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Exploring the Mammal Diversity and Conservation Challenges in Pandharpur and Surrounding Regions, Solapur District, Maharashtra.

[1]K.D.Kulkarni, [2]D.S.Gaikwad, [3]K.P.Allapurkar, [4]A.B.Mamlayya
[1,2,3,4]Department of Zoology
Karmaveer Bhaurao Patil Mahvidyalaya,Pandharpur
(Autonomous)

The semi-arid landscapes of Pandharpur, Sangola, and Mangalwedha in Solapur district, Maharashtra, represent a unique intersection of biodiversity and human activity. This study investigates mammalian diversity and the conservation challenges faced in these ecologically sensitive regions. Over a six-month period (Oct 2023–May 2024), systematic field surveys and community interviews were conducted across varied habitats—ranging from farmlands to urban fringes. We documented 20 mammalian species spanning seven taxonomic orders, including the endangered blackbuck (*Antilope cervicapra*), Indian gray wolf (*Canis lupus*), and Indian leopard (*Panthera pardus*). Analysis reveals stable populations for most generalist species, while larger carnivores and grazers are in decline due to habitat fragmentation, urban sprawl, and conflict with agriculture. Human-wildlife interactions are intensifying, with 54% of local respondents reporting direct conflicts. However, the study also reveals encouraging signs of coexistence: 74% of respondents expressed willingness to support conservation initiatives. These findings highlight both the threats and opportunities in fostering community-based conservation and call for targeted awareness, legal literacy, and habitat restoration in this overlooked dryland ecosystem of peninsular India.

Index Terms - Community-based conservation, Conservation challenges, Dryland ecosystem, Habitat fragmentation, Human-wildlife conflict, India, Mammal diversity, Solapur district, Urban-wildlife interface, Wildlife Protection Act

I. INTRODUCTION

The regions of Pandharpur, Sangola, and Mangalwedha, located in the Solapur district of Maharashtra, India, lie in the semi-arid zone of the Deccan Plateau, and are geographically positioned between 17.3° to 17.9° N latitude and 74.4° to 75.2° E longitude. These areas experience low annual rainfall (500–700 mm), hot summers, and mild winters, typical of a dry tropical climate. The landscape consists of dry deciduous forests, scrublands, open grasslands, agricultural fields, and urban-rural mosaics, which support a variety of wild mammalian species.

Pandharpur, a significant pilgrimage town, is located on the banks of the Bhima River (locally known as Chandrabhaga) and is renowned for the Vitthal-Rukmini temple, which attracts millions of devotees each year. The resulting influx of people and rapid urban expansion have led to habitat alteration and increased pressure on local wildlife.

The towns of Sangola and Mangalwedha are predominantly agrarian, with the local economy deeply reliant on rainfed and irrigated agriculture, animal husbandry, and seasonal labor migration. Crops like jowar, bajra, sugarcane, and pulses dominate the agricultural landscape. However, due to erratic rainfall and water scarcity, livelihoods remain vulnerable, prompting the use of surrounding natural and semi-natural habitats for grazing, fuelwood collection, and small-scale farming, thereby affecting wildlife movement and availability of natural resources.The region's diverse mammalian fauna includes species

such as the blackbuck (Antilope cervicapra), Indian gray wolf (Canis lupus), striped hyena (Hyaena hyaena), and Indian fox (Vulpes bengalensis), along with more urban-adapted species like bonnet macaques, palm civets, and mongoose. These animals are increasingly observed near agricultural fields, peri-urban areas, and riverine corridors, often leading to human-wildlife interactions and conflicts.

In light of these ecological and socio-economic changes, the present study aims to assess the mammal diversity, their conservation status (as per the IUCN Red List and Wildlife Protection Act, 1972), habitat preferences, and community perceptions across Pandharpur, Sangola, and Mangalwedha. By combining field surveys, structured interviews, and literature reviews, the research seeks to generate baseline data for localized conservation planning, encourage community participation, and contribute to broader strategies for sustainable coexistence between humans and wildlife in dryland regions of peninsular India.

