

Consequences of Urbanization on Wildlife Survival in India and USA - Relevance of Adoption of Legislations

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Abstract: Urbanization has always been a sign of growth, but it has created its own set of issues, concerns and challenges to tackle. One such issue is the destruction of wildlife's natural habitat in the form of deforestation which contributes to killing and choking of wildlife. The quest for urbanization gradually becomes an individual preference in which people yearn for more luxury, be it in the form of automated gadgets, luxury cars or posh farmhouses- all leading to pollution and wildlife survival disturbance.

For India and the United States of America being no exception, this trend is global. India is the world's second most populous nation and one of the largest developing economies for rising urban development rates. The United States of America on the other hand, falls within the context of a developed nation. At this juncture, urbanization and natural life are among the most controversial issues that require legal intervention to protect and preserve biodiversity.

On a cynical note, both the countries are welfare nations, but is this welfare extended to the wildlife too? India has achieved an unprecedented level of urbanization, and the United States is already an urban society, yet a dunking rate of events in untamed wildlife is a serious legal problem for both the nations.

India has adopted various legislation such as The Wildlife Protection Act, 1972 and Endangered Species Act of USA and these legislations had been formulated in the nation-state with regards to urbanization and ecological law while both the nations are parties to the UN Convention on International Trade in Endangered Species. The goal was to economically develop the country, stimulate urbanization, and sub-mix the untamed wildlife regime. By comparing both the countries, the paper will jointly present a reformation that needs to be considered under one legislation by bridging the gap between the developing nations and developed nations. The empirical method of research will be adopted to compare both the legislations.

In light of the aforementioned scenario, this paper by way of a doctrinal search attempts to endeavour into the following:

1. Relationships between the growing population, the ecology principle, change towards urbanization and the establishment of wildlife laws in India and the United States.
2. Urbanization analysis and wildlife law requirements on a global aspect.
3. Recommend sustainable urbanization improvement along with biodiversity and natural life insurance solutions.

Keywords: India; Sustainable Development; Urbanization; USA; Wildlif

"No matter how few possessions you own or how little money you have, loving wildlife and nature will make you rich beyond measure." - Paul Oxtan

Introduction

As today we move towards urbanization, we fall back in preserving natural habitats of those who are a part of our ecosystem. The greed to self-suffice an individual human and broadening aspects toward an anthropocentric system, we, the individuals, have become a threat to ourselves. At such an alarming situation, it's important to understand various interactions between urbanization and our ecosystem. Evidences have proved that such negative impacts are being directly recorded as Urbanization overpowers biodiversity which leads to loss of habitat and fragmentation. It is to be seen that the amount of land that is being used for urban development is expected to increase more than three times up to 2030 (Thomas Elmqvist, 2016). Similarly, areas covered as biodiversity hotspots with most endemic species is to be converted into urban land with a rapid growth about four times on average. (Thomas Elmqvist, 2016) However, as we look into various areas, several opportunities have been provided to rehabilitate biodiversity and reshaping urbanization. But still there are huge gaps and the practice remains in vain. Our study has tried to formulate the understanding by correlating two countries India and the United States of America to understand Urbanization and its impacts on the wildlife and how two different countries based on their economic status and different statistics are leading themselves with the legal obligations. We further are trying to understand the current issues and challenges that urbanization and wildlife management are going through today and how we can further resolve the issues by taking stringent actions.

Urban Expansion and Landcover Changes

We are initially trying to understand how urban expansion has changed the land cover on a global aspect. As the growth of urban areas has steadily increased across the globe, land cover changes due to urbanization have exerted a strong influence on biodiversity. According to a research, even though only 3 percent of Earth's surface cover urban areas (McKinney, 2006), it has been found that the locations and spatial patterns of these urban areas have significantly altered the biodiversity, to its present state. The regions or zones, which are located at a low elevation from sea level and are enriched with biodiversity, are the hotbeds of urban expansion worldwide. (Elsevier, n.d.) Although, only a tiny percentage (<1) of land is urban land in most of the terrestrial ecosystems. The impact of urbanization is most noticeable in coastal regions and islands, affecting almost 10 percent of the species living there. Studies have shown that by the year 2030, more than 25 percent of all endangered or critically endangered species will be directly or indirectly affected by urban expansion. (McKinney, 2006)

In another study, an exercise was hypothesized to predict the number of endemic species which might become extinct was organized. The method applied to predict this was by assuming a linear species-area curve (Fig. 1.) and expected urban growth (including habitat loss) between the years 2000 and 2030. The study also found that even a 10 percent urban growth in ecosystems would account for an astonishing 80 percent expected loss of the endemic species. Thus, it can be inferred that protecting from urbanization to such vulnerable species even in a small number of ecosystems could have a larger impact, i.e. preventing loss of biodiversity at such a huge scale. For instance, Big cities have been historically set up along coastlines or river systems due to the richness of the biodiversity along with these places. (Thomas Elmqvist, 2016)

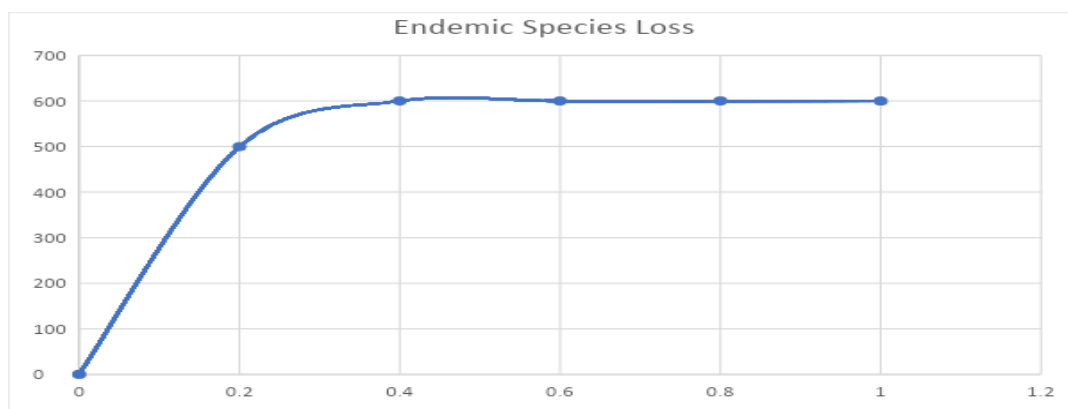


Fig. 1.0. Most of the species loss due to urbanization will be in a small fraction of ecoregions.

Source: Authors Compilation

More than 25 percent of Terrestrial protected areas (National Parks, Wildlife Sanctuaries) are said to be located within 50 km of a city. The proximity of these protected areas to human habitats have a rolling effect in the society as well as the ecosystem. Although the nearness boosts the potential for recreational activities such as eco-tourism and also increased environmental awareness among tourists as well as residents. However, in lack of proper management and lack of coordination among administrative bodies and residents, it could give rise to rampant poaching of animals and plants, vandalism, illegal dumping among other things and so on. Creating biodiversity corridors in an urban landscape is one of the keys to safeguarding the protection of endangered and endemic species. Implementation and identification of such corridors are especially important in the present time for migration of species in response to climate change and keeping with the pace of urban expansion. It is projected that by the year 2030, urban areas located near protected areas (PAs) will increase across the whole world. Every continent will experience this expansion none more so than Mid-Africa, where the urban land near PAs is expected to increase about 20 times over. In Asia, China is forecasted to have more urban land within PAs than entire Western Europe and North America combined by the year 2030. **(Fig 1.1)**(Thomas Elmqvist Susan Parnell, 2013)Even in highly urbanized US, the urban area near PAs is projected to grow by almost 70 percent by the year 2050. (McKinney, 2006).

