

## Research Article

# The Coverage of Biodiversity Conservation Issues in Local Newspapers and Its Role in Enhancing Conservation Awareness in Tanzania: An Analysis of Two News Outlets

Alfan A Rija<sup>1\*</sup> and Jafari R Kideghesho<sup>2</sup>

<sup>1</sup>Department of Wildlife Management, Sokoine University of Agriculture, Morogoro, Tanzania

<sup>2</sup>College of African Wildlife Management, Mweka, Moshi, Tanzania

## Abstract

Review on the coverage of biodiversity issues in local newspapers was conducted between 2004 and 2013 to understand the importance given to the conservation news by two local newspapers. Twelve biodiversity issues were covered at varying scales, both from rural and urban areas. Reports on biodiversity issues showed a fluctuating but with increasing trend. The reporting of biodiversity issues was overall higher than the coverage of socio-political issues during the studied period. However, both newspapers reported very few research-based news (<5% of all reports) and some news were incorrectly presented, suggesting inadequate knowledge on conservation issues among the journalists and a limited interaction between the media and scientists. Conservation education to journalists and improved interaction and information sharing between scientists and journalists are critical factors in improving the quality of biodiversity conservation news flowing to the general public and policy makers.

**Keywords:** Biodiversity issues; Conservation awareness; Newspapers; Wildlife; Tanzania

\*Corresponding author: Alfan A Rija, Department of Wildlife Management, Sokoine University of Agriculture, Morogoro, Tanzania, Tel: + 255 232601376; Fax: +255 232601376; Email: al.rija10@gmail.com

**Citation:** Rija AA, Kideghesho JR (2020) The Coverage of Biodiversity Conservation Issues in Local Newspapers and Its Role in Enhancing Conservation Awareness in Tanzania: An Analysis of Two News Outlets. Arch Zool Stud 3: 013.

**Received:** March 04, 2020; **Accepted:** March 30, 2020; **Published:** April 06, 2020

**Copyright:** © 2020 Rija AA, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

## Introduction

Loss of biodiversity is increasingly attracting a wide academic and public attention as one of the leading global environmental issues [1-4]. WWF's two Living Planet Reports [5,6] revealed a global population decline for vertebrate species by 60% between 1970 and 2014. The reports predict a further decline to 67% by 2020, unless intervention is adopted to reverse the trend. According to IUCN [4], over 27,000 species (about 27% of all assessed species in 2018) were threatened with extinction. These include 25% of mammals, 40% of amphibians and 14% of birds.

Africa is the most vulnerable continent, having lost almost 60% of its large mammals' population in the past 40 years even within the protected areas [7-9]. In East Africa, the population of large mammals has plummeted to less than 50% [7,10] and a significant number is vulnerable to extinction as a result of increasing pressures such as species over-exploitation, habitat loss and illegal trade [4,11-13].

Tanzania, one of the East African countries, has equally suffered from stresses that have left its biodiversity at risk. Overexploitation of species, habitat degradation and transformation of natural landscapes, to other land use categories; have reduced the population and number of key species inside and outside the protected areas [8,14,15]. For example, species of large mammals became locally extinct in a number of Tanzanian national parks including Mkomazi [16]; Kilimanjaro [17]; Lake Manyara [14] and Tarangire [18]. More recently an endemic Kihansi spray toad (*Nectophrynoides asperginis*) was declared extinct from its natural Kihansi Gorge Forest in Tanzania [19] although the species is currently being reintroduced back in the wild [20].

The loss of biodiversity and its apparent ecological and economic consequences have prompted solid policy actions at local and global levels to address the drivers of loss (see e.g., [1,21]). For any policy action or strategy to work, it must be communicated effectively to policy makers and stakeholders whose actions have impact on biodiversity. This is critically important in order to create awareness and inspire positive actions that promote biodiversity conservation and discourage human activities with negative impacts on biodiversity [13,22].

