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ECO NEWS

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C.P.R. ENVIRONMENTAL EDUCATION CENTRE

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A Centre of Excellence of the Ministry of Environment and Forests, Government of India

C.P.R. ENVIRONMENTAL EDUCATION CENTRE

Established in 1989

- **1980** - The C.P. Ramaswami Aiyar Foundation starts nature education for teachers and students.
- **1989** - C.P.R. Environmental Education Centre (CPREEC) established jointly by the Ministry of Environment and Forests and the C.P. Ramaswami Aiyar Foundation as a Centre of Excellence of the Ministry of Environment and Forests. Government of India.

Our Mission

- To increase knowledge, awareness and interest among the public about the environment in all its aspects
- To develop resource materials for environmental education and awareness raising
- To conduct training programmes for a wide cross-section of people
- To take up environmental projects for demonstration and research

Our Activities

- Training and awareness raising
- Awareness to and through action
- Awareness programmes in ecologically fragile areas
- Conservation of the ecological heritage
- Research and surveys
- Generation of resource materials
- Exhibitions
- Courses, seminars and symposia

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- Library
- Computer Division
- Publications Division

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- Andaman & Nicobar Islands
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- Karnataka
- Kerala
- Maharashtra
- Orissa
- Tamilnadu
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CPREEC has an extensive network of about 600 NGOs. All educational programmes are carried out in partnership with select NGOs, Universities, Colleges and Schools.

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- Green Schools of India (GSI)
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- Environmental Law Education

Special Projects

- National Green Corps (NGC)
- Biomedical Waste
- Biodiversity Conservation

Research and Surveys

- Sustainable Technologies
- Surveys of Natural Resources
- Socio-Economic Surveys
- Lab to Field Technology Transfer

EDITORIAL

This is the first issue of the Eco News for the year 2013 – 14. The issue covers a variety of topics containing several interesting articles.

P. Sudhakar's article on Parks Vs Green Space. Focuses on the shrinking green spaces in our cities. Parks have gone, substituted by high rise buildings and infrastructure projects. Parks have more exotic species than local plants. These have hampered the green cover and pave way for torrential floods that devastate cities from time to time.

The parks of my own childhood in Mumbai and Chennai have been shrinking or disappearing. Marina Beach has been divided between two memorials, vendors of food and toys and the fisherman's boats and nets. All development on the beach had been banned in British India.

M. Amirthalingam has written an article on Ecosystem services provided by the Thoppainkulam sacred grove. Ecosystem services of forests and sacred groves are in continuous demand. As our forests and green covers shrink, the ecosystem services also shrink. It is not possible to quantify the benefits of green cover. We know that sacred groves provide ground cover and improve the water retention capacity of the soil, while the local species planted in the groves serve as a biodiversity reserve.

The Rhododendron of the Nilgiris has many ecological values. It is evident from the fact that the Toda tribes use the branches to make artificial buffalo horns at the entrance of their temples.

The culture of the 20th and 21st centuries has resulted in the accumulation of waste : sewage, garbage, hazardous waste, biomedical waste, e-waste, etc. We have an article on the management of the biomedical waste by Dr.Sundaramoorthy, which is a key issue.

Street food accounts for sustenance in an economy of increasing food prices, and utilization of synthetic biomaterials is a solution for the future.

Every year, flash floods occur and devastate the cities and the need of the hour is environmental protection and adoption of preventive measures.

Nanditha Krishna
Editor

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C.P.R. Environmental Education Centre is a Centre of Excellence of the Ministry of Environment & Forests, Government of India, established jointly by the Ministry and the C.P. Ramaswami Aiyar Foundation.

The Centre has been set up to increase consciousness and knowledge about the environment and the major environmental problems facing the country today. It has been conducting a variety of programmes to spread awareness and interest among the public, including, teachers, students, voluntary workers, educators, farmers, women and youth, on all aspects of the environment and ecology, with the purpose of promoting conservation of nature and natural resources.

Urban Expansion Vs Green Cover / Parks

Dr. P. Sudhakar

According to United Nations sources, India will have a working age population of nearly 241 million between 2010 and 2030. The changes that are taking place in ecology, economy and society are due to the result of rapid urbanization in India (Defries and Pandey, 2010).

Industrial revolution in the 1970s followed by globalisation in the 1990s have expanded urbanization in India. The rate of urbanization is much faster in the last decade when compared to the earlier periods (Rahman, 2007). The increase in the urban landscape, especially of the cities, is quite expansive. Several capitals of Indian states have increased their urban scale by leaps and bounds. The percentage of expansion of Delhi, for example, is 2264% which has encroached upon the neighbourhood states of Haryana, Rajasthan, Uttarakhand and Uttar Pradesh. Similarly, Mumbai and Chennai have grown by 727% and 675% respectively.

