THINK INDIA JOURNAL

ISSN:0971-1260
Vol-22- Issue-14-December-2019

Green Infrastructure As A Driver For Socio -Economic Development – Empirical Evidences From India With Special Focus On Environmental Degradation

Dr. Nisha U., M.Com., MBA., Ph.D.,
Assistant Professor and Head of the Department
Department of Commerce (Marketing Management)
M.O.P. Vaishnav College for Women
No.20, IV Lane,Nungambakkam High Road,
Chennai 600034
Tamil Nadu, India
Author e-mail id: udayshankar.nisha@gmail.com
Author Mobile No: +91 9840096372

ABSTRACT

Humans are considered to be the most intelligent creatures on Earth who are able to learn new things in the universe which can lead them to the technological advancement. It goes without saying that there are many benefits in technological development for the economy but it also destroys the environment gradually. Advancement in technology and science has made our life easy but mankind has failed to realise that it can ruin everything that surrounds us in the near future. Destructive human activity causes several adverse effects on the environment. The effects of pollution are devastative. This research paper proposes a framework to implement 'Green Infrastructure' (GI) to protect and enhance nature and natural processes by integrating spatial planning and territorial development. Green Infrastructure can pave way to infrastructure facilities that are environment-friendly and lead to sustainable development of cities.This research establishes the clearest possible links between planning, managing and investing in green infrastructure and generating economic and social benefits for the society. It seeks to summarise the evidence that green infrastructure does have tangible economic and social values.

Key words: Green Infrastructure, pollution, society, economic development, environmental degradation

Copyright ⓒ 2019Authors

ISSN:0971-1260
Vol-22- Issue-14-December-2019

INTRODUCTION

Environment plays a significant role in making our existence on the planet possible. Environmental pollution is affecting human life physically, emotionally, socially, economically, and intellectually. It has become a major worldwide issue which cannot be solved by the effort of one. We should do our best in order not to put the end to the existence of all living things on earth. Every person on our planet should take a little step to save our environment and maintain its originality.

One of the primary causes of environmental degradation is human disturbance. The major cause of the environmental pollution is modern urbanization, industrialization, over-population growth, deforestation etc. 24% of the global disease burden (health life year lost) and 23% of all deaths (premature mortality) are attributable to developing countries than in developed countries, due to differences in exposure to environmental burden of diseases being 15 times higher in risks and access to health care.(Swati Tyagi, Neelam Garg, RajanPaudel,2014)

According to the Champaign County Regional Planning Commission report published in 2018, Green Infrastructure includes benefits for the Environment, economic condition and Health. The following were the benefits listed by the commission:

- Water Issues: Green infrastructure elements that include, increased vegetation, green roofs, rain gardens, bioswales, can all improve air quality, as vegetation helps to filter out particular matter and reduce air pollution.
- Habitat: By decreasing runoff volumes and improving the water quality of runoff discharged to bodies of surface water, green infrastructure elements mitigate detrimental effects of runoff on surface water habitats.
- Air Quality: Green infrastructure elements that include increased vegetation, such as green roofs, rain gardens and bioswales, and increases to tree canopy, can all improve air quality, as vegetation helps to filter out particulate matter and reduce air pollution.
- Recreation, Aesthetics and Property Values: Beyond the environmental benefits of green infrastructure, certain elements can have positive quality of life and economic impacts on their surrounding areas. Finally, due to the many benefits

 Copyright ⓒ 2019Authors

ISSN:0971-1260
Vol-22- Issue-14-December-2019

described above, as well as their aesthetic value, green infrastructure elements can sometimes increase property values.

LITERATURE REVIEW

Will Williams (2008) mentioned that Green Infrastructure in its practical application is the creation or maintenance of a series of interlinked green assets, all of which have particular identities and characteristics and each of which are, to a greater or lesser extent, multifunctional. Karen Fire hock (2010) in his research article stated that Green Infrastructure planning is a strategic landscape approach to open space conservation, whereby local communities, landowners, and organizations work together to identify, design, and conserve the land network essential for maintenance of healthy ecological functioning. Green infrastructure planning is not an entirely new concept and the principles that form the basis for the concept have arisen from multiple disciplines.

Pietro Morabito (2018) in his article emphasis that Green Infrastructure stands out for its ability to create solutions to these problems through the restoration and preservation of natural ecosystems, which in turn contribute to enhanced water security. Increasing water demand, decreasing water availability, deteriorating water quality and extreme weather-related events are contributing to worsening global water security. All these problems can be mitigated—to different extents—by appropriate infrastructure. Green Infrastructure can ensure that controls are in place to mitigate or avoid water contamination, promote resilience in the face of flooding or droughts, and curtail water withdrawals and reduce water losses in various processes.

