

# ENVIS NEWSLETTER

**CENTRE FOR ENVIRONMENTAL STUDIES**  
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 (Forest & Environment Department, Government of Orissa)



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## State of Environment - Plastic Waste Management

It had been established that there are various ecological effects caused by plastics in various stages of its lifecycle. Most of the states in the country have banned plastics in one or other form. Nevertheless some have accepted the unavailability of plastic and its usefulness. With such admission and acknowledgement being made, the focus now shifts to how the bans of plastics should be addressed. Hence the viability of the command and control approach and that of the market based alternatives in addressing the environmental problems caused by plastic is to be examined.

"Plastics" derived their name from their properties to be moulded, cast, extruded or processed into a variety of forms, including solid objects, fibres and filaments. The utilization of plastics ranges from toys to aircrafts, from hosepipes to dolls, from soft drink bottles to refrigerators, from gramophone records to television sets. The highest users of plastics in India are industries related to infrastructure, agriculture and water management and packaging.

**Plastics are indispensable materials used in variety of application.**

### Building & Construction

- Insulation
- Plumbing
- Fixtures
- Siding
- Flooring
- Glazing
- Doors
- Bathroom units

### Packaging

Rigid plastics are chosen when protection is needed and flexible plastics are chosen when convenience is paramount.

### Aeronautics

Used in aeronautical applications from interior trim in airplanes to nose cones for missiles.

### Household application

Plastic pouches & wraps Refrigerators Dishwashers



### Electronics

- Coffee makers
- Irons
- Mixers
- Microwave ovens
- Food processors
- In-house wiring
- Electric switches
- Connectors

**There is no material on earth that can boast of as diverse and an exceptional benefits as plastics can.** The advantages of plastics are energy saving ability, resource conserving capacity and waste reducing capability. The use of plastics allows economisation in the consumption of energy and thereby provides substantial saving in production costs.



For every seven trucks needed to deliver paper grocery bags to the store, only one truck is needed to carry the same number of plastic grocery bags. The manufacture of 1000 one litre plastic bottles requires 57 per cent less number of glass bottles and the manufacture of 1000 plastic bags requires 32 per cent less fuel than is required by the same number of paper bags.



More than a 100 million tones of plastic is produced worldwide each year. Many countries, including India, are trying to increase the amount of plastic that is recycled. Also there is a clear trend of shipping off the plastic waste of developed countries to under developed and developing country. India is the fourth highest Asian importer of plastic waste behind Honk Kong, Philippines, and Indonesia.

*Source : University Researh Paper*

**The Ecological Impact during manufacture, recycling and disposal are cause of concern. This poses threat to the ecosystem, wildlife and others.**

#### **Manufacture:**

The toxic chemicals that are most frequently released during the production of plastics include dichloromethane, acetone, methylene chloride, methyl ethyl ketone, styrene, toluene and benzene. Other major emissions include sulfur oxides, nitrous oxides, methanol, ethylene oxide and volatile organic compounds. The production of a Polyethylene terephthalate (PET) bottle produces nearly 100 times the air pollutants than by the production of same quantity of glass bottles.

The use of chemicals such as plasticisers, antioxidants, colorants, flame-retardants, heat stabilizers and barrier resins during plastic production cause toxicity of lead, cadmium, mercury and carcinogens.

#### **Recycling:**

Recycling usually results in the down cycling of plastics into lower-quality products that have higher and more leachable levels of toxic additives. The incomplete combustion of PE (Polyethylene) during recycling releases carbon monoxide. A recycling plant generates the largest amounts of effluents during washing and cleaning. The wastewater generally has high pollution load in terms of Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and Total Suspended Solids (TSS).

#### **Disposal:**

The pollution that occurs in the disposal stage is largely during incineration and when plastic wastes fail to reach landfills or incinerators. Burning of plastic containing chlorine substances releases toxic heavy metals and emits noxious gases like dioxins and furans. These can cause a variety of health problems including damage to the reproductive and immune system, respiratory difficulties and cancer. When plastic wastes are left behind find their way into the soil, the sewage system and the water bodies. They choke the gutters and drains and during monsoons flood streets causing severe health problems. When it is in the soil, it clog the soil preventing the free flow of water and deplete its fertility.



