

SWACHHTA

A RIGHT AND A DUTY

Kumaon University, March 20, 2015
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An All India problem

- On average, every Indian produces $\frac{1}{2}$ kg of waste per day
- Urban India generates about 68.8 million TPY or 188,500 TPD
- There has been a 50% increase in waste generation between 2001 and 2011
- In Mumbai alone, open burning of solid wastes release 22,000 TPY of pollutants (Carbon Monoxide, Hydrocarbons, Particulate Matter, Nitrogen Oxides and Sulfur Dioxide) plus an estimated 10,000 TEQ grams of dioxins/furans

The heritage of future generations

Time required for disintegration

- Glass bottles: 4,000 years
- Plastic bottles: 100 to 1,000 years
- Aluminium cans: 100 to 500 years
- Packaging: 100 to 450 years
- Cigarette butts: 2 to 15 years
- Chewing gum: 2 to 5 years

Garbage everywhere in Almora

- Almora produces **12.55 TPD** or **4,580.75 TPDY**



Streets littered
clogged

Drains





**Spreads
disease**

**Main cause
of death of
cows**



Himalayan source of pollution



Slow burning releases cancer-causing dioxins in the air we breathe

Enters the water we drink



Suyal to Kosi to Ramganga to Ganga

What's the solution?

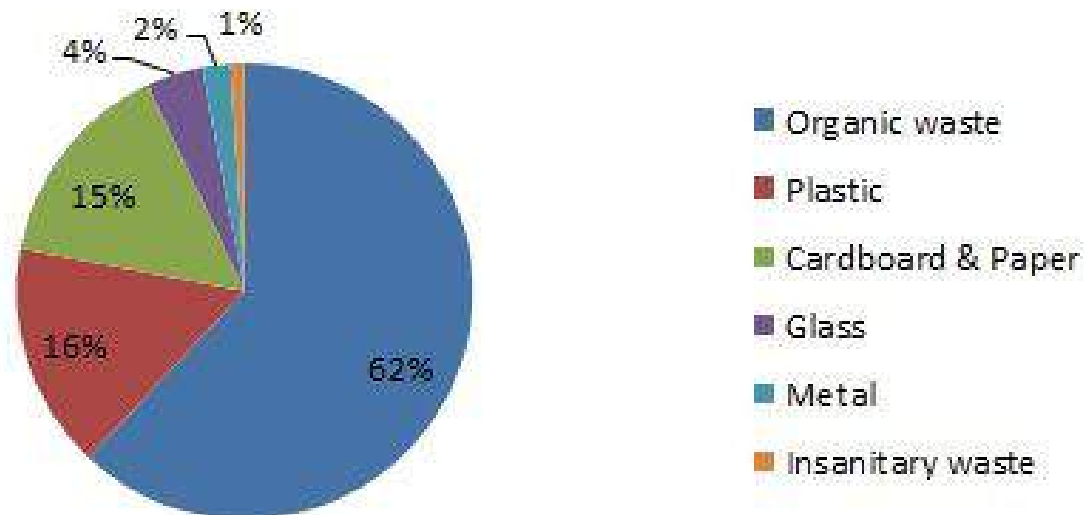
- The Modi government launched the Swachh Bharat Abhiyan for which the government will spend nearly Rs 2 lakh crore in a five-year span to completely clean India by October 2019
- But wielding a broom is not enough
- A strategy to **Reduce, Reuse and Recycle** is required
- A role for each individual, municipalities, industry and government

Role for inhabitants

- As consumers – reduce the quantity of waste we generate
 - Buy refills and reuse containers
 - Repair instead of throwing away
 - Say ‘no’ to plastic carry bags
- Treat public spaces as we treat our homes
 - Make it a habit to use dustbins
 - Ask others not to litter
- Join Green Hills and volunteer