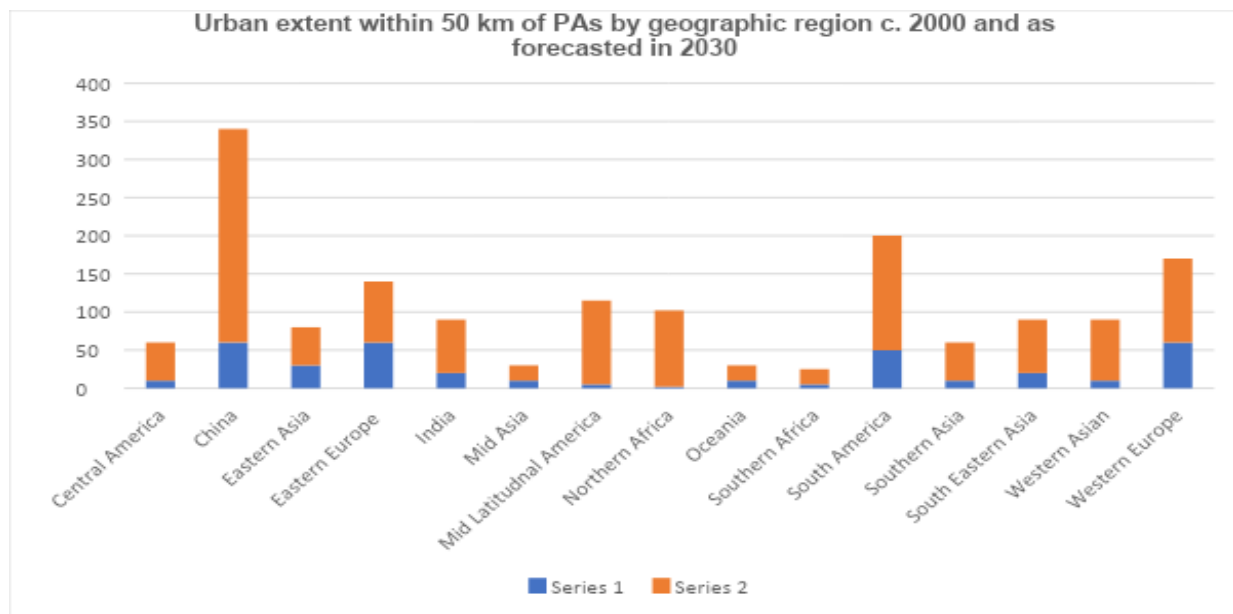


Fig. 1.1. Series1-Urban Land Circa 2000 Series-2- Mean Urban Land 2030
Source: Authors Compilation.

The Mediterranean region is one of the most diverse eco-regions on Earth with several cultures, traditions, flora and fauna, geographical characteristics as it touches the coastlines of three continents (Asia, Europe, and Africa). Among the 34 identified biodiversity hotspots in the world, the Mediterranean Basin hotspot contains the most urban land. Moreover, it is estimated that by the year 2030, the Mediterranean Basin may become the only hotspot with more than 100,000 sq. km of urban land. Considered to be a diminished and fragmented hotspot, even a small decrease in habitat can increase the number of rare species to grow at an excessive rate. The bio-diversity hotspots which will observe the highest rates of urban expansion are the ones that hadn't seen much change in landscape till the early 2000s as the urban land cover in these hotspots is expected to increase by nearly 10 times. These hotspots are:

- (a) Eastern Afromontane;
- (b) Guinean Forests of West Africa;
- (c) Western Ghats and Sri Lanka; and
- (d) Madagascar and the Indian Ocean Islands. (Thomas Elmqvist Susan Parnell, 2013)

As biodiversity hotspots often pan across national borders of various states, which creates challenges in terms of not only planning and management but also confusion regarding jurisdictional authority. For example, The Western Ghats of India is home to a population of more than 81 million people. The Ghats also is home to 293 fish species

out of which almost 85 species are endemic. It's projected by the year 2050, rise of insufficient access to water for all the people living in the region will arise and as water resources in the region become limiting, the extinction of some of the species is a very real possibility while the right to water is a fundamental basic right of every citizen. Executives of various states must realize that unregulated urban expansion comes at a cost of loss in biodiversity like in the aforementioned case of brewing freshwater crisis in the Western Ghats. These issues can't be solved by mere consultations across local levels but need cooperation from policymakers at not only national and international forums but also executive levels. To safeguard the biodiversity and ensure the smooth functioning of the multi-jurisdictional hotspots, it is, thus, critical to lay down a plan of action with proper assessment and implementation through regional cooperation as well as trans-border agreements between the countries involved to ensure a smooth and sustainable transition. (Thomas Elmqvist, 2016)

Urbanisation- The Global Aspect

We further investigate the aspect of urbanization and what impacts it has globally. Most of the population of the world can be found living in those areas that are already urbanized. Almost all the countries on the globe are marching at an increasing pace for achieving the highest rank on the scale of urbanization. This has taken the form of the phenomenon that is spread globally and can be seen in different forms across different regions on the globe. For instance, the Caribbean and other rich countries contribute to urbanization with a large chunk of the population. However, the countries in Asia and Africa are mostly rural yet but are at the verge of becoming urbanized at a faster speed than the other regions over the upcoming years. Due to the increasing urbanization, the change can be seen in the terrain of human settlement that is significantly impacting not only the living conditions but also the development and the environment in the different parts of the world. This drift that the world is experiencing has changed the overall topography of the globe.

The urban area has increased significantly, within the last few centuries, with its focus, particularly on development. However, the 20th century has marked itself in history with most areas joining the league of urbanization. Here, it becomes necessary to bring this fact in the form of a graph to get a better picture. (Fig. 2)

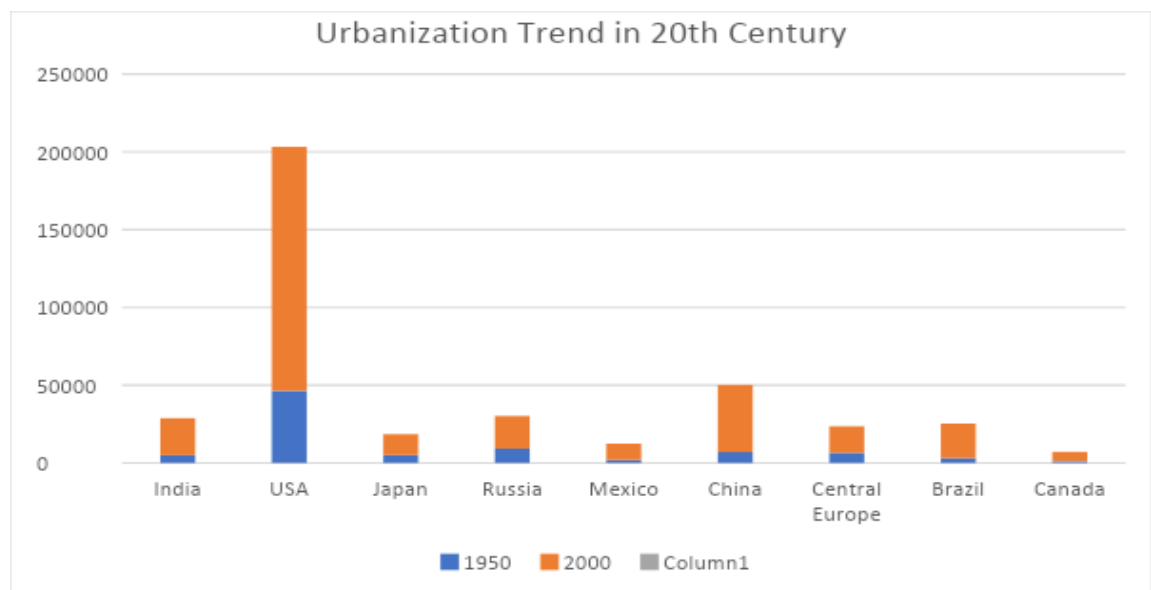


Fig. 2.0. The rate of urbanization increased its pace suddenly in the 20th Century.
Source: Author's Compilation

With the help of the data in the graph, it is clear that urbanization can be compacted to the past century. During the 1800s, more than 80 percent of the world's total population can be found in rural areas. And in the 19th century, urbanization took its highest pace yet and increased to 40 percent by 1900. Further, it can be traced to 64 percent by 1950 while 80 percent by the end of 2000. However, this rate of urbanization got surmounted by that of Japan. Urbanization in Japan was very low until the end of the 19th century. It got turned into 10 from the scale of 1 by 1900. This sudden and rapid increase reached to about 50 percent by 1950 and nearly 80 percent of the population by the end of 2000. It had surpassed the rate of urbanization that was taking place in the USA to about 90 percent in the present date.

