

KENDRIYA VIDYALAYA

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*e*arthian- The sustainability Program for Schools & Colleges



Project Report for Earthian 2011

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Conceptualization and Implementation of Zero Solid Waste Management Strategy

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Theme: Production and Consumption

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ABOUT THE SCHOOL

Kendriya Vidyalaya, N.F.C, Vigyan Vihar, one of the branches of Kendriya Vidyalaya Sangathan is a school situated near Yamuna Sports Complex in Eastern Delhi. Established in 1984, school has progressed leaps and bounds since its inception. It is a coeducational institution with aim to impart value based quality education in the role of pace setter. The school provides ample opportunities to the students in different areas including curricular and co-curricular fields, which helps to identify the talents of students and nurture them. The ultimate objective of the education at our school is to bring about all round balanced development of the personality of student. The dedicated team of teachers inculcates in the students the spirit of social forestry leadership.

The Eco-club of School offers great opportunities to students to imbibe habits to form a green environment and better world. The underlying aim of the eco club being-“Safety of environment is the safety of human race”. Environmental education is an ongoing process where **attitude** is as important as **aptitude**. All it matters is inculcating right kind of attitude towards environment among students. Our school believes in making its environment evergreen that is in making it environment friendly. We have developed a green activity area in the school. The students are motivated to keep their surroundings clean by undertaking the ongoing project- to minimize the use of plastic bags, not to throw them in public places as they choke drains, sewer drainage system, cause water logging and also provide breeding ground for mosquitoes.

Our school promotes ethos of conservation of environment motivates students to imbibe habits and lifestyle for minimum waste generation. Students also expand their creativity to field activity, poster competition so as to create enthusiasm regarding environmental issues.



1. Context of the Study

A Sanskrit verse “JANANI JANAM BHUMISHCH SWARGADAPI GARIYASI” inspires us to love our Mother and Mother earth with even more than heavenly pleasure. It has given us amply through soil, like agricultural products, habitats, minerals etc. Due to unplanned and unscientific activities by man on the Earth, soil is losing its qualities resulting in its deterioration.

Modernization and urbanization have led to the setting up of large industries to feed the growing populations. These large populations have settled in large cities, and the formation of such large modern cities has led to the generation of large amounts of solid waste collectively in these cities. Solid waste is being generated in increasing amounts in the modern cities. Society has devised many solid waste disposal methods like community dustbins and landfills away from the residential populations, which are now taking up lots of space in these already space constrained cities, and create a foul smell and unhygienic conditions. The current solid waste disposal methods are therefore proving inadequate for the disposal of solid waste being generated.

2. Rationale behind the Study

Solid Waste disposal in soil leads to changes in the soil affecting the environment and resulting in degradation in the health of land. Dumping of solid waste like polythene bags in the soil leads to a number of changes in the soil quality chemically. This inspired us to take up this study involving the management of solid waste generated within the Vidyalaya premises.

Garbage is generated in various forms in the large cities- paper waste, food waste, plastic waste, etc. Managing it is one of the essential service that Municipal authorities are duly bound to provide. It is simple to put waste into a vehicle and unload it at a dump or a landfill but who thinks of environmental degradation and its effect on our self? Waste is mostly dumped without following the principles of sanitary land filling. No segregation at source takes place. Waste is neither compacted nor properly covered. It remains exposed emitting foul smell and even smoke when burnt causing water, soil, and air contamination.

We should think of micro level by our self. This is going to be fruitful if we think of it as our duty. School waste includes paper, plastic wrappers, polythene bags, food stuff remain, biomedical waste and e-waste. Survey of Kendriya Vidyalaya, Vigyan Vihar by the Team members showed that the solid waste generated at the school mainly includes

- Paper waste
- Plastic waste
- Horticulture waste
- Negligible e-waste is there, as survey showed it is being exchanged during the stock write off
- Negligible Biomedical wastes being generated by the Vidyalaya. For First-Aid students are sent to ESI Hospital.

Management of the above waste starts with spreading awareness:

- Waste reduction initiatives, which lead to saving natural resources - energy & landfill space.

- Reducing, reusing and recycling waste will improve not only environment but also economical performance of the Vidyalaya.

