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Introductory Chapter: Managing Wildlife in a Changing World - Trends, Drivers and the Way Forward

Jafari R. Kideghesho

1. Introduction

The wildlife managers, scientists and policy makers globally, are striving to ensure the survival of wildlife resources in the face of rapid changes in socio-economic, ecological, political and technological aspects. One of the key and popular strategies that have been adopted to conserve wildlife species is the establishment of different categories of protected areas. A protected area is defined as “geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long term *conservation* of nature with associated ecosystem services and cultural values” [1]. Since the establishment of Yellowstone National Park in 1872 - the first protected area in the world - a number of protected areas has been growing over time. In 2010, there were about 161,000 protected areas [2]. *The 2016 Protected Planet Report* [3] indicated an increase to 202,470 protected areas spanning about 20 million square kilometers (15% of the world’s land, excluding Antarctica). As of August 2020, the number increased beyond 260,000 [4].

Establishment of protected areas has been complemented with many other strategies. Local and global commitment have been apparent through enacting and enforcement of numerous laws; provision of alternative livelihood strategies as a substitution to ecologically destructive activities; and supporting community-based conservation programmes including conservation education and awareness creation, benefit-sharing schemes, among others.

Local, regional and international instruments have been established to spearhead the conservation efforts and stem the causes of species loss. The popular international instruments, among others, include Convention on International Trade in Endangered Species of Flora and Fauna – CITES (year of entry into force: 1975), Convention of Biological Diversity -CBD (1993), Convention on Wetlands -popularly known as the Ramsar Convention (1971), Convention on the Conservation of migratory species of wild animals -CMS or Bonn Convention (1975) and World Heritage Convention - WHC (1972). The regional instruments include The Lusaka Agreement on Co-operative Enforcement Operations Directed at Illegal Trade in Wild Fauna and Flora; The Southern Africa Development Community Protocol on Wildlife Conservation and Law Enforcement; The Convention on Conservation of Nature in the South Pacific; ASEAN Agreement on the Conservation of Nature and Natural Resources’ and Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention).

2. Declining trends and drivers

Despite efforts which are being devoted locally, regionally and globally to curb the threats facing wildlife, it is increasingly becoming evident that these efforts are not matching the rates of the threats. The UN Report titled *Nature’s Dangerous Decline ‘Unprecedented’; Species Extinction Rates ‘Accelerating’* released by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), indicates that roughly one million animal and plant species are currently threatened with extinction [5]. According to the Report, most major land-based habitats have lost at least 20% of the average abundance of their native species since 1900. Over 40% of amphibian species and 33% all marine mammals, respectively, are threatened with extinction. Since the 16th century about 680 vertebrate species have been driven to extinction [5]. Furthermore, the recent report of IUCN *Redlist of Threatened Species* has revealed that, out of 158,908 species of vertebrates assessed, 35,300 (equal to 28%) are threatened with extinction [6]. Among other species, the declining trends involve the umbrella, keystone and charismatic species such as black rhino (*Bicornis diceros*), African elephant (*Loxodonta africana*), tiger (*Panthera tigris*), African lion (*Panthera leo*) and leopard (*Panthera pardus*) [7–12].

The declining trends of wildlife species and biodiversity in general, is a function of multiple factors (**Figure 1**) associated with socio-economic, ecological, technological or political changes. Growing human demand for food, timber, water and space is increasingly causing habitat loss and deterioration and, thus, subjecting many species to a risk of extinction [12]. According to IPBES Report (5), about 47% of natural ecosystems have declined globally and over 9% of the world’s estimated 5.9 million terrestrial species have insufficient habitat for long term survival without efforts to restore the degraded habitats. Reduced home ranges for different wildlife species and blockage of corridors are exacerbating property damage and human mortalities and, therefore, inciting pre-emptive or retaliatory killing [12, 13]. Likewise, poaching and illegal wildlife trade has accelerated declining rates to species of high economic value such as rhino, elephant, pangolins and tiger [14–19].

Human population growth is the main driving force behind most of the threats facing wildlife species. It is linked to current trends of invasive species, climate change, wildlife crime, pollution, and habitat loss and human-wildlife conflicts. The current world population of 7.8 billion [20] is projected to reach 8.6 billion in 2030;

Figure 1.
Increasing trends of protected areas globally from 1990 to 2016 [3].

9.8 billion in 2050 and 11.2 billion in 2100 [21]. These projections signify that demand and consumption for resources such as food, fuel, timber and space will increase significantly at the expense of wildlife species as more land will be transformed into human settlements and infrastructures. It is estimated that humans and domesticated livestock account for about 36 and 60 percent of the biomass of all mammals on Earth, respectively, while wild mammals have declined to only 4 percent [22].

Blockage of wildlife corridors and, subsequently, habitats fragmentation is rendering many protected areas isolated as ecological islands [23–25]. Disruption of the ecological linkage between different animal populations, consequently, reduces the genetic variability due to inbreeding depression [12–27]. Furthermore, loss of wildlife corridors and dispersal areas compromise their roles in minimizing human-wildlife conflicts, provision of alternative foraging or breeding grounds and serving as a refuge against adverse weather conditions [27].

