

Safeguarding Ecosystem And Communities: Biodiversity Conservation As A Pillar Of Climate Resilience And Sustainable Future

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Abstract

In India, protecting the environment helps the community in many ways and it gives them a better future to live in. The research findings are based on real life experiences of four regions which have the two differences of human behavior which are ecological and cultural. Forty organizations from these regions were participating in to this study. Humans are very connected to the areas around them that make up their daily lives and the land of their identity, and not just from urban descents. The study noted down collection methods of term ecological and ways to conserve resources and given perspectives on altering weather. The results of the study show that hubs of local resources are helpful in keeping devise with this global issue of climate changes. However potential problems that cause tension between local systems and the modern societies have been highlighted. The number of indigenous plant species they know has decreased. Working farmers are struggling to make ends meet and are having trouble obtaining certain information. Certain problems make it difficult for people in certain communities to conserve land they've protected for a independent amount of time, it may be helpful to keep certain knowledge and let those members of that community help preserve that land. Promoting community environments helps to conserve biodiversity thus increasing resilience and advancing globally suporther goals. This work adds to global discussions on climate adaptation by telling the stories of indigenous people, we learn how local knowledge is vital for both people and the environment in uncertain times. \

Keywords: Ecosystem, Biodiversity, Community, Climate, Sustainable

Introduction

Conservation of biodiversity has become a subject in our common interest recently because our environmental condition is worst ever. Helping protect all different kinds of life is beneficial to the Earth and could help keep human society alive for a lot of years. India and Odisha have natural sources like water, air, land, and fossil fuel. They also have traditions in Lombars and Angie. Many tribes live in this area, specifically in places like Sundargarh, Deogarh, Kalahandi, and Koraput. For a long time back these groups or communities depend on the use of rivers water, forests and eventually the farming systems. As time passes, no one is careful about using much of these resources and by doing that, they have acquired their own style of knowing about it. Communities usually rely most heavily on nature preserving themselves. But they're being threatened by decreases and overpowering buildups. In an alarming number of areas, the developing world is completely deprived of the natural resources. Blazek states that increasing natural disasters will keep more air happening and causing more floods. This paper shows how impossible it will be. More deserts are happening everyday and it will show how pointless their population was. In this research many people now think it's pointless to live as well, bernardofairs was an example. The next two Paragraphs are examples of much more occurring worldwide. The quote exists to document how extinct animals live and how humans are changing their abilities to survive because of the changing environment. Putting focus on the real life experiences of these communities points out the importance of preserving their ecosystem. By using their local knowledge people can make living places that eat less to more the people as is.

Research Objectives

The research paper follows an ethnographic research approach to study how local tribal and indigenous societies in Sundargarh, Deogarh, Kalahandi and Koraput districts of Odisha achieve biodiversity and thereby enhance climate resilience and sustainable livelihoods. The study has the following specified objectives :-

- ❖ To understand indigenous ecological knowledge and biodiversity conservation strategies through traditional practices.
- ❖ To analyze how communities adapt to, and respond towards changes in environment and climate.
- ❖ To explore in what way does collective action, cooperation, and social networks contribute to continuity in resilience and the sharing of ecological knowledge through generations?
- ❖ To find out what problems these communities face in maintaining biodiversity and resilience like economic pressure, loss of land, industrial projects, climate variability etc..
- ❖ To compare the strengths and limitations of indigenous knowledge systems with scientific or state-led approaches of conservation.

Research Questions

Following are the main questions that this investigation seeks to answer.

- ❖ How do tribals(i.e. indigenous communities) in the Sundargarh, Deogarh, Kalahandi and Koraput districts understand and practice biodiversity conservation in daily life?
- ❖ How do cultural values, ritual practices and traditional knowledge systems contribute to ecological stewardship and environmental care?
- ❖ How do these activities strengthen the ability of the community to cope with climate change, ecological disturbance and livelihood issues?
- ❖ What is the importance of different social groups like women, elders, youth etc., for sustaining and transmitting ecological knowledge to future generations?
- ❖ What challenges and threats do socio-economic pressures, migration, industrial growth and state-funded development schemes pose to local ecosystems and traditions?
- ❖ How can we incorporate Aboriginal conservation practices into scientific and policy frameworks to contribute to climate futures and adaptation in Odisha?

Literature Review

Climate change has made ecosystems far more fragile around the world. Helping communities adapt to climate change and build a better and healthier future depends on protecting plants and animals. According to several studies, Indigenous knowledge is very useful for managing natural resources. this is so because it comes from many years of closeness to nature. tribal communities in odisha have been taking care of nature in their own ways for a long time. They use traditional farming methods, safeguard important sacred forests, and manage water well. The methods help attain the goal of keeping the environment clean. Various studies in the field have found that these tribal methods are useful for saving many communities of plants and animals. By doing this, they preserve their traditions and their community. But there are problems. Sometimes, the monetary demands of life today and other government rules, overshadow Indigenous ideas and prevent the handing-down of old knowledge. As awareness about the contribution of tribal organisations for climate and environmental protection is growing, there is not much value given to their wisdom in official action plans for tackling climate change and saving biodiversity. In Odisha, it is common to find tribes living in harmony with nature. This paper delves into the diverse ways of biodiversity conservation by the tribal people of odisha and true challenges they face.

The aim is to show that Indigenous practices are useful but sometimes pressures stop them from being useful. The purpose of the research is to support the initiative to make use of locally available knowledge for new conservation and climate-change efforts to build stronger communities and healthier ecosystems in odisha.

Research Methodology.