II. MATERIAL AND METHDOLOGY

The research was conducted in the Solapur district of Maharashtra, India, focusing on both rural and semi-urban areas to explore the variety of mammal species and the conservation challenges they face. The goal was to examine different ecosystems, ranging from agricultural land to semi-natural and urban habitats, all of which host diverse wildlife and are affected by human-wildlife interactions. The study covered several important sites: Bhnadishegaon, Tisangi, Menhdapur, Sarkoli, Pandharpur city, from Pandharpur. Shingorni from Sangola, Nandeshwar, marwade and Mangalwedha city, from Mangalwedha. These sites were chosen because they represent different types of habitats, including farmlands, scrub forests, wetlands, and urban parks. The region has a semi-arid climate, with hot summers, mild winters, and annual rainfall between 500 and 700 mm. This climate influences the available habitats for wildlife, which include scrub forests, agricultural lands, riverine areas, and urban green spaces. Unfortunately, all these habitats are under increasing pressure from human activity and habitat destruction.

Field surveys were conducted over six months, from October 2023 to May 2024, to record the presence of different mammal species, the types of habitats they use, and their interactions with humans. In addition to field observations, structured interviews were held with 100 local residents, farmers, and conservationists to gather insights into species distribution, behavior, conflicts with human activities, and current conservation practices. The survey also gathered information on the legal protection status of various species, using the IUCN Red List of Threatened Species and the Wildlife Protection Act (WPA) of 1972 as references. Respondents were asked about changes they had noticed in the populations and behaviors of these species over the past 5 to 10 years. This combined approach, using field data, interviews, and secondary sources, provided a comprehensive view of the mammal populations in the region and the conservation challenges they face. These challenges include climate change, habitat fragmentation, and human-wildlife conflict. The findings from this research aim to offer valuable insights that can help shape better wildlife management and conservation strategies in Solapur and similar areas.

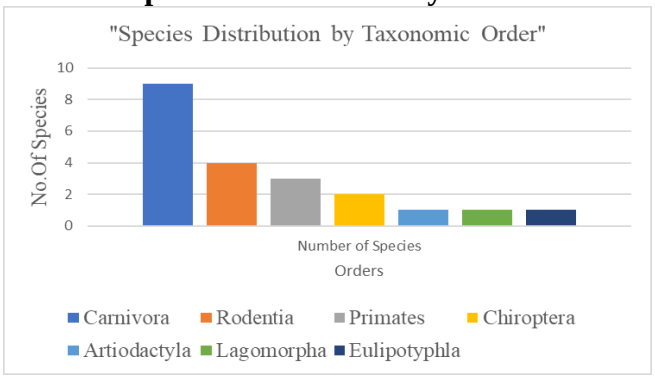
III. RESULTS-

Table No.1 Checklist of Mammals in and around Pandharpur.

Sr.No	Common Name	Scientific Name	Order	Family	IUCN Status	WPA Schedule	Population Trend	Feeding Pattern
1	Blackbuck	*Antilope cervicapra*	Artiodactyla	Bovidae	Near Threatened	Schedule I	Declining	Herbivore
2	Indian Flying Fox	*Pteropus giganteus*	Chiroptera	Pteropodidae	Least Concern	Schedule II	Stable	Frugivore
3	Indian Gray Wolf	*Canis lupus*	Carnivora	Canidae	Least Concern	Schedule II	Increasing	Carnivore
4	Indian Grey Mongoose	*Urva edwardsii*	Carnivora	Herpestidae	Least Concern	Schedule II	Stable	Carnivore (Insectivore)
5	Striped Hyena	*Hyaena hyaena*	Carnivora	Hyaenidae	Near Threatened	Schedule III	Declining	Omnivore (Scavenger)
6	Three-striped Palm Squirrel	*Funambulus palmarum*	Rodentia	Sciuridae	Least Concern	Schedule IV	Stable	Omnivore
7	Black-naped Hare	*Lepus nigricollis*	Lagomorpha	Leporidae	Least Concern	Schedule III	Stable	Herbivore
8	Large Bandicoot Rat	*Bandicota indica*	Rodentia	Muridae	Least Concern	Schedule IV	Stable	Omnivore
9	Lesser Bandicoot Rat	*Bandicota bengalensis*	Rodentia	Muridae	Least Concern	Schedule IV	Stable	Omnivore
10	Asian House Shrew	*Suncus murinus*	Eulipotyphla	Soricidae	Least Concern	Schedule IV	Stable	Insectivore
11	Small Indian Fruit Bat	Rousettus leschenaultii	Chiroptera	Pteropodidae	Least Concern	Schedule II	Near Threatned	Frugivores
12	Indian Fox	*Vulpes bengalensis*	Carnivora	Canidae	Least Concern	Schedule III	Stable	Omnivore