#### **Plastic shopping bags - Bags of trouble?**

Plastic shopping bags have a surprisingly significant environmental impact. Apart from being an eyesore, it kills large numbers of wildlife each year. In water plastic bags can be mistaken for jellyfish by wildlife. This makes plastic bag pollution in marine environment particularly dangerous as birds, whales and turtles ingest the bags then die from intestinal blockages. Once an animal ingested that plastic bags

Among the 47 chemical plants ranked highest in carcinogenic emissions by the Environmental Protection Agency (EPA), 35 are involved in plastic production.

*Source : Greenpeace*

dies, it decays much faster rate than animal. Once the animal is decomposed the bag is released back into the environment and ready to be eaten by another misguided organism. Plastic bags also clog drains and waterways threatening not only to natural environment but also urban areas. In fact plastic bags in drains were identified as major factors in severe flooding in Bangladesh in 1988 and 1998 resulting a ban imposed in 2002 and Mumbai in 2005. The lighter filmy bags are high-density polyethylene (HDPE) and the thicker bags available in clothing stores are low-density polyethylene (LDPE). Not all plastics are recyclable. There are 4 types of plastics which are commonly recycled: Polyethylene (PE) - both high density and low density polyethylene, Polypropylene (PP), Polystyrene (PS) and Polyvinyl chloride (PVC). A common problem with recycling plastics is that plastics are often made up of more than one kind of polymer or there may be some sort of fibre added to the plastic (a composite) to give added strength. This makes recovery difficult.

### **Threats of Plasticisers & Stabilisers**

Phthalate plasticisers, generally used in production of PVC, poses threat to the environment. PVC is thermally unstable and cannot be used in products without stabilizers. PVC in cables is one of the most hazardous uses of PVC for the environment and for human health. Fires involving PVC cables result in releases of hydrochloric acid and dioxin. PVC floors release the phthalates DEHP [Di (2-ethylhexyl) phthalate] and BBP (Benzyl butyl phthalate) when washed. Smaller quantities may be emitted into air and consequently cause obnoxious smells. Imitation leather and furniture film are made from soft PVC, which contains phthalates. Phthalate releases can occur in connection with washing and direct exposure, and to a lesser extent to air. Use of stabilisers in PVC may include lead. Dust containing lead can be released as they degrade in sunlight. Lead can affect the nervous system and the reproductive system in low doses. PVC in packaging includes disposable bottles (for oil, mineral water, vinegar etc), wrapping film, trays and boxes, bottles and jars, transportation packaging. Phthalates in the soft PVC can migrate to the packaged foodstuffs. PVC laminated textile is often used as water resistant material for tablecloths and aprons. The PVC contains phthalate softeners, which could leak into water during washing and wiping. Soft PVC is also used in shoes, rubber boots, sports bags, school bags, tarpaulin, car undersealing, medical products etc. Children often put toys into their mouths and chew on them. The phthalates in the soft PVC can leach out into saliva. Soft PVC, being used in Tarpaulin, contains phthalate DINP (Di-isononyl phthalate). Garden hosepipes made from PVC usually contain the phthalate DEHP. The phthalate DBP (Di-n-butyl phthalate) is a component in PVC glazing strips in glasshouses. Phthalates present in medical products can be released in production and through migration into, fluids or blood. At present recovery and recycling has been accepted as the ultimate options for plastic waste management. Thermal content of plastic can be used for generation of energy, which can be recovered by direct incineration, liquid fuel and solid fuel. A technique has been developed by which waste plastics can be converted into petrol by blending with agro waste. Further, during the preparation of the solid residue of coke from agro and plastic waste, the gaseous emission can be used as fuel like LPG.

### **The Command and Control approach :**


#### **The Recycled Plastics Manufacture and Usage Rules, 1999**

The Rules has been notified and amended in 2003 in exercise of the powers conferred by clause (viii) of Sub Section (2) of Section 3 read with Section 25 of the Environment (Protection) Act, 1986 (29 of 1986) with the objective to regulate the manufacture and use of recycled plastics, carry bags and containers. As per these rules, the use of recycled plastic bags for storing, carrying, dispensing, or packaging of foodstuffs is prohibited. Further, the Ministry banned the manufacture, stocking, distribution or selling of carry bags made of virgin/recycled plastics, which are below 8 x 12 inches in size and 20 micron in thickness. The prescribed authorities for enforcement of the provisions of these rules related to manufacture and recycling are the State Pollution Control Boards in respect of States and the Pollution Control Committees in respect of Union Territories; and for the provisions related to the use, collection, segregation, transportation and disposal are the District Collector / Deputy Commissioner of the concerned district where no such Authority has been constituted by the State Government / Union Territory administration under any law regarding non-biodegradable garbage. To enforce strict compliance of these rules registration of plastic carry bag manufacturing units with the State Pollution Control Boards/Pollution Control Committees has also made mandatory.

