# Modeling in Mathematics as a Sustainable Development Tool

Shubham Walia

Mathematics Department, Gnkc, Ynr

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In this article, mathematical modeling is characterized as a crucial instrument for sustainable development.To ensure prosperity for present generations as well as future ones, sustainable development aims to strike a balance between human requirements in these three areas.To solve the problems our planet is experiencing, mathematical science is used.To comprehend, anticipate, and manage the development process, mathematical modeling might be helpful.For seeing and comprehending occurrences that cannot be grasped just by verbal thinking, mathematical modeling can be a very effective technique.We conclude that building a mathematical model is crucial for sustainable growth.

**Keywords:** Mathematical Modeling; Sustainable Development

## INTRODUCTION

Mathematics plays a major role in our daily life.In mathematics, a mathematical model is the application of mathematics to solve real-life problems.Mathematical modeling is widely used in the natural sciences, engineering disciplines, and social sciences.Mathematical modeling is the process of creating and improving mathematical models to represent and solve a real-world problem.Sustainable development is a development that meets the needs of the present without compromising.The ability of future generations to meet their own needs. Mathematical modeling plays a useful role in sustainable development in reaching the understanding, prediction, and control of the development process.Sustainable development requires the creation of a comprehensive mathematical model.

# LITERATURE REVIEW

A study on overcoming the obstacles to sustainable development through science and technology education was done by Holbrook, Jack (2009).Here, it is demonstrated that science and technology education should go beyond merely paying lip service to sustainable development and put a strong emphasis on studying current social challenges.In 2012, Kalu A.Ugwa and Agavu A. did research on the use of mathematical modelling in Nigeria as a tool for sustainable development.Here, we classified math models and examined the advantages of mathematical modelling over other kinds of modelling.A study on mathematical models in sustainable development was conducted by R N Singh in 2014.Here are the equations for the exponential and logistic growth that are used to research the economy, water quality, fisheries, and population expansion. Mathematical model development is necessary for sustainable development.In their 2018 research, Nampally Lakshmi and Nagabhushan examined how mathematics contributes to sustainable development.Here, the math alludes to how education is applied socially for ongoing scientific and technical advancement.In their 2018 study, B. Japmala Rani and G. Bala Sowjanya examined the value of mathematics in creating a sustainable society.This article urges instructors at all educational levels to enhance public awareness of important issues and to educate the general public about the crucial role that mathematics plays.Its focus is on supporting mathematical research.

## Component of Sustainable Development

The components of sustainable development are divided into three elements: social, economic, and environmental. Social component worker's healthy and safe, equal opportunities, quality of life, benefits to disadvantaged groups. Economic component
– manufacturing and sales growth opportunities for new markets, cost reduction through efficiencies and improvements, and reducing energy and raw material inputs. Environmental components-polluting environment, waste generation, emissions into the environment, resource management, habitat restoration and protection, use ofrenewable raw materials, elimination of toxins.

## Need for Sustainable Development

In order to address the following difficulties, the concept of sustainable developmentis crucial.

1. Aiding environmental decline and ensuring human life

2. Investigating Absorbent Technology and Seeking Essential Sources

3. To encourage the plundering and destruction of natural resources

4. To replenish funds for renewable energy

**The connection between mathematical modelling and sustainable  development** The topic of global sustainable development includes issues with biodiversity, climate change, water resources, hazardous waste, nuclear waste, and population dynamics, among others. These issues are modelled mathematically. Mathematical science is essential to maintaining planet Earth's sustainability.  Every phenomenon that exists

on Earth can be described mathematically, which is the only language we have for doing so. Furthermore, any strategies used by humanity to tackle these problems must take mathematics into account. Linear and nonlinear differential equations are used to study climate change, biodiversity preservation, epidemic control, pollution, ocean sustainability, and natural disasters (volcanoes, earthquakes, and tsunamis). All parts of the earth, including the mantle, crust, atmosphere, and life it supports, are susceptible to dynamic processes. The majority of human activity on the earth is supported by mathematical models. Numerous problems in everyday life are solved using mathematical models,  including:

1. models based on math that simulate global warming.

2. Mathematical models that show how medicine works in the human body.

3. Use of mathematical models to determine India's population in 2050 AD

4. Mathematical models to comprehend how the endocrine system, kidneys, lungs, and heart function.

5. Satellite launch mathematical modeling.

6. Urban city planning mathematical modeling.

7. Mathematical modeling of reducing vehicle-related pollution.

8. Mathematical modeling of stock market options or traffic flow on highways.

Mathematical model are recognized as effective tool that could help examine economic, environmental and ecological impacts of alternative pollution control and resources- conservation actions, and thus aid planners or decision –makers in formulating cost

–effective management policies.

## CONCLUSIONS

Sustainable development is important from a social, environmental, and economic perspective. If it were possible to find mathematical models that could adequately describe them, many developmental problems could be resolved. Mathematical science is essential to maintaining planet Earth's sustainability. Sustainable development depends heavily on mathematical modeling.

## References

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