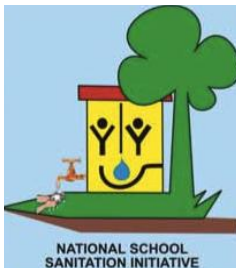


Solid Waste Management in Schools



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What is Waste ?

Defined under **Resource Conservation and Recovery Act (RCRA)** (US EPA)

- any solid, semi-solid,
- liquid, or
- contained gaseous materials discarded

... from industrial, commercial, mining, or agricultural operations and from community activities.

Some Facts...

- Total no of schools in India = 1.22 million
- Enrollment in elementary education (primary & secondary) = 222 million

Ref: Educational statistics at a glance (2005- 06), Dept. of Education, Gov. of India

Major types of waste generated in schools:

1. Food Waste
2. Plastic;
3. Paper;
4. Floor swiping;
5. Aluminum foils;
6. Others (stationary items, pencil sharpenings, etc.)

Hurdles...

- awareness;
- infrastructure;
- technology;
- human power;
- budget
- planning & overall management.

Current SWM system is corrective rather than preventive

Solutions !!!

1. Policies, plans & programmes;
2. Solid Waste Management Strategies – at school level;
3. Administrative interventions;
4. Infrastructure;
5. Disposal Techniques ; and
6. Regulations & their implementation.

Policies, plans & programmes



Solid Waste Management Strategies

1. Waste management as apart of school curriculum;
2. Student groups;
3. Awareness trainings for schools children & teachers;
4. School Activities – songs, games, quiz, involving children in segregation activities
5. Awareness campaigns in the neighbourhood; and
6. Involving children & their parents.