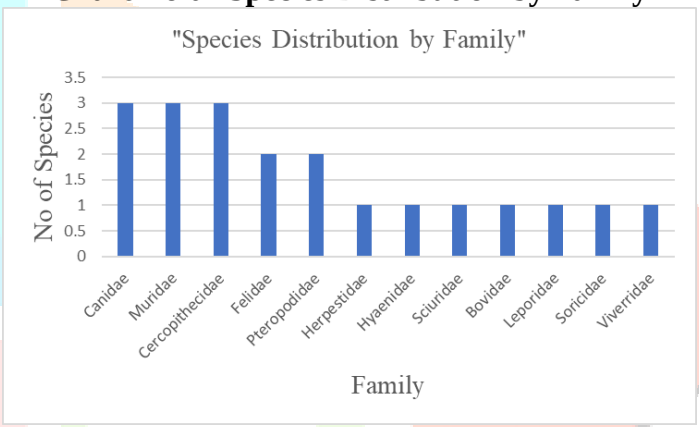
13	Golden Jackal	*Canis aureus*	Carnivora	Canidae	Least Concern	Schedule III	Stable	Omnivore
14	Indian Leopard	*Panthera pardus*	Carnivora	Felidae	Near Threatened	Schedule I	Declining	Carnivore
15	Indian Field Mouse	*Mus booduga*	Rodentia	Muridae	Least Concern	Schedule IV	Stable	Omnivore
16	Bonnet Macaque	*Macaca radiata*	Primates	Cercopithecidae	Least Concern	Schedule II	Stable	Omnivore
17	Jungle Cat	*Felis chaus*	Carnivora	Felidae	Least Concern	Schedule II	Stable	Carnivore
18	Common Palm Civet	*Paradoxurus hermaphroditus*	Carnivora	Viverridae	Least Concern	Schedule II	Stable	Omnivore
19	Gray Langur	emnopithecus entellus	Cercopithecidae	Primates	Least Concern	Schedule I	Stable	Herbivore
20	Rhesus Macaque	Macaca mulatta	Cercopithecidae	Primates	Least Concern	Schedule II	stable	Omnivore

Chart No 01Species Distribution by Taxonomic Order



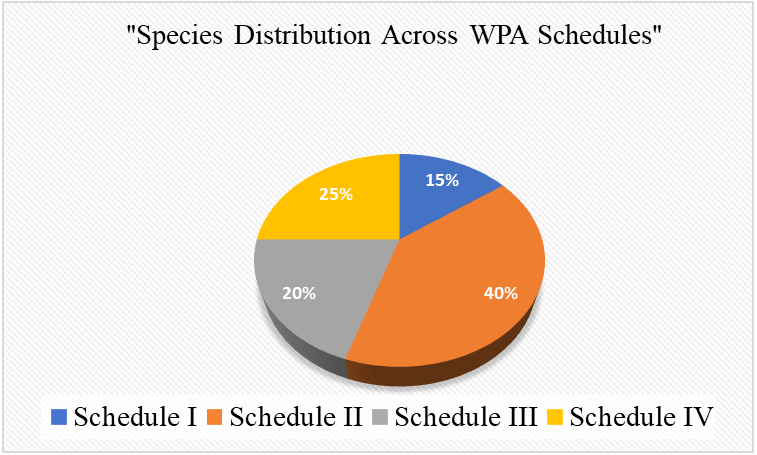
The surveyed mammal species fall into seven different taxonomic orders, showcasing a high level of biodiversity. The most represented order is Carnivora including predators and scavengers like the Indian Gray Wolf, Striped Hyena, and Leopard. This is followed by Rodentia and Primates both of which are commonly found near human settlements. Orders like Chiroptera Artiodactyla, Lagomorpha, and Eulipotyphla are less represented but still important, reflecting a mix of ecological roles from herbivory to insectivory and frugivory. This distribution emphasizes the ecological complexity of the region.