Growth of Urban Areas in Major Cities

Sl. No.	Name of The City	Area before Expansion in KM^2	Area After Expansion in KM^2	Percentage of Expansion
1	Delhi	1483	33,578 (NCT)	2264%
2	Mumbai	603*	4,355 (MMR)	727%
3	Chennai	176	1,189 (Greater Chennai)	675%
4	Kolkata	185	1,851.43(KMDA)	642%
5	Hyderabad	172	650(GHMC)	377%
6	Bhubaneswar	135	419(BDA)	310%
7	Bhopal	298	696	233%
8	Bengaluru	360	741 (BBNB)	206%
9	Ahmedabad	298	475	159%
10	Jaipur	168	200.4	119%

** Includes Mumbai Suburban (Sources: www.mmrdamumbai.org.)*

www.chennaicorporation.gov.in. www.mcdonline.gov.in. www.kmdaonline.gov.in http://bbmp.gov.in., www.ghmc.gov.in., www.bdabbsr.in., www.amcgujarat.com. http://jaipurjda.org., www.bhopalmunicipal.com.)

Though the cities have expanded by large proportions, the quality of city environment has improved little. One of the major indicators of the environmental quality of an area is the green cover (*http://www.epi2010.yale.edu/*). The percentage of green cover in several cities of India is very meagre and has not increased proportionately (Chaudhry, et.al., 2009).

Parks

The major contributors of tree cover in cities are parks. There is a direct proportion between the number of parks and the percentage of green cover, though the green cover is also based on the trees and reserves outside the parks. Parks are the much needed green space and function as the lungs of the cities. There are 270 parks in Chennai. The largest park maintained by the Chennai Corporation is the Tower Park at Anna Nagar covering an area of 14.580 hectares.

Role of Parks

The concept of parks is yet to establish itself in the suburbs. Parks should be places for recreation as well as education. Signage boards with information regarding the botanical name, family, conservational status, ethnobotanical value, distribution etc. should be provided in the parks. Parks have a good diversity of flora which includes more than 100 medicinal plants. They can be used as green centres for nature education, especially by the neighbourhood schools. The children can be made to learn through experience not only about the plants but also about the birds, butterflies and insects. Preparation of a plant diversity register for each park is an important exercise to facilitate nature education. Parks can also incorporate more of unique and botanically curious plant species that will enthuse students to learn nature. This will create an interest among the general public about parks.

Threats to Parks

Parks being the lung spaces of cities, it is the responsibility of every citizen to safeguard them. More constructed areas for providing public amenities such as play grounds, skating rinks, meditation centres etc., reduce the green space of the parks. Several parks in Chennai are dominated by such constructions. A few parks in Chennai also harbour statues. In Hindu mythology, trees like neem (*Azadirachta indica*) and Pipal (*Ficus religiosa*) are considered to be sacred. People who visit parks regularly start worshipping the trees, which eventually leads to placement of an images, that further leads to the construction of a permanent structure. A tendency that is observed in several parts of Chennai and its suburbs is that a temple structure slowly expands and encroaches upon the public space. Hence, what exists as small images or structures today might grow into a well-established temple engulfing the park space. Sivan Park in K.K. Nagar has already met with this kind of encroachment. Improper management also degrades the green cover of the park.

Developmental activities

The parks are developed in the open space revenue lands, which are under the control of the government. Whenever there is any need or urge for the expansion of infrastructural facilities, green spaces are considered "land banks", often encroached on by private as well as government interests for creating additional built up space (Zerah, 2007).

One such infrastructure development project is the Chennai Metro Rail Project, which has taken over a few parks like May Day Park, Thiru. Vi Ka Park, Nehru Park and Ashok Nagar 1st Avenue Park. The first 3 parks mentioned above are among the oldest and biggest parks in Chennai,

forming the lung space for the residents of the respective areas. These parks have been renovated recently by the government spending huge amount of public money.

While the entire area of the Thiru. Vi. Ka. Park and the Nehru Park has been taken over for the proposed metro railway station, the May Day Park and Ashok Nagar 1st Avenue Park have been partially taken over and will be restored after the completion of the project. Even though development is the need of the hour, the Government should take necessary steps to ensure that the green spaces are not disturbed as the city has only about 4.54% of tree cover (*http//cmdaonline.gov.in*) when compared to cities like Chandigarh, Delhi, which have more than 15% of tree cover (Sandhir, 2010).

Conclusion

Since industrialisation is being concentrated more in the suburban areas, the corporate sector can be asked to take up the responsibility of maintaining parks and other open spaces. Park protection committees can be formed in each locality involving the general public, neighbourhood community and local NGOs. Species of native, botanical and conservation importance should be planted in each park. The urban forest division of the Forest Department and the Corporation should work together in future urban planning for providing better and quality green spaces.

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Ecosystem Services of the Thoppayankulam Sacred Grove

M.Amirthalingam

Introduction

A sacred grove with an area of 4.0 ha is situated about 300 m away from Thoppayankulam village in Viluppuram district. It is dedicated to a deity called Muthumuneeswaran. It is surrounded by cashewnut plantations on all sides. The presiding deity is inside a concrete sanctum. Six minor local deities such as Kathavarayan, Aiyanar, Murugan, Veeran, Vinayagar, Muniyanar are also worshipped in this grove. These minor deities are made of concrete / granite structures. A few metallic objects like bells, spears, tridents, swords and chains are also present. The grove is not associated with any water body. This grove is managed by a village committee. A Vanniyar family has been priests of this temple traditionally. Terracotta horses and bulls are offered to the deities.

