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**PLANNING, DEVELOPMENT AND CONSTRUCTION MODEL FOR SUSTAINABLE
GROWTH**

Dr.Biswajit Mukhopadhyay*, Dr.uddhadev Bhattacharya, Dr.Kaushik Dutta Roy

* Superintending Engineer, KMW&SA.

Executive Engineer, KMW&SA.

Superintending Engineer, KMW&SA.

ABSTRACT

The idea of sustainability is exercised to explain an economy in equilibrium with basic ecological support systems. An additional attribute to be given by the present generations to improve the future generations' life by restoring damages already made to ecosystem and cease to contribute to future damage of ecosystem. Resource funnel is visual concept of resource consumption on one hand and resource availability on the other hand. Sustainable development model includes Sustainable architecture, sustainable design in water management, Sustainable waste management and town planning with a view to contribute to minimum amount of greenhouse gas.

KEYWORDS: Resource funnel, Sustainability

INTRODUCTION

Sustainable development is an eclectic concept, as a wide range of various development falls under this category. The notion of sustainability is used to explain an economy in equilibrium with basic ecological support systems. (Stivers, R. 1976) The sustainable development is an emerging mechanism incorporating broad and socio- environmental effects of population growth, economic as well as technological development giving due cognizance to resource depletion. Thus the sustainable development is a pattern of economic growth in which present resource use would be in such a manner that the pace and nature of development will no way be a damaging for environment and be a point of concern for the future generation. That means an additional attitude to be given by the present generations to improve the future generations' life by restoring damages already made to ecosystem and cease to contribute to future damage of ecosystem. Sustainable designs mainly encounter global environmental crisis, rapid growth of human population followed by speedy economic as well as technological activities, depletion of natural resources, damage to ecosystem and lose of biodiversity.

In some countries sustainable design are considered as Eco-design, green design or environmental design. So, sustainable designs can be treated as philosophies that can be applied in various fields like architecture, urban design, urban planning Engineering, landscape architecture etc to give the development a holistic approach.

SUSTAINABLE PLANNING

Sustainable development may enmesh developments in the quality of life for many but may dictate a decrease in resource consumption. (Brown, L. R. 2011).

During designing cities and its infrastructure, the urban planners basically interested in sustainable development or sustainable cities by using different techniques and various design principles. The technique includes smart growth theory, Transit-oriented development, sustainable urban infrastructure and new urbanism. Smart growth planning includes growth in urban planning and transportation system within its existing infrastructure boundaries of a city or town. It advocates compact, transit oriented development, walk able, bicycle-friendly land use, including mixed-use development in the range of housing choices.

Transportation is a large contributor to greenhouse gas emissions. It is said that one-third of all gasses produced are due to transportation. (Buehler, Ralph; Pucher, John 2011.) Some western countries are making transportation more sustainable in both long-term and short-term implementations.(Barbour, Elissa and Elizabeth A. Deakin. 2012)

Transit-oriented development means access to the people for more public transport rather than private transport system and hence reducing the need of private vehicles. Public transport is considered as sustainable urban infrastructure which also promotes decentralization of human needs.

Eco-friendly methods of farming tolerate the production of crops or livestock without destruction to human or natural systems. It involves preventing hostile effects to soil, water, biodiversity, atmosphere and downstream resources—as well as to those working or living on the farm or in neighboring areas. (Ben Falk, 2013) Organic gardening or biodynamic farming which is a no-till system for small scale grain production that is healthy and nutritious and can be formed in small kitchen garden by every house holder for their daily need. New urbanism basically emphasize or diversity of land use and population as well as walk able communities which reduce the need for automotive travel.

Water shed assessment is an important part in sustainable planning; the total amount of precipitation landing on the surface of a community becomes the supply for the inhabitants. The natural step frame work includes two elements beyond the system principles.

- Understanding of the “resource funnel” :
- Back Casting:

Resource funnel is visual concept of resource consumption on one hand and resource availability on the other hand. Resource consumption is expressed as the product of population growth, affluence, and the technology achievements. This product has inversely proportional effect on resource availability and ecosystem ability to provide vital services.