On the other hand, by the end of the 1980s, India and China had a similar rate of urbanization. By that time, both the countries had around only one person out of four who was a part of the urbanized population. This rate had increased its pace significantly in the 1990s as well as the 2000s. The urban share of these countries has become to around 58 percent of the total population. However, the rise in India has maintained a steady pace of around 33 percent i.e. one out of three persons in India form a part of the urbanized population.

The Underlying Causes

Two major reasons can be made accountable for the development of urbanization in the world namely, migration from rural to urban areas and natural increase of population. Various reasons contribute to attracting people towards the lifestyle in urban cities and the bright lights of life in the city.

The migration of the population from the rural areas to the bigger cities with the hope to gain a better standard of living in the major reason for the increase in urbanization. Social disruption, conflicts, change in technology, development, and economic growth are the causes that contribute to the migration. These can be termed as a pull factor as it creates an attraction of people towards urban areas and push factor that drives the population away from the rural areas. The main pull factor in this context is employment opportunities, which are paying very high wages, are available in the urban cities. Not only this but educational institutions also offer training and courses in a variety of skills and subjects.

Furthermore, it is a fact that the population is significantly increased in all the developing countries worldwide. This increase in population naturally is another factor contributing to the increase in the population in the urban cities.

The Challenges

Flourishing towns and cities form an integral part of a nation to march on the scale of prosperity. The major reasons, which are contributing to attracting people to urban cities, are the promises of prosperity and employment. Almost half of the population of the world can be found in the cities already. Further, it is expected that a shift in this data can be seen by the end of 2050 when around two-thirds of the population can be in the urban part of the world. When human and economic resources combine in one place, they give rise to science, business, industry, and technology. The urban cities provide access to social services, health, cultural activities, and education more readily than that of the rural cities.

However, profit and loss are the two sides of the same coin. With several good things that are attached to the urbanization, there are a lot of issues that come with it. Environmental degradation, deforestation, poverty, decreasing the quality of air and water, problems of waste disposal, wildlife degradation, governance, availability of insufficient water, high energy consumption, congestion, deforestation, and crime are some of the problems that are aggravated with the increasing pace of urbanization.

Many other challenges are linked to the development of the people living in the globe. There is an estimation stating that around 40 percent of urbanization in the world can be seen in the slums that have exacerbated disparities in economy and unsanitary conditions. The rapid increase in urbanization finds its links to environmental concerns as well. Many cities that are situated on riverbanks or in coastal areas have now become vulnerable to natural disasters such as floods, cyclones, and storms. Deforestation of the jungles to have more and more space to accommodate people has contributed a lot to these natural calamities. Hence, it can be inferred that if the urbanization is not planned, it will not yield positive results. There comes the necessity to get some key issues addressed by the policymakers so that the opportunity can be fully capitalized.

In such conditions, there comes the need of strong city planning as it will be helpful in the management of these as well as other difficulties that will arise along with the swelling of the urban areas of the world. Furthermore, a lot of cities are coming up with several initiatives with a major focus on the methods to tackle pollution, poverty and to improve infrastructure. For instance, Michael Bloomberg, former Mayor of New York, had expressed his views on 'Opportunity NYC: Family Rewards' initiative in a program held to release (Thangavel Palanivel, 2017). This initiative is the first program that allows for conditional cash transfer in the United States with a focus to cut down the rate of inequalities and poverty in the city by extending the incentives of job training, education and preventive health care to the households.

Impact of Deforestation on Wildlife

One of the major challenges of urbanization is deforestation. It is nothing but destroying, clearing or otherwise removing trees through accidental, natural or deliberate means. This phenomenon can take place in any area that is densely populated by trees or other plant life. However, this can be majorly seen in the Amazon rainforest currently.

Approximately 31 percent of the land area on the globe is covered by the forests. Survival of people depends largely on them. For instance, the forests not only contribute in providing purified air and water but they also become a source of employment for around 13.2 million people all over the world and approximately 41 million people are employed in those areas that are related to the forestry sector. Along with the human population, there is a wildlife population as well that relies a lot on the forests for its survival. Around eighty percent of the total land-based wildlife population of the world finds forests as its home. Another critical role that forests play in mitigating climate change. They perform the function of the carbon sink by soaking up the carbon dioxide which is available in the atmosphere and contribute majorly to the changes that occur in the climate continuously.

The world is continuously taking steps in a direction to slow down the pace of the change happening continuously in the climate, to support the human population and to preserve wildlife. However, the rate of deforestation i.e. causing mass destruction of trees is increasing and henceforth, the long-term benefits that can be gained from the standing trees are being sacrificed for the short-term benefits. According to the report of the World Bank giving the data of the period between 1990 and 2016, the world has suffered the loss of forests stretching around 502,000 square miles, which forms an area that is larger than South Africa. This clear-cutting is very harmful to the ecosystem of the forests. (TABARY, 2016) Wildlife population is the one that suffers the consequences of deforestation in the real sense. The most serious impacts are habitat loss, higher risks of wildfires and droughts, changing climate, starvation and increased interaction with the human population to list a few.

Habitat Loss

One of the consequences that the deforestation leads to is not only the general degradation of the wildlife habitat but also the direct loss of wildlife habitat. The available shelter, food and breeding habitat experience reduction with the removal of trees and other types of vegetation. In addition to it, fragmentation of wildlife habitat can be seen, where the native species are forced to live on the remaining habitat islands, which is usually surrounded by the disturbed land and is taken into use for mainly agricultural purposes. These habitat fragments can be so small that is not sufficient to maintain the available wildlife population. Further, it may not be possible for an animal, which is forming a part of one population, to breed freely with any other animal that is forming part of the other population. It may be difficult for them to figure out the shelter, food, and water, which are adequate according to their need to survive within the left habitat.

There are other dangerous situations with which the animals may encounter are an increase in the conflicts between humans and animals and the risk of getting hit by some vehicle during their attempt of migrating between the fragments of habitat. With an increase in the habitat edge, the wildlife population may simultaneously experience a rise in the vulnerability in situations such as poaching, sunlight, wind, predation, invasion of animal species and exotic plants into the remaining forest habitat. Drift can be experienced in direct exposure to natural disasters as well which have posed a greater risk in comparison to the situation that was before deforestation. Further, there are some species in the animal kingdom which are dependent entirely upon the old-growth forest habitat. For instance, Northern Spotted Owl that is found in the Western United States cannot find its survival in the secondary forest habitat. Inferentially, this kind of species cannot survive where deforestation is taking place and is at the extent of getting extinct gradually.

Higher Risks of Wildfires and Droughts

Deforestation causes a decrease in the capacity of the remaining forest area to deal with difficulties such as wildfires. Vegetation and trees in forests contribute a lot to retain moisture in the atmosphere with the help of the processes such as evapotranspiration and evaporation. And pursuant to which, there can be an alteration in the local hydrological cycles. Since deforestation leads to the destruction of tree canopies, there can be a change seen in the water cycle which can provide a route for the increase in warmer and drier conditions. This also has its impacts on wildlife habitats.

Changing Climate

It is a fact that one acre of rainforest is in the capacity to easily store and absorb up to 200 tons of the poisonous gas namely, carbon dioxide. Since the forests can store such a large amount of carbon dioxide in the world, the

contribution made by the deforestation to the emissions of global greenhouse gases is 15 percent. When fire is put to the trees in the forests, the carbon that was stored by them finds an escape into the atmosphere.

