



SUSTAINABLE HOUSING WITH INTERGRATING TECHNOLOGIES FOR SOCIAL DEVELOPMENT

¹ Ar. ABHINAV TRIPATHI,² Ar. TABISH AHMED ABDULLAH

¹ PG Student (MED), Faculty of Architecture & Planning, Dr. A.P.J. Abdul Kalam Technical University, Lucknow

² Assistant Professor, Faculty of Architecture & Planning, Dr. A.P.J. Abdul Kalam Technical University, Lucknow

ABSTRACT

Sustainability and housing development holds a very quality relationship by taking care of various aspects such as, economy, environment, social communities, residential development, etc. This paper aims to study the above-mentioned aspects in order to achieve a sustainable development. On the other hand, the paper will also enlighten the role of planning systems and infrastructural services to come up with some major issues in housing development in a sustainable manner. The research also focuses on numerous technologies which can be used as sustainability principles which can be applied for the generalization and designing of structures and further can guide for the development of sustainable housing.

1. INTRODUCTION

Sustainable housing, is generally used to describe the pattern as it applicable to the housing industry. it used to create, less waste, more re-use and recycling, together with lower life-cycle environmental impacts and costs, better reliability, less maintenance, and greater user satisfaction.

The process of sustainable and economic development is unquestionable accelerated by urbanization into housing industry.

housing is the most improving sector in the world with maximum number of design solutions and emerging technology with innovation changing the quality of accommodation of resident.

Every one need a space for living and Housing is more than four walls and a roof, it also includes access to basic facilities and amenities including water and sanitation, with providing a sense of privacy, protection, dignity, and a better standard of living. (Ibrahim, 2020)

In the development of sustainable housing the concept of sustainable development in the field of architecture is important and known as sustainable architecture, which is eco friendly and make a better life for developing humanity. the basic goal of sustainable development is to deal with economic, social, and environmental issues.

The sustainable development as the concept in architecture has applied through a very simple context as the technologies used must minimizing the negative impact of building on environment. (Susanti Muvana Nainggolan, 2020)

Technologies in are very help full to make something more valuable for making sustainable spaces.

Housing is a living space refer to architecture and construction field, but from starting to end technology play a wide role.

Sustainable architecture in the housing development helps to decrease the use of nonrenewable resources on site which helps the environment and health of peoples. Technical dimension into this largely prevail the agenda of social and cultural dimensions. (Hagbert, 2015).

Sustainable housing depend upon the climatic situations consider with parameters belongs to different climatic zones. The technologies are used in the sustainable housings are belongs to green building

standards which are environment friendly and work for the materials, energy , water & waste. (Gibberd, 2020).

There are various housing build in all over world because population growing very fast in the world and demand of living spaces also growing simultaneously. but the major concern is to protect environment and human health. In comparison to all housing projects there are very less sustainable housing present in all over.

2. LITERATURE REVIEW

2.1 HOUSING: A DEFINITION

Housing's basic aim is to protect population from harmful natural and social environment. It contains basic and non-basic functions which serves for household object and personal belongings .

These functions are inextricable part of any cultural housing.

Housing has been provided a wide meaning by world health organization (WHO), which recognize that it covers four interrelated aspects. The structure used , or planned to be use , for human habitation is referred to as a house or dwelling and the group of houses where large population exist in a planned houses society is housing. (O. Golubchikov, 2012).

2.1 CURRENT HOUSING SCENARIO

Housing development are under a lot strain as a result of rapid urbanization. By 2030, approx 3 billion people, or 40 % of world total population will need sufficient housing and access to basic infrastructure and services such as water, energy and sanitation.

From now till 2030 this equates to the need to build 96, 150 housing unit every day on serviced and registered property.

In developing world bad governance and lack of human resources limit the availability of sustainable housings. (Sminkey, 2016)

2.2 SUSTAINABLE DEVELOPMENT

The Brundtland commission report(1987) setup in an triangulated concept of sustainability, which include economic , environmental and social factors , with sustainable development in center (fig 1).cultural sustainability also called social sustainability, should be culturally week and built on an establish healthy and safe architecture.