The people of the village have great reverence for this deity. The worship is done on Tuesdays and Fridays. Ladies are strictly not permitted to come anywhere near this deity. Interestingly, the pongal (sweetened rice) is cooked and offered to the deity by men only. Legend has it that this deity is without consorts; hence the exclusion of ladies from the worship. Other rituals like tonsuring of the head and boring of the ears of the first child are usually performed here. The annual festival falls on Mahashivarathiri day. The decorated idols are taken in a procession through the village. During the festivals, goats, fowl and pigs are sacrificed in the grove. Only the large painted concrete images signify the influence of modernism. Terracotta horses are offered to the deity, as is common in Aiyanar worship.

Vegetation profile

The temple is situated amidst a thick grove of plant species. The grove consists of taller trees with an average height of 6.38 m in the range 2 to 17 m and a girth of 45.78. The canopy is discontinuous. The shrub layer and ground flora are barely recognizable. Only about 10% of the individual species are multi-stemmed. The evergreen as well as deciduous species are almost equally abundant. The top storey is distinct but discontinuous. The sub-storey is also distinct with a sizable population.

Among the species represented, 22 belong to 20 genera and 17 families. Of these, 16 are tree species and six lianas. Out of the 22 species, nine are evergreen, eight deciduous and five are brevi-deciduous. Family-wise, Mimosoideae and Faboideae have three species each while two families, namely Rubiaceae and Tiliaceae have two species each.

Ecosystem services of the groves

The grove provides various tangible and intangible benefits. The latter cannot be quantified. However, in spite of this drawback, the different benefits derived from the groves can be assessed.

Watershed value

The grove at Thoppayankulam has no waterbody close by. It is situated in typical dry red soil terrain. The vegetation of the grove thus helps to retain water even during the summers.

Nutrient enrichment

This grove has a mat of thick leaves. Hence the rainy season undergrowth of shrub and small trees builds up the litter level. Understandably, the decaying litter adds minerals to the soil and increases the fertility.

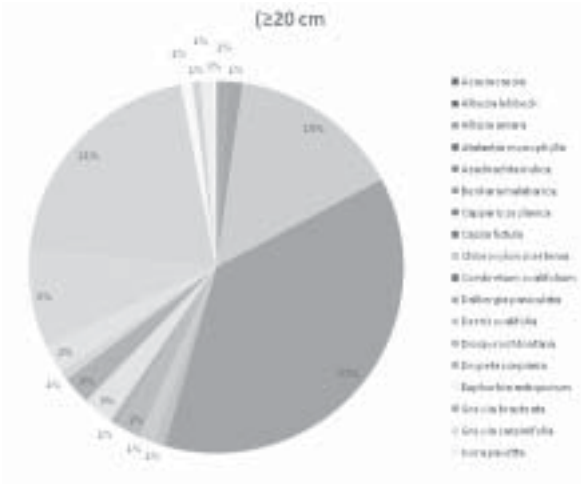
Moderation of microclimate

The ambient temperature is less by 1-3°C invariably inside the groves compared to the open surroundings.

Botanical Significance

There are 80 species (including 18 lianas) in 64 genera distributed within 39 Angiosperm families. *Memecylon umbellatum* which is a characteristic species of Tropical Dry Evergreen Forest (TDEF) is also found in the inland grove at Thoppyankulam. This grove is also restricted to certain species like *Albizia amara, Cassia fistula, Lepisanthes tetraphylla, Diospyros montana* and *Strychnos potatorum* are the species which attain the maximum height. Besides, lianas like *Combretum ovalifolium* are also found in this grove. *Chloroxylon swietenia* is another species which is fairly well represented in both the classes.

There are five occasional, four rare and two very rare species (pie-diagram). Two species such as, *Polyalthia korinti* and *Cordia monoica* were recorded for the first time in a sacred grove. The height and girth recorded indicates that the maximum number of trees could be classified among the first three classes. The height class pattern assumes a bell shape indicating young, medium and tall trees. Though the young trees were also stouter, the higher girth classes account for the older, taller and stouter trees.



Threats

This grove has been facing various disturbances and threats to its very existence. The local people celebrate the annual festival in a very elaborate manner. The people have also started building new structures and also installing various statues which have proved to be a danger to the ecosystem. Grazing of cattle is also freely allowed. This results in degradation of the undergrowth. The practice of grazing thus does not allow the further replenishment of the grove. The grove, though thick, is discontinuous. Hence, it is vulnerable to economically important tall and healthy trees being cut down by the local people.

Conclusion

The sacred groves have appreciable biodiversity and hence need to be carefully conserved. However, in the modern world, the traditional role of sacred groves will inevitably fade away unless supplemented by a new set of priorities for protection, for example, non – religious incentives. The need of the hour is the inculcation of conservation values in educational institutions.

Acknowledgement

The author wish to acknowledge the valuable inpupts provided by Prof. Dr. M.P.Ramanujam and Dr.Praveen Kumar Cyril.

Rhododendron (Rhododendron nilgiricum)

M. Kumaravelu

The Indian sub-continent is blessed with rich and diverse plant life. The different climatologically and geographical features of the landscape across the country tend to support different types of flora in particular regions. Altitude is also found to a major factor in influencing the vegetation of a particular region. In India, the vegetation can be classified into sixteen major types, based on the climatic and geographical features. They are: 1. Wet evergreen, 2.Semi-evergreen, 3. Moist tropical deciduous, 4. Littoral and swamp 5.Deciduous 6. Thorn forests 7. Dry tropical evergreen 8. Broad-leaved vegetation 9.Pine type 10. Dry evergreen 11. Montane forests 12. Montane moist temperate vegetation 13. Montane Dry temperate 14. Sub-alpine vegetation 15. Moist alpine vegetation and 16. Dry alpine vegetation.