The project is a step towards conserving natural resources and saving Mother Earth. It is not only important for fulfillment of our needs of “Food, Clothing and Shelter”, but also leads to conservation of the meager resources, as well as finding a better way for the disposal of waste produced by various segments by value addition. It also saves landfill space, and reduces garbage, the disposal of which is a threat to the environment.

Proper management of waste disposal using the techniques of reuse, recycle and recover will not only save Earth, but will also lead to conservation of biodiversity and energy.

3. Survey and Assessment of Solid waste generated in the Vidyalaya

Team surveyed the solid waste generated in the Vidyalaya by observing the sources for the same i.e. classroom dustbin which contain the waste paper, dust, chalk dust and remains of food stuff especially in the primary department.



1. **Survey in the Classroom** - Member students of team visited each class room under Primary, Middle, Secondary Departments, & observed that the dustbin contain waste paper, chalk dust & remains of food stuff.

2. **Survey at First Aid Room** revealed the fact that except for resting beds for first aid injuries, students are sent to E.S.I hospital located in front of the Vidyalaya. No medicine is given to the student; therefore no waste wrappers could be produced.

3. **Survey of Computer Lab**- Where the technology is updated, so are the gadgets. Contract is there to replace the old one with the new one.

4. **Survey at Green area**- Interview with gardener revealed that dry leaves, stems and flowers are the main waste generated in the park.





5. Survey at the Office Block – Students visited the office where they interviewed Principal Sir & staff members & found that:

(i) Principal Sir himself using both sides of paper & has already instructed the staff to do the same.

(ii) He is using one side printed document for giving dictation to office staff.

Even then considerable amount of paper was coming out daily as waste paper which

cannot be ignored.

6. Survey at the Canteen – Team members surveyed canteen & talked to the head cook, who told them that :

- (i) **He is using paper plates for serving snacks**
- (ii) **Vegetable peels and tea leaves are generated each day while making snacks**
- (iii) **No cold drinks are sold, only juices in tetrapacks, which are biodegradable.**



4. Identification of type of solid waste generated in the school

4A: Categorization of waste

On the basis of survey conducted by team for waste generated in the Vidyalaya, waste generated by the Vidyalaya student was characterized as follows

- The solid waste generated by the Vidyalaya can be categorized into two forms:
 - Biodegradable
 - Non-Biodegradable



Table -1

Biodegradable	<ul style="list-style-type: none"> ➤ Waste paper generated by student ➤ Waste paper from office ➤ Soil slit, horticulture waste ➤ Food remains ➤ Vegetables peels from the canteen
Non-Biodegradable	<ul style="list-style-type: none"> ➤ Plastic Wrappers

The survey results show the fact that except for plastic, remaining waste is biodegradable.

4B: Types of Wastes and their Sources

Type of Waste	Source
Paper	Classrooms, staffrooms, labs, canteen, art room, primary activity room
Food	Classroom, staffroom, lawns, canteen
Horticulture Waste	Lawns, ground, clay pots, planted area
Electronic & computer	Computer room, Office
Biomedical Waste	Medical room

5. Study of Waste Collection System in the Vidyalaya

After the survey and assessment of the types of solid waste generated by the Vidyalaya during school hours, the team surveyed the techniques available and functional for the same-

- Waste generated from the classroom was going to the dump by MCD Garbage Trucks
- No segregation was taking place at source
- Some amount of horticultural waste was being put in the Simple Composting Pit by the gardener
- Paper recycling machine was present at school and was being used by the Eco-Club members, but was not being done with any precise objectives in mind.

Quantity of Wastes generated in the Vidyalaya-

Source of Waste	Daily	Weekly	Monthly
Office (Paper)		1.5 kg	6.0 kg
Class room (Paper, Food and plastic Waste) 12 classes X 4 sections	8.5 kg	51.0 kg	204.0 kg
Horticultural waste	3.0 kg	12 kg	60.0 kg
Biomedical Waste		0.1 kg	0.4 kg (negligible)
Total Waste generated			260.4 kg

Management of approximately 250-300kg solid waste generated monthly from the school will prevent it from making heap of landfill thereby solving the problem of landfill space, air

pollution and ground water deterioration and can be role model for others for an act which will help to make the earth a better place for us to live.