The carry bags and containers made of virgin plastic shall be in natural shade or white.

The compliance status of the rule includes ban of plastic (< 20 microns thickness) and colored polybags.

## Applications of LDPE & HDPE

LDPE	HDPE
<p><b>Main applications:</b></p> <p><b>Agriculture</b> - Emitter flow path, pipes for irrigation, film for green houses, nursery bags, covers for crops, canal liners, mulching films and covers for flowering fields.</p> <p><b>Automotive</b> - Bushes in dashboards in cars, wiper strips and bottles for lubrication oil.</p> <p><b>Building</b> - Spacers for centering in building and ceiling liners.</p> <p><b>Electrical</b> - Wire coating, electrical cable sheathing and telephone cable sheathing.</p> <p><b>Packaging</b> - Bags, pouches, milk packing pouches, liners for HDPE woven sacks, grocery bags, garbage bags, bags for railway food packing, food packets for flood affected areas, shopping bags, garment packing bag in box packing and cellular foams for packaging.</p> <p><b>Medical</b> - Bottles for packing fluid transfer tubes, saline bottles, tubes for saline sets, gas transfer tubes, liners for medical packets, blood transmission set and injection liquid packing bottles.</p> <p><b>Electronics</b> - Washers for electronic typewriters and telephone leg buttons.</p> <p><b>Household</b> - Bushes in kitchen mixers, nozzles for portable fire extinguishers, buckets, take away containers for fast food, pen boxes, inner trays, water bottles, shopping bag handles, tent films and house covers to stop water leakage.</p> <p><b>Miscellaneous</b> - Readymade garment seals &amp; tags, films for covering outdoor signboards, children toys, dolls, protective coating, external coating for pipes, machinery parts coating etc.</p> <p><b>Applications of Recycled LDPE:</b></p> <p><b>Domestic:</b> Soap boxes, caps and closures, toys, carrier bags and tubes/pipes.</p>	<p><b>Main applications:</b></p> <p><b>Agriculture</b> - Drip irrigation drippers, sprinkler parts and agriculture nets.</p> <p><b>Automotive</b> - Fuel tanks, decorative covers on car wheels, water tanks, petrol cans, caps, plugs, bumpers, boats, mini truck cabs etc.</p> <p><b>Building</b> - Drainage pipes, outdoor components for construction pipe joints, hoppers and shutters for buildings.</p> <p><b>Electrical &amp; Electronics</b> - Insulation of telephone wires, television cabinets, meter housing, camera housing, pump bodies etc.</p> <p><b>Packaging</b> - Cereal box liners, snacks packaging, dairy foods, bottle caps, bottles for food packaging, bottle for pesticides, water packaging containers, cement packing, jumbo bags for export packaging, flower packing etc.</p> <p><b>Medical</b> - Fine mesh for repair of incisional hernias and medical fluid bottles. Sports - Sports net, skin protectors, bowling balls, paddles etc.</p> <p><b>Household</b> - Furniture, grocery bags, corrugated tubes &amp; pipes, mugs, soap boxes, tent covers, tarpaulins, chairs, fridge bottles, containers, drinking water glasses, buckets, water tanks, mosquito nets, waste boxes, dust bins, luggage, ice-trays and squeezable bottles.</p> <p><b>Industry</b> - Gasoline tanks, industrial drums, flexible pipes, exhaust systems, truck bed liners, chemical storage tanks etc.</p> <p><b>Miscellaneous</b> - Bottle closures, toys, spectacle covers, fish nets, roof sheets, containers, water system valves, luggage racks, pipes for chemicals, workshop table tops etc.</p> <p><b>Applications of Recycled HDPE:</b></p> <p><b>Agriculture:</b> Drainage pipes, pig &amp; calf pens, and plastic pots.</p> <p><b>Marine Engineering:</b> Boat piers (lumber)</p> <p><b>Domestic:</b> Mugs, buckets, combs, paint brushes, soap boxes, detergent containers, cassette covers, tooth brush holders, moulded dust bins and toys.</p> <p><b>Civil Engineering:</b> Building products, curb stops, pipes signs, traffic - barrier cones. Gardening: Flower pots, garden furniture, lumber and golf bag liners.</p> <p><b>Industrial:</b> Drums/pails, kitchen drain boards, moulded luggages, pallets, trash cans, milk bottle crates and soft drink base cups.</p>
	