There is a vital role that is played by the trees in controlling climate. The change in climate furthers the patterns of new weather, change in the levels of precipitation as well as the fluctuations in the temperature. These changes in the climate give rise to a lot of negative impacts not only on the wildlife population but also on the human population around the world as the global change in the climate brings the alteration in the habitat that depends upon it.

Starvation

Whenever there is a destruction in the trees, the sudden disappearance in the integral elements of the ecosystem of forests can be seen. The plants are the source of energy of all the animals either in a direct way or indirect. Plants derive their energy from the sun and passes it on to the herbivore's animals forming the direct path of transfer of energy. On the other hand, carnivores' animals feed themselves on the herbivore's animals, who have gained their energy from plants and thus, leading to the indirect transfer of energy. If there will be no availability of plants, there will be absolutely no food in the ecosystem leading to the starvation of the animals.

Increased Interaction with Humans

Deforestation is a means of getting claim over the area upon which we have never inhabited previously. This brings to the conclusion that there will be an increase in the level of interaction that happens between wildlife that is already living in that part and the human population that has started to conquer that part. The interaction of wildlife population with the human population is generally negative and lead to very negative results on the animals. For instance, wolves give the best example of the problems that arise when humans start living with large carnivores. Wolves are regarded not only as that mammal which is widely distributed in the world but also as the worst enemy of the humans as they hunt our livestock. This conflict has taken such a huge form that all the wolves were extensively chased down and pursuant to which, they have become a rare species in many areas across the globe.

Urbanization Case Study-India

One of the various features of Indian society that has achieved the heights is urbanization. It is taking place in India at a very high rate that is marked by the large-scale impact on the environment of the country. It has seen the increase in population from 17 percent in the year of 1950 to that of 29 percent in the year of 2007. The rapid increase in urbanization has led not only to the depletion of the widespread green cover of the land but also increase in the vulnerability of the urban areas with respect to climate change.

The increase in population in urban cities is the major factor amounting to the reduction in the local vegetation, increase in the fragments of habitat, leading to the countless problems in the environment including the loss in biodiversity. This causes a reduction in the vegetation cover in local areas and also lowers down the composition, quality, and structure of the remaining vegetation. This leads to the destruction of the local ecosystems gradually. Further, trees are being cut on a large basis to accommodate the increasing population which is leading to the destruction of the forest ecosystem. When there is a decrease in the forest areas, it creates a lot of difficulties to wildlife in terms of survival.

The sudden increase in the population in the urban areas has worked as a fuel that accelerated the need for natural resources, brought changes in the pattern of using the land, became a major source of pollution, altered hydro-geomorphology and caused depletion of biodiversity to list a few. The demand of resources is directly proportional to the increase in the population. Based on the census of 2011, it came to the forefront that there are more than 35 cities in India that are emerging with a population of more than a million. With around 22.7 million people being a resident of the Indian Capital, Delhi has attained the second position in the most populous cities in the world. On the other hand, Mumbai attained seventh position with a total population of 19.7 million while Kolkata got the title of the tenth most populous city with an aggregate population of 14.4 million. However, it is expected that the population in Hyderabad, Chennai, and Bangalore will shoot to more than 10 million by 2025. We further are analysing three cities of India based on the rate of urbanization.

Delhi

Cities have been looked at as indicators of growth and progress. Delhi has witnessed a sudden increase in population from 1.74 million in 1951 to that of 29.39 million in 2019. (Delhi Population 2019, 2019) The migrating population from the adjoining states such as Uttar Pradesh, Bihar and Haryana contribute a lot to this sudden rise in Delhi. The

increased urbanization has negative impacts on both people and the environment. As per the survey of Directorate of Economics and Statistics, 14.4% of the total urban population and 7.7% of the rural population are not living the standard life and are below the poverty line. On the other hand, air pollution has touched its heights in Delhi and the air quality has deteriorated to that of 610 and 421 in the categories of PM 10 and PM 2.5 respectively. (Real-time Air Quality Index (AQI), 2019) Further, a lot of agricultural land, fallow land, scrubland, and shallow water bodies had to sacrifice themselves so that such a large population can be accommodated in the urban city which led to the total land area of around 1484 square km. (Fig. 3.0)

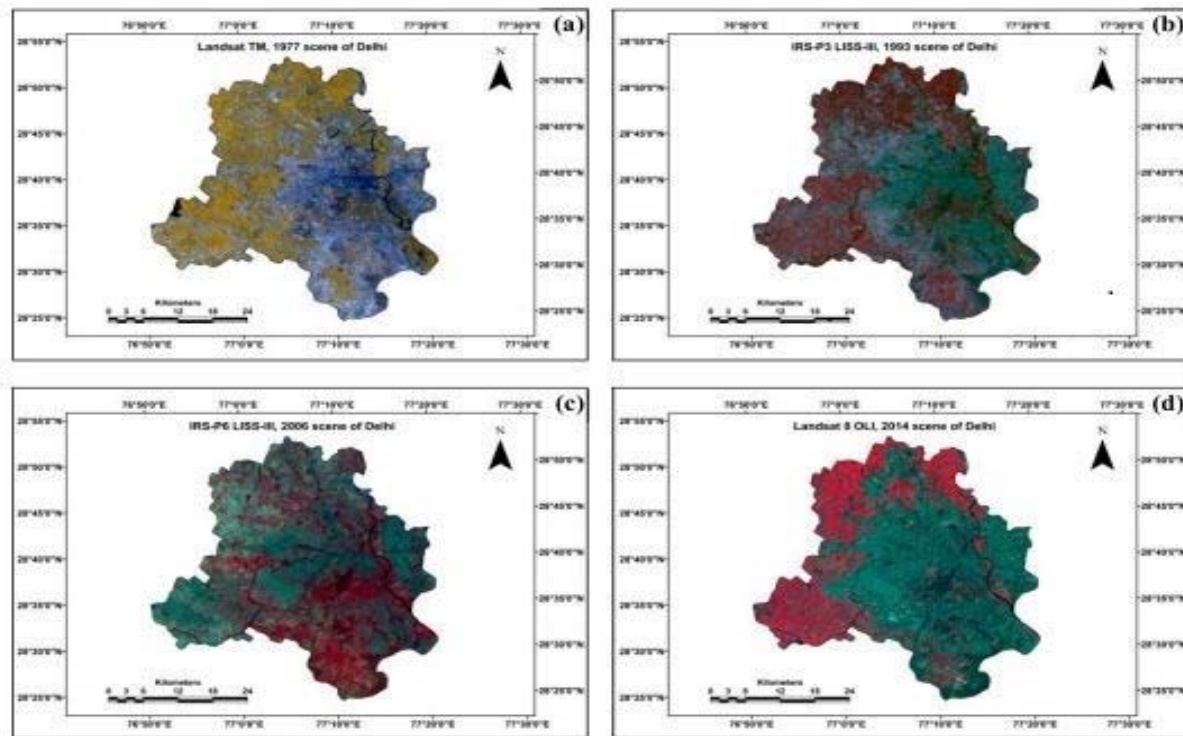


Fig. 3.0 Urban Growth of Delhi for the years (a) 1977, (b) 1993, (c) 2006 and (d) 2014.

Source: Madhvi Jain and A.P. Dhimri, Urban Sprawl Patterns and Processes in Delhi from 1977 to 2014 Based on Remote Sensing and Spatial Metrics Approaches, <https://journals.ametsoc.org/doi/pdf/10.1175/EI-D-15-0040.1>, pg. 7.

The urbanization in Delhi is taking place at a very high rate leading to the degradation of the natural forests, encroachment of the urban development over the lowlands, transformation of many stormwater drains into the drains of dirty water and then are covered, conversion of lakes and ponds into garbage dumps and so on. For instance, Siri Fort Forest was cut to get area for the Asian Games, 1982, Talkatora water reservoir was claimed for getting the swimming stadium for these grand events, the games village for the 2010 Commonwealth games got constructed on the flood bed of Yamuna river and storm drain got converted into a parking lot for JLN stadium to list a few incidents where urbanization became a cause of death for the natural resources available in Delhi.