Economic sustainability consider low cost overtime while environment sustainability consider energy resources , waste and water quality.(Stefansson, 2016)

In this report , sustainable development is also describe as the development that satisfy the requirement of present generation to fulfill there own demands because the lengthy spam of life of home as physical structure they have effect on current and up coming generation , making housing a essential part of sustainable growth.(Goedknecht, 2012)



Figure 1 The triangulated definition of Sustainable development.
Source: (Commission, 1987)Brundtland commission report.

2.3 SOCIAL SUSTAINABLE HOUSING

Housing has an effect on peoples daily life , as well as their safety, health and well being .

The social-environmental relationship includes it as well.Despite the fact that the process of building homes requires the use of several natural resources, produces waste, and pollutes the air and water, the building itself is frequently influenced by the climate.

Providing secure, healthy, inclusive, and diversified homes, communities, and communities that are well-integrated into the larger socio-spatial systems of which housing is a part—both urban and national—is what social sustainability in housing is all about. The relationship between human requirements and social sustainability is illustrated in the same book's theoretical discussion of the social sustainability of housing.(Stefansson, 2016)

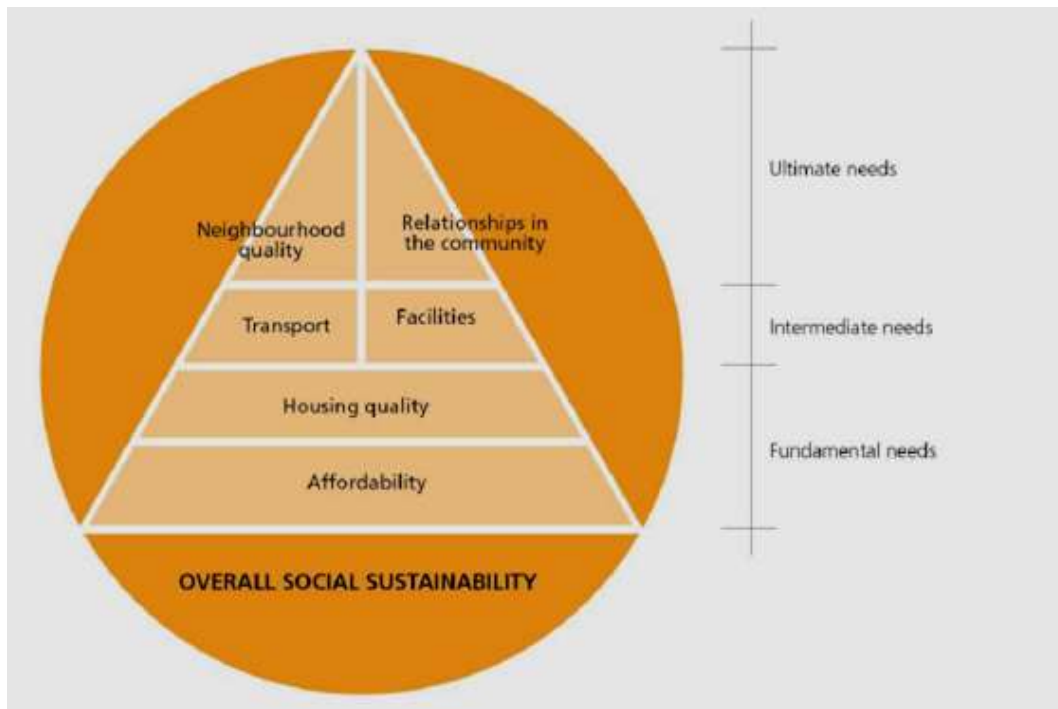


Figure 2: Interrelation between human needs and social sustainability.

Source :Brundtland commission report.