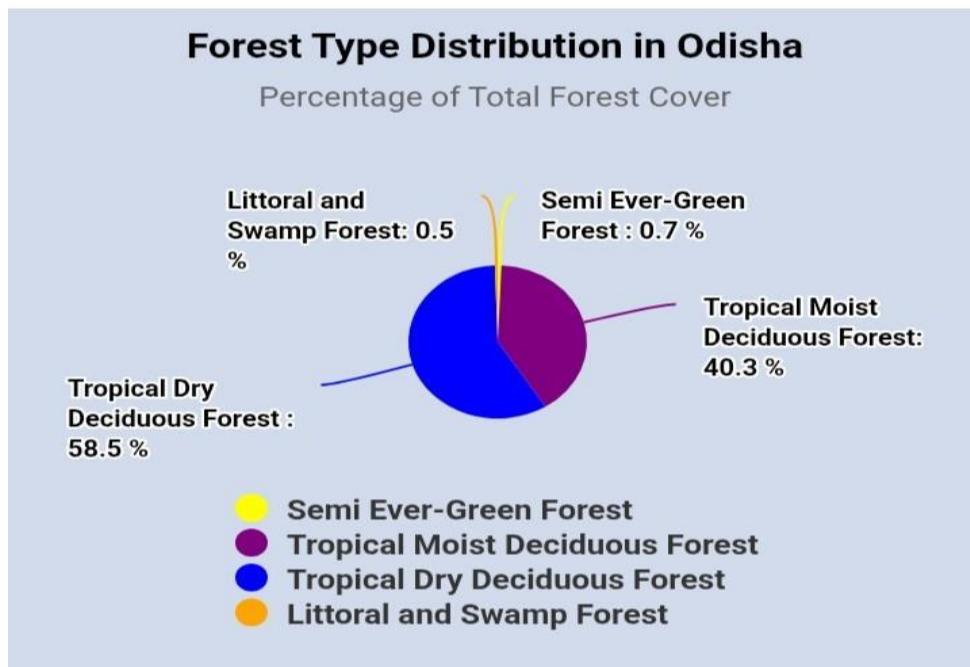
Ethnography Research Approach.

This Study uses an ethnographic method for the analysis and observation of the attachment of the aboriginal inhabitants of Odisha to their environment.. Ethnography involves the in-depth study of the people and organizations one wants to learn about. According to the textbook definition, ethnography is the scientific description of the customs of individual peoples and cultures. Ethnography is different than methods that only conduct surveys or short visits, as it often involves spending long periods of time in the community, sharing space and often taking part in daily tasks. Using this type of immersion helps the researcher to not just record the facts but to also get an understanding of feeling, meaning, and value which the people attach to their natural resources and environment. By being directly involved in farming, use of forests, festivals, activities in the household etc. the researcher gets more than mere information. It demonstrates that biodiversity conservation is not an abstract concept. It is something that has connections to the livelihoods, spirituality and cultural identity of people. Indigenous peoples protect their rivers, fields and forests lands to defend their traditions, safeguard their forests or rivers and for the good of their descendants. Usually, formal scientific studies are bereft of such perspectives as they focus only on numbers or data. Ethnography brings out how local people see and respond to climate change. People in the community are a great asset. They give valuable information about changing weather patterns, crop failures, scarcity of resources, and such. Further, they also show how they adapt in practical ways, like changing their planting cycle, sharing labor, or making use of traditional ecological knowledge. According to the responses, the invisible forms of resilience are probably observable by unwanted research tools. Lastly, the approach depends on constant observation and reflexive analysis, whereby the researcher repeatedly compares notes from the field, the community and oneself. The process demonstrates the strong connections between ecology, society and politics in these tribal areas. In the end, ethnography shows that resilience and sustainability don't stem from just one thing. Instead, it is the combination of cultural heritage, natural knowledge and social organization that helps communities.

Site selection and Description

The research was conducted in four important districts of Odisha Sundargarh Deogarh, Kalahandi and Koraput. They have been chosen because of their essentially wide ecological variety and strong cultural traditions of tribal

communities. Each district has a unique blend of ecology and social life, this making it suitable to study the relationship between people and nature.



(Figure 1- Pie chart showing Forest Type Distribution in Odisha)

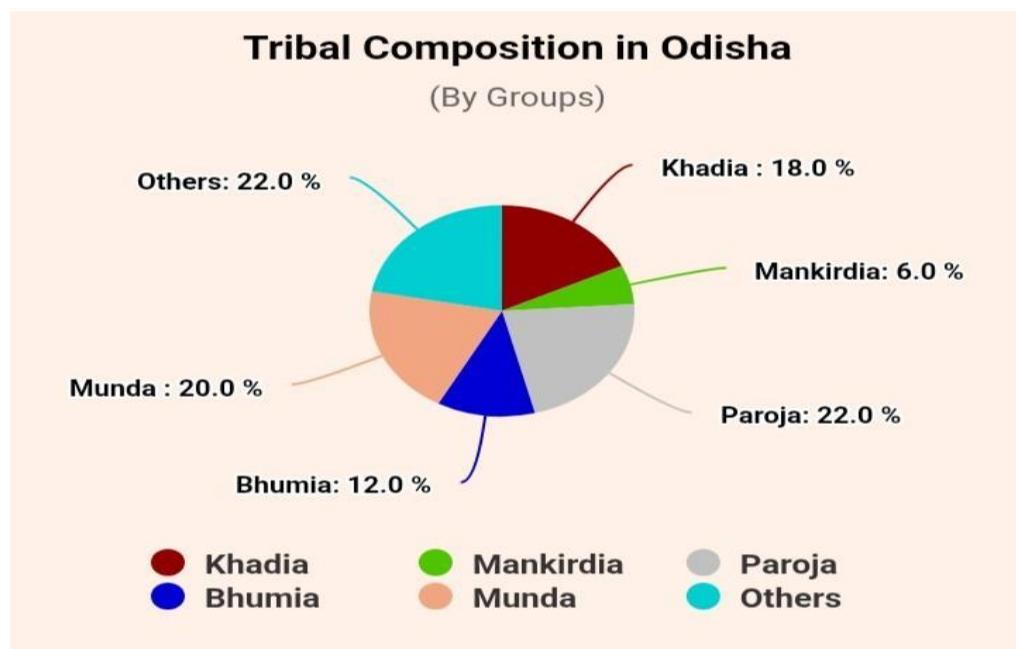
Sundargarh, which is located in the northern belt of Odisha, and Deogarh, which is located towards the central region, both have large areas of forest rolling hills and several river basins. Many tribal groups depend on forest products rivers and traditional farming methods to run their daily lives. These natural features sustain their food and income. The forests provide wood, wild fruits and other things. Apart from these, forests are also important sources of medicinal plants which tribal healers still use in local healthcare. In these districts, the seasonal cycles of agriculture and harvesting of forest produce affect their rhythm. On the other hand, Kalahandi and Koraput situated in the southern and southwestern directions of Odisha are famous for their dense forests high mountains and sacred groves which are socially and ecologically significant. These groves are worship places of the local people as well as a safe home to many rare and diverse species of plants and animals. Forests serve as the carbon sink water source regulator and landscape protector of the district. Farming on hilly slopes, shifting agriculture and collection of minor forest produce are the common means of livelihoods of the people here.