Media including newspapers play a critical role in raising awareness and improving the public understanding of the benefits, challenges, trends and policy actions on/of biodiversity conservation. They promote an understanding of the interactions between science and the public as an important way of learning the important links existing between nature and human existence [23,24]. For example, understanding that biodiversity provides ecosystem services (e.g. clear air and water, regulation of temperature, pollination functions, recreation etc.) for supporting life on earth can enhance people's attention to environmental conservation [23,24]. Thus, the public may take initiatives to maintain biodiversity and improve the landscape health for human existence [24,25].

Interactions between science and the public exist as continuum where at one end researchers must generate information while the media in the middle of the continuum should pass the information to the public who are the users of information at another end of the continuum. Accordingly, there have been a growing number of scientific publications from environmental and biodiversity conservation studies in Tanzania. Such studies have mainly been prompted by increasing conservation and environmental challenges, their effects, and growing interest to address these challenges [12]. Such studies have ranged from investigating illegal hunting of wildlife (e.g. [18,26-29]), wildlife habitats and ecosystem connectivity e.g., [30,31], human-wildlife conflicts, e.g., [32,33], mining and environmental healthy e.g. [34], and human development and species loss, e.g., [13,19,20,35].

Despite the wealth of scientific information generated from different studies, it is not clear how such information trickles down to the general public to inform the actions in favor of biodiversity conservation. However, elsewhere, evidence suggests that most published scientific reports either end up in shelves [36] or remain in language that is perceived too difficult to be comprehended and assimilated by the non-scientific community [37,38], a situation that may not be different for Tanzania. Essentially, research reports are mostly being communicated among the scientists themselves [39] mainly due to inadequate interaction between the scientists and journalists [40]. This has, consequently, caused the information gap between the scientists and the general public [37,40,41] thus, undermining the efforts to curb environmental and biodiversity threats emanating from anthropogenic causes [12,13,35].

Scientific studies have established the useful roles of media in the provision of information, the construction of knowledge and the cultivation of skills and attitudes [22,42,43]. Media as a risk communicator, or as a promoter of data, information and good practices of any kind, is expected to motivate people to align their behaviors with conservation goals and become more environmentally responsible [43-45]. Furthermore, through media (electronic or printed), people are informed and be able to associate reasons and effects, and, therefore, establish the origins and the causes of the major environmental and conservation problems [43,46].

Local media are the immediate source of information that can reach the general public within a relatively short time period across the country. Newspapers, like other media channels such as radio, television and social media, are particularly useful as tools for raising awareness and promoting biodiversity conservation [47,48]. Furthermore, the last decade has seen a growing body of literature on the media and environmental conservation issues mostly from western countries. For instance, most publications that examined media and environmental-related issues such as land use and land cover change impacts, climate change, tourism and natural disasters [49-52] were from Europe and North America. The same regions also had greater degree of public sensitization about nature [53,54].

A corresponding trend exists between the media and biodiversity conservation. For example, studies on use of charismatic species in popular conservation magazines aiming at creating conservation awareness and fund raising for conservation [55], warning of anthropogenic consequences of species over-exploitation [56], human-wildlife conflicts [47,48] and the effective management of ecosystems to maintain stability [57] have portrayed the western and Asian (particularly India) perspectives.

## Framing the issue

Use of media is construed as one of the effective strategies of enhancing public understanding of biodiversity values, trends and threats in a way that empowers people to make choices and act based on sound scientific and evidence-based recommendations [37,58]. However, there is a concern among the conservationists and general public that the biodiversity crisis doesn't get the headlines it deserves and often the contribution of biodiversity resources to society are understated [59,60]. Greater priority is often placed on other issues, such as politics, leisure and sports, terrorism, health, economy [59]. This, consequently, limits the public understanding of the magnitude of the conservation problem and strategies to address it. Furthermore, there are limited opportunities for the lay public to stay abreast of the rapid rate of scientific discovery [61] due to insufficient interaction between scientists and journalists [22,38] and failure of the journalists to interpret the scientific findings into a simple non-scientific language [37,39]. Inadequate knowledge of biodiversity and conservation issues among the journalists is also not uncommon in most of the developing countries, thus contributing to misreporting of the issues.