6. Study of Various techniques available for Reuse & Recycling of Solid Waste

After surveying the solid waste generated at the various points in the Vidyalaya during the school hours, the team discussed various strategies that can be utilized for reuse & recycling of solid waste under the heads-

- A. Horticultural waste
- B. Reuse of Paper
- C. Reuse of Plastic
- D. Biomedical waste.

6A: Composting of Horticultural Waste →

Visit to green area of the Vidyalaya by the team leader along with the students & assistant staff Gardener revealed that lot of Horticulture waste is generated from the path, herbal garden. He also told that the generation of dry leaves, flowers, etc. is more during autumn season.

The Horticulture waste generated from the green area needs to be managed because if this waste is sent to the MSW, it will become a part of landfill.

Various techniques available for the management of Horticulture waste were discussed as follows:-

SIMPLE COMPOSTING

Simple composting is the simplest method of solid waste management & solid waste being generated as horticulture waste (dry leaves, stems etc during annual fall) along with kitchen waste being generated from canteen.

All the biodegradable material is collected & put into the compost pit. It is kept for 40-45 days.

It works on the simple principle of aerobic decomposition by microorganism in the presence of sunlight, air & water. As a result, organic waste is converted into manure.



VERMI COMPOSTING

Vermi-compositing is a technique for making manure with the help of worms.

This is one of the best & fast, eco friendly ways for better management of organic waste. The manure obtained from this is free from chemicals as compared to fertilizer.

It consists of two pits:-

- (i) Preparation Pit
- (ii) Process Pit

Preparation pit collects the leaves to be used in process pit

In process pit worms (Australian worms) which convert 20% of soil & 80% of waste into manure.

The organic waste is thus converted to organic, green manure for the garden, which is eco-friendly.

ROLY-POLY COMPOSTING

Roly-Poly composter is a method of composting which is closed, well-aerated and hygienic. It is space efficient, odour & pest-free, and is much more efficient than open pit composting.

It is easy to use, faster, and the controlled air, moisture & temperature composting reduces green house gases.

How Roly- Poly Composter Works

1. Waste is fed into Roly Poly mouth. To enhance the process of degradation, some lime is added.
2. It is rolled over onto one of its 10 sides in the direction of arrows.
3. Compost is emptied when required

It has 4 compartments. The first empties into second when the unit has completed a whole revolution of ten flat surfaces. It gives green manure for garden.

6B: RECYCLING & RE-USE OF PAPER WASTE→

Survey was conducted at the source responsible for generation of used paper like classroom, art room, lab's, office etc. It showed that primary students waste maximum paper as compared to the other sources. But their minds are like clean slates, which can easily be sensitized with good habits of saving paper. Team discussed the various techniques available for recycling paper:-

- Paper Recycling
- Paper Machie



PAPER RECYCLING

Paper recycling is a process to re-use paper by making useful sheets of paper from used ones.

It involves the following steps:-

- Soaking
- Pulping
- Paper Making

Refining & Drying, Product Making

PAPER MACHIE

Paper Machie is a technique of recycling used paper. Used writing sheets as well as newspapers can be recycled by this technique to make decorative handicraft items.



roads.

It involves the following steps:-

1. Collection of plastic waste from school premises.
2. Cleaning process
3. Shredding Process.
4. Heating the aggregate in mixing chamber to have good blend with bitumen.
It gets cooled uniformly over the aggregate giving a smooth look.

6C: RE-USE OF POLYTHENE BAGS IN CREATING BETTER ROADS→

Survey of the solid waste generated by the Vidyalaya showed that the plastic disposed by the students is also a part of waste, which cannot be ignored. Plastic have become common man's friends, but they are non-biodegradable & their disposal is a problem. Re-use of plastic is being done in an innovative & inexpensive way. Waste plastic is being for designing of polymer coated bitumen road for with standing increased loads preventing cracking & importing resistance of water penetration producing more sustainable



6D: DISPOSAL OF BIO-MEDICAL & OTHER WASTE→

Survey conducted by the team leader & students & interview with the first aid in-charge revealed the following facts:-

- Medical room is used only for First-Aid purposes. For serious & second grade injuries, students are sent to ESI hospital situated in front of Vidyalaya, so in all negligible bio medical waste is generated on the school premises. Therefore, the disposal of Bio-Medical waste is not a major problem.