The communities human of these areas are equally diverse. Khadia, Mankirdia, Paroja, Bhumia and Munda are important district tribes. Distinctive activities are performed by different groups. They live in their own unique ways using ecology. The way people farm and cook food and all the ceremonies show respect for the forests and seeds, to demonstrate their unity. The way people of Himachal Pradesh lead their lives shows their closeness of ecological customs and relationship with nature and farming. These rural lifestyles are also reflected in their cultural practices and festivals of Himachal Pradesh. The tribal communities that exist in Sundargarh, Deogarh, Kalahandi, and Koraput are not only distinct ecologically but also culturally. The versatile geographical locations of the Harappan site shows that the early humans used their knowledge and skill to survive. The sacred groves in related geography shows that. Climate change, natural disasters, and development challenges to indigenous people make a strong case. It can also become an exciting site to study covid, and facilitate learning from indigenous knowledge and bio-cultural conservation and social practices for climate resilience.

Characterization of Indigenous Peoples Investigated.

The researcher is thrilled about the research in a few tribal societies of Sundargarh, Deogarh, Kalahandi and Koraput districts, Odisha. The groups possess different cultures, social customs, mother tongues and means of livelihood which are closely confined to the environment they inhabit. These communities have been able to live with farming for long years mainly inclusion of forest and crop shifting gathering. Additionally, they make handicrafts, use forest products like fruits leaves and tubers, and hunt for food. Besides their livelihoods, these communities have ecological knowledge. This information has been passed down from one generation to another. Safeguarding sacred sites, traditional seeds, and the wise use of plants. It consists of living organisms found in groves, mountains, water bodies, holy places, seeds for cultivation, plants for medicine, etc. for use in rituals and daily consumption. A variety of resources are owned and used

by different sections of society. The use will be for a church. Hindu culture and religion encourage the preservation of soil and water in forests.



(Figure 2- Pie chart showing Tribal compositions in Odisha)

The research covers such a wide range of tribal people that it basically outlines a diverse picture of native management of nature. Many communities in the world are keeping clean the environment. Nowadays climate change and weather patterns have become unpredictable in the world entire. Comparing their customary practices with community practices is one approach to observe how climatic resilience can be strengthened using indigenous knowledge and eventually promote biodiversity at the region.

Data Collection Techniques.

The researchers utilized participant observation using group dialogue and interviews to determine how resources are used and protected by the community. The research group snowball sampled, as they elicited one participant and referred to another distinct participant.

The researcher took up a participant position in the community in an ordinary way. They arranged rituals to collect from farms and forests. The learners will get to experience the cultural ritual events that will enhance their observances of the way people adapt to the environment. The researcher saw that people in the community were able to share and exchange knowledge because of the participation and coexistence that took place there.

Members began to think about environmental and conservation issues because of the group discussion. People from the community attended sessions where they could convey their views and contest issues and priorities in common. The discussion provided valuable information on participatory decision-making in a community, local governance systems and opportunities to conserve biodiversity.

Semi-structured interviews were used to express the participant's perspective. Honest women, young people and the elders used to do it. Systematics remembered change over time. For women, it was with a household scale. the aspirations and plans of young conservation heroes and heroines for conservation and development in the new millennium and millennium development goals. Government officials discussed such a natural resources framework.

These three approaches take into account the individual scenario of the live experience and the worldview of community. This knowledge leads to informed views about benefits local people get from the ecosystems and ways of coping with the changing scenario; hence attaining resilience and resourcing for conservation.

Ethical Problems and Social Engagement

This study adhered to guidelines for respectful and accountable engagement for working with Indigenous Peoples. Since the study was so sensitive in the very beginning, the respondents were informed about the study and informed about their right to being informed about the results of the study and how the information would be used and their full freedom to participate. Subjects in the study were informed that they could take part voluntarily, and could opt out of the fieldwork, at any time, without a penalty for not taking part, or a loss of benefits, after giving their consent (membership of a fieldwork team)..

Knowing the culture was delicate and required caution. The community's requests for privacy and spirituality were fully respected. Community obeys the rules of sensitive information discovery. As a result, heritage was secure and there was no hesitation in sharing it. Research on community participation has been focused on participation and not on observation. We were in contact with the participants in the process. They knew what we were doing. They could raise concerns at any point. We managed to transfer knowledge and technology back to the community in useful forms. The local leaders & local parties will be invited to take part in the interpretation of results for improved accuracy and cultural relevance. While visiting locations, the study group attempted to minimize interference in the everyday activities of the people as much as they could. We didn't harm, deceive or exploit, in any way, to the best of our ability. The research process aimed to initiate a learning process whose benefits would first be available to the researcher and then to the natives. As a result, the investigation would benefit the natives, which will not be at their expense. This research's ethical framework is focused on dignity, non-manipulation, and the best interests. They also did not solely interrogate indigenous peoples for the research.

Data handling and Thematical analysis.