Effective media intervention is important in shaping the mindsets of the societies and policy makers about the value of biodiversity in providing economic and ecological services and thereby promoting its conservation, sustainable use and equitable sharing of benefits. However, a critical analysis of performance of the media on reporting of the biodiversity and conservation issues is imperative. In developing countries, where threats on biodiversity are growing [12], little is understood regarding the role of media in environmental sensitization among the public [62]. Tanzania is no exceptional. Contribution of local newspapers in enhancing conservation awareness is not acknowledged in scientific publications despite the mounting pressures on country's natural resources and biodiversity. The goal of this study was to improve an understanding of the roles that local newspapers play in communicating information about biodiversity and conservation to general public and, therefore, improving their knowledge, skills, attitudes, behaviors and actions. Specifically, the study sought to:

- i. Assess the types of biodiversity and conservation news reported in the local newspapers;
- ii. Understand the spatial distribution of the reported biodiversity and conservation issues in the country and the affected habitats and wildlife species,
- iii. Assess sources of the news reported in local newspapers with a focus to scientific publications and understand the author/editor's opinion, if any, on the reported environmental and biodiversity concerns. This is because the news editors' opinion may reflect their interests, thus their propensity to publishing news in the local newspaper e.g. [63],
- iv. Assess the quality and verity of the reported news.

This study provides insights on how local newspapers can be used to foster biodiversity conservation awareness among the public and forms a baseline for future investigations into other media types.

## Material, Methods and Data Analysis

This study was conducted from October to December 2013 at Sokoine University of Agriculture, Solomon Mahlangu Campus.

We used local newspapers archived in Sokoine National Agricultural Library (SNAL) to access two popular local newspapers (Majira and Daily News) published from 2004 to 2013. The *Majira* newspaper is published in Kiswahili (a national language spoken across the country) and the *Daily News* is published in English. These newspapers were selected against other newspapers (*Nipashe, Rai, Mwanania, Raia Mwema, Mwananchi, Tanzania Daima, Jamhuri, The Citizen and The Guardian*) for a number of reasons: they are published regularly (dailies) and are one of the top most circulated in Tanzania; have been in the news publication business for at least ten years and; have an established archival system deposited at SNAL. Selection of *Daily News*, published in English and owned by the government, and *Majira*, published in Swahili under private ownership was important for comparison purpose to establish whether language and ownership can influence the coverage and quality of biodiversity and conservation news. The Government is responsible for overseeing conservation of wildlife and biodiversity in the country as stipulated in the national policies of wildlife and environment [64,65]. We assumed that the newspaper under the Government ownership would be used more regularly to disseminate environmental and conservation education to the public compared to privately owned newspaper. The news items on biodiversity and conservation were classified as news articles, features articles, columns, editorials and human-interest photographs.

Data collection was preceded by a one-day training workshop given to three field assistants who helped in data collection from the newspapers archived in SNAL. The field assistants were oriented on some safety precautions particularly on handling old and dust archived newspapers. The actual data collection comprised a four-step process. First, we searched for two newspaper outlets from the library archive aiming for all issues published within the targeted ten years (i.e. N= 10\*365 paper issues each for *Majira* and *Daily News*). All retrieved newspapers were sorted according to the news outlet (i.e. type of newspaper) and year published. However only 54% of these (N= 3923 from both *Majira* = 2133 and *Daily News* = 1790) were found in the archival room and there were no means of accessing the missing papers as they may have been removed from the store. Each year under the period investigated was represented by these newspapers albeit in varying amount. Second, a sample of 3000 newspapers was drawn randomly from the collection (i.e. 150 newspapers per outlet per year) for inventory of biodiversity conservation news reported. To collate these data, the newspapers were recorded the issue number, year of publication and scanned through the pages for titles related to environment and biodiversity conservation (here with subsequently referred to biodiversity issues) or report not related to these (e.g. socio-political). Third, upon sighting a relevant title, a detailed reading was conducted to understand the news and to record the types of biodiversity issue(s) reported.

