

“Planning For Smart Cities with Environmental Sustainability and Sustainable Management of Natural Resources”

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Abstract

Globally, the concept of a “Smart Cities” is not new. The rapid growth of the world’s population has already an impact on settlement pattern and on the growth of some of the largest cities. The term “Smart City” was coined towards the end of the 20th century. Smart City is greener, safer, faster and friendlier. The different components of a smarter city include smart infrastructure, smart transportation, smart energy, smart healthcare and smart technology. These components are what make the cities smart and efficient. It is rooted in the implementation of user-friendly information and communication technologies developed by major industries for urban spaces. Its meaning has expanded to relate to the future of cities and their development. Smart cities are forward-looking, progressive and resource-efficient while providing at the same time a high quality of life. They promote social and technological innovation and link existing infrastructures. They incorporate new energy, traffic and transport concepts that go easy on the environment. Intelligent decision need to be taken at the strategic level if cities want to become smart. It takes more than individual projects but careful decisions on long term implementation, considering cities as entire systems can help them achieve their ultimate goal of becoming SMART.

A formal definition of a Smart City is- “A city connecting the physical infrastructure, the information-technology infrastructure, the social infrastructure, and the business infrastructure to leverage the collective intelligence of the city”

In the approach of the smart cities mission the object is to promote cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment.

“Environmental sustainability” is the rates of renewable resource harvest, pollution creation and non-renewable resource depletion that can be continued indefinitely, if they cannot be continued indefinitely then they are not sustainable. It is defined as responsible interaction with the environment to avoid depletion or degradation of natural resources and allow for long term environmental quality. The practice of environmental sustainability helps to ensure that the needs of today’s population are met without jeopardizing the ability of future generation to meet their needs.

Sustainable Management of Natural Resources is defined by Environment Act as “Using natural resources in a way and at a rate that maintains and enhances the resilience of ecosystem and the benefits they provide. In doing so meeting the needs of present generations of people without compromising the ability of future generations to meet their needs and contributing to the achievement of the well-being goals in the well beings of future generation act.”

This paper aims to analyse scientific studies on environmental sustainability of smart cities and sustainable management of natural resources.

Keywords:- Smart cities, Environmental Sustainability, Management of Natural Resources.

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I. Introduction

The cities are home for many and half of the world’s population, in near future there is an expectation to add another billion of new residents. We face increasing environmental pressures and infrastructure needs and the growing demands for residents to deliver them a better quality of life and to do that we need sustainable cost. Intelligent decision need to be taken at the strategic level if cities want to become smart. It takes more than individual projects and careful decisions should be taken on long term implementation which consider cities as entire system and help them to achieve their ultimate goal of becoming a ‘SMART CITY’.

A SMART CITY

A smart city provides a better living condition to the citizen and making it more sustainable, resilient and liveable.

According to Caragliu and Nijkamp, “A city can be defined as ‘Smart’ when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure, fuel sustainable economic development and a high quality of life, with a wise management of natural resources, through participatory action and engagement”. [1]



The picture of a smart city contains a list of infrastructure and services that describes the level a strong hope. The needs of the citizens are urban planners ideally aiming at developing the entire urban eco-system which is the four pillars of comprehensive development institutional, physical, social and economic infrastructure. This is a long term goal and cities can work towards developing such comprehensive infrastructure, incrementally adding a layer of ‘Smartness’.

The core infrastructure elements of a smart city includes:-

- 1) Adequate water supply
- 2) Assured electricity supply
- 3) Sanitation, including solid waste management
- 4) Efficient urban mobility and public transport
- 5) Affordable housing ,especially for the poor
- 6) Robust IT connectivity and digitalization
- 7) Good governance, especially e-Governance and citizen participation
- 8) Sustainable environment
- 9) Safety and security of citizens, particularly women, children and the elderly
- 10) Health and education

Making a smart city is not a goal but a means to an end. The entire point is to respond more effectively and dynamically to the needs and desires of residents. Technology is simply a tool to optimize the infrastructure, resources and spaces they share. Smart cities need to focus on improving outcomes for residents and enlisting their active participation in a place called Home.