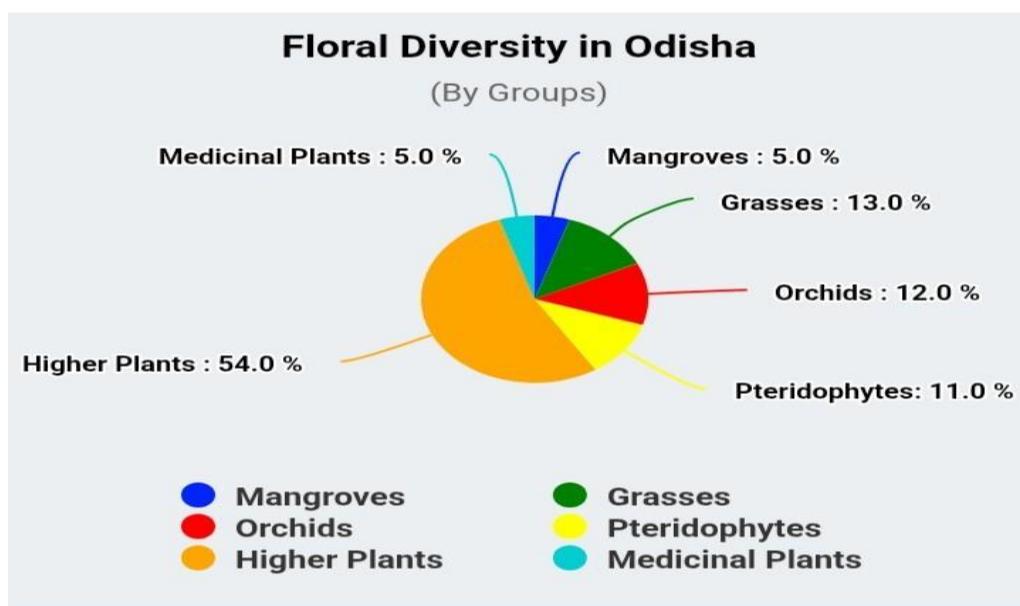
The obtained data was processed using participant observation data, personal interview, FGD data. The process ensures integration of integrity and confidentiality of information and renders data readable to proceed with additional processing. The team also registered with correct text documents of any record in the fieldnotes by both written and audio records. Every other thing had been locked up. To avoid revealing the identity of the participants, the researcher assigned codes instead of their names to the participants. The thematic analysis of materials was performed. By which I mean that, when we read in this it will begin to be recoded. We shall have started becoming familiar with the trends, repetitions, topicality and degree of associations. The study explored deeply in the paper the apparent expression of belief together with anxieties over environmental alteration traditional ecological knowledge safeguarding of biodiversity group coping policy and more efficient therapies set up through different environments. It is at this trying moment that many are trying to help the Earth using body and brain.

Accordingly, the novel ideas were juxtaposed to each other to have a permanent comparison. I correlated the data with the stories of the participants, and some of the observations. Continuous comparison is helpful in having a triangulation of differentiation between what is surface bound and what is deeper. The research indicates the presence of agreement among the participants. Nonetheless, there are certain gaps not only across generations but also among the residents and other participants in the four districts suggested in the study. By reflecting on all of this we get a better idea of how communities sense, engage and socialize with their living, breathing environment. It is not simply some series of familiar themes.

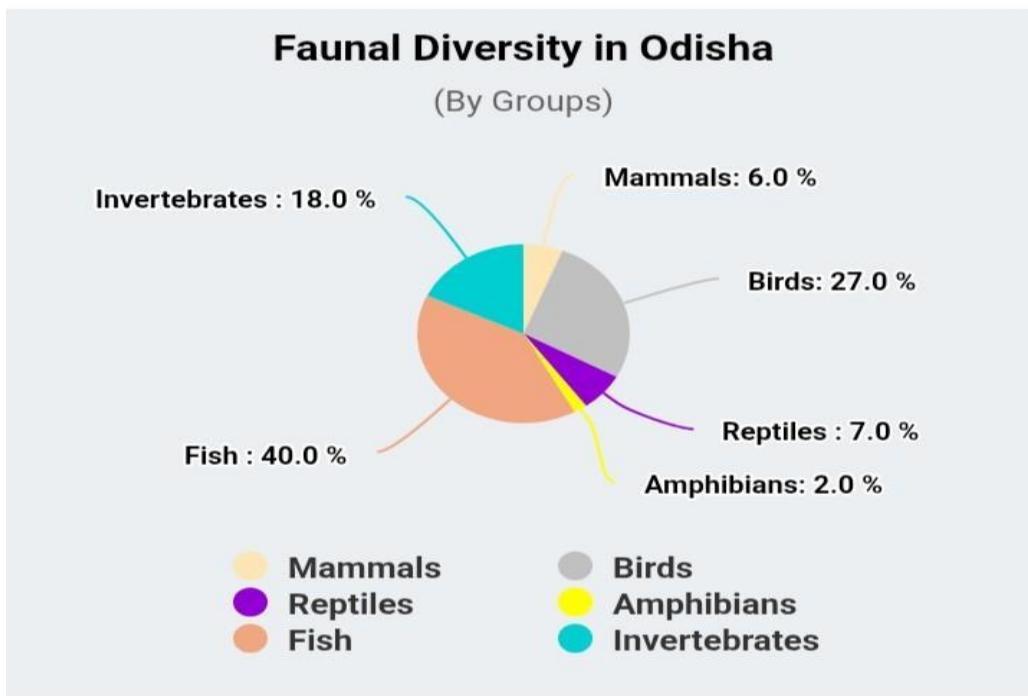
It presents all forms of qualitative data under one group of results and reveals the correlation of everything with another. As indicated, the findings reveal how communities reveal their emotions; however, there is an additional clarification of the interconnection between human culture, nature and existence in relation to tribal and indigenous and forest communities of Odisha. (30 words) Thematic analysis provides understanding on the connection between adaptation to climate change and community identity. In addition, it has shown how environment, knowledge and adaptation works..

Indigenous Livelihoods and Ecosystem Connections.

The tribal communities of Odisha, in sundargarh deogarh kalahandi and koraput districts have for centuries lived in close association with forest river and farmland. Their existence is made more profitable not only from fanning but also from collecting forest produce, small-scale manufacture, handicrafts traditional and other occupations drawing upon forests. Not only do people carry out these economic activities for a living but they also assist with the conservation of the diversity of plants, animals and soils that sustain us. We will closely examine the social and cultural identities of these groups. The study examines the sacred natural sites that exploit natural resources as well as the spiritual and ecological roles. Also analysed are the important roles of men and women in the conservation of natural resources for the future.



(Figure 3- Pie chart showing Floral Diversity in Odisha)



(Figure 4- Pie chart showing Faunal Diversity in Odisha)

Socio-economic and Cultural Life

In the four districts, almost forty different tribal groups live, which differ in their customs and traditions, and everyday survival strategies. You will see that nearly all families rely on their small plots of land for subsistence farming. Meanwhile, many practice Podu -- local shifting cultivation. This enables them to clear patches in the forest for short-term farming as deactivated. The forest provides honey, fruits, tubers, medicinal plants, firewood and in some cases fish or wild meat for the household. The social organization may be clans or village councils. A usually leader is an elder or traditional chief who makes decisions and resolves disputes. The harmony of spirits and culture is reflected in nature. Folk songs and dialect of tribals are related to the seasonal and natural happenings like rains, harvests or lunar calendar. The statement that Tribal Worldview of Nature is a result of a strong imaginative and aggressive human response to nature is broadly acceptable, assuming that human beings have been and continue to be an integral part of nature. According to this worldview, human beings are not separate from nature but form one part of a larger ecological system. The following few pictures show the socio-economic and cultural life of the tribal groups selected for study.