Further, to simplify the reviewing, a list of biodiversity issues prepared in priori was used to guide the data collectors. These include, occurrence of wildfires in natural environments, pollution (both in wild and urban environments), illegal resource exploitation (both aquatic and terrestrial), droughts and land use and land use change impacts, overgrazing, deforestation and logging, wildlife habitat encroachment, wildlife poaching, illegal wildlife trade and charcoal making. Fourth, for each reviewed newspaper, an attempt was made to extract the opinion by the editor on the reported environmental or conservation news. For all news reviewed, the issue reported, location/area where a conservation threat was cited, species or ecosystem

affected, causes of the threat (if mentioned), and authors' views on the issues being reported were recorded. Furthermore, the nature of the news reported (whether a scientific research or not) was recorded. Forty articles (20 from each newspaper) were picked randomly from all biodiversity and conservation articles in the sampled newspapers and assessed thoroughly to establish the quality and reliability of the news.

For analysis, the collected data were entered into a spread sheet and cleaned for errors. The Excel program was used to generate tables of the reported biodiversity and conservation issues reported in the newspapers. Trend graphs were plotted to understand status and trends of the reported news on biodiversity and conservation issues over the study period. To understand the difference in the news coverage between the two newspapers, a non-parametric Wilcoxon signed rank test was used to compare the reported issues as the collated data failed the normality test (Shapiro-Wilk test >0.05) under SPSS program ver. 16. Furthermore, most analyses involved calculation of frequency of variables. Finally, the reported areas in newspapers were plotted on a map to understand the spatial distribution of the news across Tanzania.

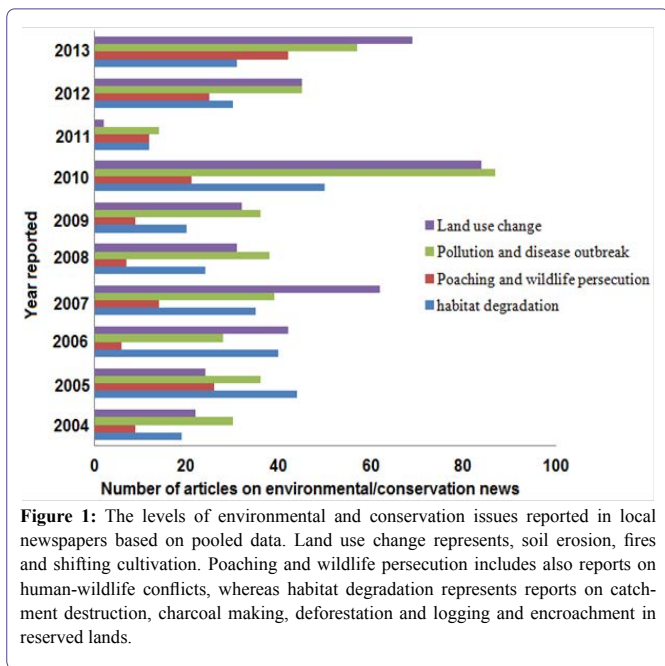
## Results

### Coverage of biodiversity and conservation issues in local newspapers

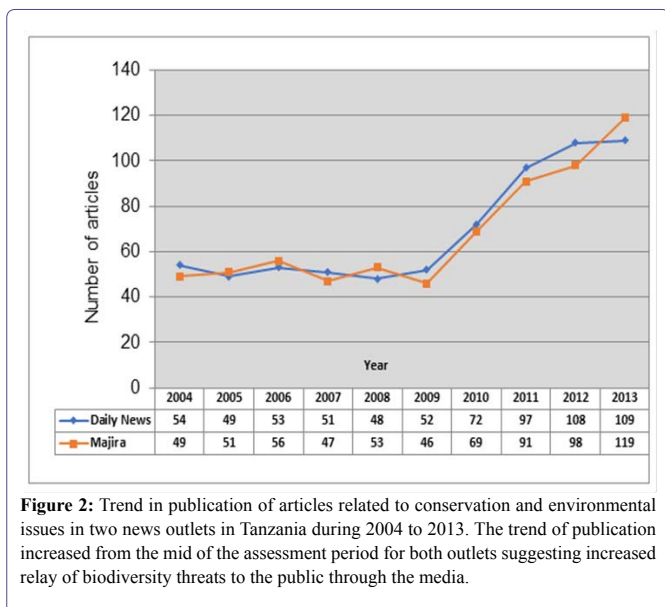
In total, the number of biodiversity news reported in the *Daily News* and *Majira* during the period under review (2004 – 2013) was 693 and 679, respectively. The abundance of the news reports was not significantly different between the two outlets (Wilcoxon W = 144.0, Z = - 0.347, p = 0.729). However, the frequencies of news on individual issues were variable (Table 1). Some environmental issues such as diseases outbreak featured more frequently in both news outlets (23.09% in *Daily News* and 19.73% in *Majira*) than other issues during the assessment period (Figure 1).