2.4 CHANGING DYNAMICS FOR SUSTAINABLE HOUSING

The effects of population ageing, migration, habit changes, and climate change on architecture and planning are all significant. Having well-designed, reasonably priced housing has social benefits in addition to technological ones. After all, housing is about people. Focusing on preventative measures is the best option to deal with the ageing population from a housing aspect. The majority of older individuals choose to afford housing, which is something that should be supported.(forum, 2010)

2.4.1 DEMOGRAPHIC CHANGES

Families, family lives, and households have all undergone significant transformation in recent decades. As a result of demographic changes, numerous new types of households have been created. In addition to "typical" nuclear families, there are also a growing number of single-person households, married or unmarried couple households, single-parent families with children, separated parents who invite their children over for the weekend, and so forth. The trend toward smaller households is anticipated to continue in the future as a result of population ageing.(forum, 2010)

2.4.2 ECONOMIC CHANGES

The globalization process has an impact on how we live. Due to the increased mobility of firms, the labor market has grown increasingly globalised. Nowadays, fewer people remain in the same house, neighborhood, or even nation for their whole lives.

Therefore, there is a demand for adaptable housing. In addition, a pattern called "glocalization" has been seen. People are beginning to think globally but act locally as they become more regionally focused. The housing requirements of today show this pattern. The design of a person's home should correspond to their neighborhood's aesthetic.(forum, 2010)

2.4.3 SOCIAL CULTURE CHANGES

Identity and lifestyle are becoming more and more important, especially in marketing. People have many options today, the information society is advancing, and regional disparities in housing demand are growing. These changes unmistakably affect homes and our way of life.

3. TECHNOLOGIES

Sustainability principles that apply to the generalization, design, and use of structures should guide the development of housing. The method aims to improve user experience, decrease impacts on natural resources, and reduce environmental costs brought on by insufficient proactive processes and solutions.(Olotuah, 2010)(Ramandeep Sharma, 2017)

3.1. RENEWABLE ENERGY RESOURCES

Solar energy is the best usable source of energy in future .Photovoltaic (PV) or solar panel mounted on the rooftops of residences and commercial buildings as well as solar collectors that can switch and follow the sun during the day, like mirrors or parabolic dishes, are used to generate solar energy. Buildings with this system have focused lighting.(Ramandeep Sharma, 2017)

Solar PV systems can generate power from either direct or indirect sunlight, but it is essential that they are exposed to enough of it. In order to fully absorb the sun's energy, solar panels should be oriented towards the south. The device needs to be put in a spot where it won't be blocked by nearby trees or buildings.(Ramandeep Sharma, 2017)