Smart city is still evolving and it leverage information and communication technology to enhance service levels, citizen well-being sustainability and economic development. A smart city is a city “Connecting the physical infrastructure, the information technology, the social infrastructure and the business infrastructure to leverage the collective intelligence of the city”. It is a place where traditional network and service are made more flexible, efficient and sustainable with the use of information, digital and telecommunication technologies to improve its operations for the benefit of its inhabitants.

The term “Smart City” incorporates elements of sustainability and social inclusion at the same time it is being suited to the evolutions of the new internet technologies. Some observations indicate that the term “Smartness” is more neutral from the point of view than the term “Sustainability”. So, there are various

combination of the term “Smart”(“Smart City”, “Smart Growth”, “Smart Development”) were more easily accepted in countries were a large part of the term “Sustainability” and “Greenness “with strong policies.[2][3]

Smart Cities are greener, safer and friendlier. The different components of a smart city include smart infrastructure, smart transportation, smart energy, smart healthcare and smart technology. These components are what make the cities smart, efficient and green.

GREEN CITY

“Green” means different to different people. This term is widely used now by private and public organizations as a brand for sustainability and eco-friendliness. “Greening” is another term associated to the term green. The “green” and “Greening” are used synonymously for sustainability and related issues where energy and resource efficiently are the central elements.



The green city concept is one of the latest responses to the diverse efforts and research conducted by the dispersed model of city development and to help cities to become more sustainable (greener), less dispersed and more liveable.

A green and sustainable city is a community of residents, neighbours, workers and visitors who strive together to balance ecological, economic and social needs to ensure a clean, healthy and safe environment for all members of society and for generation to come.

The green city means a way to increase the sustainability of urbanized areas. It is a concept of urban planning relying on the ecosystem services that green infrastructure can supply. This concept includes the characteristics of all the urban concepts as city meeting with nature, restoring the values of urban ecosystem, minimizing resources and energy consumption and taking advantage of the ecosystem services of the blue-green natural components.

Green buildings are sustainable structures with high energy efficiency, water efficient and indoor environmental control with an objective of reducing their carbon foot print and provide optimal energy performance. Green buildings are as much larger concept than smart buildings. Smart buildings can be considered as part of the smart infrastructure or they are considered as independent components of smart cities. Smart buildings can easily connect to other buildings, people and technology, the global environment and smart power grids which can be used by smart buildings.

SUSTAINABILITY

“Sustainability” is the ability to continue a defined behaviour indefinitely. Sustainability has often been defined as biological systems endure and remain diverse and productive. The definition of the 21st century of sustainability goes far beyond these narrow parameters. It also refers to the development of the sustainable models necessary for both the human race and planet earth to survive. Sustainability is a balancing act. Sustainability is meeting our own needs without compromising the ability of future generation to meet their own needs. In addition to natural resources, we also need social and economic resources. Sustainability is not just environmental sustainability but also social equity and economic development.[4]



The three pillars of Sustainability must be Sustainable. The three pillars are Social Sustainability, Environmental Sustainability and Economic Sustainability.

Environmental Sustainability is the ability to maintain rates of renewable resource harvest, pollution creation and non-renewable resources depletion that can be continued indefinitely.



Economic Sustainability is the ability to support a defined level of economic production indefinitely.

Social Sustainability is the ability of a social system, such as a country, to function at a defined level of social well-being indefinitely.[5]

The theory of Sustainability in the 1990s reconciled social equity, economic growth and environmental preservation with city development.[6]and opened the way for the development of other concepts such as sustainable city.[7], green urbanism [8],liveable city [9-12] and compact city [13,14] among others, that are still current and are at the centre of the debate on the influence of urban forms, city designs, use of natural resources, energy and other issues linked to urban Sustainability.

Of the three pillars the most important is Environmental Sustainability. If this is not solved, then no matter how hard we try the other pillars cannot be made strong because they are dependent on the greater system they live within the environment.