A research report by Sustainability Outlook (2011) states that Green infrastructure, encompasses the triple bottom-line framework and acts as the ecological structure needed for environmental, social and economic sustainability. The report further stated that Green infrastructure differs from conventional approaches to open space planning because it looks at conservation values and actions as an intrinsic aspect of land development, growth management and built infrastructure planning. Its approach analyses the natural environment in a way that highlights its function and subsequently seeks to put in place, through regulatory or planning policy, mechanisms that safeguard critical natural areas.

 Copyright ⓒ 2019Authors

ISSN:0971-1260
Vol-22- Issue-14-December-2019

Kathryn J Bowen and Marissa Parry (2015) in their research paper review the relationship between green infrastructure, human health outcomes and economic health benefits. The review reveals that there is a substantial body of evidence that shows green infrastructure is significantly beneficial for an individual's physical, mental and social health.Green infrastructure exists in a variety of physical forms. These forms include, public parks and gardens, greenways, street verges and open space pockets in residential and other streets, sports and recreational facilities, private and semi-private gardens, green roofs and walls, squares and plazas, natural green space, utility areas, and agricultural and other productive land.

Anna Zaereba, Alicja Krzeminska, Krzysztof Widawski and Piotr Olensniewicz (2016)in their research paper stated that Green Infrastructure delivers a broad range of benefits to environment which can be grouped in three categories: environmental, economic and social. This multi scale benefits are particularly visible in highly damaged and limited urban environment. The paper further stated that GI benefits include, reduced storm water runoff volumes, enhance groundwater recharge, improving environment quality, reduced sewer overflow events, mitigation of Urban Heat Island Effect, increase biodiversity, additional recreational space, improved human health and wellbeing and increased land values in surrounding residential areas.

MATERIAL AND METHODS

Research Objectives

- To analyze the existing aspects of environmental degradation and its effect on social and economic environment in Tier 1 and Tier 2 cities of Tamil Nadu.
- To study the impact of Green Infrastructure facilities on socio-economic development.
- To develop a model for implementation of Green Infrastructure to curb the problem of environmental degradation.

Research design

The present study is based on an innovative and analytical research design. This research has adopted quantitative research. Quantitative research method involved human observation and responses that were collected in the form of a survey from the

 Copyright ⓒ 2019Authors

ISSN:0971-1260
Vol-22- Issue-14-December-2019

respondents that has been organised and presented in a clear and systematic manner to provide accurate conclusions. A combination of two types of research methodologies have been employed in this study – Exploratory research and Descriptive research.

Scope

This study has been undertaken among citizens of Tier 1 and Tier 2 cities of Tamil Nadu, including Chennai, Coimbatore, Madurai and Trichy.

Sampling technique

In this study convenience sampling technique was employed to select the sample. Convenience sampling is used as every known element of the population has a known and equal chance of being selected as the sample.

Sample size

A total of 115 responses were collected from 4 cities in Tamil Nadu.

Data collection procedure

The source of data collection will be both primary and secondary sources. Structured questionnaires were used to collect the primary data. All the respondents were briefed on the particulars to fill the questionnaires, prior to their filling the questionnaires. Secondary data was collected by referring to pre published information from previous studies, websites, books, magazines, journals and newspapers.

RESULT AND DISCUSSION

- There were different age group of respondents, it was noted that 31.7% of the were between the age group of 18-25 which is the maximum whereas the minimum was 8.3% under the category above the age of 56, which shows the participation of today's youngsters in environmental conservation.
- In the survey based on the profession of the respondents, the maximum participation was from students with 40% among other categories of profession like salaried, self-employed, homemaker with percentages of 23%, 18%, 17% respectively.

Copyright ⓒ 2019Authors

ISSN:0971-1260
Vol-22- Issue-14-December-2019

- From the survey we can figure out that most of the respondents were concerned about the environment conservation with 73% saying yes and 7% saying maybe.
- 65% of the respondents has suggested that they feel a change in the quality of environment.
- 78.3% of the respondents said that they feel there's a decline in the quality of environment.
- Out of the factors that contribute to environmental degradation, 53.4% consider pollution to be the major factor and global warming to be the second major factor with 26.6% respondents.
- And only 15% have considered deforestation as a contributor for degradation which shows that there is a need for awareness in terms of afforestation.
- 38.33% of the respondents consider human health to be the most part in environmental degradation whereas 33.33% consider atmosphere and climate has been affected the most.
- Out of the respondents, most of them (i.e.) 60% consider pollution to be the most faced problem in their locality.
- Only 10% have said floods as their most faced problem in the locality. Though it is faced more often in Chennai.
- 52% of the respondents have considered that the problems caused by environmental degradation is a result of improper infrastructure facilities and 38 % have said maybe which indicates the quality of infrastructure in the locality.
- Around 80% of the respondents were ready to take all the mitigation measures for environmental conservation which shows the awareness and readiness of the people for change.
- Many of the respondents have said they are fairly aware about the steps of the government and laws passed by them for environment conservation.
- 30% of the respondents have said they have not come across the term green infrastructure and 30% says maybe which shows the lack of awareness of it in Chennai.