	Frequency (%) of issues		Difference between reported issues DNp*Mnp (Z-test, Sig)
	Daily News	Majira	
Environmental/conservation threats			
Catchment destruction	7.36	15.46	0.67 NS
Charcoal making	1.88	2.8	0.45 NS
Deforestation and logging	8.95	6.33	0.89 NS
Diseases outbreak	23.09	19.73	0.89 NS
Encroachment in reserved areas	1.01	0.74	0.22 NS
Soil erosion	6.64	2.5	1.34 S
Fire	8.66	16.64	1.34 S
Land use change	16.31	19.73	0.44 NS
Wildlife persecution	0.87	0.59	0.22 NS
Poaching	6.2	6.19	0.44 NS
Pollution	14.43	2.8	1.34 S
Wildlife-human conflicts	4.62	6.48	0.67 NS

**Table 1:** The proportion of environmental and conservation issues reported in the two newspapers showing frequency of occurrence in the Daily News (n = 693) and Majira newspapers (n = 679). The issues pooled from across ten years were compared at 0.05 significance level, DNp = Daily News, Mnp = Majira, NS = not significant and S = significant.



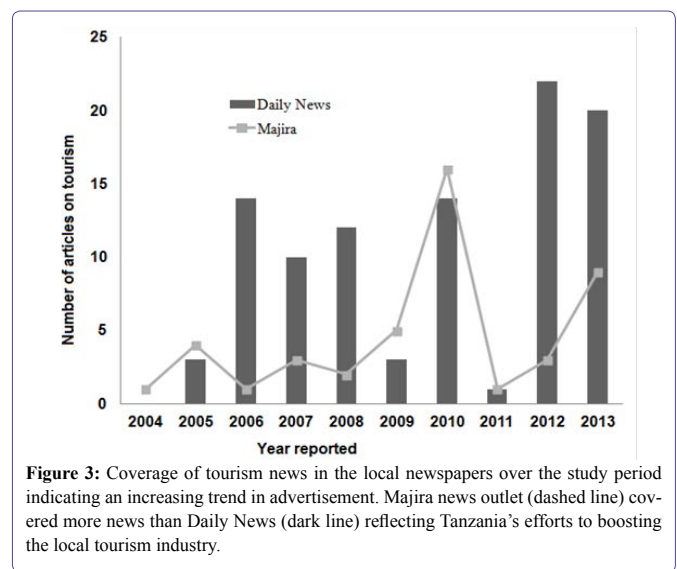
Reports on impacts of land use change and diseases outbreak ranked the highest among other issues in the Majira papers while in the Daily News, land use change ranked the second after diseases outbreak (Table 1). Climate change impacts were, overall, highly reported in each year (Figure 1). Overall, there was an increasing trend in publication of biodiversity news over the assessed period, 2004 to 2013 (Figure 2).