ENVIRONMENTAL SUSTAINABILITY

“Environmental Sustainability” is “the ability to maintain things or qualities that are valued in the physical environment.”[15]

Environmental Sustainability is one of the biggest challenge and most important target of the present times. It is the key strategy against the backdrop of the growth of human population and the rampant exploitation of environment by humans. The underlying concern of modern society is that while today people are enjoying the comforts of economic development, the future generations are on the verge of confronting scarce natural resources and polluted environment and it is our most important responsibility to leave the planet as a self-sustainable providing equal opportunities of survival not only to our future generation but also to all other species co-habiting with us.



It is the rates of renewable resource harvest pollution creation and non-renewable resource depletion that can be continued indefinitely then they are not sustainable. It is defined as responsible interaction with the environment to avoid depletion or degradation of natural resources and allow for long-term environment quality. The practice of environmental sustainability helps to ensure that the needs of today’s population are met without jeopardizing the ability of future generations to meet their needs.

When we look at the natural environment, it has a remarkable ability to rejuvenate itself and sustain its viability. For example, when a tree falls it decomposes, adding nutrients to the soil. These nutrients help sustain suitable conditions so future can grow.

Our life and economies depend on energy from the sun which is the solar capital and natural resources and natural capital which is provided by the earth.

Living sustainably means living off earth’s natural income without depleting or degrading the natural capital that supplies it. We can become more environmentally sustainable through economic development dedicated to improving the quality of life for everyone without degrading the earth’s life-support systems.

Nature has sustained itself for billions of years using solar energy, bio-diversity, population regulation and nutrient cycling lessons from nature that we can apply to our lifestyle and economics.

PLANNING FOR SMART CITIES WITH ENVIRONMENTAL SUATAINABILITY

The preoccupation for sustainable development of the urban settlements has been a major preoccupation since ancient times for both architects and administrators. A Smart City is “a city that monitors and integrates conditions of all of its critical infrastructure – including roads, bridges, tunnels, rails, subways, airport, seaports, communication, water, power, even major buildings – can better optimize its resources, plan its preventive maintenance activities and monitor security aspects while maximizing services to its citizens.[16]

Asmart city can be seen as a determined geographical space able to manage resources (natural, human, equipment, buildings and infrastructure) as well as waste generated by life style; it should be sustainable and must not be harmful to the environment.[17]

Smart cities must include infrastructure which help to provide better quality of life for its citizens, the solutions should help in creating cleaner and more sustainable environment through application of some smart solutions in areas like economy, mobility, technology, energy, infrastructure, environment, people, living and government. Smart city is about creating better place for people.

Smart Economy:-It provides high quality high paying jobs while supporting local business to compete globally.

Smart People:-They are knowledgeable workforce who use information and technology, embraces creativity and innovation and explores new ways of doing things. They are supported by community leaders, mentors and are the needs of the employers today and tomorrow.

Smart Governance:- It ensures that things available in the city are effectively used to fulfil better living.

Smart Environment:- It help in achieving good growth while protecting resources. It harmonizes living and workspace. It balances energy supply and energy use.

Smart Living:- It provides opportunities for healthy lifestyle for all the citizens including quality healthcare, education and safety.

Smart Technology:- It uses latest wireless technologies in addition to IoT (Internet of Things) network architecture, sensors etc. It helps in automating household devices and more. These technologies are like a thread which channelizes all data from different aspects of the city, such as traffic, utility, finance, health or waste management to monitor and deliver improved services, improve e-governance, advance analytics which results in smart and intelligent solution. A smart solution in waste management monitors the level of garbage in bins with the IoT sensors. When a bin is about to be filled to the brim, an alert is sent to garbage pickup vehicle passing nearby so that it can empty that bin. This would assist city administrators in maintaining the cleanliness of the city.

Smart Energy:- It uses smart grid to provide continuous electricity with facility to conserve the power/energy. Smart cities are evaluated from the point of view of using clean energy. The smart grid solutions are key factors for supporting the development of renewable energy sources (RES) and high –efficiency cogeneration power plants. Large scale integration of electrical vehicles requires intelligent solutions to be adopted in electrical networks as the air-pollution in cities is one of the most important public health problems. Management of battery charging is essential to avoid network overloading and to support optimized use of clear energy. The electrical vehicle is a mean for handling the surplus energy from renewable sources, mainly during the night periods. The smart grid application is oriented towards the consumers as smart grid are customized to inform, educate and assist the consumer in taking the best decision. By integration of electrical vehicle and supporting the small power energy sources, the consumers may become prosumers, having the possibility of injecting power into the electrical network during the peak load periods. The consumer can be actively involved in the efficient use of energy.