Chart No 02 Species Distribution by Family



A total of 12 mammal families were identified in the survey, with Canidae, Muridae, and Cercopithecidae each represented by three species. These families include adaptable and generalist species such as jackals, macaques, and rodents. Felidae and Pteropodidae follow with two species each, indicating the presence of key predators and fruit bats. Other families like Herpestidae, Hyaenidae, Sciuridae, Bovidae, Leporidae, Soricidae, and Viverridae are represented by one species each. This variety indicates a balanced presence of both common and less frequently observed mammals in the surveyed landscape.

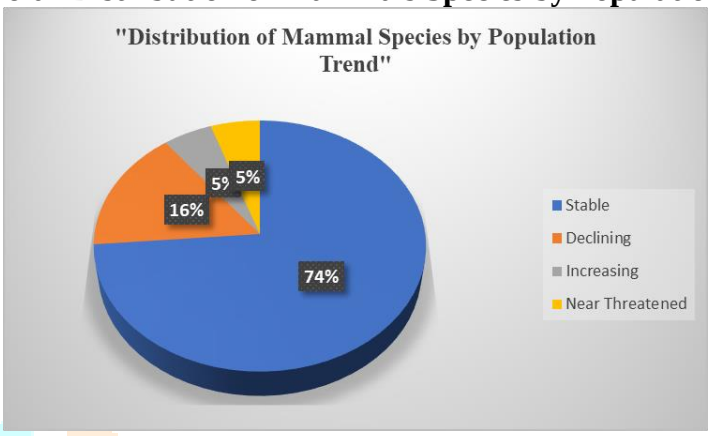
Chart No 03 Species Distribution Across WPA Scheudles



Under the Wildlife Protection Act (WPA), species are categorized by conservation priority. In this survey, 3 species fall under Schedule I, including the Blackbuck, Indian Leopard, and Gray Langur, which are given the highest protection due to their vulnerability. Schedule II includes 8 species, such as the Flying Fox, Jungle Cat, and Rhesus Macaque, which are also protected but with less stringent regulations. Schedule III (4 species) and Schedule IV (5 species) cover species like the Hyena and Palm Squirrel, which are more

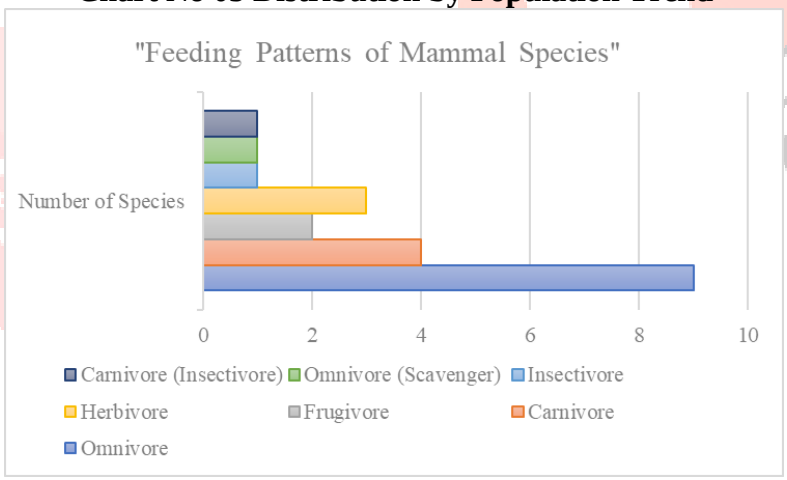
common and receive basic protection. This distribution highlights that many of the observed species are legally protected, though community awareness about their legal status remains moderate.