The wet evergreen vegetation type, which is unique, are seen both in the North as well as certain parts of the south of the sub-continent. In the southern region this vegetation type is predominant in the Western Ghats. On elevations above 1200 MSL one can find grass lands and sholas and on the hill slopes the vegetation is adorned with mosses, fern and orchids. Among all the sixteen types of vegetation, Montane temperate vegetation is peculiar and confined to the mountains that are represented by small, evergreen pockets called the shola forests in the Nilgiris. These forests are found in patches on the undulating hills which dominate the grasslands in the Nilgiris and part of Kerala's high ranges where the rainfall ranges from 150 to 625 cm annually.

Some of these habitat specific trees are Rhododendron, Champak, tree ferns and woody climbers. A study by the department of forests reveals that in Longwood shola at Kotagiri there are about 44 tree species, 32 shrubs, 25 Lianas and other climbers, 5 Epiphytes and 12 Fern species. That shows the richness of the vegetation diversity in the shoals. It can also be classified as the Montane wet temperate forest.

Rhododendron

Rhododendron makes itself very special due to certain unique factors, its sturdy nature and attractive flowers that mostly flower in the winter season defying the odds. The tale of the Rhododendron, one of the ancient flowering trees, shows that the total species of Rhododendron available at the global level is 500 and in India 80 species are present, mostly in the Himalyan region. In Tamil Nadu in particular, 5 species are available and all of them grow at temperate zones. In the Nilgiris, two species, namely Rhododendron arboretum (J.E. Smith subspecies Nilagiricum (Zenk.) Tagg are found commonly in the temperate forest

ecosystem. *Rhododendron indicum* (Linn.) is an ornamental variety which is a cultivated species.

Ecological value

Rhododendron nilagiricum, an evergreen tree, is in the shape of a cauliflower at its canopy. It has more than 3 layers of bark that protects the trunk as well as from forest fires. Forest fires will not burn this tree easily as the bark releases waster thus dousing the fires Scientists suggest that this tree can be grown as a fire barrier on the grasslands. Apart from this, the tree supports many avian fauna which build their nest around the year. Its fast red colour flowers attract bees and butterflies at large. However, some other species of Rhododendron are considered poisonous to livestock. The leaves of some species are used for medicinal purposes and for making aromatic products. It is reported that the honey from the flowers of some species is poisonous. (Rangaswami and Sambamurthy, 1957).

Cultural value

Rhododendron nilagiricum's trunk and barks are very strong and sturdy. Hence the Toda tribes in the Nilgiris use the branches for making imitation buffalo horns that are kept at the entrance to their temple and home as sacred products. The flowers are used for performing temple rituals.

Aesthetic value

Rhododendron nilagiricum generally blooms during January every year. Hence, it is locally called as *'Pongal Poo Maram'*. However, it is observed that in the Himalayas it blooms between March and May. This tree can be planted in public and private gardens since it attracts bees and butterflies. The other plants will also get benefit from inter-pollination.

Rhododendron nilagiricum is endemic to the higher altitudes of the Western Ghats. The decline of its habitat due to human activities and unplanned management of plant diversity has taken its toll. *Rhododendron nilagiricum* cannot be used for any domestic purposes and for fire wood. At the backdrop of climate change and global warming, especially at the micro-climate levels in the mountains, it would be prudent to take efforts for the regeneration of the Rhododendron.

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The author wishes to thank Dr. S. Rajan, Head, Survey of Medicinal Plants & Collection Unit, Ooty, for his valuable support in this study.

Biomedical Waste Management in India – the Present scenario

Dr. T. Sundaramoorthy

In a developing country like India along with high population growth, economic and industrial growth, the generation of waste has also grown considerably. Health care waste or Bio medical waste is part of this waste.

Health care waste is defined as "The waste resulting from the patient's diagnosis, preventive research and treatment procedure as well as waste generated from all other health care establishments, research facilities and laboratories". The major source of health care waste is hospitals, health centers, clinics, diagnostics centers, blood banks, mortuary, crematoria and dental clinics. The large quantity of waste is mostly generated from departments such as surgery, gynecology, accident & emergency, laboratories and renal dialysis. The composition of health care wastes is often characteristic of the type of source. The waste generated from intensive care units and intermediate care units are mainly infectious. Waste such as dressing, bandages, gloves, plasters, disposable medical items, used needles, I.V sets and body fluids. Operation theatres and surgical wards give rise to anatomical waste such as tissues organs, fetuses, body parts, other infections waste and sharps. The laboratory waste include pathological highly infectious waste like microbial culture, infected animal carcasses, blood etc., Besides wastes such as expired drugs and chemicals, packaging materials, aluminum foils are generated from the stores section and dispensary.

In India, Bio medical waste management is governed by the Bio-Medical waste (Management and Handling) Rules 1998 issued by the Ministry of Environmental Forests in exercise of the powers conferred by sections 6,8 & 25 of the Environment (Protection) Act, 1986. The rules were further amended in 2000 and 2003.