Smart Healthcare:- It uses latest facilities to patients including remote monitoring etc. to provide better healthcare.

Smart Mobility:- It uses modern transportation systems using latest technologies to have smart mobility solutions for human beings.

Smart cities must include these infrastructures which help to provide better quality of life for its citizens. These solutions should help in creating cleaner and more sustainable environment.[18]

FEATURES OF SMART CITY

- 1) Smart cities will promote the use of technology, information and data to enhance and improve its infrastructure and services. This includes access to resources like water and electricity. Providing homes that are affordable to all, provision of proper education and health services and increase IT connectivity.
- 2) A larger number of government services will be made more accessible to people. Services will be offered online and will provide more accountability, transparency and more involvement of the public. Formation of e-groups will allow people to voice their opinions and receive feedback, monitor programs and activities with the help of cyber tour worksites.
- 3) An increase in access to public transportation and creative solution such as smart parking, intelligent management and integrated modal transport. Smart cities will be more pedestrian and cyclist friendly with key administrative services at shorter, walk able distances.

- 4) Smart cities will redevelop or develop unplanned and poorly planned areas such as slums with a vision to make cities safer and less disaster-prone. With the use of video surveillance, criminal activity will be tracked and drastic security measures will be taken to protect women, children and senior citizens.
- 5) Urban areas will be reduced by creating and maintaining parks, playgrounds and recreational spaces. Living spaces will be made to accommodate the growing population and also to enhance its standard of living.
- 6) Infrastructure will be more sustainable and eco-friendly by reducing the amount of waste generated and also through mindful consumption of natural resources.

BENEFITS OF SMART CITY

- 1) It helps the people to live, work and play with others while requiring fewer resources.
- 2) It makes life easier by operating community's systems efficiently including physical systems (e.g. transport, power, water) as well as administration.
- 3) Smart energy systems help in conserving energy which helps in reducing costs.
- 4) It employs real time monitoring to address water leaks, sewage and drainage issues.
- 5) The use cases such as smart parking, smart lighting helps in saving time and money.
- 6) Production: it provides organic food, safe products and reduces cost of delivery.
- 7) It helps in controlling water, environment and conservation of animal populations.
- 8) It helps in smart waste management, recycling and reuse.
- 9) It makes mobile payments easier and creates online ordering apps.
- 10) It has delivered intelligent rail and other transit solutions. The asset tracking, smart roads, fleet management has become possible due to smart city solution.

The advantages of smart city will help us getting more customers for the developers of the smart city.

Cities planned and built with new approaches and technologies to solve problems like land utilization, communication, transportation etc. Solutions for urban problems depend on the values adopted by societies and making the use of resources in a systematic manner. As a rapidly developing economy, the country needs to keep up with global standards and thus the execution of this plan could help India take a major leap in the developing race.

Smart cities are not quick to implement because there needs to be a symbiotic relationship between human, natural and built environment. It is like a new urbanism in which India is struggling and will struggle with a number of significant barriers that continue to hamper the development of urban infrastructure. Hence eco-friendly cities in the form of smart infrastructure will be the requirement for a better quality of urban life.

SUSTAINABLE MANAGEMENT

Sustainable management means ensuring that it is sustained in a way for future generations to use. Sustainable management also involves making sure local people are not disadvantaged and also ensures that management is environmentally friendly.

Sustainable management is connected to five decisive competitive advantages:

- 1) **Production efficiency**:-Facilities that produce less waste and use resources more efficiently do not only excel from an ecological point of view. Resource efficiency can also lead to lower costs, higher quality and more stable processes.
- 2) **Support by community**:- Especially in the context of emerging economies, support by local communities and authorities is critical to a company's success. Adopting an active position in terms of sustainability can enhance this kind of support for instance if a license for building a new production facility is needed.
- 3) **Innovation capacity**:- Effort to improve the social and environmental footprint can positively influence overall innovation capacity. This is due to the organizational learning effects resulting e.g. from handling complex environmental technology or collaborating cross-functionally in sustainability projects.