The compliance status of the rule includes ban of plastic (<20 microns thickness) and colored polybags.

Name of SPCBs/UTs	No. of Units	Present status
Andhra Pradesh	150	Less than 20 micron carry bags are banned. Littering of plastics carry bags is banned in public places, levy of penalties against the violators of recyclers norms.
Delhi	147	Non-biodegradable Act, 2001 has been brought out.
Goa	16	Notification has been brought out and thickness of plastic carry bags has been raised to 40 microns.
Himachal Pradesh	13	Recycled plastics rules notified.
Orissa	14	State Government has banned the use, storage & littering of polythene carry bags less than 20 microns thickness from 26 th Jan 2004. Use of paper bags made mandatory in places of historical importance like monuments, wildlife sanctuaries & National Parks. District authorities have made several raids to curb storing of plastics less than 20 microns.
Nagaland	4	Less than 20 micron poly bags are prohibited.
Pondichery	56	Usage of poly carry bags for foodstuff banned.
Punjab	-	Usage of poly carry bags for foodstuff banned.
Tripura	-	The manufacture, sale, distribution and use of virgin and recycled plastic bags and containers are prohibited.
UP	-	Unsafe of poly carry bags for foodstuff banned.

**1. The use of recycled and virgin colored polybags for non-food applications was allowed but for packaging food items is discouraged**

The Rule allows the use of colored virgin and recycled bags for non-food applications provided the dyes or pigments used in the manufacture of polybags were non-toxic and conformed to the specifications in the Food Adulterations Act. However, the use of colored polybags for food products was prohibited. Colored polybags for packing food items involved the risk of toxic pigments and dyes added during the manufacturing process leaching out into the food products. The Rule clearly specified that food products had to be packed only in virgin material of natural color without any pigments and dyes.

**2. All carry bags of size less than 20 microns are banned**

The ban enforced with the intention of curbing the littering problem in the country. Prior to the formulation of this Rule, carry bags of size ranging between five & ten microns were used. The waste pickers had no incentive to pick these low-valued-carry bags and a large part of plastic waste remained uncollected. As a result, unnecessary problems and nuisance like choking of soil, drains etc. are caused. The ban was supposed to be a panacea for all these problems. If the thickness of polybags increased, their value would increase and the waste pickers would have incentive to collect them for recycling. Increase in the thickness of carry bags also implied higher price for retailers, which would be passed to the consumers thereby initiating among the consumers a tendency of reuse.

**3. The guidelines for the recycling of plastics were made mandatory**

The Rule made recycling in accordance with the guidelines compulsory. The Ministry of Environment and Forest and the Bureau of Indian Standards with a view to bringing discipline to the recycling practices and to improve the quality of recycled plastic products had formulated the Guidelines for Recycling of Plastics. Standards were prescribed for the segregation and processing of plastic waste and manufacturers of plastic products were instructed to use marking on the finished product so as to facilitate the identification of the basic raw material. In respect of recycled plastic products, it was necessary to indicate the percentage of recycled content in the product.

## Status of Plastic Production in Orissa

Plastic industry in the state has been progressing very fast after 80's. These industries are mostly concentrated in places like Balasore, Bhubaneswar, Cuttack, Puri and Rourkela, etc. As many as 225 plastic processing units are operating in the State. Government have selected a special Industrial Estate at Chandaka in Bhubaneswar for the development of plastic industry and a number of entrepreneurs have also set up their plants in this complex.

PVC Pipes: 15 units in the State producing rigid PVC and HDPE pipes.

Polythene Film Bags: Some 84 small scale industries producing plastic film and bags from LDPE/LLDPE/HDPE/HMDPE/PP with a production capacity of 450 MT per month.