7. Development of Green Activity Area→

A green activity area was developed in the Vidyalaya as a point to set up management strategies about environment. This was done to ensure that children are sensitized towards environmental activities, and to make them understand that their involvement in environment-related ventures is important for saving the Earth and living sustainably.

8. Management Strategy - Implementation of the solid waste management techniques for achieving zero waste campus →

After surveying the various points at which solid waste was being generated in the Vidyalaya, strategy was developed by team for utilization of waste by proper Solid Waste Management in Green Activity Area.



8A: Segregation of waste at source for Bio degradable and non biodegradable waste→

Although efforts were made to segregate the waste, our team decided to completely segregate the waste at source. Two dustbins (green & blue) for biodegradable and non-biodegradable waste were installed in the classrooms. School is from class I to XII (4 sections in each class) along with 10 classes at other parts like Chemistry, Biology, Physics, Computer Office etc.

48+ (10) waste collection points are maintained with the help of housekeeping staff, so that segregation of waste can be done at source. Total

segregation:

- (i) 48 classes containing 2 dustbins
- (ii) 5 points containing two dustbins at office, central quadrangle, at playground, at entrance, at green activity area
- (iii) 5 points containing two dustbins at Chemistry lab, Bio lab, Physics lab, canteen,

8B: Composting of biodegradable waste →

1. Simple Composting → Simple composting facility was available in Vidyalaya but not properly used, pit was reconstructed with the help of students so that horticulture waste can properly be managed. Stream lining helped in management of solid waste biodegradable generated resulting in protection of Environment but also helps in avoiding the large heaps of land fill.

Survey revealed that simple composting was not enough to utilize the horticulture waste being generated from the Vidyalaya. It was proposed by the team members to set up other, more efficient methods of composting in the Vidyalaya.



2. Vermi-composting unit → Eco club coordinator contacted the NGO, dealing with environment concerns such as solid waste management. They came to Vidyalaya-

- Set up Vermi composting pit with the involvement of students.
- Gave training to the students on how worms convert bio-degradable waste into organic manure, which is not only eco-friendly for the plants but also for the environment.
- Group leader took interest & promised to not only take care of it but also spread the awareness amongst the other children in the school.



3. Roly Poly composter for converting the biodegradable waste from Canteen & Classes (food stuff) into organic manure → During the annual eco club meet at Bal Bhawan members saw mechanical composting (Roly Poly) which has so many advantages (beyond eco-friendly) over simple composting & vermi- composting. They proposed the idea in eco club meeting. As a result Principal Sir was convinced & ordered the same for the Vidyalaya.

Advantages of two units: Vermi-composting & Roly-Poly over Simple Composting were:-

- Time utilized for converting Biodegradable waste being generated by Vidyalaya Community was much less with Vermi composting & Roly Poly composter as compared to simple composting.
- Simple composting system alone was not enough to consume the biodegradable waste so as to avoid it to become the heaped land fill.



8C: Recycling of paper waste→

➤ Survey conducted by team revealed that Primary Students waste more paper as compared to secondary. Special Assembly program being conducted by the team helped a lot to sensitize primary kids about not wasting the paper. The result in change in their behavior to great extent came as response from parents during Parents Teacher Meeting.

➤ Survey tells us that students coming to Vidyalaya who belongs to middle or lower middle class community were using **second hand text book**. Talking to them, the team came to know that they either borrow or get at second hand price from within the school from seniors.

➤ One of the Advantages for the above point is due to the fact that in Kendriya Vidyalaya NCERT books are being used, which doesn't change so frequently.

➤ In **Nation Wide KVS** even if child gets transferred from one state to another he or she can use the same book & notebooks.

The team also recorded that paper waste being produced in the Vidyalaya premises is being regularly recycled in the Paper recycling facilities in the Green Activity Area Paper recycling machine has been set up in the green activity area for solid waste management. It reduces energy consumption by 40% VS when paper is made with fresh pulp. It causes 30% less water pollution and 74% less air pollution. It eliminates the land fill caused by waste paper.