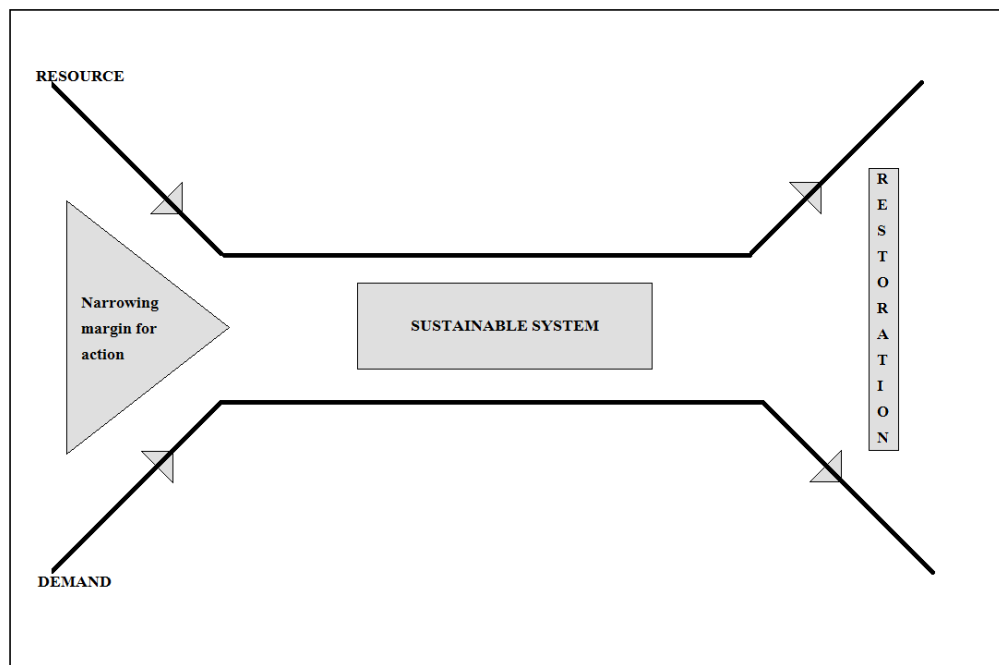


Fig.1 Resource Funnel

Many ecosystem services are now at risk with over consumption including clean water, clean air and healthy soil. As the funnel has narrowed over time, limits emerge in many different ways, such as loss of fire wood coupled with increasing landslides from deforestation in the Himalayas, widespread loss of top soil and concurrent increase of sediment load in surface water, increasing cost to supply water to growing cities, increasing cost to treat waste water, as the list goes on. (IPCC Fifth Assessment Report .2014)

Sudden or unanticipated change may lead to the closing walls of funnel. In contrast, back casting is a planning method that allows revitalization of the situation. For back casting to be effective, planners must proactively be willing to understand the larger environmental and social context with accesses to the present reality within whole system perspective.

The conventional planning practices often ignores this natural configuration of land in planning stage which ultimately comes out to be the cause of ecological damage by the form of stagnation of streams, soil erosion, flooding etc. By applying the method of scientific modeling for planned building projects damage to natural environment can be minimized.

SUSTAINABLE ARCHITECTURE

Sustainable architecture is mainly the design of sustainable buildings to reduce the collective environmental impact during both the production of building components and as well as in the construction stages and the life cycle of the building. The life cycle of a sustainable building mainly emphasize on indoor environment quality including illumination, thermal conditions and acoustics etc. (Traditional Architecture Group) The integrated design of indoor environment is essential and must be a part of integrated design of the entire structure. The sustainable design should emphasize the efficacy of heating and cooling system, selection of appropriate building site, reused or recycled building materials, onsite power generation using solar technology, ground source heat pumps, wind power, rainwater harvesting for gardening, washing and aquifer recharging and onsite waste management such as green roofs and lawns, pebble supported landscape which helps to control storm water runoff and filter it to certain extent before ground water recharge or discharging to disposal Point. So, for sustainable architecture a close vigil has to be attributed to every stage of the project that is from the selection of site to scheme formation, material selection, procurement and implementation. (Issue Brief: Smart-Growth).