The quantum of Biomedical waste generated in India is estimated to be 1-2 kgs per bed per day in a hospital and 600gram per day per bed in a general practioner's clinic.

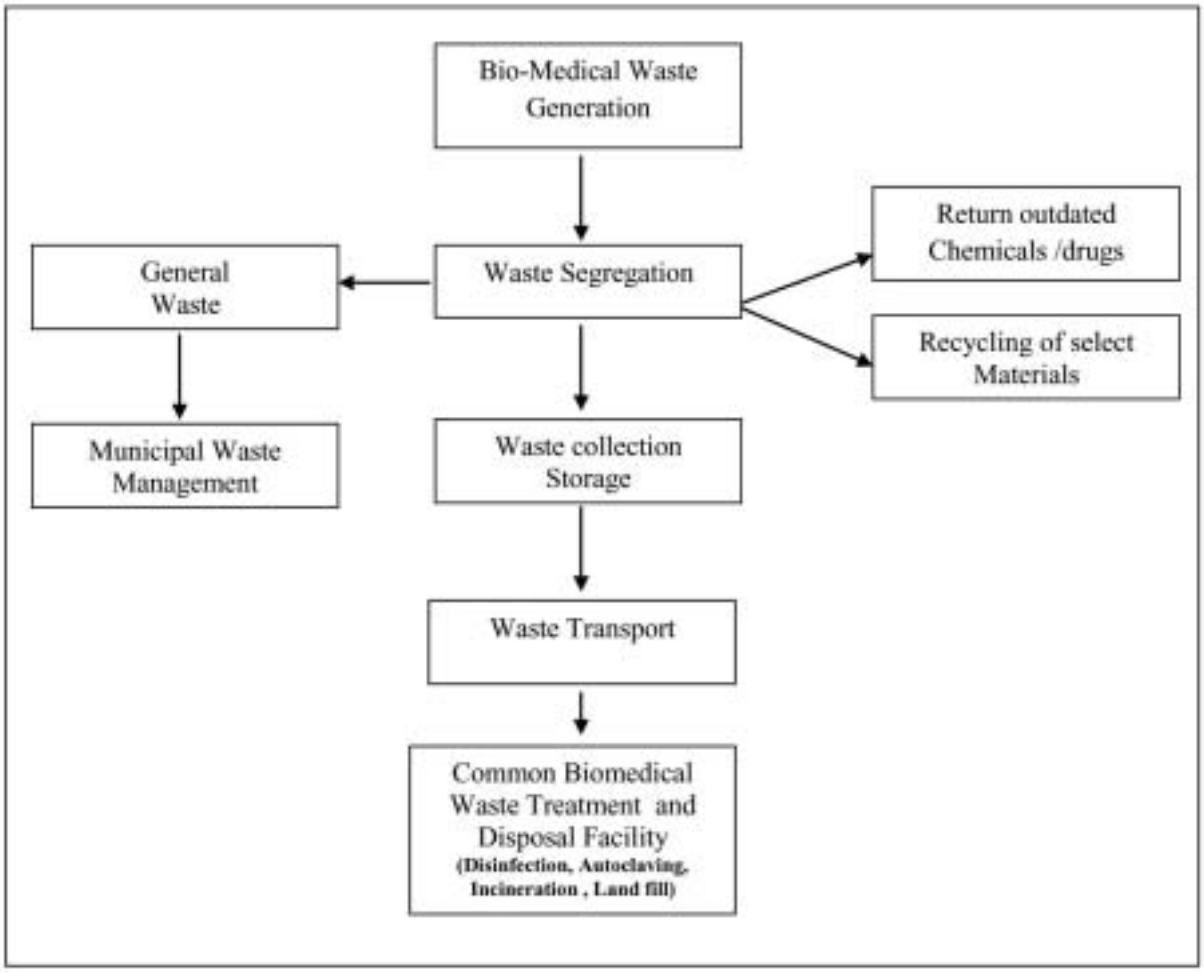
Principles of sound health care waste management include segregation of waste according to color codes in coloured bins/ bags, disinfections before disposal (eg. Autoclaving, containment (of sharps) and final treatment options (Interaction/ deep burial/ use of hydrochloride/ use of plastic shedders and recycling the plastics etc.,) management of heavy metals, chemicals & the management of liquid waste.

The waste categories as per Bio-medical waste (Management and Handling) Rules 1998 are as follows.