This change in the ecosystem of Delhi has extreme effects on the various species of birds and wildlife. For instance, there were a large number of birds coming across the Yamuna due to the existence of the Asian Flightpath, but a decline has been reported in this diversity of birds and the sparrow bird, state bird of Delhi, is on the verge of extinction. People in Delhi have started to deal in the illegal trade wild flora and fauna to earn their livelihood leading to serious implications on the existence of the endangered species as well as the sustenance of the ecosystem. The illegal trade of rhinos, lions, tigers, etc. has been reported many times but many other species are also under the danger of such trade. Delhi has emerged as the largest hub attracting people for involving in the illegal trade of these species. For instance, 11 big bundles of Shatoosh wool were caught in 2003 and 293 marine animal articles were caught in 2007 are few of the biggest ever incidents that were reported. This leads to the inference that urbanization has severe ramifications on the wildlife population.

Kolkata

The evolution of the city of Kolkata began during the early eighteenth century from a small trading post to a bustling city by the twenty-first century. Kolkata has emerged as the hub for industrialization during the British era. It is a fact that industrialization and urbanization go hand in hand. The industrialization in Kolkata had brought the flood of opportunities that attracted people of the adjacent states such as Orissa, Bihar and the north-eastern part of the country to migrate to Kolkata. Kolkata has witnessed the increase in population from 4.6 million in 1950 to that of 14.75 million in 2019 (Kolkata Population 2019, 2019). The migration of people in bulk had led to the substantial burden on the natural ecosystem of Kolkata and the adjoining areas leading to the degradation of East Kolkata Wetlands and Sundarbans while rising in socio-economic problems, poverty, traffic congestion, urban pollution, overpopulation, and other logistics problems. Further, a lot of agricultural lands, fallow land, scrubland, marshy land, and shallow water bodies had to sacrifice themselves so that such a large population can be accommodated in the urban city which led to the total land area of around 633.2 square km in 2010. (See fig. 3.1).

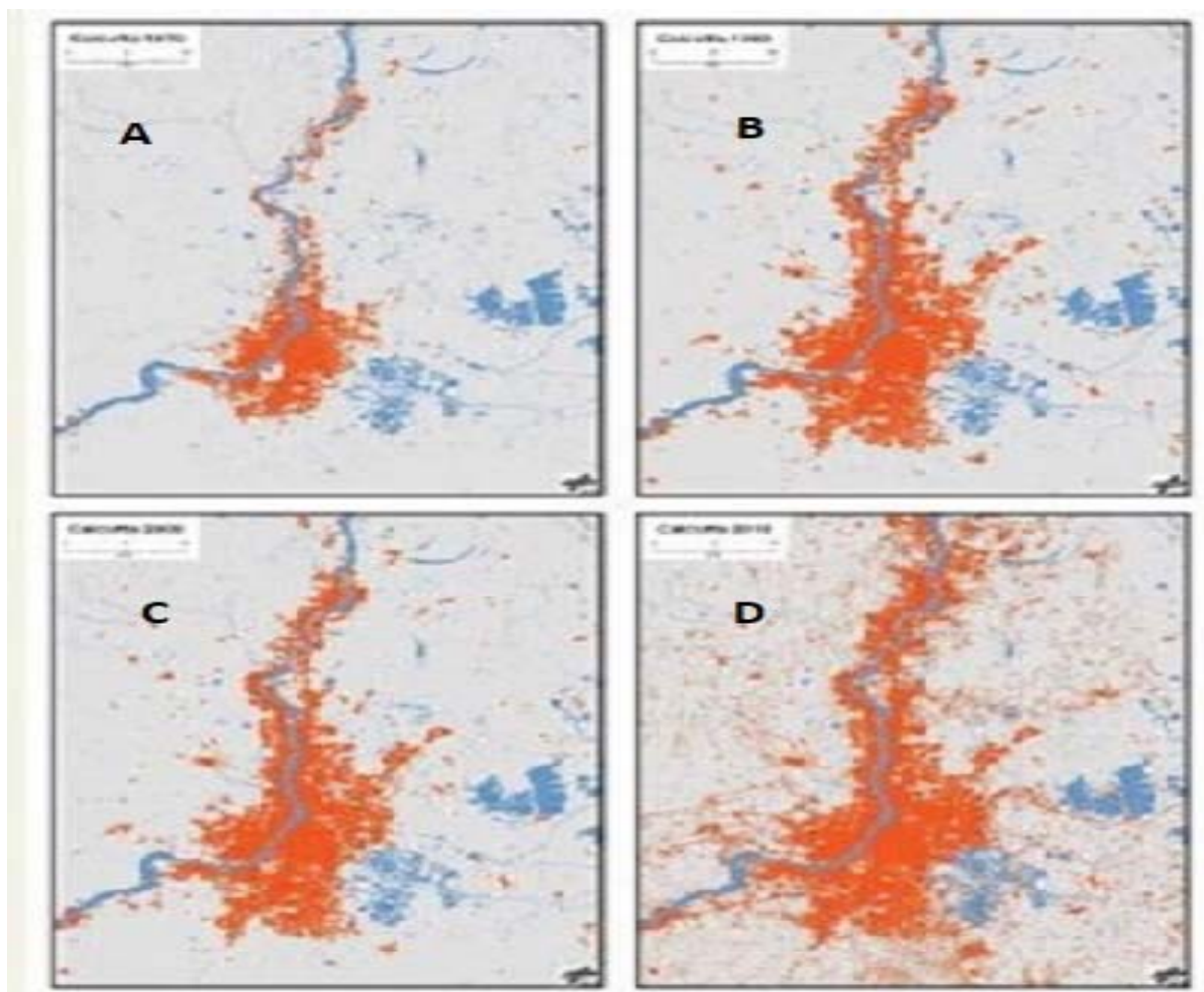


Fig 3.1. Urban Growth of Kolkata for the years (a) 1970, (b) 1990, (c) 2000 and (d) 2010.

Source: WWF Report 2011

http://www.indiaenvironmentportal.org.in/files/file/impact_of_urbanisation_on_biodiversity.pdf pg., 29

East Kolkata wetland is the designated Ramsar site and home to rare mammals like the threatened Indian mud turtle (*Lissemus punctata*), Indian civets (*Viverra zibetha*), small Indian mongoose (*Herpestes javanicus*), marsh

mongoose (*Atilax paludinosus*) and over 100 species of plant. Further, the wetlands are also known for sustaining around 40 species of migratory and local birds, including sandpipers, eagles, terns, egrets, cormorants, grebes (*Podiceps nigricollis nigricollis*), kingfishers (*Alcedo arrhis*) and many more. The massive urbanization in Kolkata has created a voracious demand for the space to accommodate people leading to encroachment over the wetlands. In addition to it, a report showed that around 680 million liters of daily sewage and 3500 tons of municipal waste is getting discharged at the site of wetlands (Suutari, 2006). The partially treated sewage is taken into use for the irrigation of agricultural lands and fish rearing. Further, a study showed that around 70 percent of the total waste generated by the city is discharged into the Bay of Bengal directly while only 30 percent is being used for irrigation and aquaculture. (Dey, 2009)

On the other hand, Sundarbans comprises of ubiquitous mangrove forests, which is also considered as the moist tropical seral forests that consist of tidal forests and beach forests. The Sundarbans serves as a home to a number of threatened and endangered mammals such as great Indian civet (*Viverra zibetha*), smooth-coated otter (*Lutrogale perspicillata*), tiger (*Panthera tigris*) and various small predators such as leopard (*Prionailurus bengalensis*), fishing cat (*Prionailurus viverrinus*) and jungle cat (*Felis chaus*). In addition to it, Sundarbans are known for their floral diversity with around 64 plant species. However, industrial effluents that are carried by the tributaries, unusual discharge of untreated domestic waste and discharge of contaminated mud from the Haldi Port Complex have resulted in the drastic change in the ecology of the delta. Further, the Sundarbans have been exposed to vulnerable pollutants like DDE, DDT, pesticides, heavy metals and so on.