Traditional Ways of Managing Resources

The land, water and forest management processes have originated from the great wisdom of generations of indigenous knowledge and practices. Rotational farming through mixed cropping resists droughts and maintains soil fertility. Several groups use cautious collection techniques. To help certain plants re-grow, you need to harvest them responsibly. Community members make certain that the forests reserves the rivers and grazing commons are safe from use by as many for as long as. Helping to conserve different types of rice, millet and millets by giving people the ability to save and trade their own state of the art seeds inside of their community. To fix the problems with the food system, these networks of humans created protection. Each country turns to the earth for all needs. We rely on our environment for our well-being and future. Conservation and livelihood are linked in many ways.

Sacred Natural Places and Biodiversity.

Native people in Odisha believe in the importance of sacred land. Some thing isn't going to help you, you need something better than that. The areas prohibit the consumer of trees, hunting, or wildlife disorder. At the site of crisis, they celebrate festivities having strength to them, developing a continuum of religious morals and they pray. Around these sacred places many diverse life forms grow. Some preserves protect unique plants and animals from danger. Ecosystems make safe environments for unknown species, distribute carbon, keeps the water clean and gives habitats. It also shows what our responsibilities towards our environment is depending, on the name we give to the universe that sustains us.

Gender and Environmental Care.

In separate communities males and females join to work on environmental restoration as partners. Traditionally women are the ones who have been involved in projects such as numerous agricultural activities based on preserving nature. Living groups from time to time will search for materials such as their food.

Men are also more likely to engage in community defense, coordinating the protection of the commons, hunting together, and going to village meetings or councils to participate in decision making. They learn about biodiversity and its daily use in life. Many times, they take the lead in implementing policies about the use of land or forest. Intended text gives a full picture of nature management. Men and women play complementary roles, and it is important to recognize their respective skills while planning programmes for their conservation or resilience. Inclusive approaches not only value women's ecological knowledge, but women and men's leadership capacities as well. As a result, that makes this process fair. It also makes the whole community more powerful. As they can ultimately overcome the environmental and social challenges successfully.

Observed Climate Change and Community Actions.

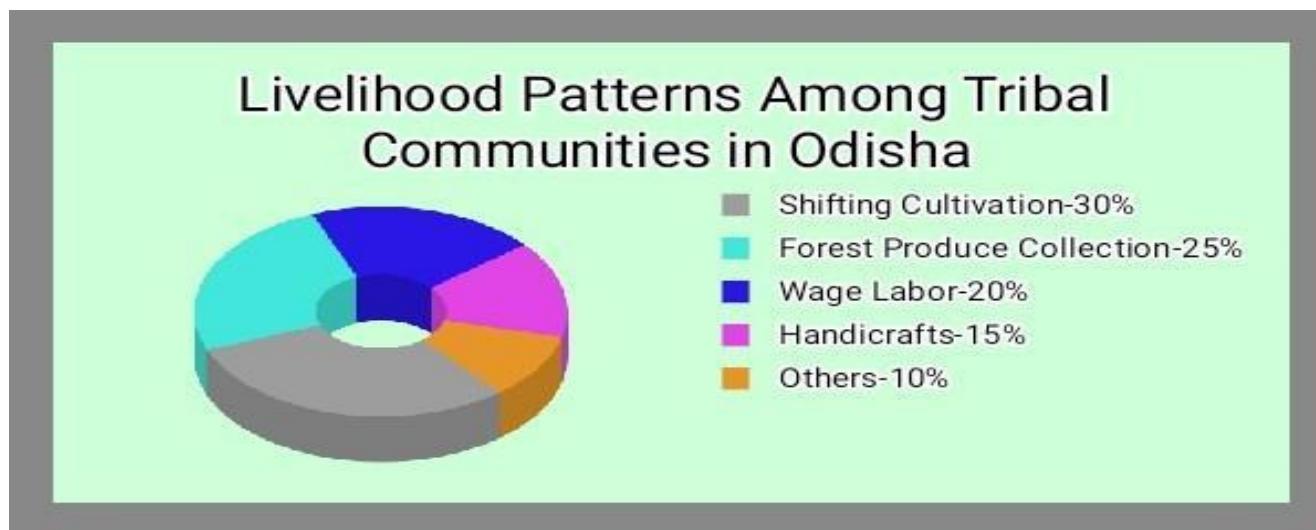
In the past few years, the tribal and rural people of Sundargarh, Kalahandi, Deogarh, and Koraput districts of India have been undergoing weather and environmental changes. People think climate change is real. It is not just a scientific theory anymore. Every day, the changing events have an impact on their fields, forests, water bodies as also customs and

social structures. Climate change is as a result of the varying climate and seasonal rainfalls. The other was the depletion of resources. We shall next examine the opinion of the local population. It examines that human impacts on climate change are adversely impacting their work and environment directly before their eyes. We are now aware how they manage natural hazards which arise under climatic changes and how things are evolving. In addition, they engage in conservation that is, promoted by the society. Based on the two progressions, there were positive local responses to climate change and the use of indigenous knowledge to enhance climate resilience.

Attitudes to Climate Change.

According to the farmers and their folks, it rains at the wrong time. Citizens believed the weather was something that will be repeated over and over. This could modify as the dry seasons increase in length.. Floods, heavy rainfalls and droughts are on the rise. It is possible we will see this change. Changing the times of planting and harvesting disturbs the growth of forests. Drinking water and irrigation issues arise. Members of the community say that the reason they make the change that they do is that their body and spirit do not match. From time to time, something is said that can disturb rain. Taking too much from forests, mining, or damaging a holy place can cause this harm. Sometimes, they result from something much bigger going on. The way a person perceives the world, is often the limit to their response. Experts' opinions on climate change matter a lot. Beyond rituals, intensive settings give social presence to global warming, like UN climate meetings. Effects on Farming and Livelihood.