Category No.	Waste Category/Class	Treatment and Disposal methods
1.	**Human Anatomical Waste** (human tissues, organs, body parts)	Incineration/ Deep burial
2.	**Animal welfare** (animal tissues, organs, body parts, carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals, discharge from hospitals, animal houses)	Incineration/ Deep burial
3.	**Microbiology and Biotechnology Waste** (Waste from laboratory cultures, stocks or specimens or micro-organisms, live or attenuated vaccines, human and animal cell or culture used in research and infections agents from research and industrial laboratories, waste from production of biological, toxins, dishes and devices used for the transfer of cultures)	Local autoclaving/ Microwaving/ incineration
4.	**Waste Sharps** (needles, syringes, scalpes, blades, glass etc., that may cause puncture and cuts. This includes both used and unused sharps)	Disinfection (chemical treatment/ autoclaving/ microwaving and multination/shredding
5.	**Discarded Medicines and Cytotoxic Drugs** (wastes comprising of outdated, contaminated and discharged medicines)	Incineration/ destruction and drugs disposal in secured landfills.
6.	**Soiled Waste** (items, contaminated with blood and body fluids including cotton, dressings, soiled plaster casts, linen beddings, other material contaminated with blood)	Incineration / autoclaving microwaving.
7.	**Solid Waste**(waste generated from disposable items other than the waste sharps such as tubing, catheter, intravenous sets etc.,	Disinfection by chemical treatment/autoclaving/ microwaving and mutilation/shredding
8.	**Liquid Waste**Waste generated from laboratory and washing, cleaning, housekeeping and disinfecting activities)	Disinfection by chemical treatment and discharge into drains.
9.	**Incineration Ash(**ash from incineration of any biomedical waste)	Disposal in Municipal landfill
10.	**Chemical Waste(**Chemicals used in production of biological, chemicals used in disinfection such as insecticides etc.,)	Chemical treatment and discharge into drains for liquids and secured landfill for solids.

In order that the BMW is collected, treated and disposed effectively the flow of biomedical waste generated in health care facilities should follow a particular direction, in a system and at each step of this system waste management needs to be monitored and supervised.

The basic flow should be as below:



In addition to the above, the radioactive waste is to be disposed as per the guidelines issued by the Bhabha Atomic Research Centre (BARC) in India and by the International Atomic Energy Agency (IAEA).

Concern in Managing BMW

Although the BMW Rules 1998 as amended are in existence since 1998, the compliance level is still very low as compared to the other Acts / Rules under the Environmental Protection Act 1986, such as the compliance of the Water Act Rules 1974 as amended in 1998 and the Air Act Rules 1981 as amended in 1987 or even the Hazardous Waste (Management of Handling and Tran boundary movement) Rules 2008 as amended. Except for a few large private health Institutions, the implementation level is very poor in India. The situation is still worse in smaller towns, cities and villages. Lack of awareness and segregation practice is one of the main reasons for the poor implementation of the BMW

Rules. However, it is observed that the implementation of the above said BMW Rules is at various states of India.

In general the reasons for poor implementations of the BMW Rules in India are as follows.

- In many parts of the country BMW is not segregated at the source properly mainly because of the lack of training, The entire waste generated in medical institutes, including other solid waste, is collected as BMW.

- Most of the Non – incinerable / autoclavable waste is not sent to the waste disposal facility. This waste often reaches the recycling market without any treatment.

- CWTPs charge the generators either on per kg or per bed basis. In the latter case, facilities are not capable of undertaking the appropriate waste segregation measures. However, where the charge is based on weight, the waste received from hospitals has been noted to go down considerably, indicating that hospitals may be disposing of some waste in an unscientific manner.

- The number of vehicles available for waste BMW collection is low.

- Transporters do not maintain records of the waste collected from individual operations on the basis of category and weight.

- Transporters do not regularly collect BMW from all hospitals, particularly smaller ones.

- The majority of BMW incinerators installed do not meet the specifications of the 1998 Rules. Incinerators are found to be operating under improper conditions; in most cases, the required temperature to incinerate the waste is not achieved. Their functioning is also impaired due to the lack of proper segregation of waste. In many facilities, there are no alternative disposal technologies such as autoclaving / hydro clawing / microwaving for waste (for example, chlorinated plastics should not be incinerated)

- The common facilities are often not equipped to manage all the steps in waste management. For instance, some have only incineration facilities with waste management some have only incineration facilities with no proper arrangement for ash disposal. Scrubbed waste and floor washings are also not adequately treated.

- Records of incinerator operation conditions, including temperature, waste received and treated, time of operation, and fuel consumption, are not maintained at the site.

- Most CTF facilities lack technical support to address operations problems.

Suggestions to improve the BMW Management in India.

1. Training and monitoring are important activities for the health care waste management (HCWM) system. By providing training and awareness on health care waste

management, individual capacities of different health care personnel are enhanced and developed to handle waste safely by protecting themselves and the community from the risk associated with improper waste handling. Training and capacity building within the institutions for health care waste management must be carried out simultaneously with other activities to improve the health care waste management system. Training is required to bring in uniformity in many practices related to waste management amongst all categories of staff. Training should include an orientation regarding waste, its hazards from mismanagement and also the desirable best practices management.

2. A good monitoring system gives critical information and helps to implement corrective measures. Monitoring can be undertaken on a daily basis by the administration. It is essential that a monitoring activity is followed up with appropriate feedback to the staff and also steps are taken to solve the problems, if any. It is suggested that a monitoring format is developed and utilized before undertaking monitoring activities.

Current BMW Waste Management Practices in India

The Government of India promulgated the Bio Medical Waste (Management and Handling) Rules on 27 July 1998). which governs all aspects of the waste, generated in a health care facility. All types of health care facilities including blood banks, diagnostic facilities, dental centers and dispensaries are covered by the rules. The rules are comprehensive and dwell on all aspects of bio-medical waste management. The performance standards for bio-medical waste management equipment have also been laid in the rules. The rules have been amended on 6 March 2000, 2 June 2000 and 17 September 2003. Some more amendments are also expected very soon.