NATURAL RESOURCES

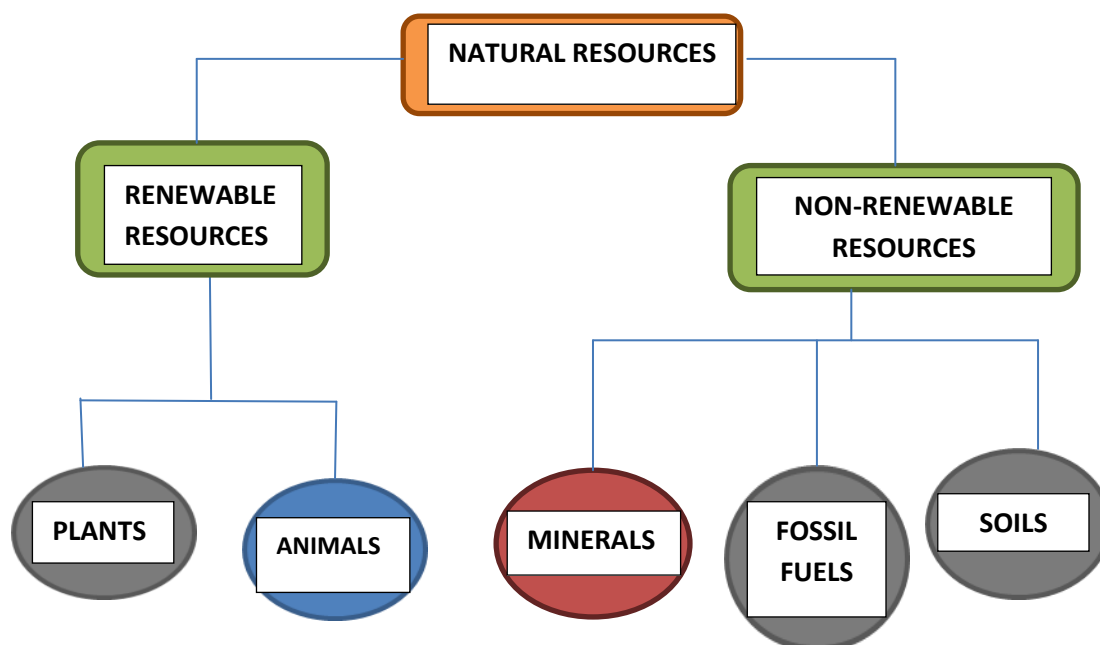
The word 'natural' presupposes 'untouched', 'original' 'as it is'. And 'resource' means something that is precious or essential by itself or can contribute to the usefulness of another.

TYPES OF NATURAL RESOURCES

All Natural Resources fall under two main categories:

- Renewable and
- Non-renewable Resources

The table below will help us understand this better.



RENEWABLE RESOURCES

Renewable resources are those that are constantly available (like water) or can be reasonably replaced or recovered, like vegetative lands. Animals are also renewable because with a bit of care, they can reproduce offspring's to replace adult animals. Even though some renewable resources can be replaced, they may take many years and that does not make them renewable.

If renewable resources come from living things (such as a trees and animals) they can be called **ORGANICRENEWABLE RESOURCES**.

If renewable resources come from non-living things (such as water, sun and wind) they can be called **INORGANICRENEWABLE RESOURCES**.

NON-RENEWABLE RESOURCES

Non-renewable resources are those that cannot easily be replaced once they are destroyed. Examples include fossil fuel. Minerals are also non-renewable because even though they form naturally in a process called the **ROCK CYCLE**, it can take thousands of years, making it non-renewable. Some animals can also be considered non-renewable because if people hunt for a particular species without ensuring their reproduction, they will be extinct. This is why we must ensure that we protect resources that are endangered.

Non-renewable resources can be called inorganic resources if they come from non-living things. Examples include minerals, wind, land, soil and rocks.