Environmental changes have severely affected livelihood systems. Crop output has dropped, timber is scarce, and soil and forest quality are deteriorating. The scarcity of plants, fruits, tubers, and medicinal plants, that were once available in plenty, threatens our food security as well as additional income. Shifting cultivation was an adaptive method applied in the past but now becoming more difficult as rain patterns are not following seasonal patterns. Certain families are obligated to modify their cropping techniques, shorten cycle lengths, or even cease crop production entirely. Once a time, springs and ponds were reliable sources of water for drinking, household activities, and irrigation of fields. They dry up during certain months which increases the burden on women and children for fetching water. There is a shortage of availability of natural resources, causing households to search out temporary migration and wage work in nearby towns. These days, many households try to maintain their traditional food production along with other income sources to survive rather than rely only on their usual farming systems.



(Figure 5-Pie chart showing Livelihood patterns among Tribal in Odisha)

Traditional Ways of Adaption

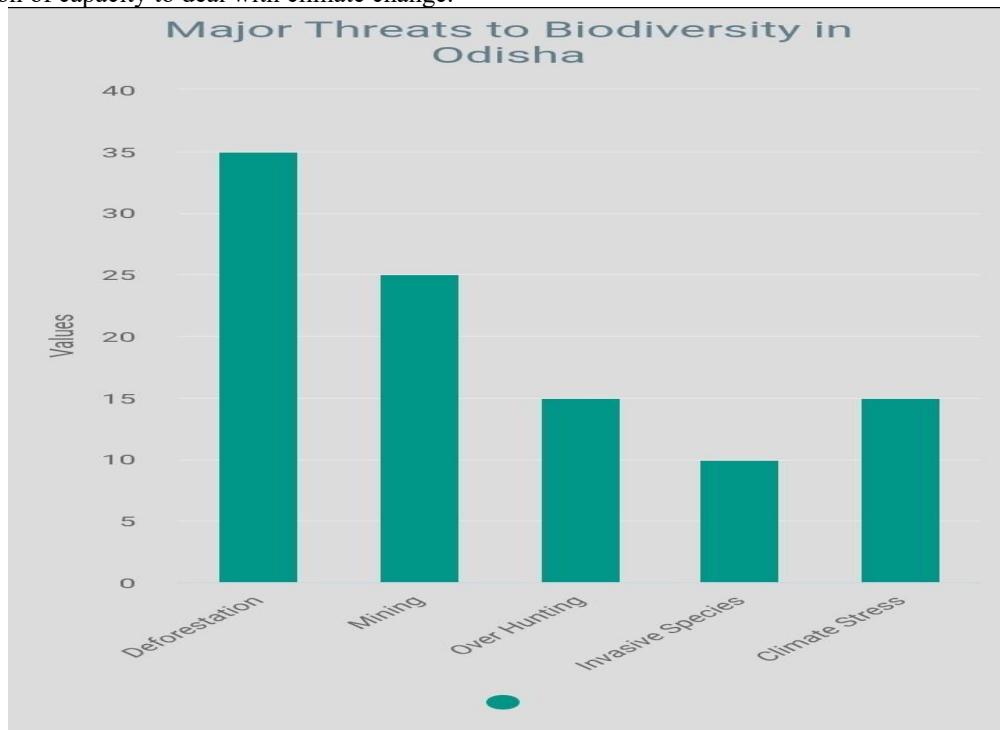
Local communities create traditional practices, which are dynamic and bend and stretch with new stresses or challenges. Choosing varieties of crops which are more resistant to drought and or have shorter growing cycles changing the planting date and experimenting with inter-cropping practices to reduce risk. The restoration or repair of old water harvesting structures such as ponds, hand-dug pits, and mud-depositing tanks are undertaken to store rainwater for household and agricultural purposes. Many communities are now conserving their sacred groves in today's world. Studies that are small in scale share great implications for cultural identity, conservation and adaptation to climate change. Spiritual reverberations via ritual and ceremony focused on cultural, local beginnings such as fields and Domesticates, for securing rainfall, fertility of terrain and of the people, heavenly alignment and earthen balance in the forest driven ecology live and breathe. In order for certain decisions to be passed, these decisions need to be within agreement among everyone. One of these regulations is to avoid the excessive utilization of resources. It can work to minimize the harvest from specific areas. That sub-head contains the collective management of public water resources.

This response is equivalent to a first action. Or being the one who, after having demystified the target in front of the contempt of those who have emotions, succeeds in putting the javelin in the bull's-eye.

Actions Communities Can Take To Preserve Nature.

Villagers are not just individual agents but they are also traveling in groups to carry out conservation action. In the last several committees, the forest protection plan created for the forest. At present, they perform monitoring and management of resources on community forests with an approach to prevent illegal logging and overharvesting. They are planting native species that will make revenue courses of degraded land more profitable and productive. With the indigenous seed banks operated by farmers in their locality, traditional breeds for the soil and climate are preserved. This helps conserve genetic diversity to use for future generations. Our activities support governments and NGOs programmes. We gave technical support and small grants training on soil conservation, watershed management and so on. Families are a network so we're all involved in supporting families to move well. The constant intervention of external actors whose involvement determines the external pressure to impose what does not reflect the interests of indigenous people. As such, these partnerships are problematic to communities. Inclusive models show that ecological sensitivity can increase our livelihoods. Projects such as these can demonstrate to emerging countries that knowledge and local organization is the means to attain results in line with the objectives of climate adaptation and productive growth in rural settings. Biodiversity has to be safeguarded and climate change has to be adapted.

The tribal communities and indigenous folks of Odisha have co-existed with nature for ages and have robust ecological wisdom. but, more and more such society Members are facing problems in leading this life. Over the ages these communities have managed the forest river and biodiversity. nonetheless, they now risk losing their know-how but also face financial pressure, with changing policies and large-scale development presenting increasing challenges. the project section refers to social, cultural and political factors that prevent these communities from not conserving biodiversity and possession of capacity to deal with climate change.



(Figure 6- Bar chart showing Major Threats to Biodiversity in Odisha)

Economic Pressures and Market Changes.