- The water coming out of the recycling machine is used for watering the plants as it is chemical free. It helps in avoiding the heap of land fill

8D: Reuse of plastic bags, non-degradable waste→ Plastics are also a commonly used item in our life. It was therefore decided by the team leader to-

- a. Convey the message to the student community to limitise the use of plastics
- b. Reuse the plastic waste generated to make better roads with high tensile strength, lesser potholes, and increased water withstanding capacity.

8E: Solid Waste Derived Fuel→

Due to increasing population and their increasing demands, there is more consumption. thus more waste is generated and hence more landfills sites will be required. Therefore there is a need for the proper reuse of these wastes, and it is great to know that we have come up with a technology of Solid Waste Derived Fuel which utilizes the solid waste generated in the school to generate energy, which can be used FOR various purposes.

9. Sensitizing the neighbourhood community through awareness campaigns →

9A: Assembly in school

There started the move at broader aspect. A group of children - Ayushika, Mahima, Charu and Soumya presented the project during the school assembly with the motive of spreading awareness and reaching out to the school community.

Morning shift – a) Primary section

b) Secondary section

Evening shift – a) Primary section

b) Secondary section



Message conveyed during various assemblies with the message-

- 1. Limit the Use of Plastic - Small Step (pledge)**
(Use paper/ cloth bag to keep lunch)
- 2. Environmental Awareness towards Paper Saving**
- 3. Environmental Awareness towards Segregation of Waste in the Classroom**

And the act:

- Contribute the used plastic bags to the school for reducing solid waste and for making better roads. In this way, save the environment and be part of the project
Thus, with assembly as platform, the message reached thousands of people, parents and this peer group of nearly 5000 children ultimately spread the message to more than 50000 people - their families, friends and neighbours.

Motivation by Principal sir to the Student Community

Principal Sir took special efforts to start the move. He acted as catalyst for spreading the message. After the assembly programme in which students presented the project of reusing the plastic and ultimately making the students aware, Principal Sir addressed the children on this innovative and noble cause and motivated them to be a part of this move. Taking up of this initiative by the Head of the Institution helped the issue to reach not only the hearts of the children, but the message was also conveyed to their parents by the students. This sensitized 5000 students of both I and II shift.



MEETING WITH STAFF MEMBERS

Principal Sir interacted with teachers of I Shift (Primary section) and II Shift (Primary section). Presentation of the project was shown to the staff members by Mrs. Meenu Wadhwa, Project Coordinator to make each member aware about the issue. They were sensitized by the Project Coordinator and Principal Sir along with Vice-Principal Madam to become a part of the move. It was easy for the coordinators to discuss the same with other fellow teachers. Teachers also decided on their own to make the project successful with their best efforts to make children aware about solid waste as a social and community problem.

RESPONSE OF COMMUNITY -- MEETING WITH STAFF MEMBERS

As this project has gained sufficient popularity among teachers and students, it was decided to make this move a part of the next level- namely, the community. They shared their views about this issue in their neighborhood and promised to spread this message.

9B: INTERACTION WITH PARENTS (PTA DISCUSSIONS)

As the voice reached the homes of 5000 students, their parents visited the school. Getting a positive response from the parents and through repeated telephonic inquiries about the project, an interaction session was organized with parents during P.T.M. within the school, about the message of the project. Here, this issue was discussed in the sessions along with the presentation, and response sheets were given to the parents present in the meeting .

9C: INTERVIEWS WITH PARENTS→

During the parents-teacher meeting, an interview session was organized for the parents. Students involved in the project of solid waste management interviewed parents about their views on the school's move towards environmental protection. Their responses make us realize that this is a noble cause, and has to be spread in a broader spectrum.

9D: RALLY IN NEIGHBOURHOOD COLONIES (COMMUNITIES) →



A rally of school children was organized with the objective to make the population in the neighbourhood aware of the fact that proper management of waste disposal is very essential, and use of plastic bags in day to life is harmful to the environment they live in. Children went to each and every door of nearby locality viz. Triveni Apartments, Delhi Police Staff Quarters at Vivek Vihar and Jhilmil Slums. Children were carrying placards saying– SAY NO TO PLASTIC BAGS. They interacted with community people in the following ways:

- Spread awareness about the ill effects of waste being thrown carelessly.
- Explained measures of reducing the

waste

- Motivated people for contributing and cooperating in the noble move.