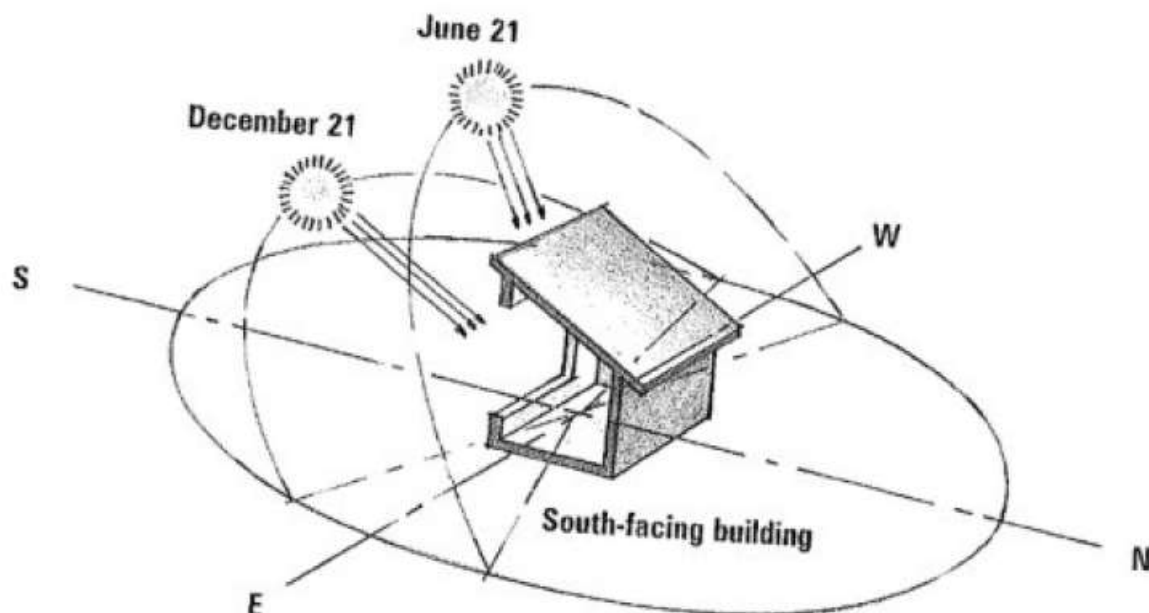


Figure 3 Solar house topography

3.2. DECENTRALIZED WASTE WATER TREATMENT SYSTEM(DEWAT)

DEWATS – a brief insight into technical configuration

In typical debates, the next technical treatment step is combined in a modular fashion.

- Primary treatment- space in sedimentation ponds, shelters, septic tank or bio digesters.

- Secondary treatment - in anaerobic the felt reactor, and aerobic filters or an aerobic and facultative pond system.
- Secondary Aerobic/Facultative Treatment -in horizontal gravel filters.
- Post-treatment – in aerobic polishing ponds.

India's leading proponent of decentralized waste water treatment systems is Vigyan Vijay Foundation (VVF). Based on their expertise, standard models of debate plans are a device to quickly plan debate plants for different levels of housing. With the help of the Central for Rural Development and Technology (CRDT) and IIT Delhi, VVF has successfully executed over 14 debate plants in North India.(Ramesh Sakthivel, 2012)