### Socio-political news coverage in local newspapers

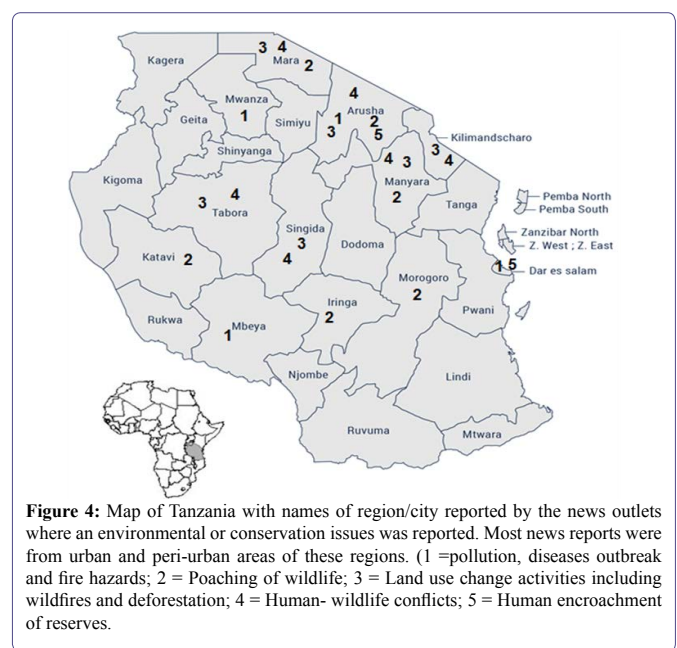
Reports on tourism in both news outlets were featured in a relatively similar frequencies (Wilcoxon  $W = 108.5$ ,  $Z = -1.189$ ,  $p = 0.234$ , Figure 3). About 6.3% and 19.8% of the news reported in Daily

News and Majira, covered corruption and mismanagement of government office respectively. Majira covered slightly more (21.8%) local political news than Daily News (19.8%). However, the local political news was more dominant (41.7%) than corruption news (26.1%) during the study period. Pooled together across the study period, conservation-unrelated news (i.e. socio-political news) featured slightly less (42.1%) than were news on biodiversity news (47.9%).



### Spatial distribution of biodiversity issues in Tanzania

The distribution of coverage of biodiversity news was variable (Figure 4). Most of the news (89.4 %,  $n = 1372$ ) reported environmental issues (pollution, diseases eruption and fire hazards) from urban areas including cities and the rest (10.6%) covered news on wildfires from rural areas, particularly Kilimanjaro, Katavi and Tarangire National Parks and from Mufindi Forest Plantations in Iringa Region (Figure 4).



Of the news from urban areas, about 49.3% covered the sub-suburbs and peri-urban localities of the four cities, Dares Salaam, Mwanza, Arusha and Mbeya. Furthermore, the distribution of conservation-related issues such as poaching, land use change impacts and habitat degradation was not homogeneous. Notably, the poaching news was reported from Katavi, Manyara, Mara, Morogoro, Iringa and Arusha. Land use change and human wildlife conflicts on the other hand were reported in Mara, Arusha, Manyara, Kilimanjaro, Singida and Tabora Regions (News on human encroachment on the wildlife reserves and other protected areas were reported from Dar es Salaam, Manyara (Tarangire National Park) and Arusha Regions.

### Coverage of wildlife species in the local newspapers

Ten species of wild animals and three species of plants were reported in both newspapers. Specifically, the reports focused on pressures facing these species from humans due to illegal exploitation, road construction and mining activities (Table 2). Elephant (*Loxodonta Africana*) was the most reported species (35.5%; n = 52 news reports) in relation to poaching and illegal wildlife trade. Most of the news covered the ivory seizures and countries involved in ivory trafficking (Table 3) and the protected areas and countries where elephants were killed (Table 4).

Species name	Common Name	N-times covered in news	Taxon
<i>Dicerosbiconis</i>	Black Rhinoceros	6	Mammal
<i>Panthera leo</i>	Lion	4	Mammal
<i>Loxodonta africana</i>	African elephant	19	Mammal
<i>Equus burcheli</i>	Plain Zebra	2	Mammal
<i>Chonochaetestaurninus</i>	Wildebeest	1	Mammal
<i>Nectophrynoideasperginis</i>	Kihansi spray toad	5	Amphibian
<i>Sruthio camelus</i>	Ostrich	1	Bird
<i>Phoenicopterus sp</i>	Flamingo	2	Bird
<i>Hippotragus nigerroosevelti</i>	Sable antelope	1	Mammal
<i>Pan troglodytes</i>	Chimpanzee	3	Mammal
<i>Dalbergiamelanoxydon</i>	African black wood	4	Plant
<i>Pterocarpus angolensis</i>	African teak	2	Plant
<i>Santalum album</i>	Sandle wood	2	Plant

**Table 2:** The frequency of coverage of animal and plant species threatened with human pressures of over exploitation during the study period based on the pooled data from the reviewed newspapers of Majira and Daily News.

