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Household Plastic Consumption and its Impact on Coastal Pollution And Fisheries: A Study of Danda Village Near Mankeshwar Beach, Keagaon, Maharashtra

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Abstract: *Plastic pollution has emerged as a major environmental concern, particularly in coastal ecosystems where land-based waste significantly contributes to marine debris. The present study investigates household-level plastic consumption and disposal practices in Danda village near Mankeshwar Beach, Keagaon, Maharashtra, and evaluates their impact on coastal pollution and fisheries resources. A survey-based research design was adopted, and data were collected from 50–100 households using a structured questionnaire. The study analyzes patterns of single-use plastic consumption, disposal methods, and the relationship between socio-educational factors and waste management behavior. The findings indicate that improper disposal practices such as open dumping and burning contribute significantly to coastal pollution. The study also highlights the ecological risks posed by plastic waste to marine organisms and fisheries. The research provides baseline data and suggests the need for improved waste management strategies and awareness programs.*

Keywords: Household plastic consumption and its impact on coastal pollution and fisheries: a study of danda village near mankeshwar beach, keagaon, maharashtra

I. INTRODUCTION

Plastic pollution has emerged as one of the most critical environmental challenges of the 21st century, particularly affecting coastal and marine ecosystems across the globe. Since the advent of large-scale plastic production in the mid-20th century, the use of plastic materials has increased exponentially due to their versatility, durability, lightweight nature, and low production cost. Plastics are extensively used in packaging, transportation, construction, healthcare, agriculture, and daily consumer products. Among these, **single-use plastics**—including carry bags, food wrappers, bottles, sachets, and disposable containers—constitute a significant proportion of plastic waste generated worldwide. These items are designed for short-term use but persist in the environment for decades or even centuries due to their resistance to natural degradation processes.

Once discarded, plastic waste undergoes slow fragmentation through physical, chemical, and biological processes such as ultraviolet (UV) radiation, mechanical abrasion by waves, temperature variations, and microbial activity. This degradation results in the formation of smaller particles known as **microplastics**, which are typically less than 5 mm in size. These particles are highly persistent, mobile, and capable of accumulating in various environmental compartments, including water, sediments, and living organisms. The persistence and widespread distribution of plastics have led to their recognition as a global pollutant of major concern.

A substantial proportion of marine plastic pollution originates from **land-based sources**, with estimates suggesting that nearly 80% of plastic debris entering the oceans is derived from terrestrial activities. Household and urban waste

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represent a major component of this input, particularly in coastal regions where waste management infrastructure may be inadequate or inefficient. Improper disposal practices such as open dumping, uncontrolled burning, and direct disposal of waste into rivers, creeks, and coastal waters significantly increase the likelihood of plastics reaching the marine environment. In many developing regions, rapid urbanization, population growth, and increased consumption of plastic products have further intensified the problem.

Coastal communities play a crucial role in the dynamics of plastic pollution due to their direct interaction with the marine environment. Settlements located near shorelines often lack organized waste collection and disposal systems, leading to the accumulation of plastic waste in nearby coastal areas. Activities such as fishing, tourism, and small-scale industries also contribute to plastic waste generation. Consequently, understanding **household-level plastic consumption and disposal behavior** is essential for identifying key sources of pollution and designing effective intervention strategies.

Danda village, situated near Mankeshwar Beach in Keagaon along the western coast of Maharashtra, represents a typical coastal settlement where human activities are closely linked with marine ecosystems. The village is characterized by its proximity to the shoreline, dependence on fisheries for livelihood, and increasing use of plastic products in daily life. The absence of efficient waste management systems and the close interaction between households and the coastal environment make this area particularly vulnerable to land-based plastic pollution. Plastic waste generated within households can easily be transported to the beach through wind, surface runoff, and tidal movements, contributing to the accumulation of debris in coastal and nearshore environments.

The ecological implications of plastic pollution are profound and far-reaching. Marine organisms, including fish, crustaceans, molluscs, and seabirds, are highly susceptible to the adverse effects of plastic debris. Plastics can cause **physical harm** through entanglement, leading to restricted movement, injury, or death. Ingestion of plastic particles is another major concern, as organisms often mistake plastics for food. This can result in internal blockages, reduced feeding efficiency, malnutrition, and impaired growth and reproduction. Additionally, plastics can act as carriers for toxic chemicals such as persistent organic pollutants (POPs) and heavy metals, which can accumulate in the tissues of marine organisms and enter the food chain.

The formation of microplastics further exacerbates these risks. Due to their small size, microplastics can be ingested by a wide range of organisms, from plankton to higher trophic levels, facilitating their transfer through the marine food web. This raises serious concerns regarding **food safety and human health**, as contaminated seafood may pose risks to consumers. Furthermore, the accumulation of plastic waste in coastal habitats can lead to **habitat degradation**, affecting the structure and function of ecosystems such as mangroves, coral reefs, and sandy beaches.