Solid waste management to be part of curriculum

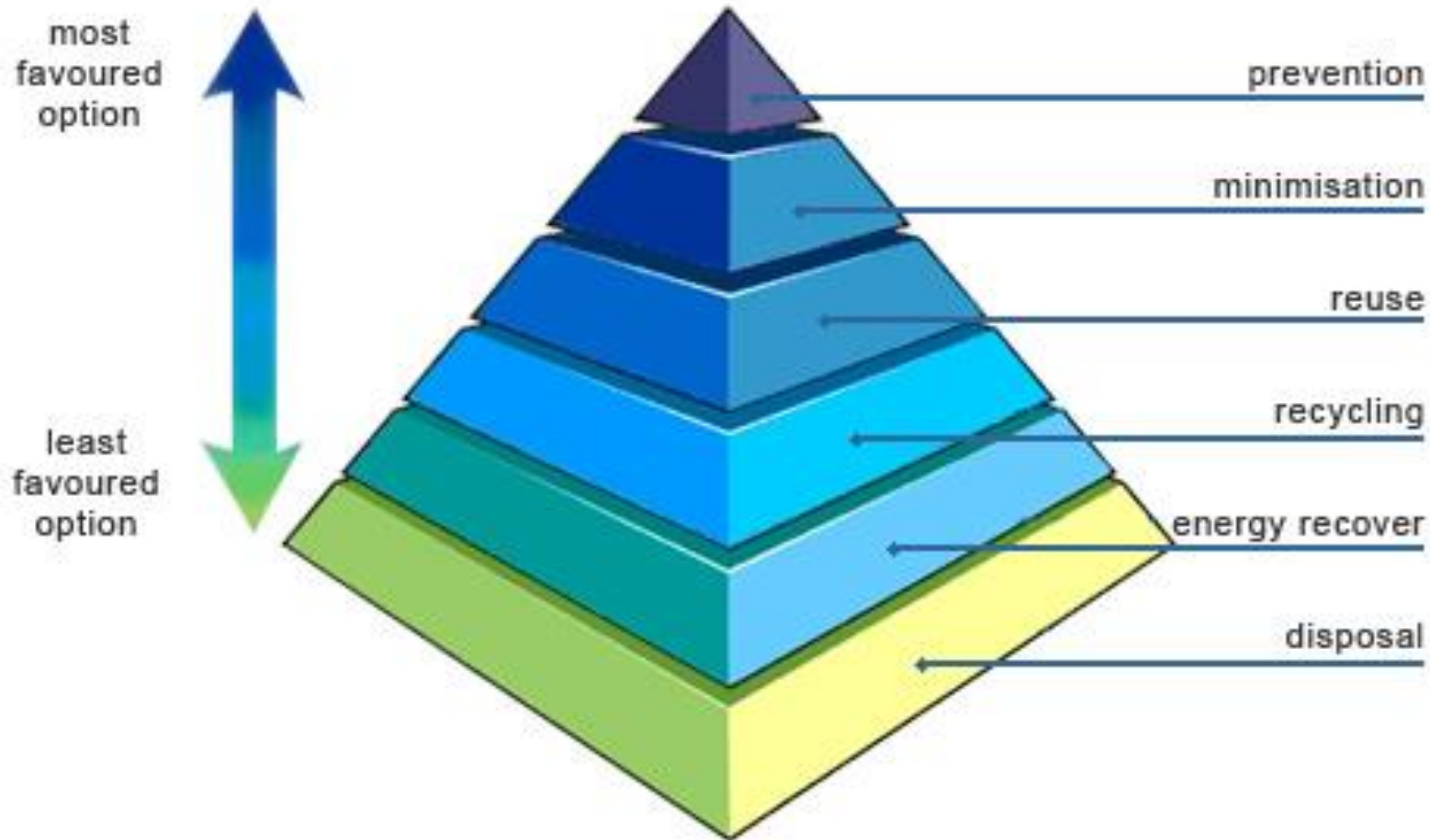
Times of India- Oct 20, 2007

The government [was] working on a proposal to incorporate waste management in school curriculum to sensitise the younger generation about managing municipal solid waste in a hygienic and scientific manner.

Urban development secretary M Ramachandran [wrote] to the secretary, secondary and higher education, pointing out the need to incorporate the subject in school curriculum.

Solid Waste Management as a part of School Curriculum

Solid Waste Hierarchy



Solid Waste Management Strategies - Ground Rules



Student groups



Make them work

Ref: http://recycle.uoregon.edu/waste_audit.htm (accessed on 16/07/12)



Make them work

Source: <http://vincebond.wordpress.com/2011/11/28/composting-takes-off-in-vermont-schools/>
(accessed on 16/07/12)



Source: <http://www.gpynepal.org/index.php?page=7> (accessed on 16/07/12)



Source: <http://www.suzannemichaels.com/resume.html> (accessed on 16/07/12)

School Activities

Competitions

Games



Source: <http://www.willcountygreen.com/games/recyclmatch.aspx> (accessed on 16/07/12)



Source: <http://blog.lib.umn.edu/efans/ygnews/2010/12/> (accessed on 16/07/12)

Training

School Activities

Field work



Source: <http://blogs.inlandsocal.com/communitygardens/> (accessed on 16/07/12)

Administrative Interventions

1. School Administrator



2. Class Monitors



Ref: <http://www.weblearneng.com/monitor> (accessed on 16/07/12)

3. Budgeting



4. Contacts with various agencies



Infrastructure

1. Waste segregation & collection



Source: <http://www.panoramio.com/photo/37087841> (accessed on 16/7/12)

2. Garbage Transportation – within school



Source: <http://www.indiamart.com/> (accessed on 16/7/12)

3. Space of composting activities



Source: easterniowaschools.com (accessed on 16/7/12)

4. Garbage Transportation – outside school



Source: ecvv.com (accessed on 16/7/12)

Disposal Techniques

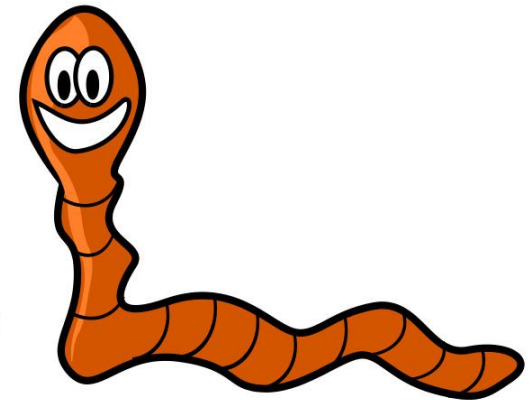
Segregate



Source: <http://apartmentadda.com/blog/tag/green-apartments/> (Accessed on 16/7/12)



Source <http://www.workplace-products.co.uk> (Accessed on 16/7/12)