Higher the rate of urbanization, the higher the rate of a declining ecosystem. The increase in waste and urban areas has led to countless problems for the wildlife species living in the wetlands and Sundarbans. This has resulted in various animals to fall into the category of endangered and threatened species.

Laws in India

India has drafted some of the most stringent laws for the conservation of the wildlife and the ecosystem. These are Wildlife (Protection) Act (1972), Indian Forest Act (1927), Forest Conservation Act (1980), Environment (Protection) Act (1986), Biological Diversity Act (2002) and National Forest Policy (1998). We will be focusing on the Wildlife (Protection) Act (1972) and the Biological Diversity Act (2002) as they deal with the wildlife largely.

WILDLIFE (PROTECTION) ACT, 1972

This Act is one of the most important legislations with a major focus on setting such rules and regulations that prohibit hunting, protect and manages wildlife habitats and zoos establishes protected areas and regulates and control trade in parts and products that are derived from wildlife. Tiger reserves and national parks are protected in such a strict manner that only those human activities that are in the direction of the wildlife conservation are allowed. Unlike sanctuaries where grazing and other private tenurial rights can be allowed by the Chief Wildlife Warden, national parks strictly prohibit any such right. The commercialization of the products of forests in both wildlife sanctuaries and national parks is strictly barred under this Act.

These forests are home to various coelenterates, insects, crustaceans, fish, reptiles, amphibians, birds and wild mammals and there are severe repercussions of attempting to hunt them either outside or within protected areas. The punishment for hunting is not only imprisonment ranging from three to seven years but also fine of minimum INR 10,000. Two new categories are created within the protected areas under the statute namely, conservation reserves and community reserves. They cast a duty on the civil societies, stakeholders and local communities and also provide them with an opportunity to conserve those areas which cannot be classified under strict categories such as national parks or wildlife sanctuaries. In addition to it, the Act provides various restrictions on the diversion or destruction of wildlife and its habitat by the use of any method except in those situations which are for the better management and improvement of the wildlife. Such situations will be decided by the state government only after consulting the National as well as State Boards for Wildlife.

The Act lays down the procedure in a very detailed manner for intervening with the legal rights in such protected areas. Various other important aspects are dealt with by the Act are the procedure to regulate trade in wildlife products, the appointment of wildlife boards and state wildlife authorities and detection, prevention and punishment for the violation of the Act. The Act also provides for the establishment of some boards with their focus in a single direction such as the establishment of Tiger Reserves and National Tiger Conservation Authority and Wildlife Crime Control Bureau to list a few. (Wildlife Protection Act, 1972, 1972)

Biological Diversity Act, 2002

Biodiversity becomes very important for the functioning of the ecosystem which makes the survival of humans and millions of species possible on the earth. As per the report of the International Union for Conservation of Nature (IUCN), there are around 17,291 species from a total of 47,677 species which are demarcated as threatened or endangered. India is the home of the two most important biodiversity hotspot namely, Northeast Himalayas and the Western Ghats. India enacted the Biological Diversity Act in 2002 for the conservation of biodiversity, promote its sustainable use and enable equitable and fair sharing benefits that arise from the biological resources.

The Act provides for a three-tier system for the implementation of the statute. These authorities are at the national level, state level, and local level. They keep a check on the prohibited acts under the statute, advise the government for selecting biological heritage sites and conserving biodiversity and so on. It prohibits trade in wildlife such as tigers, rhinos, etc., as it had led to the extinction of these species. The loss of biodiversity can have severe ramifications as the disturbance to any one species will give lead to an imbalance in some other existing species. To do away with such a situation, the government has come up with the idea of establishing various biosphere reserves in several parts of the country. (Justice)

Urbanization Case Study-USA

United States of America is to be considered as the biggest empire that has attained the highest development scale. USA has also accepted inhabitants' migrants. However, urbanization in the USA took a bit later than other developed nations. Migration from the rural areas to urban has made the cities larger and populated. The major reasons seen for urbanization has been for better living standards and better industrial jobs. Major Urbanization was seen on the East coast as it was the entry point for most of the migrants. (Bank, 2019) (Fig.4) We, further, analyse different areas that have had a state of rapid urbanization in the United States of America.

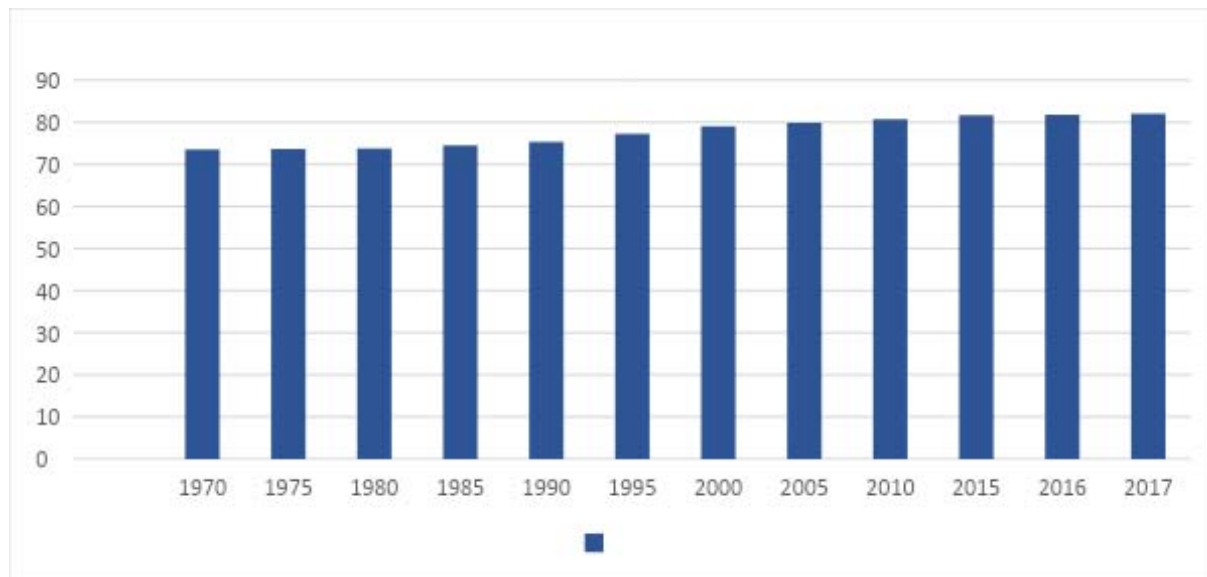


Fig. 4. The rapid urbanization in the USA
Source: Author's Compilation

Seattle

Seattle is seen as a country that had one of the major opportunities in terms of employment in 2000. The statistics show that it was the 7th largest employment base in the USA. As the employment led to higher rates in 2000, Seattle was ranked as the least in terms of Urban Population out of 11 urban areas from the other 13 states with more than 1 million population. If we compare it in terms of percentage, the density was approximately 60% below Los Angeles which was the US's densest urban area. Just the fact that the consistency in increasing urbanization, the call for the destruction of the habitat of the wildlife is evidential.