Some non-renewable resources come from living things-such as fossil fuels. They can be called organic non-renewable resources.

METALLIC AND NON-METALLIC RESOURCES

Inorganic resources may be metallic or non-metallic. Metallic minerals are those that have metals in them. They are harder, shiny and can be melted to form new products. Examples are iron, copper and tin. Non-metallic minerals have no metals in them. They are softer and do not shine. Examples include clay and coal.

JHARKHAND AND ITS NATURAL RESOURCES

There are some states in the country that are very rich in natural resources. Jharkhand is one example where there is immense natural wealth. The state is well known for its minerals such as ***mica, copper, uranium,***

bauxite and coal etc. that are found in infinite quantities. The 40% of the country's minerals come from Jharkhand. It is also surrounded by forests of India's largest tribal-dominated state. The tribal's livelihood is mostly dependent on forest wealth. The resources and the sustainable development of the people of Jharkhand, which are rich in natural wealth, are managed by the Adivasi Tribal Association with Wildlife, for years.



Economic development of the country is possible only through natural resources. The main sources of water, forest and climate have always been there natural resources. The whole world is unanimous that the growing influence of ozone can be prevented through the improvement of jungles.

Jharkhand has an everlasting relationship with the forest, the name 'Jharkhand' means 'Bush-land' or 'The Land of the Forest'. The tribal's here are living in the forest for ages and because of this, they have developed a very special relationship and love for the forest. In this way there is greenery in Jharkhand, which is rich in forest wealth and trees and the balance of the environment still remains. In this connection afforestation campaign is being run in the state under tree plantations and tree rescue campaign. Planting trees in Jharkhand is a concrete move towards sustainable development.

The forest of Jharkhand is not only known for various types of timber but also many types of medicinal plants are also found here, they are **neem, white muesli, gudichi, kalmegh, triphala, amar bell and Karanj** etc. the tribal society are familiar with these medicinal plants and it has been treated in disease with it. Adivasi have their own medical practice in the state which is called 'Hodopathy'.

Jharkhand is top in the country in production of Tasar silk. It has a prominent place in the international market. Thousands of poor farmers and women are working in the formation of cocoon of Tasar, which has become a means of income. Arjuntrees have also been installed in large scale in the state, in which silk worm grows.

On the other hand self-employment is being provided to poor farmers through cottage industry too. In this processing of **honey, tamarind, chironji, kanaj, jamun, mango and amla** etc. are being promoted. For Self-employed, the ability to work together with the finance as well as knowledge is important, which is the highest in Jharkhand compared to other states.

The government has so many resources, institutes and provisions that it is fully capable of providing capital to eligible persons for self-employment. The effort being done in this regard will prove to be important in changing the condition and direction of Jharkhand in the coming years.

Preparing to build a forest park in the state for the purpose of identifying the same world class identity is being prepared in which a variety of trees, plants, species models are being prepared in the state through the Forest Department.

Efforts are also being made in the direction of water management and convergence.

Jharkhand is recognized for its diverse mineral resources. The economy of the state, employment as well as industrialization largely depends upon its expansion as well as utilization. Numerous steel companies, thermal power units as well as aluminium plants are supported on coal, iron and bauxite obtainable in the Jharkhand state. The Limestone formed in the Jharkhand state is being utilized in Cement plants situated inside and outside the state. Jharkhand is gifted with immense natural resources particularly the diverse assortment of mineral deposits ranging from **Coal, Copper Ore, Bauxite, Graphite, Fire Clay, Uranium, Iron Ore, Mica, Limestone** etc. Jharkhand is one of the main producers of minerals in India.