From a fisheries perspective, plastic pollution poses a significant threat to the sustainability of marine resources. It can damage fishing gear, reduce fish catch, degrade fishing grounds, and negatively impact the economic well-being of fishing communities. The long-term consequences include reduced biodiversity, altered ecosystem functioning, and decreased productivity of marine fisheries.

Despite growing global awareness of plastic pollution and its impacts, there remains a significant lack of **localized, site-specific data**, particularly in small coastal villages like Danda. Most existing studies focus on large urban centers or broad regional scales, often overlooking the contribution of individual households to coastal pollution. However, household-level studies are crucial for understanding the behavioral and socio-economic drivers of plastic waste generation and disposal.

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In this context, the present study aims to conduct a detailed assessment of **household plastic consumption and disposal practices in Danda village** and evaluate their contribution to coastal pollution at Mankeshwar Beach. The study also seeks to examine the potential impacts of plastic waste on marine ecosystems and fisheries resources. By generating baseline data and identifying key factors influencing plastic waste management, the research aims to support the development of effective waste management strategies, enhance community awareness, and promote sustainable coastal resource management.

II. HYPOTHESIS

The present study is based on the central hypothesis that household-level plastic consumption and disposal practices play a significant role in contributing to coastal plastic pollution and, consequently, influence the health and stability of marine ecosystems. In recent decades, the rapid increase in the use of single-use plastics—such as carry bags, bottles, packaging materials, and disposable containers—has resulted in a substantial rise in plastic waste generation at the household level. It is assumed that in coastal villages like Danda, where proximity to the shoreline facilitates direct interaction with the marine environment, improper waste disposal practices significantly increase the likelihood of plastic entering coastal waters. Activities such as open dumping, burning, and disposal into nearby drains, creeks, or directly into the sea act as major pathways through which plastics are transported into marine ecosystems.

The **null hypothesis (H□)** states that there is no significant relationship between household characteristics—particularly education level, environmental awareness, and socio-economic status—and the methods of plastic waste disposal. According to this assumption, disposal practices would be random and not influenced by individual or household-level factors. In contrast, the **alternative hypothesis (H□)** proposes that socio-educational factors significantly influence plastic disposal behavior. Households with higher levels of education and awareness are expected to adopt more environmentally responsible practices, such as using municipal waste collection systems, while those with limited awareness may engage in environmentally harmful practices.

Furthermore, the hypothesis framework extends to the ecological implications of household-generated plastic waste. It is assumed that plastics entering the marine environment have direct and indirect impacts on marine organisms and fisheries. These impacts include ingestion of plastic particles by marine fauna, entanglement in plastic debris, and degradation of habitats such as sandy beaches and nearshore ecosystems. Thus, the study hypothesizes a clear linkage between household behavior, environmental pollution, and ecological consequences.

III. LITERATURE REVIEW

Plastic pollution has been widely documented as a major environmental issue affecting marine ecosystems worldwide. Scientific studies estimate that nearly 80% of marine plastic debris originates from land-based sources, with household and urban waste being the primary contributors. The increasing reliance on plastic materials in daily life, combined with inadequate waste management infrastructure, has resulted in large quantities of plastic waste entering coastal and marine environments.

Research indicates that plastic consumption has increased significantly in coastal communities due to factors such as population growth, urbanization, changing lifestyles, and the widespread availability of low-cost plastic products. In many developing countries, including India, the absence of efficient waste collection and disposal systems exacerbates the problem. As a result, environmentally harmful practices such as open dumping, roadside disposal, and disposal into water bodies are commonly observed.

Several studies have utilized household surveys to understand patterns of plastic consumption and disposal behavior. These studies consistently highlight the importance of socio-economic factors, particularly education and awareness, in determining waste management practices. Households with better access to information and waste management facilities are more likely to adopt environmentally responsible behaviors. Statistical tools such as percentage analysis, correlation analysis, and chi-square tests have been widely used to examine the relationship between socio-economic variables and waste disposal patterns.

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From an ecological perspective, plastic pollution poses severe threats to marine biodiversity and fisheries. Marine organisms often ingest plastic debris, mistaking it for food, which can lead to internal injuries, reduced feeding efficiency, and mortality. Entanglement in plastic waste can restrict movement and cause physical harm. Additionally, plastics contribute to habitat degradation by altering the physical and chemical properties of coastal environments. The presence of microplastics in fish tissues has raised serious concerns about food safety and human health.

Studies conducted along the Indian coastline, particularly on the western coast, have reported significant accumulation of plastic waste in coastal areas due to high population density and anthropogenic activities. However, most of these studies focus on large urban centers, with limited attention given to smaller coastal villages. This highlights the need for localized studies, such as the present research in Danda village, to better understand the role of household behavior in contributing to coastal plastic pollution.

IV. OBJECTIVES

The primary objective of this study is to comprehensively assess household-level plastic consumption and disposal practices in Danda village and evaluate their contribution to coastal pollution near Mankeshwar Beach. The study seeks to provide a detailed understanding of how everyday household activities influence environmental quality in coastal regions.