Composting

Disposal Techniques – Organic Waste

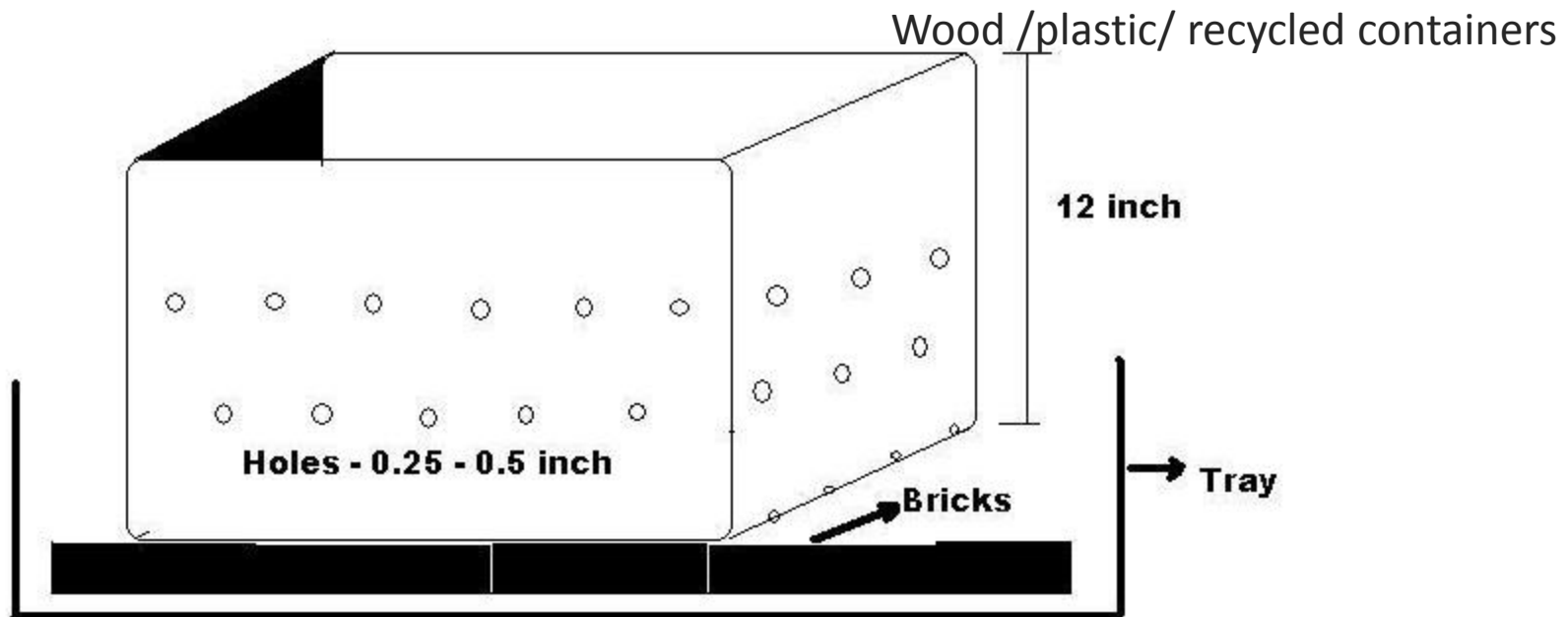
- Vermicomposting;
- Aerobic composting;



Vermicomposting

- Using earthworms and microorganisms to convert organic waste into manure.

Construction of Vermicomposting Bins



- Size - one square foot of surface area per pound of waste in your bin.
- Make sure that containers are well cleaned