HDPE/PP/woven sacks: Around 20 small scale units manufacturing HDPE/PP woven sacks in the state with a production capacity of 500 MT/month.

Injection moulded/blow moulded buckets and containers: 10-15 units mainly located at Bhubaneswar, Jagatpur & Cuttack are manufacturing buckets, containers and waste paper boxes. The total capacity of these units is 80 MT per month.

List of Plastic Industries in the State

Name of the District	No. of units
Balasore	55
Bolangir	5
Cuttack	46
Dhenkanal	3
Ganjam	15
Kalahandi	8
Keonjhar	3
Koraput	8
Mayurbhanj	6
Puri	34
Sambalpur	10
Sundergarh	32



## Question & Answer in State Assembly on Plastics and the Environment

02.08.2004

**Question raised by Smt. Vijaylaxmi Patnaik**

will the Chief Minister be pleased to state:

- in how many locations the ban of polythene use has been imposed
- how many cases have been filed against organizations and individuals for not obeying the ban polythene use before 30 th June 2004?

**Answered by Hon'ble Chief Minister, Orissa**

- ban on polythene of less than 20 micron thickness has been imposed through out the State
- collection of information is on process.

27.12.2004

**Question raised by Sri Puspendra Singh Deo**

will the Chief Minister be pleased to state:

- Whether Government is feeling that the prestige of Orissa is hampering due to polythene bags garbage on all the roadsides of Puri, Bhubaneswar, Cuttack, Berhampur & other town areas, if yes, when Government will ban using of all types of polythene bags in real sense; and
- Whether Government is aware that Himachal Pradesh Government has banned using of all types of polythene bags since 20 years back?

**Answered by Hon'ble Chief Minister, Orissa**

- Government is aware of littering of garbage including polythene in urban areas of Orissa. Having realized this, the State Government has prohibited the sell, import, store and use of polythene carry bags of twenty-micron thickness or less from 26th January, 2004.

- (b) No. Himachal Pradesh has not banned use of all types of polythene bags. It enacted a law in 1995 namely: THE HIMACHAL PRADESH NON-BIODEGRADABLE GARBAGE (CONTROL) ACT, 1995 to prevent throwing or depositing non-biodegradable garbage in public drains, roads and places open to public view in the State.

28.11.2005

**Question raised by Shri Nitesh Ganga Deb**

Will the Chief Minister be pleased to state:

Whether the Government is aware about the use of plastic bags and polythenes in the state and is it free from pollution, if "not" what steps have been taken by the Government to discontinue it?

**Answered by Hon'ble Chief Minister, Orissa**

Government is aware of the use of plastic and polythene bags and its ill effect on environment. A ban on sale, import and use of polythene carry bags less than 20 Microns has been imposed.

For effective implementation of the order, Government have directed the District Collectors, Superintendents of Police, Executive Officers of NACs / Municipalities as well as Home Department, Commerce and Transport Department and Finance Department.

13.02.2006

**Question raised by Shri Aswini Ku. Patra, M.L.A.**

Will the Chief Minister be pleased to state:

what specific policy-decision State Government has taken to ban use of polythene in order to protect the environment; is the State Government proposing to enact a new law on the subject after taking into consideration similar laws in force in other States?

**Answered by Hon'ble Chief Minister, Orissa**

Considering the ill effects of polythene on environment and after examining the laws existing in other States, the State Government have imposed a ban on sale, import, use, storage of polythene carry bag of less than twenty micron thickness under Section 5 of The Environment (Protection) Act, 1986.

A market based alternatives and innovative tool for curbing the plastic menace in addition to the present command and control approach may form a good cocktail for addressing plastic waste problems.

#### **Market based alternatives:**

##### **Tradable Emission Permits**

Under a system of tradable pollution permits, the pollution control agency determines a target level of environmental quality and translates this into the total amount of allowable emission that can be discharged. The agency then allots or auctions the rights to discharge units of pollution to firms in the form of permits. These rights can be bought and sold subject to an overall ceiling of allowable discharges, which has been fixed a priori. Since this ceiling is usually less than the current aggregate level of discharges, there is a scarcity value to the permits and this puts an initial price on them. The price would increase over time as economic activity increases and more firms bid for the permits. The system of tradable pollution permits allows more flexibility than the current pollution control regime does. Tradable emission permit is a market-based instrument (MBI). The use of MBIs to address environmental problems has been endorsed by the international environmental community in the Rio Declaration on Environment and Development at the UNCED conference at Rio de Janeiro in 1992 and also by the Indian government in its Policy Statement for Abatement of Pollution.