Most waste can be recycled

Composition of Municipal Solid Waste in Almora



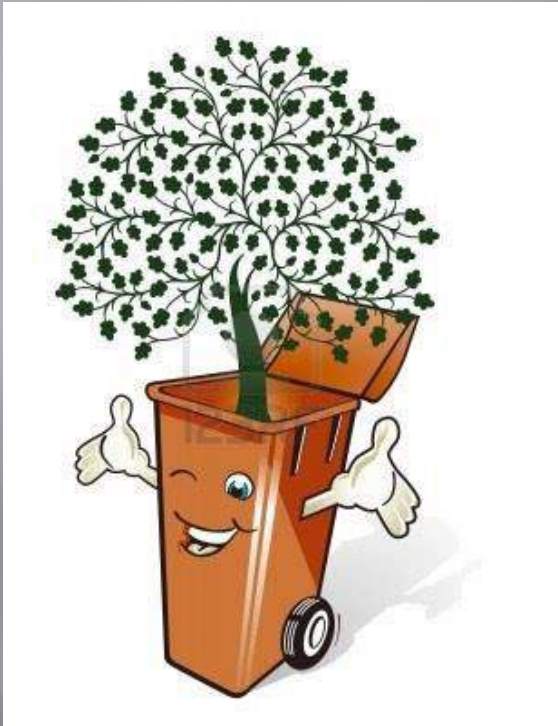
Good reasons to recycle

- Recycling creates 36 times more jobs than incineration
- For every tonne of paper that is recycled, 17 trees are saved.
- Recycling one plastic bottle can save enough energy to power a 60 watt light bulb for six hours.
- You can make 20 aluminium cans out of recycled material using the same amount of energy as it takes to make just one new one.
- The energy saved from recycling one glass bottle is enough to power a 100 watt light bulb for one hour

Waste loses its value when mixed



Segregate at source



Wet - Compostable



Dry - Recyclable



Insanitary waste

Local Initiative

- Form a Mohalla Swachhta Samiti
- Ask people in your neighbourhood to segregate
- Arrange for decentralised composting of organic waste
- Ask Safai Karmcharis to collect waste door-to-door and not to mix different types together
- Recyclables should be collected only once a week

Bokashi method

- Bokashi is Japanese for "fermented organic matter"
- Uses a specific group of microorganisms to anaerobically ferment all food waste
- Since the process takes place in a closed system, insects and smell are controlled, making it ideal for urban or business settings.
- The process is very fast, with compost usually ready to be integrated into your soil or garden in around two weeks.

Dry Recyclables

PLASTIC

- Use in Road Construction
- Pellitisation and remoulding – Kathgodam factory
- Refuse Derived Fuel through Plasma pyrolysis

PAPER

- Pulped and used to make recycled paper or cardboard

GLASS

- Refilled
- Powdered and remoulded

METAL SCRAP

- Melted and remoulded

Plastic waste into pipes - Kathgodam



Dr. Vasudevan's method

- Uses polyethylene, polypropylene and polystyrene (carry bags, plastic bottles, laminates, thermacole cups, etc) but not PVC
- Gravel is heated to 170°C and shredded plastic spread over it. Melts in 30 seconds.
- Bitumen is then added and the mix used for road construction

RESULTS

- 1 ton of bitumen saved per km of 3.75 m wide road (INR 20,000)
- Each ton of plastic used avoids release of 3 tons of CO₂
- Durability of roads increased from 5 years to 10 years
- Load bearing capacity enhanced

Plasma Pyrolysis system

Plasma is a means to convert electrical energy into heat energy efficiently.

Plasma torch used for bio-medical waste

Cost: INR 26.5 lakhs for a capacity of 25 -30 kg per hour

Temperatures of 950 to 1,100°C as compared to 600 -850°C in a incinerator



Join Green Hills Almora

- Formed in 2014 by a few concerned citizens
 - Has 1,200 members – 800 students, 400 adults
 - Negotiations with government and Nagar Pallika, meetings with Ward members, Vyapar mandal
 - 3-month Pilot programme in Thapalia Mohalla
 - Presentations in five schools
 - Mountain of Plastic rally in September 2014
 - World Environment Day – June 5, 2015
- Exhibition of models by High school students

Petition to the municipality

- Stop dumping and open burning of waste
- Equip Safai Karmcharis for collecting organic and insaniatary waste separately
- Organise mohalla-level composting sites
- Purchase an incinerator for hospital waste and insaniatary waste
- Compact plastic waste and send to Kathgodam for recycling

Changes recommended by Green Hills

- Source segregation into three
- Set up of Mohalla Swachhta Committees that monitor Safai Karmcharis, collect user fees and arrange for Shramdaan on a regular basis
- Composting at home or at neighbourhood level
- Door-to-door collection of insanitary waste daily by the Nagar Palika and centralised incineration of it
- Door-to-door collection of recyclables once a week
- Arrangement with kawadis to take all waste in exchange for interest free loans
- Banning polythene carry bags
- Fines imposed on those who litter or do not segregate



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