They also made them aware that if they had some waste plastic bags in their house for disposal; they might kindly handover the same which could be scientifically disposed off in the process of solid waste utilization, which will ultimately benefit the community. Getting positive response from all the children and their parents, volunteer students conducted a meeting, in which they decided that they will spread this message all around to the neighbouring colonies. In this manner, message was spread to the neighborhood of the students, there by reaching to thousands of people.

9E: MEETING WITH RWAs & RESPONSE OF COMMUNITY -- OUTREACH TO THE NEAR BY COMMUNITY OUTSIDE THE VIDAYALAYA

There was an over whelming response from the local community, who voluntarily gave huge quantity of waste plastic bags and also decided that henceforth, they will minimize or avoid using plastic bags as it caused harm to the environment.

In Triveni Apartments, the head of the Resident Welfare Association (RWA) was very much convinced with the students' efforts towards the present problem faced by each human due to plastic. He not only promised to spread this awareness in each association meeting but also welcomed the students in the next day's meeting, in which message was spread in the whole community.

While talking to the residents of Triveni Apartment, president of RWA expressed his deep concern about the rampant use of



polythene bags by local vendors as there is hardly any check by law enforcement agencies in this area. As a common person of the locality, there is very little one can do, as prevention processes need to be done in support of both local administration and law abiding citizens to curb the menace effectively. So far, people of this area, even though they recognized the environmental problem, could not do much about it, as there is no entity in place to organize the citizens constructively to get together and formulate a plan of action, which would prevent further aggravation of environmental damage.

The house wives of the Delhi Police Staff Quarters area decided that they will use old clothes for making bags and will inculcate these habits into their children so that they will have minimum problem in coming future. Mrs. Sharma, a mother of 3 school going kids, resident of the Delhi Police staff quarter said that she was happy to find some valuable educational activity was being provided by KV Vigyan Vihar, and hoped that the children will learn the values wisely and protect the environment by avoiding use of plastic bags. As these children will grow up to become responsible citizens, it depends on how these children handle this environmental issue. She promised to the students that she will follow the message, "SAY NO TO PLASTIC BAGS" in letter and spirit in her day to day life.

In Slum (Jhuggi) Colony, teachers along with the students addressed the slum-dwellers and made them aware of the problem. They realized the problem they will be having in the future.

The head (Mukhiya) of the slum dwellers understood the explanations given by the students of the rally but pointed out that government should be proactive in this regard and should impose the complete ban on plastic bags. The govt. should also provide a suitable substitute to the users free of cost before imposing the complete ban as the residents do not have any reservations or any inclination towards use of plastic bags.

They were happy that children were spreading this message which even they were aware of

- How foodstuff kept in plastic bags becomes harmful
- How harmful substances are imbued into the stuff kept in these bags, and
- How the bags also harm the land when they reach the soil

They promised to take action on it and welcomed the children again in the hopes that this problem can be eradicated.



10. Summary

The high growth rate of our economy, a vast and expanding domestic market catering to the needs of the gen-next, an active population with increasing amounts of disposable income and rapid obsolescence of consumer products are the main drivers for improved lifestyles strongly. These factors are unabatedly increasing in the quantum of urban-wastes being generated across the country.

The best way for utilizing this waste is to use it as a resource in co-processing by either using it as manure

for organic waste or fuel in manufacturing process (inorganic as well as organic) from remains. This is especially relevant in the Indian context as it affects biodiversity both directly- in the area of effect, and indirectly- through awareness and resource conservation.

A general reduction of the solid waste in and around the school and its utilization was indication of the improvement in the quality of life.

The wastes have an impact on air, water and land utilization of waste generated from various sources at the Vidyalaya by using the techniques for extracting energy “Wastes as the system for transfer of Energy”

The conceptualization towards the reduction of solid waste to improve the quality of life if applied can be initiate a step towards not only environmental protection but will also be a salute to mother earth from us, her children.

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