The penetration of bigger Markets and the monetisation of urbanisation have resulted in changes in tribal village life in recent years. Families who were entirely involved either in subsistence agriculture or Gathering Forest products are now being persuaded to cultivate commercial crops, sell timber or get involved forest-based trade. Fast money tempt us not to think about long term use. Cash crop farming and commercial timber could cause soil fertility depletion damage to biodiversity and threat forest cover. People are forcing households into wage labour or seasonal migration to cash-rich towns and industrial areas. Cutting off from the local community altogether and remaining out of touch with the locality for a long time weakens local systems. It may have traditional systems for managing common land and the local laws that regulate. Youth often feel less connected to and less a part of their communities. For the most part, people are indifferent unless money is involved. But then it is an outsider job or gig. Shifts in patterns of consumption may take place, and with that, people's responsibility of the commons may also shift over time.

Loss of Knowledge and Effects of Modernization.

People are gradually losing their traditional ecological knowledge due to the spread of modern education and mass media. Older generations have the skills to recognise plants that are believed to have medicinal properties. They also know how to predict the weather. Similarly, they can conserve seeds and also perform sowing and harvest rituals. Kids aren't catching on as quickly as older people. Many people now taking on the main stream life style since youngsters are moving to cities to do work or study. As time goes on, people will lose interest in the local language, indigenous farmer methods, the tradition of conserving farm animals, etc. This gap has become a cause of concern for many scholars. A technical view causes them to discard ecological knowledge. Songs, Stories and Spiritual Practice we hear and undertake inculcate a moral responsibility to care for the forest, rivers, etc. It is feared that the basic values that pose challenges to indigenous conservation are jeopardising continuity unless linguistic rituals and oral tradition are retained..

Barriers from Policies and Institutions.

The government's programs focused on land Management and wildlife conservation hardly acknowledge tribal governance systems. The Forest Rights Act and similar laws were designed to empower communities with legitimate authority over their lands and livelihood. State institutions often implement these laws in very different ways. Communities that have customary rights to land and forests are sometimes not involved or consulted in important decision making. This creates bad feelings between authorities and local people. Due to unclear policy frameworks, permits and Other paperwork hassles, Indigenous groups aren't able to participate in conservation planning. It's important to consider the insights and experiences of traditional councils and customary leaders when formulating conservation policies. Otherwise, these policies may not be implemented effectively on the ground. According to reports, it is vital to maintain existing production and consumption patterns with minimum environmental impact and full participation of local stakeholders.

Development versus Conservation.

Expansion projects of the scale of mines Industrial corridors hydro electric dam expansion of agriculture takes place in the tribal belts of Odisha. While these projects help with job creation, road construction or energy production, they also have an ecological cost. People cut forests, destroy animal habitats and pollute the rivers. The uprooting of families from ancestral homes not only hampers their cultural roots but makes them take up insecure means of livelihood which makes the more vulnerable and puts their existence in more danger. In a sense, people look for opportunities which may provide an improved standard of living, school and income facilities. However, they realize that cultural identity and survival links with forests rivers and land. People want things to grow but also want to things to protect. Wanting both things creates messy landscapes. If we don't consult and report in balanced ways, villages will suffer conflicts that hinder their ability to deal with climate change.

Integrating Local Knowledge into Climate Solutions.

This part focuses on how indigenous Knowledge can be integrated in climate change mitigation as well as biodiversity conservation. Indigenous people have lived in harmony with nature for generations. Moreover, they have developed pathways for utilization as well as conservation of natural resources. By combining traditional knowledge, modern science and sound policy support, we can build stronger and more balanced systems to tackle climate challenge like floods and droughts. As Ramesh says, creating governance structures for joint decisions is essential to empower local communities. Our new laws and fresh policies must also focus on taking care of both the environment and the people together. Strategies that work together in Odisha's tribal areas could help the environment stay stable. The people would also benefit.

Learning from Community Practices.

Studies conducted in the real world show Indigenous peoples have a store of useful and cultural knowledge developed in that place. Over the years, these communities learned to adapt to the changing weather and resource availability. The custom of viewing spiritual belief for the management of water bodies farmlands and forests lies with two agencies. Earth and water rituals make humans responsible for their actions and behaviour in nature. On the one hand, conservationists will need to comprehend that there is no need of conserving species when gains to the regional communities are not evident. The strategies themselves will make sense when biodiversity, they will be realistic; they will be socially accepted and effective once government and organization implement the propositions that fall within the climate frameworks.

Giving a Communities Strength by Participation.

Change can only occur when Communities are involved in life and living. The individuals who develop governance structures that will enable local individuals to make decisions regarding land and resource exploitation. It is paramount that state has legal obligation of guaranteeing customary land rights since land is the identity and source of livelihood of citizens. This gets these individuals empowered when we discuss with them in their villages (women, youth, and other

marginalized people). It introduces justice and multiplicity of thoughts. When traditional knowledge is applied to enhance results through additional techniques and financial means, it performs better. This helps separate communities to treat external actors justly so that corporates and the government do not take advantage of developing at the expense of their own natural environment and rights.

Anyone Can Be resilient if they have the policy to do it.

The native knowledge cannot be merely interpreted symbolically on the state, national and global levels. Rather, it must be treated as a useful and time-tested instrument of preservation efforts to biodiversity and adaptation to climate change. Using local communities and authorities, the law will help manage the forest. This would imply that they share responsibilities and benefits. Funds to conserve water through tree plantations and renewable energy should be accessible to communities. This can be local weather patterns, flowering and animal behaviour. It is possible to give early information, information we can offer the systems by indigenous ecological indicators. Regulations concerning common property rights become increasingly powerful.. Furthermore, maximizes resilience, active collaboration of Government,NGOs, Research Groups on environment-wise school education programmes.

Building a Sustainable Future.

The integration of local knowledge, scientific genius, and good policy is key to protecting ecosystems for the future. For thousands of years indigenous communities have prospered and lived alongside nature and the environment. Science can come up with new ways and plans on policies for long-term engagements. For Success, The Government Should Work With The Private Sector. Government agencies approve the legal framework. NGOs can offer capacity building support. Academics can supply research. The ecosystem in the indigenous areas has been known for long. As the future generations will use more of what the community knows than what they build, it will help them. Inheriting the traditions and practices from one generation to another ensures continuity. Education helps to bring renewal and adaptation of change. The tribal communities in Odisha, India, have strong partnership systems to build a climate-resilient ecological sustainable future which also respect cultural values.