Chart No 04 Distribution of Mammals Species by Population Trend



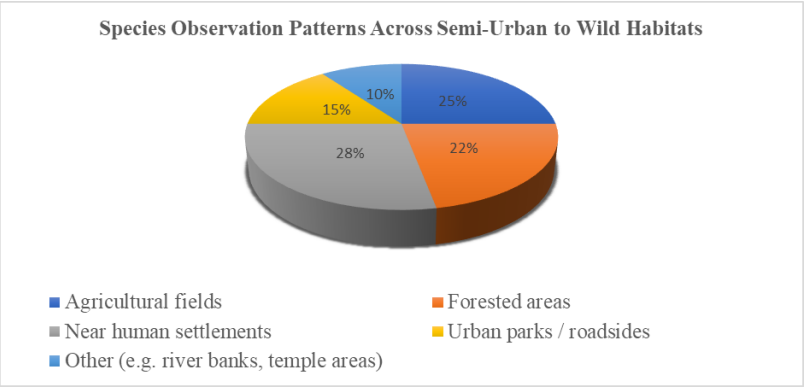
Most of the observed species (14 out of 20) have a stable population trend, suggesting that despite urbanization, many mammals are maintaining their numbers, especially generalists like rodents, macaques, and civets. However, 3 species (Blackbuck, Leopard, Hyena) show a declining trend, indicating conservation concern. The Indian Gray Wolf is noted to have an increasing trend, possibly due to adaptive behavior or effective regional conservation. Interestingly, the Small Indian Fruit Bat is categorized as Near Threatened, which requires close monitoring as its population stability could be impacted by habitat changes or loss of roosting sites.

Chart No 05 Distribution by Population Trend



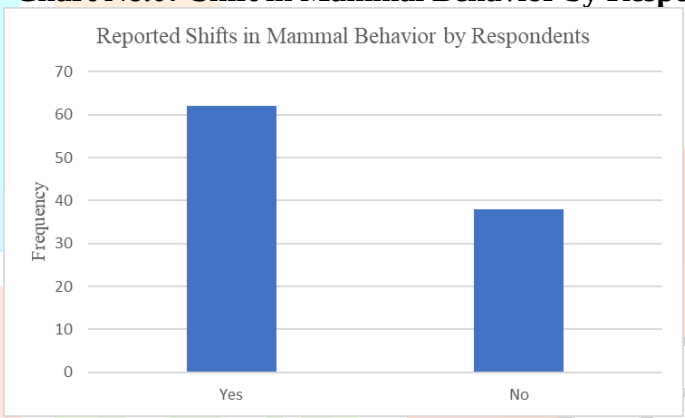
Feeding behavior reflects ecological roles. The majority of species (9) are omnivores, such as macaques, civets, foxes, and rodents, which allows them to thrive in varied habitats. Carnivores (4) like the wolf and leopard are fewer but crucial for trophic balance. Frugivores (2), including fruit bats, play important roles in seed dispersal, while herbivores (3) like the Blackbuck and Gray Langur contribute to plant dynamics. Insectivores (1) such as the Asian House Shrew help control insect populations. The Striped Hyena, listed as a scavenging omnivore, fills a vital niche in cleaning up carrion, while the mongoose is listed as a carnivore with insectivorous habits, balancing smaller prey populations