- 1) **IRON ORE** – The Entire store of Hematite in the Jharkhand area is more than 3000 million tones. Out of this Reserve, around 2000 million tonnes arise in Chiria region, situated near Monoharpur area in the Singhbhum district. It is one of the principal solitary deposits in the world.
- 2) **BAUXITE** – The deposits of Bauxite in Jharkhand are limited to Latehar, Gumla and Lohardagadistricts. Some important bauxite bearing areas are: Pakhar, Orsapat, Bagru, Hazaribagh, Palamau, Ranchi and Serengdag, Gurdari, Kujam, Nindi, Jalim, Chirodih and Senai etc.
- 3) **LIMESTONE** – There are around twenty-two limestone mines in Jharkhand that constitutes the total reserve of 563 million tons in the areas of Singhbhum districts. All the types of limestone are obtained in these mines.
- 4) **COAL** – Coal is the most significant and profuse fossil fuel. It comes up with 63% of the country’s energy requirement. In Jharkhand the entire reserves of the coal are 69128 million tones. It is extended over Hazaribagh, Rajmahal, Bokaro, Chatra and Jharia regions. The manufacturing of prime coal from the Jharkhand area is narrow. Relatively the standard superiority cooking coal is obtainable in profusion.
- 5) **MICA** – Jharkhand constitutes around 46% of Mica reserves. Jharkhand persist to be the most important producer of Mica in India. Affluent Copper ore deposits crop up in the East Singhbhum. Out of the 703 million tones reserves in India, Jharkhand state has around 47 million tones deposit of Fireclay.
- 6) **GRAPHITE** – Jharkhand’s Graphite reserve is primarily situated in the district of Palamau. In Palamau district, both blistering and nebulous graphite transpire in lumpy appearance at Barwadih, Sokra and Satbarba regions. 0.6 million tones reserve along with 50 % to 60% carbon content has been predictable at the Sokra region.
- 7) **URANIUM** – Jharkhand’s East Singhbhum region is the major producer of Uranium. The mineralization of Uranium occurs intermittently in metasediments at several places in Singhbhum Zone.
- 8) **CHINA CLAY** – The China clay is normally found in the West Singhbhum district. It is also found in some parts of Hazaribagh, Sahebganj and Ranchi districts.
- 9) **COPPER ORE** – Copper ore’s affluent deposits transpire in the East Singhbhum area. Hindustan Copper Ltd. The mining copper ore for the copper plant is situated at Ghatshila for drawing out of copper. The reserves of Copper have estimated to be around 110 million tones.
- 10) **KYANITE** – Kyanite is found in East Singhbhum area and Khejurbahar region in the Ranchi district.
- 11) **GRANITE AND ORNAMENTAL STONES** – Widespread deposits of ornamental stones and granite (gabber, dolomites, peridolite, migmatites, hematite, jasper etc.) are obtainable in Jharkhand state. Granite deposits are anticipated to be approximately 19 million cubic meters, based on the IBM report.[22][23]

NATURAL RESOURCES ARE IMPORTANT

Natural resources are available to sustain the very complex interaction between living things and non-living things. Human also benefits immensely from this interaction. All over the world people consume resources directly or indirectly. Developed countries consume resources more than under –developed countries.



The three major forms include food and drink, mobility and housing & infrastructure. These three make up more than 60% of resource use.

▪ **FOOD AND DRINKS**

This includes agricultural products as well as naturally occurring foods such as grains, fish from fresh water and seas, seeds and nuts, medicines, herbs and plants. They also include drinking water as well as water for sanitation and household use. We think of ceramic plates, silverware (spoons, forks and knives), cans, milk packages, paper and plastic cups are all made from raw materials which come from our natural resources.

▪ **MOBILITY**

This includes automobiles, trains, water-vessels, airplanes, together with all the fuel that powers them.

▪ **HOUSING AND INFRASTRUCTURE**

The houses, public places, roads are constructed objects we have in our city or town. The energy for heating and cooling we consume in our homes are all the wood, metals, plastic, stone and other materials are all natural resources.