Summary of The Findings.

The study focusing on four districts of Odisha indexed the traditional skills and knowledge of local communities. Locations like Niyamgiri Hills, Eastern Ghats, North Odisha and Western Odisha host these places deogarh, Koraput, Sundargarh and Kalahandi. Because of their traditional knowledge, these communities have successfully managed forests, reclaimed degraded land, and conserved numerous species. If others adopt these practices, not only will they benefit, it would also be possible to achieve sustainable development through modern science..

The communities are Firm believers in nature. They are dependant on the land and the forest for their daily needs. Indigenous people are the gar-dians of the land and the resources as they live a sustainable life by relating with nature and using its resources carefully. Over time, these communities have seen significant Changes in weather and climate. For example, the rain does not fall as regularly as before and dry spells are longer. The crops, forests and water supplies have been affected. Communities are facing difficulties in continuity of conservation. With the changing nature of weather and climatic conditions of the environment and the various shocks and stresses they face indigenous farmers are modifying their cropping regularly to adapt. Thus, they are responding to the climate crisis. Due to the economic pressure, people are made to live their lives through other means which takes them away from their traditions.

A lot of elder knowledge and skills are getting lost as the younger generation is shifting towards modern things. The rights and knowledge of the indigenous people are sometimes not recognized by government Policies and laws leading to some misunderstanding and conflict. As per the study, the community's struggles for recognition and agency have strengthened over the years. Moreover, in their struggle against destructive large-scale mining, they reject misinterpretations from both pro and anti-mining sectors on the known adverse impacts of these projects. In contrast, they argue rationally in favor of mining. by giving these communities more voice and responsibilities, helping them better protect natural resources and build Stronger resilience to environmental change. When joined with proper governance and right science, support for tradition can keep ecosystems going as it improves community, and region well-being. The study shows that to build a sustainable and climate-resilient future for odisha and beyond, we need to empower indigenous peoples and respect their courage.

References

1. Berkes F. (2017). *Sacred ecology* (4th ed.). Routledge.
2. Choudhury A. & Patra S. (2019). Participatory conservation and community forestry in tribal Odisha. *International Forestry Review* 21(1) 83-94.
3. Das A. K. & Pradhan S. (2018). Climate change adaptation practices of tribal communities in Odisha: An ethnographic study. *Journal of Environmental Studies and Sciences* 8(1) 68-79.
4. Dutta S. & Mishra S. K. (2020). Role of indigenous communities in biodiversity conservation in Eastern India. *Journal of Cleaner Production* 268 122198.

5. Gadgil M. & Malhotra K. C. (2010). Role of traditional knowledge in biodiversity conservation in India. *Current Science* 99(11) 1581-1588.
6. Gadgil M. Berkes F. & Folke C. (1993). Indigenous knowledge for biodiversity conservation. *Ambio* 22(2-3) 151-156.
7. Hagerman S. M. & Chan K. M. A. (2009). Climate change and biodiversity conservation: Impacts adaptation strategies and future research directions. *Philosophical Transactions of the Royal Society B: Biological Sciences* 365(1543) 2259-2271.
8. Jegora T. (2022). The potential role of biodiversity conservation in climate change mitigation: A review. *American Journal of Environmental Protection* 11(2) 14-18.
9. Kumar A. & Singh G. (2017). Indigenous knowledge and climate change adaptation: Evidence from tribal communities of India. *Environment Development and Sustainability* 19(2) 673-689.
10. Kumar S. & Pradhan K. (2019). Cultural practices and biodiversity conservation: Evidences from tribal Odisha. *Ecological Processes* 8(1) 43.
11. Malhi Y. et al. (2020). Climate change and ecosystems: Threats opportunities and solutions. *Philosophical Transactions of the Royal Society B: Biological Sciences* 375(1794) 20190104.
12. Nayak P. & Mishra B. (2020). Indigenous knowledge systems and sustainable forest management in Odisha. *Forest Science and Technology* 16(2) 103-110.
13. Nayak S. (2019). Community-based natural resource management in Odisha: Challenges and prospects. *International Journal of Sustainable Development & World Ecology* 26(5) 384-394.
14. Padel F. (2001). Biodiversity conservation and the struggle for indigenous knowledge. *Development and Change* 32(1) 71-88.
15. Paul A. K. (2018). Traditional agricultural practices and biodiversity conservation: A study among tribal groups of Odisha. *Journal of Agriculture and Environmental Ethics* 31(2) 207-224.
16. Rai S. & Panda B. (2017). Traditional water management systems among tribal communities in Odisha: A case study. *Water International* 42(4) 480-492.
17. Sahu N. & Behera S. K. (2020). Traditional ecological knowledge and climate change adaptation among tribal communities in Odisha India. *Indian Journal of Traditional Knowledge* 19(4) 661-669.
18. Shivanna K. R. (2022). Climate change and its impact on biodiversity and human well-being. *Environmental Science and Policy* 128 160-171.
19. Shrestha S. & Vetaas O. R. (2013). Indigenous knowledge for sustainable forest management: A case study from Nepal. *Forest Policy and Economics* 32 49-57.
20. Singh A. Mishra A. K. & Jena R. K. (2021). Biodiversity conservation through sacred groves: A case from Odisha India. *Journal of Environmental Management* 284 112036.
21. Singh B. & Kumar D. (2018). Tribal livelihoods and forest dependence in Odisha: Socio-economic and environmental linkages. *Forest Policy and Economics* 85 115-123.
22. Singh R. K. & Pandey D. N. (2020). Indigenous ecological knowledge and climate resilience in Indian Himalayan communities. *Mountain Research and Development* 40(1) R1-R10.
23. Singh S. & Maurya V. K. (2022). Impact of mining on indigenous communities and environment in Odisha. *Environmental Impact Assessment Review* 97 106887.
24. Swain B. (2021). Challenges of industrialization on tribal communities in Odisha: An environmental perspective. *Environment Development and Sustainability* 23(4) 5734-5752.
25. Tripathy S. & Mohanty P. (2017). Indigenous seed conservation practices among tribal farmers in Odisha. *Indian Journal of Traditional Knowledge* 16(3) 475-48