Chart No.06 Species Observation Pattern Across Semi-Urban to Wild Habitats



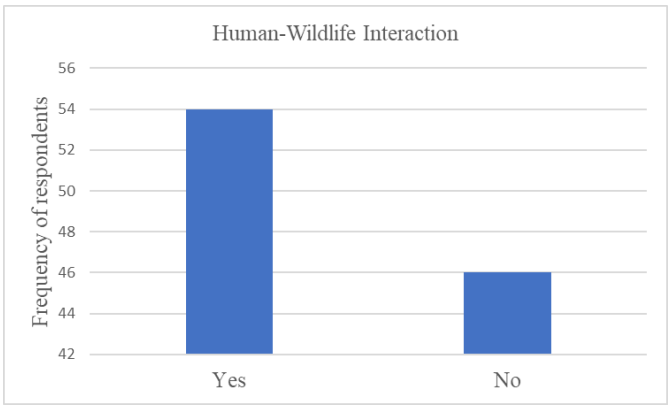
According to the survey, the majority of animal sightings occurred near human settlements (28%), followed by agricultural fields (25%) and forested areas (22%). This suggests that several mammal species have adapted to live close to or within human-dominated landscapes, likely due to the easy availability of food and shelter. Urban parks or roadsides (15%) and other areas such as temple grounds and riverbanks (10%) showed fewer sightings, indicating that less structured or natural green spaces still provide secondary habitats for wildlife, though less frequently.

Chart No.07 Shift in Mammal Behavior by Respondent



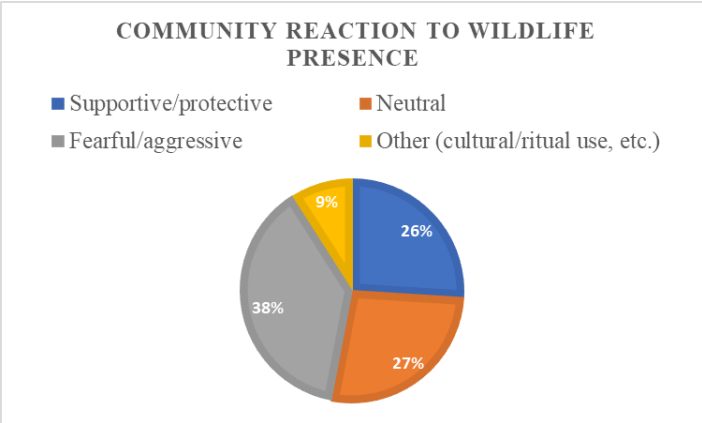
A significant 62% of respondents observed changes in wildlife behavior or numbers, while 38% did not notice any such changes. These shifts may reflect the effects of urbanization, habitat fragmentation, seasonal variation, or human interference. Changes might include altered feeding patterns, increased boldness around humans, or changes in the frequency of sightings. The results imply that a large portion of the community is aware of ecological changes happening around them.

Chart No.08 Human Wildlife Interaction.



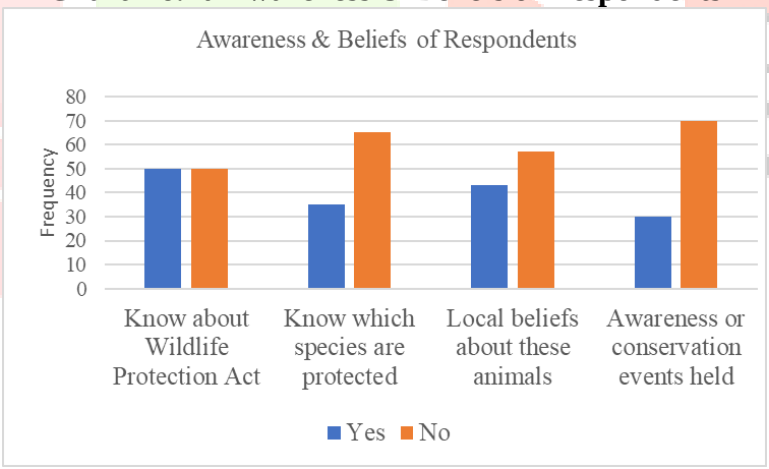
More than half of the respondents (54%) reported conflicts with wildlife, while 46% did not. These conflicts are likely related to issues such as crop raiding, livestock predation, or property damage. The data reflects a growing concern over the overlap between human activities and wildlife territories, reinforcing the need for conflict mitigation strategies such as fencing, compensation schemes, or awareness campaigns.