Despite the gloomy picture, it is important to note that a number of local health care facilities adhering to the BMW Rules have developed well functioning health care waste management systems. Many have become models and most have proven to be economically sustainable. Such models should be replicated by the other health care facilities in the country.

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Street Food

U.Thirunavukkarasu

Hunger, is not the problem of a bygone era : It is still with us. Consider the data given by the various wings of the United Nations. One third of the global food production of is wasted. 870 million people are hungry in the world. Every one in eight person goes to bed without food in the world.

The United Nations Environment Programme (UNEP) designated the theme of World Environment Day-2013 as "Think. Eat. Save: Reduce Your Food Print". Around 1.3 billion tonnes of food is being lost or wasted around the globe in a year. If one fourth of it is saved, it could be enough to feed the hungry people of the world. It is expected that the world will have an additional 2.7 billion people by 2050 and the food production has to be increased by another 50% to meet the growing demand.

Out of the total population of 1241.5 million in India, 217 million people are undernourished, a considerable 18% in the total population.

Increasing food prices

Recent years have witnessed dramatic increase in food prices, even though the food materials are available, it is beyond the reach of poor. The increase in crude oil prices at the international market has seen the food prices blotted along with it. The high magnitude of surge from 50 to 200% raise in commodity prices has also affected the availability and purchasing capacity of people in the developing countries. This scenario has snowballed into increasing the number of undernourished people in the world and added 44 million more. Shockingly, the increase in food and commodity prices has also triggered an increase in infant and child mortality among the undernourished.

The trend in skyrocketing food prices are attributed to extreme weather events, low cereal stocks, competition between food crops and energy crops and fluctuating food stocks.

Food production, from 'field to plate' impregnates the social, economical and ecological aspects of the society. It may appear very trivial to look into certain aspects of food production and availability. But in reality, economic sustenance, purchasing power, affordability, reach, energy and nutritional requirement of people vary in different cultural systems and countries. 'Appeasing the hunger pangs on the streets' portrays the socio-economical plight of people among the different sections of the society. It also throws up many uncomfortable questions to be answered.

Street Foods

Street foods are defined as a "wide range of ready-to-eat foods and beverages sold and sometimes prepared in public places, notably streets", as accepted by the Food and Agriculture Organization (Winarno1986). A variety of food material are prepared and sold in public places

Picture courtesy: www.indiamike.com

like streets and small establishments in roads, beaches, markets, fairs, rail and bus stations. Street foods are a cheap alternative to restaurant based food items. Growing urban population, particularly increasing number of urban-poor raises the demand for street food. The people involved in the selling of street food are popularly called 'hawkers or street vendors'. The street food establishment may be a small portable stall, kiosk, stand, push-carts or hand held containers. The street foods are also referred to as 'finger food' or 'fast food' in some countries.

Picture courtesy:www.worldette.com/

Street foods and its global presence

An estimated 2.5 billion people consume street food around world (Food Agriculture Organization FAO, 2010) and food material sold by street vendors accounts for up to 40% of the daily diet of urban consumers in developing countries. Street food purchases were upto 30% in Latin America and 40% of the energy intake of Bangkok residents are met by street food vendors.

Picture courtesy:www.searchindia.com

Street foods and cultural pattern

Street foods reflect shades and an array of different traditional local culture with a never ending variety. It serves the niche customers from varied backgrounds - especially migrants from rural areas. The flair for preferred cuisine, low cost and accessibility drives low income group people, migrant laborers, street children and informal sector employees to opt for street foods. However, the quality, nutritional status and hygiene are compromised in most cases.

Street food and food safety

Food safety is a great concern in street food. Most of the street food is not hygienically stored before it is offered to the customers. The possibility of microbial contamination is very high. Due to congestion, high density of population

and garbage, street foods establishments are situated in highly unhygienic conditions. Street foods sold near garbage dumps, hospitals, and sewerage systems are prone to contamination. Water scarcity and improper storage of food commodities adds to the problem.

Nutritional status and street foods

African countries even try to improve the quality of street food. Underprivileged in many developing countries have their first meal of the day in street food stalls. FAO supports the nutritious nature of street food in certain instances like the study of street food in Kolkatta, India.

Street foods and local economy

Street foods are also a source of sustenance and income for many. The revenue generated from street food supports many women in the low income groups. There is a strong link between the local economy and street food. Vendors, laborers and workers are customers of street food and in turn street food hawkers buy their raw material for food preparation from local retailers. In contrast, big food establishments import and trade food items with far and wide spread operations in the global market economy.

Street food establishments are an micro-enterprise in itself. It was considered as an informal sector for long and the paucity of systematic studies on the issue of economic interactions make the street food sector neglected and underestimated in the developing world. However, isolated examples are available. The Indonesian city of Bogor's sells street foods worth US $ 67 million (Cohan, 1986).

Dietary choices have got a decisive role in food sustainability. It influences nutritional pattern, agricultural system, land use and conservation of natural resources (Gussow and Clancy, 1986). Even though street food have nutritional and food safety problems, it can be explored further for stream lining it to meet the energy and nutritional requirements of the poor and needy.