##### **Contracting out waste collection and transit**

Another way in which pollution owing to plastics can be checked is by ensuring a professional and competent waste collection and transit system. In the current system, municipal workers sweep the streets and bring the waste to prefixed collection points, which could be unconfined open spaces or confined masonry enclosures. Contracting out of these services will increase the efficiency.

##### **Private operation of Landfills**

A final way of limiting pollution due to plastics is to ensure their proper disposal in landfills. For this, landfills have to be managed and operated scrupulously. Entrustment of landfill management to private parties even while retaining government ownership is a feasible way of guaranteeing meticulous waste disposal. The government will have a role in the sense that it would maintain all assets, oversee the system, maintain or enforce regulatory authority, create the framework for running facilities, specify controls on the solid-waste system stream and take advantage of competitive opportunities to save money and improve services. Such system will result in some major benefits such as increase in efficiency; improvement in accountability; enhancement of capital availability and superior cost savings; and unambiguous allocation of risk and liability.

### What some dailies report: -

1. 107 km of Orissa coast eroding

A study by a group of scientists of National Institute of Oceanography (NIO), Goa reveals that about 23 percent of shoreline along the Indian mainland is affected by erosion. Orissa, with its long coastline is no exception. Discharge of sediments, through the Indian rivers into the sea is estimated at 1,200,000 kg/year. Maharashtra, Karnataka, Kerala and Orissa are those whose coast is most-affected by erosion. In Orissa 107 km out of 476.4 km coast is eroding. Erosion is noticed at Gopalpur, Paradip and Satabhaya.

Source: *The Daily New Indian Express*, dated 11 th Sept. 2006

2. More than 400 elephants missing

About 405 number of elephants are missing from various forest regions in Orissa. The elephant population in Orissa has been declined in a faster rate during last two decades. As per the latest survey the population is 1639 in 2005 as compared to 2044 in 1979. It is mainly because of decline in the population of male elephants, which are 271 as compared to 363 in 2002. More than 50% decrease in elephant population is reported in Keonjhar between last two censuses.

Source: *The Daily Dharitri*, 6 th October 2006

3. State Environment Development Fund

The State Government of Orissa has created an Environment Development Fund for protection of environment of the state. The programmes to be covered under this fund will be: to prevent different types of pollution being generated from different industries, improvement of surrounding environment, protect ecological balance and environmental awareness.

Source: *The Daily Sambad*, 8 th Nov. 2006

4. Vultures get home in Nandankanan

The Central Zoo Authority (CZA), which had given its sanction for setting up of vulture conservation and captive breeding centers, has now approved the proposals of the four Zoos, including Nandankanan Zoological Park. The Project is expected to be completed by the turn of this fiscal. The conservation and captive breeding centre at Nandankanan Zoo is meant for the white-backed vultures (*Gyps bengalensis*)

Source: *The New Indian Express*, 10 th Nov. 2006

5. Gahirmatha future under threat

Constant battering by huge sea waves has caused fragmentation of tranquil Gahirmatha beach renewing the debate over the future of the natural habitat, widely acknowledged as the world's largest nesting ground for Olive Ridley sea turtles. Erosion, in fact, is a regular phenomenon along the coastline. The process of fragmentation of the beach assumed alarming proportion since 2000. Nasi-2, otherwise called Outer Wheeler's Island, has been fragmented into at least three parts over the last one year.

Source: *The New Indian Express*, 21 st Nov. 2006

6. Environment Clearance for SEZs

It is now mandatory for Special Economic Zone (SEZ) to obtain environmental clearance prior to establish. The Rule has been enacted by the Centre considering the case of increase of environmental pollutants in the coastal area of Gujrat and other States.

Source: *The Daily Sambad*, 25 th Nov. 2006

## Feedback

*We would appreciate if you send us comments and suggestions.*

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Sri G.K.Pujari, Programme Officer (CES) and P. M. Dash, Programme Officer (ENVIS) have prepared this newsletter

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