SUSTAINABLE WATER TECHNOLOGY

Sustainable design in water management should be principally defined as correctly implementation of concepts towards proper use of water lessening the wastage to a minimum. Among the principal concepts for water usage pattern in developed countries one popular concept is 100% of water destined for consumption; not necessarily for drinking purposes only or of potable quality, that may be for other purpose also like gardening, washing, street laundering etc. The concept is producing different qualities of water for different purpose or may be called as “fit to purpose”. This more rational use of water not only sustainable but also achieves water economics in the form of saving consumption of energy, chemical cost etc. The sustainable water supply system is an integrated system that includes water intake, water utilization, waste water discharge and treatment and also environmental protection of water. Recycling or reuse of water can be done in several ways to achieve long term sustainability. Grey water is waste water coming out from baths, shower, sink and washbasins. It can be treated and used other than drinking likes lawn washing, car washing, gardening etc. As grey water contain less faecal coliform and nitrogen than sewage and thus organic content of gray water decomposed rapidly. After treatment grey water can also be used for aquifer storage or recharge. Rainwater harvesting is also an economic and viable process in respect to sustainable water supply system.

The “Dublin statement on water sustainable development” narrates some principles of great significance in regard to sustainable development.

- Fresh water is a finite and valuable resource, essential to sustain life, development and the environment.
- Water development and management should be based on participatory approach, involving users, planners and policy makers at all levels.
- Women play a central part in this provision, management and safeguarding of water. Institutional arrangements should reflect the role of women in provisional protection of water.
- Water has economic value in all its competing uses on resource and should also be recognized as an economic commodity.

SUSTAINABLE WASTE MANAGEMENT

It is proven fact that there is no completely safe method for waste disposal. All forms of waste disposal have negative impact on environment, Public Health and Local economics. Landfills contaminate drinking water source. Garbage burning by incinerator is the culprit for air, soil and water pollution. The toxic components from house hold waste like

batteries, empty containers of deodorant spray or mosquito repellents, Nail polish, and Shoe Polish etc. contain lead, cadmium, mercury etc. when buried or burnt also pose to serious threat to public health and the environment. So only way to avoid environmental harm by those wastes is to prevent its generation. It can be done only by using refillable bottles or containers. (United Nations Environmental Programme .2013).

Those Preventive Strategies in Planning for facilities should be brought under a comprehensive sustainable design strategy which will ensure that all waste items of present life style be recycled for re-use or recycled back into environment through by degradation. This means we should rely on natural products that are environment friendly and herbal product other than chemical ones.

The following waste prevention strategies can be adopted

- Use products that minimize waste and are non toxic.
- Compostable and an aerobically digestible bio degradable wastes.
- Reuse materials onsite or collect suitable materials for offsite recycling.

The performance of the municipal solid waste utilization system mainly targeted on energy, economic and environmental aspects such as annual energy generated, system net cost and the Carbon dioxide (co2) generation of the system. (National Waste & Recycling Association)

Sustainable solid waste management system is a complex process because it involves many technologies associated with controlled generation, handling, storage, transportation; processing and final disposal of municipal solid waste under legal and economically acceptable guidelines that would not do harm to public and protect environment. The main function of municipal solid waste management system is the treatment of waste generated; where in addition energy and recyclable materials can be recovered as by products. Municipal solid waste generated by domestic activities is frequently used as renewable energy resource. However, utilizing municipal solid waste in waste to energy (WTE) processes helps to reduce the green house gas emissions by reducing methane (CH4) generation. The impact of green house gas emission is reduced as they replace fossil fuels in energy production activities.

CONCLUSION

For the sustainability of the ecological system the margin between the resource consumption and generation should be considered during project modeling stage. Sustainability concerns the natural environment and how it endures and remains diverse and productive. As natural resources are originated from the environment, the status of air, water, and the climate are of specific concern.

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