

- The visitors will not only get an idea of the physical appearance of the animal but also of their natural habitat and behavior
- Enrichment devices that stimulate the ability of the animal in captivity may serve the purpose of 'training' them for eventual reintroduction.
- Increased behavior repertoire can reduce stereotypic behavior.
- Optimum utilization of resources.
- It will serve the purpose of educating the visitors.
- It is integrated teamwork and involves all the relevant staff member including Director, Curator, Veterinarian, Vet-Nutritionist, Horticulture, Engineers, Animal Keepers, etc., and can be supported at all levels of the institution.
- Enrichment plays an important role in maximizing good animal welfare both in term of health

(increasing activities -> decreasing obesity) and psychological well-being (providing opportunity for animals to perform species appropriate behavior.)

With the rate of extinction of wildlife there may come a time when the only way to restore natural biodiversity is through well organized reintroduction programme. Then zoos and other holding facilities around the world will be called upon to supply healthy individuals for reintroduction.

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**Assessing the Benefits & Risks of Environmental Enrichment (Duncan 1997)**

<b>BENEFITS</b>	HIGH	Initiatives that have low risk and high benefits.	Initiatives that have high risk and high benefits.
	LOW	Initiatives that have low risk and low benefits.	Initiatives that have high risk and low benefits.
		LOW	HIGH
	<b>RISKS</b>		

## Converting Zoo waste to Energy

Yuvraj R.Kaginkar

As we begin the 21st century we are faced with an ever-increasing human population that consumes vast amounts of resources. In the face of such pressure the environment suffers. Reports of pollution, logging, urban sprawl, land degradation, mass starvation, decreased fisheries, global warming, the extinction of species and much more, are legion, and paint a bleak and overwhelming picture.

As the earth becomes more crowded and our landfills start to overflow, people will be forced to address the issue of waste. If current trends in the global economy continue, human consumption will have increasingly serious consequences for our ecosystems. As conservation centers, Zoos must address sustainable relationships between humankind and nature. If we are to evolve as organizations we should actively support strong environmental messages. Through the development of organic waste, such as compost, zoos could reduce the amount of waste going to landfill substantially by utilizing waste-to-energy activity.

**Waste collected:**

Our zoo disposes of some of 105-110 tons of zoo waste per year.

Animal waste: Manure, straw, sand, food scraps, etc., (95-105 tons/year)

Visitor waste: Food wrappers, drink cups, assorted paper, etc., (1-1.2 tons/year)

Miscellaneous solid waste: Office paper, (0.4-0.5 tons per year) which is dispose of landfill.

Objective:

Contribution to the alternative sources of energy.

Creation of an organic recycling program that is sustainable.

Help solve the Zoo waste problem.

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**Veterinary-Cum-Extension Officer, S. V. Zoological Park, Tirupati, A.P.**

Cost effectiveness – get a return on the product.

Market – not only the product but also the zoo and its commitment to preserve the environment and to reduce the impact humans have on the environment.

Daily waste collected from the zoo is around 105-110 tons/year which can be used in production of biogas, which would be helpful for cooking feed for animals. Other waste like animal, visitors, & miscellaneous waste can be converted into organic manure through vermi-culture, which can be utilized for the fodder farm and the gardens maintained by zoos on the premises.

### **Vermi-composte and biogas implementation for converting waste to energy:**

Implementing vermicompost and biogas plant in the zoo premises, to generate the energy from zoo waste.

#### **Method of preparation of vermicompost:**

A shed area for each pit 12'x12' is sufficient to accommodate three vermibeds of 10'x3' each having 1' space in between for treatment of 900-1200 kgs of waste in a cycle of 40-45 days.

Basic vermi-composting involves setting up some type of shed, filling it with moist bedding materials, introducing worms and feeding them on a regular basis, monitoring the conditions in the shed, and adding food, water, and more bedding as conditions warrant.

#### **Method of preparation of biogas plant:**

Biogas technology is that in which the microbial waste converts organic matter to methane, which is used as a cooking gas. Biogas is produced from organic wastes by concerted action of various groups of anaerobic bacteria. Nearly seventy per cent of methane from biogas digesters fed with cattle dung is derived from acetate. The potential of biogas production - herbivores droppings will yield gas around 0.4-0.5 m<sup>3</sup> / kg.

The next step will be to promote, market and sell the product to the public, by developing promotional strategies, packing, and market analysis.

### **Advantages / Benefits**

It will help to assist the zoo in determining an innovative, cost effective, and environmentally conscious method for disposing of animal waste, by application of eco-friendly concepts.

The zoo mission includes the naturalistic animal habitats and environments for the visitors for making positive contributions to the environment through conservation and educational efforts, as the zoos and aquariums of the world attract about 600 million visitors per year.

This will stress an economic effect in the consequence of fast recovery of investment in connection with the annual cost of zoo waste in revenue.

Zoos offer a unique platform for environmental educators with the issues being incorporated throughout the system.

The zoos also have a commitment to educating and assisting the community to undertake similar initiatives at home and in their local area

Encourage positive utilization of the waste material.

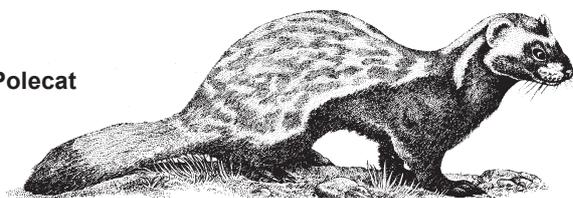
Vermicompost is an eco-friendly natural fertilizer prepared from biodegradable organic wastes and is free from chemical fertilizers.

It does not have any adverse effect on soil, plant and environment, and it also improves the soil aeration, water retention, reduces soil compaction Potential for creating a more environmentally friendly and self-sustaining zoo.

#### Acknowledgement:

*I am thankful to Officials of Andhra Pradesh, Forest Department, particularly Mr. Parthasarathi, Curator (S.V. Zoological Park), Dr. TH Thoibasingh, Vet Asst Surgeon, Mr. Selvakumar, F.R.O, admin-staff, animal keepers, and Dr. M. S. Karawale, Dy. Supdt (VJBU-Zoo, Mumbai) for their encouragement and generous support.*

**Polecat**



**Indian mongoose**