 Copyright ⓒ 2019Authors

ISSN:0971-1260
Vol-22- Issue-14-December-2019

- Most of the respondents have said they understanding about the terminology green infrastructure is moderate.
- Most of the respondents are not aware of there is pursuance of green infrastructure in their locality. 45% have answered have said no whereas 20% have said maybe.
- 56.6% of the respondents have said that they have green infrastructure facilities installed in their organizations.
- 37 % have said green infrastructure can bring a significant amount of change in terms of environmental problems.
- Rainwater harvesting seems to the most famous green infrastructure practice among the others which the respondents would like to have installed in their locality whereas rain garden and permeable pavement stands second and third familiar practice.
- Lack of education/understanding, Lack of support from administration, Lack of maintenance costs are considered to be the main barriers of installing green infrastructure in the city.

SUGGESTIONS

- Taking major steps to cater with pollution as it is turning to become the one of the biggest environmental problems in the major cities of India.
- Usage of cars with CNG (Compressed Natural Gas) and other alternatives that will reduce pollution caused through cars.
- Creating awareness about the importance of natural resources and depleting resources.
- Reducing the use of things like plastic that affect biodiversity use of better substitutes.
- Increasing steps for afforestation and mainly preventing deforestation.
- Taking steps to establish the importance and understanding of green infrastructure as a technique of environment conservation among the public.
- Improving the quality of infrastructural facilities.
- Methods of dealing with floods and storm water management to be improved.

 Copyright ⓒ 2019Authors

ISSN:0971-1260
Vol-22- Issue-14-December-2019

- Government taking more initiatives to bring sustainable and green technologies which would not affect the environment.
- Few of the green infrastructure practices like rain water harvesting and rain garden should be followed in most of the locality to make the most out of green technologies.

GREEN INFRASTRUCTURE MODEL DEVELOPMENT

The research puts forth the following dimensions:

• There is strong evidence that green infrastructure provides substantial physical, mental and social health benefits. However, more research is needed to refine our understanding of the relationship between green infrastructure and health outcomes.

• There is strong physical and environmental evidence that demonstrates the effectiveness of green infrastructure as an adaptation strategy to climate change. However, the extent to which these demonstrated physical and environmental benefits result in measured, improved human health outcomes is unknown. There has been limited research work to date that has sought to quantify and evaluate the human health benefits of using green infrastructure as a climate change adaptation strategy.

• There is some international evidence that indicates the potential, substantial economic health value of green infrastructure. There is an explicit lack of Indian studies evaluating the economic health value of domestic green infrastructure projects, highlighting the need for such studies to be conducted.

From the literature review and primary research, the researcher put forth the following model for Green Infrastructure development:

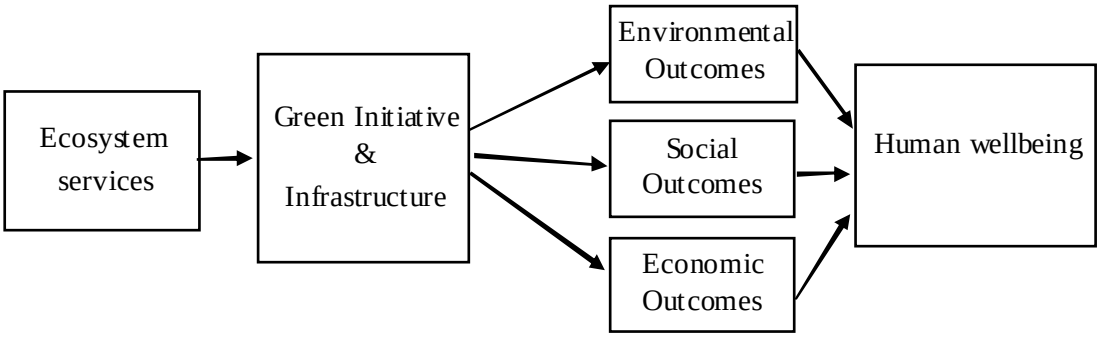

Fig 1: Green Infrastructure Model Development

Investing in green infrastructure generates:

Copyright ⓒ 2019Authors

ISSN:0971-1260
Vol-22- Issue-14-December-2019

1. Environmental outcomes– such as improved air quality and associated improvements to health
2. Social outcomes– such as increased community engagement and associated improvements in mental health
3. Economic outcomes– such as improvement to the 'sense of place' or 'attractiveness' of an area and associated increases in property values

Foregoing these outcomes results in welfare losses and increased costs to society through increased environmental, social, and medical costs.