If we further look at the 2010 Census, it shows a difference in the Seattle metropolitan region. (Table-1)

Seattle Combined Statistical Area: Population 2000-2010						
Area	2000	2010	Change	%	Share of Growth	Share of Population
City of Seattle	563,374	608,660	45,286	8.0%	9.2%	14.5%
Pierce & Snohomish Counties	1,306,844	1,508,560	201,716	15.4%	41.0%	35.9%
Balance: King County	1,173,660	1,322,589	148,929	12.7%	30.3%	31.5%
Metropolitan Area	3,043,878	3,439,809	395,931	13.0%	80.4%	81.9%
Metropolitan Area Outside Seattle	2,480,504	2,831,149	350,645	14.1%	71.2%	67.4%
Exurban Metropolitan Areas	663,260	759,503	96,243	14.5%	19.6%	18.1%
Combined Statistical Area	3,707,138	4,199,312	492,174	13.3%	100.0%	100.0%

Table 1 Calculated from US Census Data (Cox, Newgeography, 2011)

City of Seattle (Historical Core Municipality)

As seen from 2010, the city of Seattle grew by 8% from 564,000 to 609,000 which is considered to be a healthy growth. Adding another 450,000, the city was accountable for 9.2% of the Seattle metropolitan region. The city of Seattle was less than one-third of King County's population. In addition to it, the city continuously saw a decline in the metropolitan regions and the downtown area had almost lost its dominance. (Cox, Newgeography, 2011)

Inner Suburbs

However, the city of Seattle saw a growth of 90% in the metropolitan region. The inner suburbs, that included the south, north, and east of Seattle had a growth of 12.7% between 2000 to 2010. The total growth added nearly 150,000 residents, which is more than three times of the city of Seattle. 30% of the growth of King County also increased in the metropolitan region and became one of the largest diverse cities having the Microsoft Campus in the neighbouring Redmond. (Cox, Newgeography, 2011)

Outer Suburbs

The external Suburbs saw growth from 1.3 million to 1.5 million which added 200,000 new residents more than 4 times the city Seattle. The pierce and Snohomish have captured 36% of the metropolitan region. (Cox, Newgeography, 2011)

Exurban Areas

The exurban areas saw an increase in their population by 14.5%. The exurban statistical areas now account for 20% of the metropolitan region's population growth. (Cox, Newgeography, 2011)

The Dispersion Continues

The dispersion of Seattle, like that of metropolitan regions around the nation and the world, has been going on for decades. The city of Seattle has accounted for only 5 percent of the metropolitan region's population since 1950 (Fig. 4.2) with suburbs and exurbs accounting for the vast majority of the nearly 3,000,000 increase. (Cox, Newgeography, 2011)

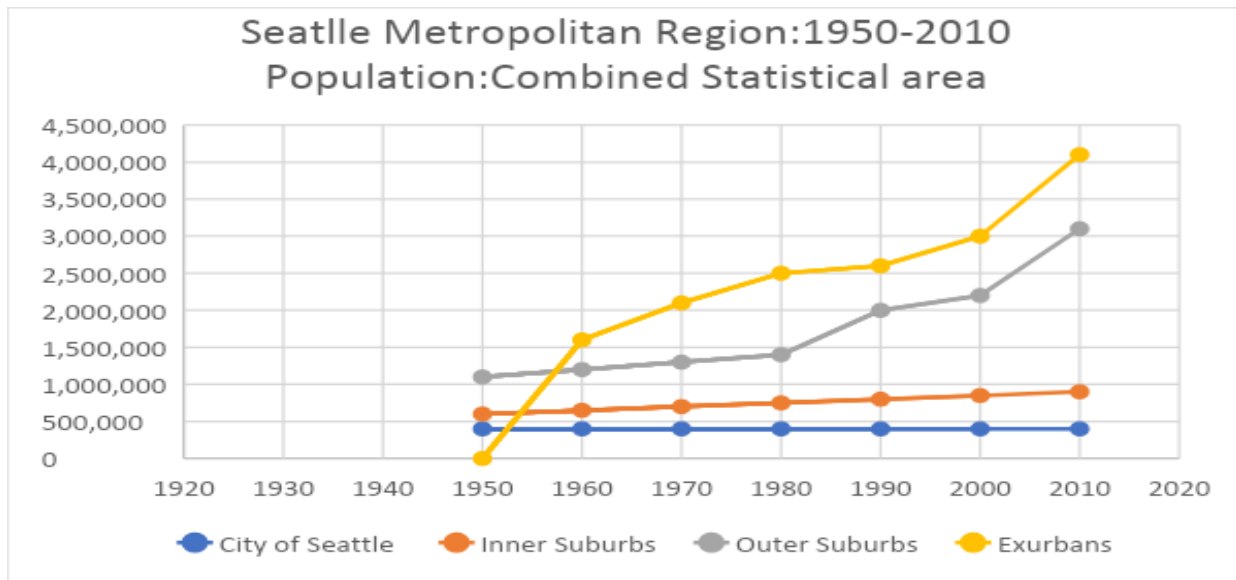


Fig. 4.1. Seattle Metropolitan Region: 1950-2010
Source: Authors Compilation

If we investigate the aspect of Seattle city, we don't see a major growth but the areas abounding the same has seen rapid urbanization growth. Proving by the statistics, the appropriation of the country causes an alarming situation as the Urban population increases stagnating the Wildlife and raises an alarm.

California

As we further analyse, we end up with California, which has evolved after the world-war II and has the highest urban population density. As we look in (Fig. 4.2), we understand that California has an average density of 4300 per square mile and is to be graphed that California has the three most densely populated urban areas in the country. If we look into Los Angeles, we see, it has 7000 residents per square mile, San Jose has 5800 residents per square mile and San Francisco at approximately 6300 residents per square mile. Surprisingly, San Jose, which did not have a pre-World War II urban core, is to be said 10% denser than the urban area with the nation's largest pre-World War II core, New York (5300 residents per square mile). (Cox, newgeography, 2016)

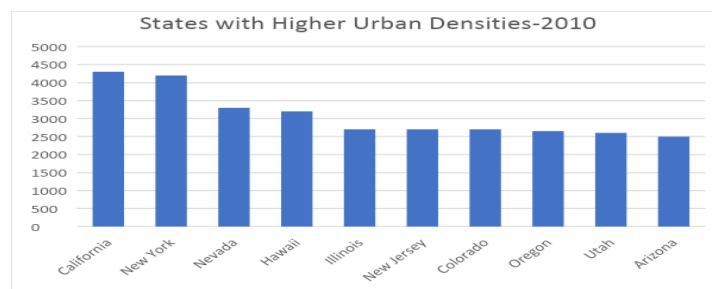


Fig. 4.2. Census Data proving states with higher urban densities. Source: Authors Compilation

Even before Senate Bill 375's radical densification policies were implemented; the high-density credentials of California were impeccable of all the nation's urban areas. California has 21 of the 25 densest areas including Richgrove i.e. an urban area with a population density of over 10,000 per square mile. Richgrove is located in the San Joaquin Valley in Tulare County, which is 10 miles east of State Highway 99, in the city of Delano. Not only Los Angeles is about twice as dense as the Portland template of global densification, but San Francisco, San Jose, Sacramento, Riverside-San Bernardino, and San Diego are also denser than Seattle, not to mention Fresno, Oxnard, Stockton, Los Banos, Simi Valley, and Modesto and, of course, Richgrove (as well as others). New York has the highest urban population density at the rate of 4200 residents per square mile. Shockingly, Nevada has the third population density however below New York.

Las Vegas is the fifth-highest urban population city with more than 1,000,000 people, with 4,500 residents per square mile. Only one other state, Hawaii, has an urban density of more than 3,000 residents per square mile (3200). Honolulu has an urban density of 4,800 per square mile, with less than 1,000,000 people.

Highest Urban Land Percentages in the Northeast Corridor

In the East and Midwest, seven areas are in the South, which, like California, has a reputation for urban sprawl rather than being dominated by states with the urban areas considered to be the densest. Only New Jersey, most of which are suburban New York or Philadelphia, as well as Illinois, home of the nation's third-largest urban area and Chicago ranks among the ten densest urbanization states.

Although California has the densest urbanization, in terms of its urban land area, yet it is by no means the most urbanized. Only 5% of California's land area is urban, which is marginally higher than the national average, but 22 states have higher percentages of urbanization.