Beyond these three major areas of resources consumption, we consume much more resources from our environment on a daily basis. The role of natural resources in sustaining life on earth is extremely important and we must ensure that we protect the environment and also make it easy for it to replenish itself naturally.[19]

The relevance of natural resources cannot be overstressed. Natural resources are embedded in the physical environment and the natural resources are:-

- 1) **SUNLIGHT:** Sunlight is the light that comes to human from the sun.it has many uses. For example, it is necessary for photosynthesis of plants which supplies food. Also it is a source of visible light, source energy/power among other uses.
- 2) **Atmospheric gases** of oxygen, carbon-di-oxide, nitrogen etc. serve very important functions, for example, we breathe in oxygen for survival and release carbon-di-oxide is used by green plants, nitrogen is useful in plants and wind dries as well as provide wind power.
- 3) We also have water from the atmosphere in form of rainfall. Rainfall supplies our water needs, replenishes groundwater bodies and ensure the survival and growth of plants, animals and microorganisms among others.
- 4) Non-metals and metals e.g. Kaolin, Kyanite, clay, limestone, slice tin, gold, columbite etc. [20]
- 5) Coal and tin for example are some of the earliest minerals found and mined in Jharkhand. Several metric tons of coal have been shipped in the past used as fuel and source of electricity. Limestone has been a strong mineral resource. Limestone is used to manufacture cement.
- 6) The vegetation resources include the plant and grass cover of the earth’s surface. Forest resources include herbs are used by man. For example, forest woods are used as fuel for cooking, used in the building and construction industry, useful in making tyres e.g. rubber trees and some softwood are used in manufacture of paper among other uses. With reference to health, tree barks, stems, roots, leaves and some herbaceous plants serve medicinal purposes for the treatment of a wide range of ailments as malaria fever, typhoid fever, cholera, dysentery etc. The animal resources are also important. They not only supply meal and dairy products they also form medicaments and raw materials. Skins from animals are tanned into leather used in shoe making, hair for brush etc.

SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES

The goal of sustainable management and utilization of natural resources for the benefit of present and future generation is very important. New technology is used to achieve continued satisfaction of human needs for present and future generations.

Sustainable agriculture conserves land, water and plant and animal genetic resources and is environmentally non-degrading, technically appropriate, economically viable and socially acceptable. Crop production is the resultant effect of interaction between different natural resources such as soil, water and weather as well as external inputs like seed fertilizer, energy, management etc. Temperature variation in productivity is often witnessed depending upon how these resources are used and managed as reflected in wide spatial and temporal fluctuations with marked peaks and through among different agro-ecological situations or even within the same ecosystem.

The agriculture production can be sustainable if it promotes practices as:-

- 1) Improve soil quality while reducing erosion, Stalination and other forms of degradation to achieve greater resilience to drought, better fertilizer efficiency and reduce greenhouse gas emission.
- 2) Minimize the use of pesticides and herbicides by applying integrated pest management, crop rotation and crop diversification.
- 3) Employ environment management systems to ensure proper treatment of solid waste, manure and waste water.
- 4) Ensure the safe storage, application and disposal of agriculture chemicals.
- 5) Maintain habitats to support wildlife and conserve biodiversity.

There are needs to develop agricultural techniques that are ecologically sound, economically viable and socially responsible. Activities are focused on environmental sustainability across agricultural supply chain and multi-use landscapes. Sustainability agriculture in the context of development helps to achieve production efficiency, protect ecosystem functions, enhance resilience to climate change, ensure healthy communities and satisfy basic needs.[21]

Sustainable management of natural resources can be taken to mean as management that meets the needs of the present without compromising the ability of the future generation to meet their own needs. Natural resources are immense and diverse.

II. Conclusion

The development of smart cities is highly dependent on the level of intelligence and the most important aspect is the easy co-ordination between the urban administration, the operators of the various infrastructures and those responsible for the public safety and health. While development opens up and advances economics, creates new wealth and uses many people to a richer lifestyle, millions are forced to struggle to make meaning of the darker side of development that is not environmentally sustainable. The importance of our environment and its dependence upon ecosystem services means that it needs to be sustainably managed. The first challenge is how presently undervalued environmental components such as geography, climate and green spaces which is defined as a smart city mission for the identification of smart cities. Efforts to sustainably manage natural resources and increase resilience of livelihood to contribute to sustainable development. The quantity and availability of natural resources affect the rate of economic growth. The discovery of more natural resources, such as oil and minerals deposits will give a boost to the economy by increasing a country's production capacity. Natural resources are available to sustain the very complex interaction between living things and non-living things. Human also benefits immensely from this interaction. The goal of sustainable management and utilization of natural resources for the benefit of present and future generation is very important.

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