Chart No.09 Community Reaction to Wildlife Presence



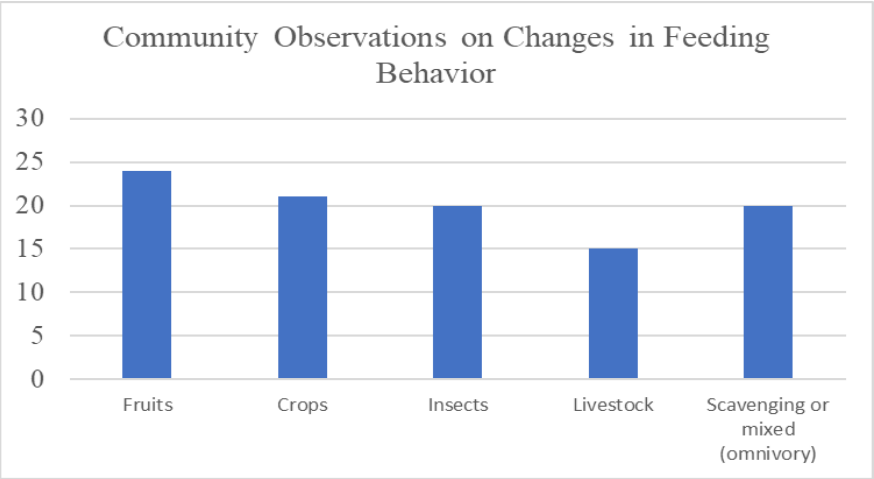
The community's perception of wildlife varied, with 38% showing fear or aggression, likely due to perceived threats to life or property. About 27% of respondents were neutral, while 26% were supportive or protective of wildlife, indicating a willingness to coexist or a respect for animal life. A smaller group (9%) noted other reactions based on cultural or ritual uses, reflecting traditional connections to wildlife. These mixed responses highlight the importance of tailored conservation outreach to different segments of society.

Chart No.10 Awareness & Beliefs of Respondents



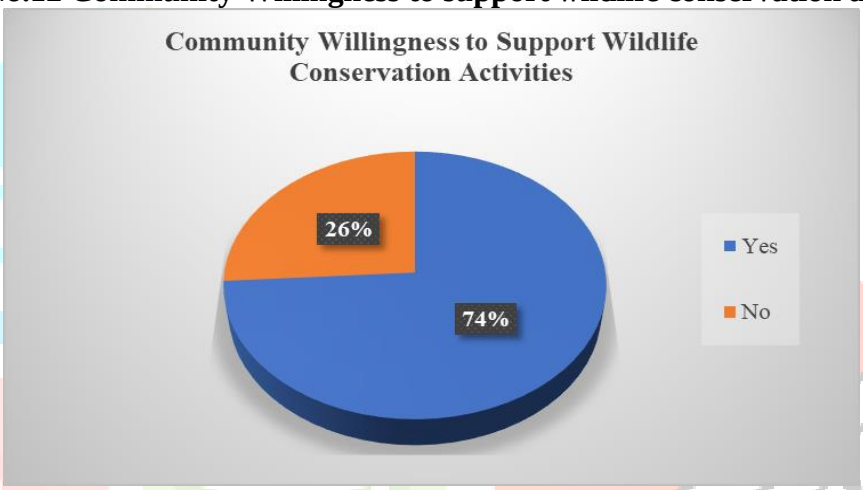
Only 50% of the respondents were aware of the Wildlife Protection Act, and just 35% could identify protected species, indicating a knowledge gap in legal frameworks and species status. However, 43% mentioned local beliefs or traditions that influence their view of wildlife, which could be used positively in community-based conservation. Meanwhile, only 30% had attended or heard of conservation events, suggesting limited on-ground awareness programs. This data points to a need for more robust educational and awareness campaigns.