Four states are clustered close to the top with under urban development namely, New Jersey, Rhode Island, Massachusetts and Connecticut between 37% and nearly 40% of their land area. Each of these states is in the Northeast Corridor, home to about 50 million people, extending from the suburbs south of Washington across parts of ten states and the Columbia District.

Most states though are much less urbanized. Also, in the northeast megalopolis, the fifth and sixth most urbanized states, Delaware and Maryland, have barely as much urban land as the top four, about 20% urbanized. It's another big drop in Florida's number seven, 14 percent. (Cox, *newgeography*, 2016)

Laws in USA

US has drafted some of the most stringent laws for the conservation of the wildlife and the ecosystem. These are the Lacey Act (1900), Migratory Bird Treaty Act (1918), Endangered Species Act (1973) and Marine Mammal Protection Act to list a few. We will be focusing on the Endangered Species Act (1973) and Lacey Act (1900) as they deal with the wildlife largely.

Endangered Species Act, 1973

The US legislature came out with the Endangered Species Act of 1973 for covering all domestic issues while the UN came out with CITES treaty to protect the species all across the world. The Act had replaced the Endangered Species Conservation Act of 1969. The Act was drafted with the objective to protect those animals that are part of the threatened or endangered species. It has introduced an incidental take permit that works as permission to take any of the listed species, where taking comprises of killing, importing, selling, harassing or habitat modification. The statute provides for penalties, both civil and criminal, for any violation of its provisions.

Further, the Act has even barred all federal agencies to take any action jeopardizing the survival of the listed species or modifying their habitat. It has also cast a duty on the authorities to take steps for the conservation of the listed species and restoration of their number so that they can be removed from the list. The law provides extensive protection to these animals. It lists down around 1925 species of both animals and plants that are facing imminent danger of getting extinct or might get extinct soon. The Act is of evolving nature pursuant to which it keeps on adding the name of those species in the list that are under the threat of getting extinct. Such species which are under investigation for making an addition to the list are known as candidate species. For the protection of land animals, plants, freshwater fishes and marine fishes and wildlife, the Act provides for the establishment of authorities namely US Fish and Wildlife Service and National Marine Fisheries Service respectively. (fund, 2018)

Lacey Act, 1900

In 1900, the legislator of the US came out with this Act for a complete ban on trafficking in wildlife, plants as well as fish that have been sold, transported, possessed or taken illegally. It also makes a prohibition on the failure to mark wildlife shipments and on the falsification of documents for shipments of wildlife by making it a civil and criminal offense respectively. The penalty ranges to a maximum of USD 10,000 and imprisonment of one year. Department of the Interior, Commerce, and Agriculture looks after the implementation of the Act with the help of various agencies namely, US Fish and Wildlife Service, National Marine Fisheries Service and Animal and Plant Health Inspection Service.

Currently, the Act is considered as one of the most comprehensive and broadest weapons that are used by the federal agencies to fight against wildlife crimes. It goes through amendments regularly so that it may not become outdated. The latest amendment of 2008 was done for the inclusion of a wide variety of not only prohibited plants and their products but also those products that are made from illegally logged woods. The Act provides penalties not only for the humans that are involved in the commission of offenses against wildlife but also for the aircraft, vehicles, vessels or any other equipment that is used for commission of any such crime.

Results and discussion

If we look at the current situation, the wildlife is struggling with the management and protection. However, we have stringent laws globally but the Urban wildlife management falls into five broad areas:

- 1) Destruction of the ecosystem and the habitat and fragmentation.
- 2) Anthropocentric Approach
- 3) Lack of public awareness, education, and mismanagement of the resources
- 4) Lack of multidisciplinary efforts and visionary thinking and commitment to managing wildlife of the urbanized Landscape
- 5) The need for comprehensive and integrated plans, continuing action, and adaptive management

The Urban Wildlife Management programs should start working with the Urban population growth management programs globally and not specific to any one country. The urban population is an alarming situation not just for developed or developing countries, it's a situation that has raised an alarm globally. The landscape changes with the human dimensions as they have prioritized an anthropocentric approach which now needs to shift towards a biocentric approach. Those laws should be implemented in which biodiversity is above humans because, in the end, it's again for the benefit of humans. Mandatory adoption of legislation to provide general awareness and education should be implemented as the youth covers the largest urban population and they need to understand the need for protecting the environment and not exploiting the handful of resources we are left with. A new millennium and prospects for new wildlife funding provide the impetus for more attention to urban wildlife conservation in developed countries. Students of urban ecology identify numerous challenges for multidisciplinary efforts involving regional and city planners, natural resource managers, and urban conservationists.

The scale of needs and opportunities extends from the sanctuary of the backyard to the level of the regional landscape. We, further, suggest the following prioritization for wildlife management:

- 1) An increased need to consider wildlife hazard management programs and initiatives.
- 2) Planning and mitigating the effect of urbanization on habitat, habitats, and interactions between humans and wildlife, such as artificial feeding.
- 3) Urban green space restoration and management.
- 4) Research and education programs designed to address wildlife and nature social needs, the role of wildlife in outdoor recreation and the conservation of wildlife resources under sustainable development and continuing urbanization.
- 5) Strong efforts should be made in inventory, research and monitoring of wellrounded urban wildlife programmes; planning and management; public and multiagency information, education and extension services; and urban habitat acquisition, development, and conservation.

UN legislation that has taken over the Endangered Species Act of 1973 has expanded the act. However, if we analyse, we understand that the current situation of urbanization should not restrict only up to the endangered species. UN should specifically cover all the Wildlife in one Act, for instance, any Global Wildlife Act, which provides equality to all the animals and not just the endangered one, as they are already at the severity of extinction.

The species that are in abundance, in the current situation, also require the same protection as that of any other endangered species because the growth of urbanization and the anthropocentric nature is soon to bring them down. Current issues in the Landscape Ecology of Urban Wildlife Management are the sub-discipline that includes both natural and cultural systems.

In landscape ecology, at least two approaches can be taken. The biocentric approach emphasizes the importance of landscape phenomena and processes are evaluated with reference to communities of plants and animals. However, the anthropocentric approach emphasizes the ecosystems of human relationships. In the latter, the emphasis is placed on humans short-term as well as long term needs along with human responsibility for the environment and its biodiversity. The importance of urban areas to maintain biological diversity also was observed by Murphy (1988:76) who stated “Our urban centres can be viewed as bellwethers of our global environmental fate. Our success at meeting the challenges of protecting biological diversity in urban areas is a good measure of our commitment to protect functioning ecosystems worldwide. If we cannot act as responsible stewards in our backyards, the long-term prospects for biological diversity in the rest of this planet are grim indeed.” We review landscape ecology and biological diversity in relation to the urban environment.

Conclusion

Our study has revealed the new aspects of rapid urbanization in different areas, be it developing countries, or a developed countries and various structure and composition are reflected from the census data. We have understood that urbanization is a threat to the world and holds a figure to destroy the wildlife which at the end is a threat to the humans. We have found that however there are economic difference in the country the needs and requirement of an individual maybe different in the countries but the result towards the destruction of wildlife has been the same, equal levels of habitat loss, destruction of forest areas, climate changes are concerns that are being the same despite of variations in the countries. As urbanization takes place globally a need for urban decision makers and the citizens need to adopt policies and act on them in their daily lives to sustain. We have found strong agreements between the United Nations organization and different countries, which have been a part of the treaties but the implications of the treaties are still in vain as the concern over urbanization and wildlife management still do not have any major difference in the results. We understand that despite, having various laws globally, the need to understand the issue on ground level is a must and it's time to adopt strict legal implication for any damage caused to the environment. Our research points to the need for focused and critical evaluation of the management of wildlife along with the urbanization growth. Improved qualitative and quantitative studies on the ecosystem service in the developing region needs to be covered where both rapid urbanization and projected loss in protected areas and hotspots are expected to occur; and development of stronger theoretical framework integrating social and cultural values of the urban ecosystem with monetary values in decision making process is required. (Thomas Elmqvist, 2016)

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