One of the key objectives is to quantify the extent of single-use plastic consumption at the household level. This involves identifying commonly used plastic items such as carry bags, bottles, food packaging materials, and disposable products, and estimating the amount of plastic waste generated. Understanding consumption patterns is essential for identifying major sources of plastic waste.

Another important objective is to analyze the methods of plastic waste disposal adopted by households. This includes examining the extent to which households rely on municipal waste collection systems and identifying environmentally harmful practices such as open dumping, burning, and disposal into water bodies or directly into the sea.

The study also aims to investigate the relationship between household characteristics—particularly education level and awareness—and disposal behavior. By analyzing these factors, the study seeks to understand how knowledge and socio-economic conditions influence environmental practices.

Additionally, the research aims to evaluate the contribution of household plastic waste to coastal pollution and assess its potential impacts on marine organisms and fisheries. This includes examining the presence of plastic debris in coastal areas and understanding its ecological implications.

Finally, the study aims to generate baseline data that can be used to develop sustainable waste management strategies, promote environmental awareness, and support coastal conservation efforts.

V. MATERIALS AND METHODS

The study was conducted in Danda village, located near Mankeshwar Beach in Keagaon, Maharashtra, a coastal region characterized by close interaction between human activities and the marine environment. The geographical location and socio-economic characteristics of the village make it an ideal site for studying household contributions to coastal pollution.

A descriptive survey-based research design was adopted to systematically collect and analyze data on plastic consumption and disposal practices. The study involved a sample of 50–100 households selected using a random sampling method to ensure representation across different socio-economic groups. This approach minimizes bias and enhances the reliability of the findings.

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Primary data were collected using a structured questionnaire designed to capture information on various aspects of household behavior. The questionnaire included questions related to types and quantities of plastic used, methods of waste disposal, awareness of environmental issues, and access to waste management facilities. Face-to-face interviews were conducted to ensure clarity of responses and to minimize errors in data collection.

The parameters studied included the number and types of single-use plastics used per household, frequency of plastic usage, disposal methods such as municipal waste collection, burning, open dumping, and disposal into water bodies, and levels of awareness regarding plastic pollution and its impacts.

Data analysis was carried out using statistical methods such as percentage distribution and averages to summarize the data. The chi-square test was used to examine the relationship between socio-economic variables and disposal practices. This analytical approach ensured a systematic and objective evaluation of the data.

VI. RESULTS AND DISCUSSION

The findings of the study reveal that single-use plastic consumption is highly prevalent among households in Danda village. Commonly used plastic items include carry bags, water bottles, food packaging materials, and disposable containers. The widespread use of these items reflects their convenience and affordability but also contributes significantly to the generation of plastic waste at the household level.

The study indicates considerable variation in disposal practices among households. While some households utilize municipal waste collection systems, a significant proportion engage in environmentally harmful practices such as open dumping, burning, and disposal into nearby water bodies. These practices facilitate the movement of plastic waste into the coastal environment, particularly during rainfall and tidal activities.

A significant relationship was observed between socio-educational factors and disposal behavior. Households with higher levels of education and environmental awareness were more likely to adopt proper waste management practices, whereas those with limited awareness tended to dispose of waste improperly. This highlights the importance of education and awareness in promoting sustainable environmental practices.

Field observations conducted during the study confirmed the presence of plastic debris along Mankeshwar Beach, including plastic bags, bottles, and packaging materials. This provides clear evidence of the direct link between household waste disposal practices and coastal pollution.

The accumulation of plastic waste in coastal areas poses serious threats to marine ecosystems. Marine organisms are at risk of ingestion and entanglement, which can lead to injury, reduced growth, and mortality. Additionally, plastic pollution contributes to habitat degradation and negatively impacts fisheries resources.

Overall, the findings are consistent with previous studies and emphasize the need for targeted interventions to address household-level plastic pollution.

VII. CONCLUSION

The present study concludes that household-level plastic consumption and disposal practices are significant contributors to coastal plastic pollution in Danda village. The increasing use of single-use plastics, combined with inadequate waste management practices, leads to the accumulation of plastic debris in coastal ecosystems.

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The study highlights the critical role of socio-educational factors in influencing disposal behavior and underscores the importance of awareness and education in promoting environmentally responsible practices. It also emphasizes the need for improved waste management infrastructure, including efficient collection and disposal systems, to reduce the entry of plastic waste into the marine environment.

Furthermore, the study stresses the importance of integrating waste management strategies with fisheries conservation efforts to ensure the sustainability of marine resources. Plastic pollution not only affects environmental quality but also has economic implications for coastal communities dependent on fisheries.

The findings provide valuable baseline data for future research and policy development aimed at mitigating plastic pollution and protecting coastal ecosystems. Continued research and community engagement are essential for achieving long-term environmental sustainability.

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