Chart No.11 Change in Feeding Behavior



Almost half of the respondents (47%) noted a change in feeding behavior, while 53% did not observe any change. These changes might include increased consumption of crops, livestock, or food waste from human settlements. It suggests that some animals are altering their natural feeding patterns in response to habitat changes, scarcity of wild food, or easy access to human-derived food sources.

Chart No.12 Community Willingness to support wildlife conservation activities



An encouraging 74% of respondents showed willingness to participate in conservation-related activities, suggesting strong potential for community-based conservation programs. The remaining 26% who declined may require more motivation, education, or tangible benefits to participate. This data highlights a valuable opportunity to channel community support into active wildlife protection and education initiatives.

IV.DISCUSSION

This study highlights the rich diversity of mammals in Maharashtra, especially in the western region, with species from seven taxonomic orders. Carnivores such as leopards, wolves, and hyenas are dominant, playing key roles in ecological balance. Badhe and Jaybhaye (2021) noted that "leopards are thriving in fragmented habitats of Pune's Junnar forest division, but increasing proximity to human habitations is a conservation concern." Similarly, rodents and primates are found more often near human settlements, showing how adaptable some species are to living in human-altered landscapes (Deshmukh & Jaybhaye, 2024).

Feeding behavior also reflects ecological functions. Frugivores like bats help with seed dispersal, while omnivores like civets and macaques thrive due to their flexible diets. According to Joshi and Madhusudan (2010), "ecological roles are often overlooked in fragmented landscapes where human-wildlife interactions dominate conservation discourse." This highlights the need to value all species for their contribution to ecosystem health.

While 14 out of 20 species show stable population trends, species like the Blackbuck, Leopard, and Hyena are declining. This is due to threats like habitat loss, poaching, and increasing human activity. Vajpeyee (2024) reported that "leopard attacks account for the second-highest deaths in Maharashtra," showing the urgent need for improved wildlife management. On the other hand, the Indian Gray Wolf is increasing in number, possibly due to its behavioral flexibility. Gandhe (2021) observed that "canid species are increasingly sighted near agro-forestry interfaces, indicating habitat plasticity."

Over 54% of community members interviewed reported conflicts with wildlife. This includes crop raiding and livestock loss, especially in agricultural and peri-urban areas. Deshmukh and Jaybhaye (2024) found that "local communities in buffer zones report annual crop losses up to 25%, primarily due to ungulates and primates." These conflicts make it important to introduce measures like fencing, timely compensation, and public education.

Despite the conflicts, 74% of the respondents said they were willing to support conservation efforts. This shows great potential for community-based conservation. Pinjarkar (2023) highlighted similar success in Blackbuck conservation at Karanja-Sohol Sanctuary, where "volunteers and local patrolling teams helped reduce conflict and support wildlife recovery."

However, awareness is still low: only 35% of people could identify protected species, and just 50% had heard of the Wildlife Protection Act. Conservation outreach programs must be improved. Karanth et al. (2013) emphasized that "perception and tolerance of wildlife vary widely based on socio-economic status, experience with wildlife, and cultural attitudes." Interestingly, 43% of people mentioned that local traditions influence how they view animals, suggesting cultural values can be a powerful tool in conservation.

In conclusion, this study shows that Western Maharashtra supports high mammal diversity, but increasing human-wildlife interactions and lack of awareness pose major challenges. If local communities are empowered, conflicts can be reduced and conservation efforts can become more effective.

V. Acknowledgement

The authors gratefully acknowledge the support of the Principal of Karmaveer Bhaurao Patil Mahavidyalaya, Pandharpur (Autonomous), for facilitating the fieldwork and providing the necessary resources for this research. We extend our sincere thanks to the local communities of Pandharpur, Sangola, and Mangalwedha for their cooperation during surveys and interviews. Their valuable insights significantly contributed to our understanding of mammalian diversity and the conservation challenges in the region.

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ANNEXURE-

Fig.1 Rhesus Macaque

Fig.2 Rhesus Macaque in Urban area

Fig 3-Grey Langur in Human habitation and agricultural field.

Fig 4- Black Bug Near to Agriculture area at Mendhapur

Pug marks and Drooping observed at study area