Vermicomposting bin

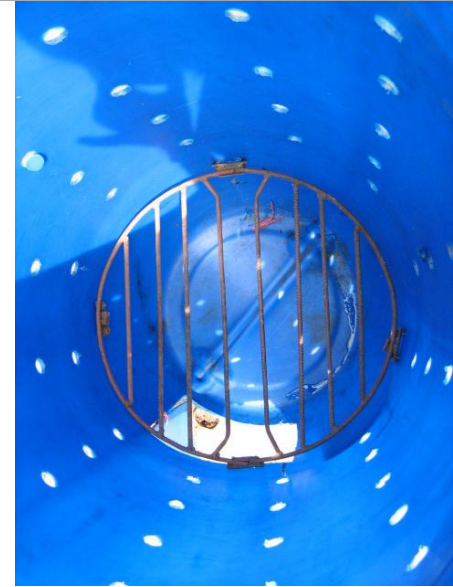
Lid

Aeration
Holes

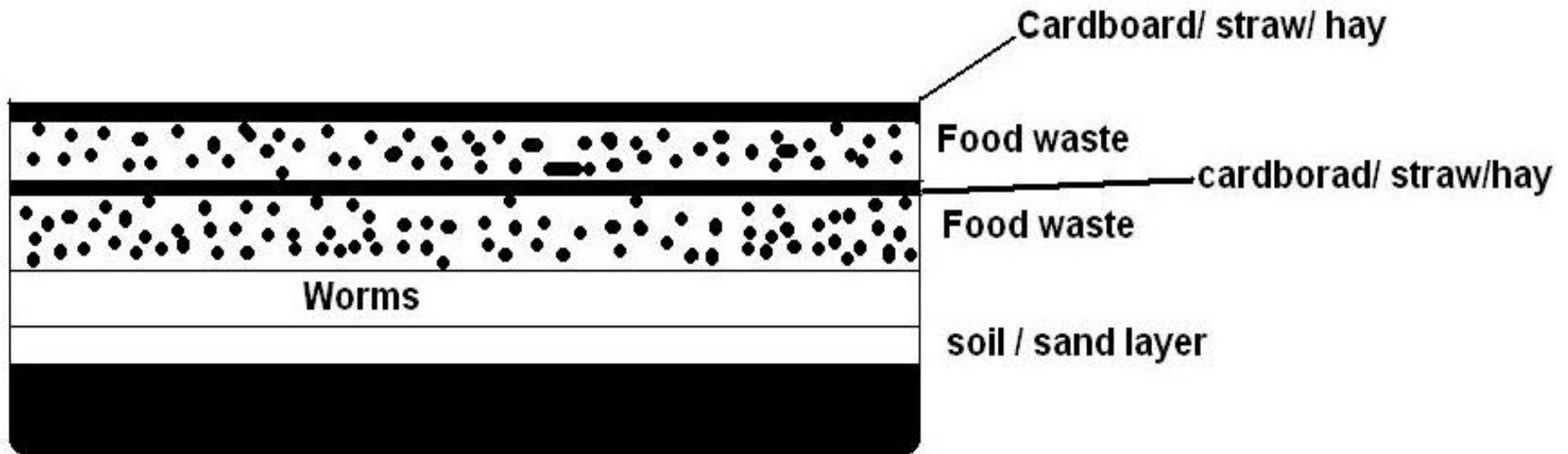
Opening for removing
compost

Tools

Screen



Construction of Vermicomposting Bins



Bedding - cardboard; shredded leaves, straw, hay, sawdust

- The bedding material should be thoroughly moistened before adding the worms;
- Space - 1 cu.ft. of worm bin/500 worms.
- Approx. 2000 of earthworms to recycle a pound of food waste;

Adding Food Waste

- Avoid bones, dairy products, and meats that may attract pests, and garlic, onions, and spicy foods.
- Limited amounts of citrus can be added,
- Do not add any chemicals;
- No metals, plastics, glass, soaps;
- Grinding or blending the food waste in a food processor speeds the composting time considerably.



Climatic conditions

- Temperature range = $5^{\circ}\text{C} - 26^{\circ}\text{C}$
- The worms should never be allowed to freeze.
- Bins kept outside to be insulated with straw in the winter
- The bin contents should be kept moist but not soaked.
- Do not allow rainfall to enter the bin.
- A straw covering may be needed in exposed sites to keep the bin from drying during summer.



Maintaining the Bin

- Food scraps to be continually added for 2 to 3 months
- When the bedding disappears, harvest the worms and finished compost,
- Refill the bins with new bedding material.
- Do not overloading the bin with food wastes;
- Do not soak the food waste and bedding;
- Make sure the food waste is buried properly in the bedding.
- Do not expose food wastes to the our environment.
- Keep the bin covered with straw.



