion

- Global developments in plastic recycling technologies, machines and processes in the 21st century.
- Innovations in collection – separation – treatment of plastic waste to optimise recovery.
- Additives, Fillers and Chemicals that add value to recycled waste and help create useful products.
- Systems and programmes of collection and Management of Plastics Waste in different sectors.
- Trends in recovery of Plastics Waste from electronics products – cell phones, etc.
- Responsibility of Waste Collection and Recovery for automotives, computers & printers, etc., in the developed economies.
- Polices, Regulations & Incentives for Plastics Waste Recovery and Recycling in industrialised nations.
- Global Markets for Plastics Waste and Recycled Materials – Optimal Value Creation.
- Ideas in Handling Plastics Waste Recycling and Trade – Indian Initiatives – R&D Efforts & Studies.
- New Products using Plastics Waste – Important Tests & Standards for Products.

### Benefits of Conference

This Conference offers a practical and dedicated platform for all stakeholders to discuss the key factors concerning plastics waste management and address issues relevant in Asia to deal with growing volumes of plastics waste. It will be structured to help recyclers, processors, policy makers, municipalities, NGOs, packaging units and all major users of plastics to understand trends and policies from around the globe and help make business more competitive and responsible. It will help understand how some countries and states have created wealth from plastics waste and been exceptionally successful in plastic recycling with private-NGOs and Citizens' partnerships.

*For further queries / details please contact the conference desk at:*

### INDIAN PLASTICS INSTITUTE

30, Sarvodaya Indl. Estate,  
1st Floor,  
Off. Mahakali Caves Road,  
Near Paper Box Factory,  
Andheri (E), Mumbai 400 093  
Tel.: 6695 0347 / 6696 2601  
Fax: 91-22-6695 0348  
E-mail: ipi@vsnl.com  
ipi@bom3.vsnl.net.in  
Website: <http://www.inplasin.org>



**Indian  
Centre for  
Plastics in the  
Environment**

*For further information contact :*

### Indian Centre for Plastics in the Environment

Kushesh Mansion, 2nd Floor, 22, Cawasji Patel Street and  
48/54, Janmabhoomi Marg (Ghoga Street), Fort, Mumbai - 400 001.  
Tel.: +91-22-2282 0491 / 0496 • Fax: +91-22-2282 0451 • E-mail: [icpe@vsnl.net](mailto:icpe@vsnl.net)  
Website: [www.icpenvis.org](http://www.icpenvis.org) • [www.envis-icpe.com](http://www.envis-icpe.com) • [www.icpeenviis.nic.in](http://www.icpeenviis.nic.in)