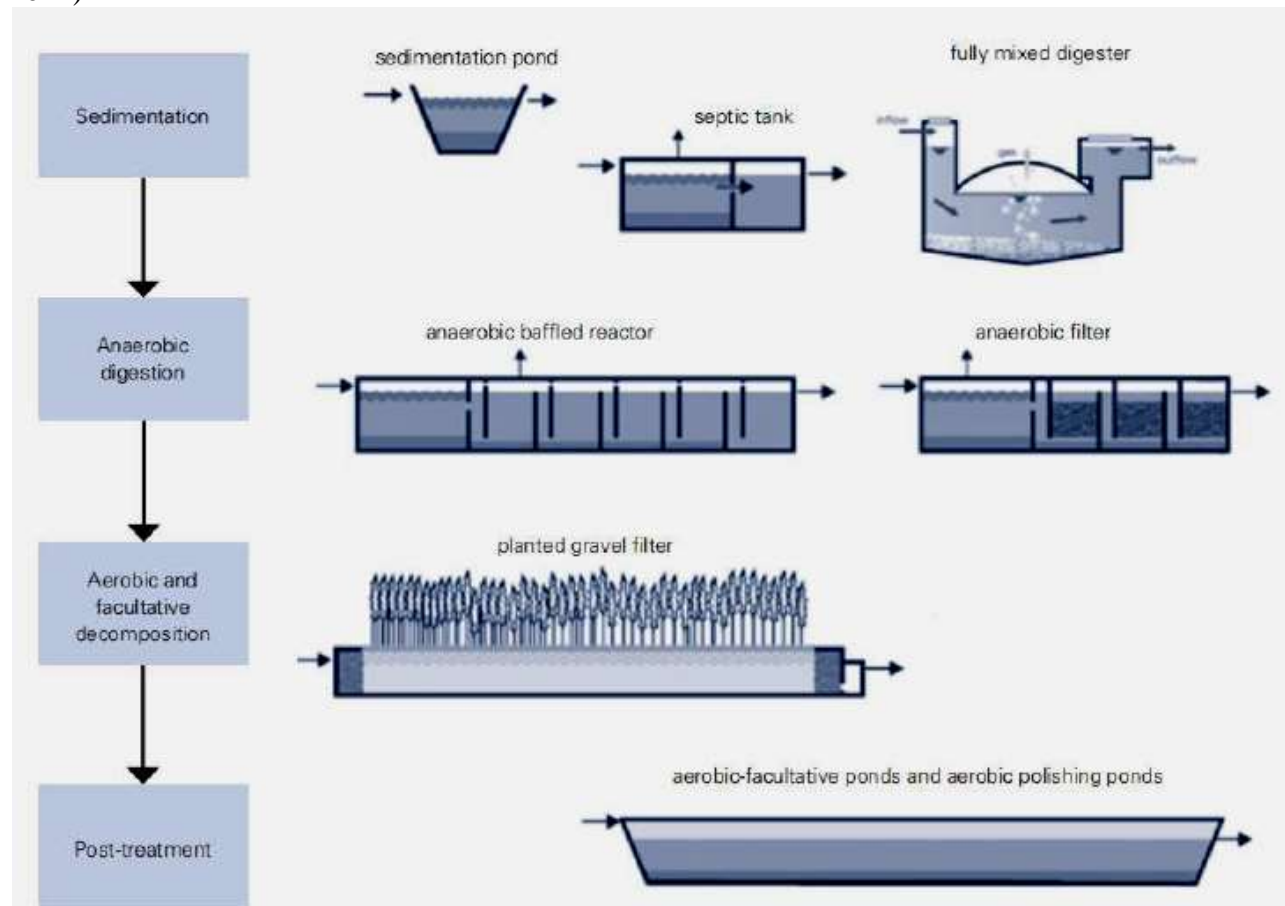


Figure 4 : DEWATS Configuration Scheme(DEWATS and Sanitation in DEVELOPING COUNTRY MANUAL)

3.3 URBAN FARMING IN BUILDINGS

In addition to serving as a way of growing food, urban farming contributes to the greening of buildings, which offers natural cooling, shading, and a comfortable environment for the occupants. Finding diverse architectural components that can be used for plant cultivation is the focus of urban farming design decisions. It should be emphasized that vertical building facades can be used for the aforementioned purpose, meaning that horizontal area may not even be employed for urban farming. Urban farms built into vertical structures typically comprise cultivation on the roof, wall, and balcony.(Suparwoko, 2017)

3.3.1 VERTICAL FARMING

The practice of cultivating in vertically stacked layers, inclined soils, or other structures is known as vertical farming. Indoor farming methods and controlled vertical farming concepts are utilised in current times so that many environmental variables can be managed when producing crops, primarily leafy greens.(Al-Kodmany, 2018)

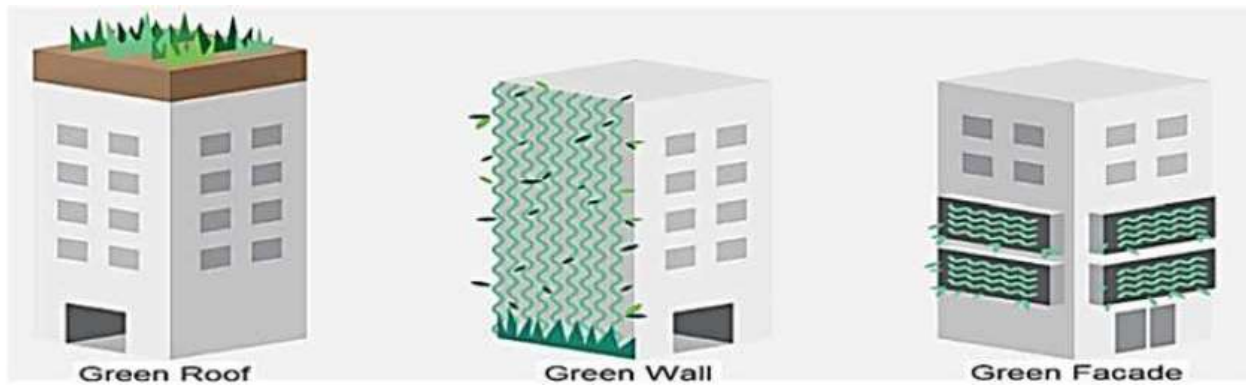


Figure 5 : Schematic model of Green roof, green wall and green façade

These facilities make use of fustigation, internal climate control, and artificial lighting systems. In some vertical farms, artificial lighting and metal reflectors are used in place of natural sunlight in a manner akin to greenhouse techniques. These farms are frequently referred to as hydroponic in the business sector since they don't use soil as the substrate for the plants and instead rely exclusively on water and a floating material like polystyrene or husk as the medium of planting.(Al-Kodmany, 2018)

3.4 WATER HARVESTING SYSTEM

The technique of gathering rainwater that naturally falls from the sky and using it as a replacement for potable water is known as rainwater harvesting. Rainwater is typically collected in a tank in the basement (or underground), and it is then pumped to a tank at a higher level so that gravity can work in its favor. When pure drinking water is not necessary, rainwater can be used for a variety of uses in homes and larger buildings. This includes running mechanical heating and cooling systems that require water, flushing toilets, washing laundry, and other exterior uses like cleaning.