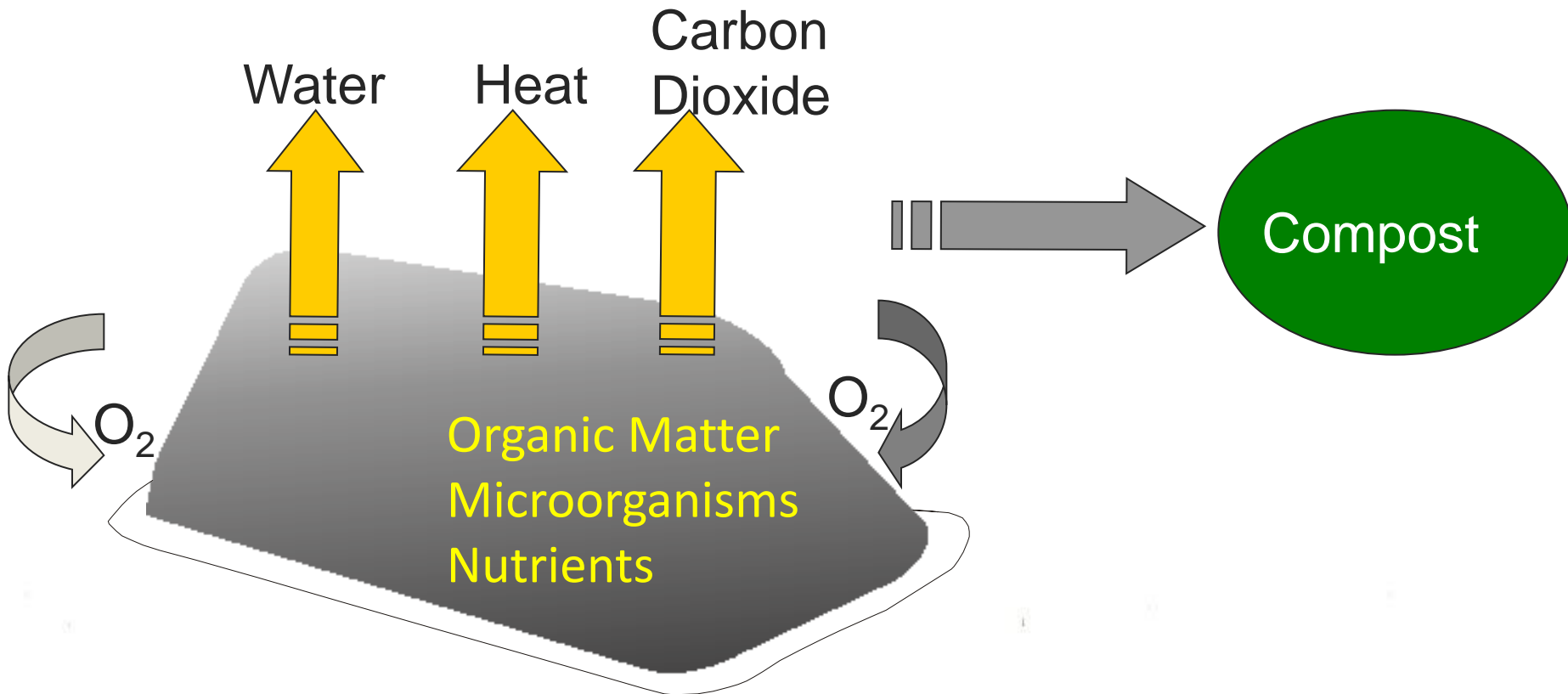
Harvesting the Compost and Worms



- Use mesh / screens.
 - Sift the worms out.
-
- Larger pieces of compost can be returned to a new batch of bedding and worms.
 - The worms can be added back to a new bin of bedding and food waste.

Composting

Composting is the method of breaking down organic materials by microorganisms such as bacteria, fungi to the final product – the compost.





Technique

- Minimum dimensions for a pile are 3 x 3 x 3 ft;
- Alternating layers of organic materials, and fertilizer or manure
- First layer - 6-8 inch - coarse organic material like sawdust;
- Second layer - 1-2 inch. of poultry, or livestock manure;
- Alternate layers of organic materials and manure, until the pile is 3 - 5 ft high

Maintenance of compost pile

- Proper uniform moisture levels and no soaking of pile;
- More compost is turned the faster it decomposes;
- During turning, place compost on the outside edges of the pile in the middle of the new pile.



Solid Waste Management in India: Regulations

- Environment Protection Act, 1986
- Hazardous Wastes (Management and Handling) Rules, 1989 ,2010
- Bio-medical Waste Handling Rules - 1998, 2003
- Municipal Solid Waste (Management and Handling) Rules 2000;
- The Batteries (Management and Handling) Rules 2001, 2010
- E-waste Management and Handling Rules 2011
- Plastic Waste (Management & Handling) Amendmend Rules -2011

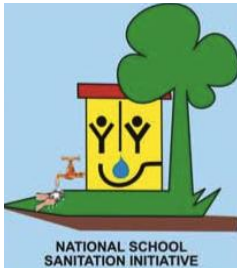
Summary

- Wastea resource
- Solid Waste Management Strategies – at school level
- Integrated approach
- Administrative interventions
- New approach for waste management
- Regulations & their implementation.



Comments / Q & A

Thank You



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