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Synthetic Biology and Future of Our Nature

R. Sabesh

Introduction

Synthetic Biology is basically a redefinition and expansion of Biotechnology. It is an area of biological research and technology which combines biology and engineering and it involves a variety of different approaches, methodologies and disciplines. Synthetic biology refers to the use of computer-assisted biological engineering to design and construct new synthetic biological parts, devices and systems that do not exist in nature and also of redesigning the existing biological organisms. The Synthetic biologists' approach is to create new biological systems from different perspectives to benefit human society. There are several advantages like production of life saving drugs, enhancement of agricultural production, development of high yielding disease resistant varieties of plants etc., Synthetic biology poses an enormous potential threat to nature, biodiversity, livelihood and food security of farmers, forest-dwellers, livestock keepers and fishing communities who depend on biodiversity, especially in the developing countries like India.

Developing countries are already being tapped as the major source of biomass to supply industrial-scale feedstock for synthetic biology's fermentation tanks and biorefineries. So far very few scientific studies have been conducted to systematically examine the increased demand for genetically engineered microbes mainly for industrial purposes and its subsequent impact on biodiversity.

Synthetic Biology and Ecological threats

Considerable ecological threats are associated with the release of synthetic micro-organisms into the environment. Unlike other forms of environmental pollution such as chemical spills which can be cleaned up using appropriate technologies, it is very difficult to take back the living self-replicating micro- organisms once they are released into the environment (Snow 2010). "Even if the source of all parts of a synthetic microorganism are known and every new genetic circuit understood, if micro organisms engineered to produce industrial chemicals or fuels accidentally escape from confinement they could become environmental pollutants. Algae engineered to produce oils may escape and continue producing oil along the water ways. An organism engineered to break down sugarcane could escape and continue to consume sugar in the

surrounding environment. There is also a risk that synthetic organisms could become a new form of invasive species (Snow 2010).

Genetically engineered algae grown in open ponds could survive and proliferate in the ecosystem and change the entire aquatic ecology. Synthetic organisms could negatively impact the environment by disturbing, competing and suppressing the local and traditional varieties of plants, animals and microbes. During the course of time the native biodiversity may be wiped off from the ecosystem. It is very difficult to eliminate synthetic organisms once successfully colonized, and they might also disrupt some aspects of the habitat into which they have been introduced, thus upsetting the natural balance and leading to the degradation or destruction of the local environment" (Tucker and Zilinskas 2006).

A common industrial application of synthetic biology is to develop microbes to transform cellulose and other sugars into industrial compounds. There is a concern that such organisms, if released into cellulose rich environments (soils, forests, etc.), could continue to secrete undesirable chemicals into the environment. In a parallel case, when researchers added a genetically engineered Klebsiella planticola (a common soil bacterium that was engineered through recombinant DNA techniques to improve the fermentation of wheat to ethanol) to soil in the laboratory, the engineered microbe persisted in the soil and after three weeks significantly reduced the number of bacterial and fungal feeding nematodes, subsequently killing wheat plants growing in the soil (Holmes et al. 1999). While engineered organisms may not have a fitness advantage in the open environment, it is also possible that they could find an ecological niche, survive and reproduce, and swap genes with other species. Released synthetic organisms could lead to genetic contamination, threatening biodiversity and the well being and livelihoods of surrounding communities Most of the organisms being engineered through synthetic biology (e.g., algae, yeast, E. coli) naturally and regularly swap genes. The behaviour of synthetic biological systems is inherently uncertain and unpredictable. Synthetic organisms are currently being developed for commercial uses in partial physical containment (i.e. fermentation tanks or bioreactors) as well as for intentional non-contained use in the environment.

Researchers and decision makers who are dealing with the synthetic biology subject should understand the biological sciences, biosafety and basic ecological principles.

Rules and procedures for the safe transfer, handling and use of Genetically Modified Organisms (GMOs) and Living Modified Organisms (LMOs) under the Cartagena Protocol on Biosafety and the Nagoya Protocol do not completely address the issue of synthetic organisms or genetic parts developed by synthetic biology. In addition, the evolution of synthetic biology, genomics and chemical synthesis of DNA could profoundly alter the current practices related to the conservation and

sustainable use of biodiversity and rules governing access and benefit sharing as per the Biodiversity Act, 2002. Hence the new and emerging issue of synthetic biology is relevant virtually to all the CBD's thematic programmes of work including agricultural biodiversity, forest biodiversity, fresh water biodiversity, island biodiversity, marine and coastal biodiversity. Synthetic biology is also relevant to many other issues, especially biodiversity for development, sustainable use of biodiversity, traditional knowledge, innovations and practices climate change and biodiversity, ecosystem approach, invasive alien species and so on.

Conclusion

We human beings are manipulating nature and ecology for thousands of years. Synthetic biology, at least in theory, seems to be a tool that can help to bring back extinct species, Solutions to various types of environmental problems and to provide food security etc. are definitely worth considering. However, its applications and the long term consequences on nature and biodiversity conservation have neither scientifically studied nor understood by us properly. Apart from a lot of scientific and technical challenges, synthetic biology raises questions about bioethics, biosecurity, biohacking, biosafety, long term sustainability, monitoring the commercial exploiters etc., are some of the major challenges. The need of the hour is to create public awareness about this subject especially among farmers and enforce proper regulations in collaboration with all stakeholders viz., synthetic biologists, conservationists, political analysts, anthropologists, policy level decision makers, research and development organizations, NGOs, private companies using synthetic biological tools etc. so as to ensure the protection of nature and human welfare.

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