4. CONCLUSION

Four "key objectives" listed in the national strategy must all be met simultaneously:

- a) Effective environmental protection
- b) Upkeep of strong and constant rates of economic development and employment
- c) Social advancement that takes everyone's demands into account; and
- d) Prudent use of the environment's resources (2005, Nicholas et al).

Planning authorities need to make sure that their development plans address sustainable development in an integrated manner. They should pay close attention to how social inclusion, environmental preservation and improvement, responsible resource use, and economic development are interconnected. Housing development with sustainable and smart designs is a good practice, according to the Smart and Sustainable Dwellings (2008) in planning, designing, building, renovating, and maintaining homes. This enables them to sustain society, the environment, and the economy.

The goals of the development's designs are determined by the public's desire for housing. These demonstrate the requirements of the populace as well as their suggestions for improving housing longevity, cutting costs, and minimizing negative social and environmental effects. To maintain a steady supply, the private sector aims to do this. Additionally, this sets an example for residential house designs and the building industry. These elements, such as the occupant's freedom of mobility, safety and security, affordability, and minimal use of resources like water and electricity, should be considered while designing a sustainable dwelling. This location can then accommodate the family's demands and is regarded as smart housing for all stages of a person's life, by keeping the factors for sustainability involve.

BIBLIOGRAPHY

- Al-Kodmany, K. (2018). *The Vertical Farm: A Review of Developments and Implications for the Vertical City*. reasearch gate.
- Commission, B. (1987). *our common future*. Oxford University Press.
- DEWATS and Sanitation in DEVELOPING COUNTRY MANUAL*.
- forum, E. h. (2010). *CHANGING LIFESTYLES, CHANGING CLIMATE – THE ROLE OF HOUSING IN THE EU*. The European Housing Forum.
- Gibberd, J. (2020). *Green Building Technologies*. research gate.
- Goedknecht, D. (2012). Sustainability in Project Management. *PM World Journal* , <https://pmworldlibrary.net/wp-content/uploads/2013/01/PMWJ4-Nov2012-GOEDKNEGT-Sustainability-in-Project-Management-StudentPaper.pdf>.
- Hagbert, P. (2015). *Sustainable homes, or simply energy-efficient buildings?* journal of housing and building environment.
- Ibrahim, I. (2020). *Sustainable housing development: role and significance of satisfaction aspect*. springer.
- Medina, V. F. (2016). *Rainwater Harvesting*. RESEARCH GATE.
- O. Golubchikov, A. B. (2012). *Sustainable Housing for Sustainable Cities: A Policy Framework for Developing Countries*. semantic scholar.
- Olotuah, A. O. (2010). *Housing Development and Environment Degeneration in Nigeria*. reasearch gate.
- Ramandeep Sharma, T. T. (2017). *Futuristic and Intelligent Housing in Developing Countries* . International Journal on Emerging Technologies.
- Ramesh Sakthivel, A. S. (2012). *Standardisation of Design and Maintenance of DEWATS Plants in India*. RESEARCH GATE.
- Sminkey, P. V. (2016). Case Management Ethics. *Professional Case Management* .
- Stefansson, A. (2016). *Social Sustainability in Green Low-Cost housing project in lima, peru*. Luleå University of Technology.
- Suparwoko, a. B. (2017). *Urban Farming Construction Model on the Vertical Building Envelope to Support the Green Buildings Development in Sleman, Indonesia*. RESEARCH GATE.
- Susanti Muvana Nainggolan, O. C. (2020). *10 Criteria of Sustainable Housing: A Literature*. atlantis press.