Technological advancement, improved accessibility to remote areas and availability of markets for wildlife products have also worsened the destruction of habitats and depletion of wildlife species [28–31]. Emerging of new economic opportunities and increasing need for development are giving rise to adoption of policy choices that are economically rewarding but ecologically damaging such as mining, industrial agriculture and construction of infrastructures [32–37]. Political unrest and associated effects such as insecurity, proliferation of firearms, influx of refugees and disruption of operations of protected areas has contributed enormously to the increased decimation of wildlife populations and destruction of habitats [38–40].

Climate change is increasingly featuring as one of the important global agenda impacting nature and human life. The main driver of climate change is destruction of nature through human actions such as increased use of fossil fuels, deforestation and intensive agriculture. Food insecurity and income poverty ensuing as a result of climate change leave people with limited livelihood options, a situation that may prompt engagement of people in poaching and habitat destruction [41]. Climate change accelerates habitat threshold and increases risk to species in fragmented habitats [42]. Climate change is confirmed to facilitate the increase of wildlife diseases [43–45], spread of invasive species [45–47] and escalation of human-wildlife conflicts [12, 48].

In recent decades the number of invasive alien species has kept on growing and thus posing a serious threat to native wildlife species [49–52]. Nearly 40% of introductions of invasive alien species in the past two centuries occurred between 1970 and 2014 [46]. According to Seebens et al. [53] the projected overall increase of alien species between 2005 and 2050 was 36% per continent. The challenge is increasing in tandem with the changes which are taking place globally such as international trade; global transport of goods, population changes, migration, pollution, tourism, recreation, climate change and economic development such as land use and energy consumption [54–59]. Invasive alien species present threat to native species by out-competing them for food and other resources, destroying their habitats, introducing diseases, thwarting reproduction of native species, preying on native species or killing the young of native species [60–63]. The proportion of threatened or endangered species facing a risk of extinction because of invasive species is estimated at 42% [64]. Among other threats, Invasive species are currently threatening 27% of the globally threatened terrestrial species of mammals, birds and reptiles included on the IUCN Red List, and 40% of the critically endangered species, in particular [52].

Human population growth, urbanization, habitat loss, poverty, climate change and improved conservation measures, among other drivers, are intensifying human-wildlife conflicts in many parts of the world. Numerous wildlife species are subjected to risk as human-wildlife conflicts intensify. Economic loss and mortalities caused by problem and dangerous animals incite retaliation in form of killing and destroying wildlife and their habitats [48]. Similarly, population growth, destruction of

ecosystems, climate change along with increased human activities such as industrialization, mining, water-waste, metal refining and the burning of fossil fuels are exacerbating pollution in form of synthetic chemicals, oil spills, toxic metals and acid rain. The documented impacts of pollutants to wildlife species include immediate deaths, habitat destruction, reduced or impaired reproduction, cancer, neurological damage, liver damage, muscle atrophy and immune suppression to diseases [65–67].

Increasing human impacts on ecosystems, climate change, invasive alien species and pollution are attributed to emerging and re-emerging of diseases affecting humans and non-human species [65, 68–71]. Human-induced changes on land use and land cover through modification of natural habitats are responsible for over 50% of the emerging zoonoses [72–76]. Given the global human population growth and deforestation rate, estimated at 10 million hectares per annum [76], it is indisputably that the risk of animal-to-human diseases transmission will increase along with increased proximity of humans and livestock to natural habitats. Diseases have both direct and indirect impacts on wildlife species. Direct impacts involve effect of a disease on the health of animal species which can subsequently lead to deaths. Examples of diseases with direct impact on the health of animals are anthrax and Canine Distemper Virus Disease. Indirect impacts are impacts which disrupt the management interventions of the species and habitats. For instance, emerging of pandemics (e.g., Ebola and COVID-19) and, consequently, imposition of travel restrictions and lockdown had reduced revenues from tourism and impacted the livelihood of many people. This has denied conservation authorities adequate resources for conservation and, therefore, subjecting wildlife species to risks including poaching [75].

3. The way forward

Reversing the declining and extinction trends that the world is experiencing today calls for effective planning, innovations and adoption of approaches that are developed through scientific realities. Understanding of the factors and the mechanisms in which they influence the survival of wildlife is critical in devising the mitigation against the current challenges facing wildlife. Deliberate efforts are required to address the underlying and proximate causes of the declining trends and extinction of wildlife species. This book “*Managing Wildlife in a Changing World*” presents issues and possible options for effective management of wildlife in a world where the changes are no longer speculative, but a reality and inevitable. By reading the Book, you will realize that not all conservation issues require biological solutions. Sociological approaches are essential as most of the current challenges are anthropogenic in nature. Issues such as poverty, human population growth, human-wildlife conflicts, illegal use of resources, habitat loss, proliferation of invasive species and diseases, among others, call for informed policies, public awareness, wide stakeholder involvement in planning, decision-making and implementation of conservation measures.

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