CONCLUSION

The key thrust of this report is to describe green infrastructure in terms of the social and economic benefits that result from its intervention and investments and to justify these benefits through collation of a comprehensive evidence base. The utility of this approach is to encourage new and on-going green infrastructure investment to be set within a strategic context.

Clear evidence has been provided in this report to show that green infrastructure provides both tangible economic and social benefits for the regions where it is installed, particularly in terms of the maintenance of the current resources and through strategic investment in new green infrastructure.

Every state and local government has a long-range transportation plan. Growing communities also have detailed plans for improving their airports, sewage treatment plants, telecommunications facilities and other public infrastructure. Just as these communities need to upgrade and expand their grey infrastructure, so too they need plans to upgrade and expand their green infrastructure.

Green infrastructure plans provide a blue print for conservation in the same way that long- range transportation plans provide a blueprint for future roads or transit lines. Green infrastructure plans can create a framework for future growth while also ensuring that significant natural resources will be preserved for future generations. Green infrastructure plans can even reduce opposition to new development by assuming civic groups and environmental organizations that growth will occur only within a framework of expanded conservation and open space lands.

Thus, the researcher concludes by strongly recommending that, based on the evidence presented, states and communities should grasp the opportunities provided by green

 Copyright ⓒ 2019Authors

ISSN:0971-1260
Vol-22- Issue-14-December-2019

infrastructure, for the wide range of benefits it offers which has been demonstrated in this research.Intelligent infrastructure, manifested as green architecture, geo-engineering, smart systems, and connectivity, will allow countries and governments to create a smarter, stronger and more sustainable infrastructure.

REFERENCE

- Anna Zaereba, AlicjaKrzeminska, Krzysztof Widawski and Piotr Olensniewicz (2016). Green Infrastructure practices – strategies how to sustain in metropolitan areas, 1st International Conference on the Sustainable Energy and Environment Development. Vol 10.
- Champion County Regional Planning Commission (2018). Green Infrastructure Benefits: Environmental, economic and Health. https://ccrpc.org/documents/regional-water-supply-framework-for-champaign-county-and-eastcentral-illinois/green-infrastructure-benefits-environmental-economic-and-health/
- Kamal Meattle(2011). Green Infrastructure: Strategies, approach and way forward. Paharpur Business Centre & Software technology Incubator Park. Sustainability Outlook.http://www.india.carbon-outlook.com/content /green-infrastructure-strategies-approaches-and-way-forward
- Kathryn J Bowen, Marissa Parry (2015). The evidence base for linkages between green infrastructure, public health and economic benefit. Research project published by VictoriaUniversity.http://www.vises.org.au/ documents/2015_Bowen&Parry_Evidence_Base_for_Lin kages_Green_Infrastructure.pdf
- Karen Firehock (2010). A short history of the term Green Infrastructure and Selected Literature. http://www.gicinc.org/PDFs/GI%20History.pdf
- Pietro Morabito **(2**018**).** Green Infrastructure can yield multiple benefits in an Environmentally-friendly way**.** Environmental andEnergy Study Institute**.** https://www.eesi.org/articles/view/green-infrastructure-can-yield-multiple-benefits-in-an-environmentally-friendly-way

 Copyright ⓒ 2019Authors

ISSN:0971-1260
Vol-22- Issue-14-December-2019

- Swati Tyagi, Neelam Garg and RajanPaudel (2014). Environmental Degradation - Causes and Consequences. European Researcher. Vol 81(8-2). DOI: 10.13187/er.2014.81.1491
- V.M. Jayasooriya, A.W.M Ng, S. Muthukumaran and B.J.C. Perera (2017). Green infrastructure practices for improvement of Urban air quality, Urban Forestry & Urban Greening. DOI: 10.1016/j.ufug.2016.11.007
- Will Williams (2008). The economic benefits of Green Infrastructure: The public and business case for investing in Green Infrastructure and a review of the underpinning evidence. Natural Economy Northwest. http://www.greeninfrastructurenw.co.uk/resources/The_ Economic_Value_of_Green_Infrastructure.pdf

Copyright ⓒ 2019Authors