### Sources of news reported in local newspapers and opinion by news editors

Overall, the majority (88.9%) of the news reported had glaring sources of origin while the rest had no clear root of origin. However, most (97.7%) of the biodiversity news were tapped from non-researched information. This news was gathered by journalists from sources other than scientific reports or the researchers. In contrast, all the socio-political news clearly indicated the sources, most of which were from political rallies, party officials and from government apparatus such as the judiciary.

Furthermore, about 98.3% of the news on environmental and conservation issues ended without recommendations from the news editors on how the public should address the threats facing biodiversity and the environment. In contrast, most of the news (83.9%) on local

politics and corruption came out clearly with comments from news editors casting their support on the issues reported or urging specific actions such as ‘offender should be brought to justice immediately without delay’.

### The quality and verity of the reported news

Of the 40 articles on biodiversity and conservation issues assessed for quality and reliability, there was misreporting of nine articles and almost 70% lacked critical analysis showing the causes, effects, benefits and strategies. For instance, articles mentioned some wildlife species in some protected areas while these species are not found in these areas and some are not even found in Tanzania. For instance, one of the articles reported the presence of chimpanzees in Selous Game Reserve while the species is restricted to some areas in western Tanzania (including Mahale Mountains and Gombe Stream National Parks). Another article cited tiger as one of the species found in Serengeti National Park while the species is found in Asia and have never lived in Africa. Another observed flaw in reporting was failure in some articles to distinguish mandates of different wildlife management institutions and categories of protected areas. For instance, in one of the articles Tanzania National Park (TANAPA) was blamed for failure to compensate villagers for crop damage while this is the function of the Wildlife Division. Similarly, Selous was referred to as the biggest national park in Tanzania while it is a game reserve.

### Discussion

Local newspapers are important tool for conveying information to the public regarding anthropogenic effects on the natural environment and biological resources globally and have been useful in influencing policy formulation or restructuring geared towards addressing pressing issues in various societies [43,66]. In this paper, the goal was to understand the coverage of biodiversity issues in local newspapers in Tanzania. Over the period under review, various biodiversity news and socio-politic news featured in a relatively similar proportions but varying frequency, with the former news, mostly covering urban areas. The trend of publication of biodiversity news by the news outlets fluctuated and peaked from 2009 to 2013. Further, the newspapers also reported direct threats facing the wildlife such as poaching and illegal wildlife trade. Most of the news, however, came from sources other than scientific publications.

The high coverage of issues like diseases outbreak and pollution relative to other environmental threats can be attributed to the urgency of the health problem and the high risks posed to the lives of the people in urban areas and cities. It may also be due to the ease with which such news are gathered, owing to the proximity of the journalists to the areas of scene. Frequencies of reporting of environmental issues such as encroachment on protected areas, human-wildlife conflicts, poaching, deforestation and wildlife persecution were minimal, despite the seriousness of the problems in conservation sector. This is not surprising since such news are sourced from rural areas which are not easily accessed by journalists probably due to high costs involved in the face of limited budget allocated by media owners. Most of the journalists are stationed in urban areas, thus making the news in rural areas fetch low priority. Similar situation was observed in Ghana by Appiah and colleagues [62], who attributed socio-economic factors constraining news gathering to under-representation of the health news in the mainstream media.

Number of poaching articles	Ivory's country of origin	Seizure country	Outlet port	Entry port	Destination
43	Kenya	Kenya (34)	J.K Int. Airport (10)		Thailand (9)
		Ethiopia (1)	Mombasa Port (13)	Addis Ababa (1)	China (6)
		Thailand (5)		Bangkok Port (4)	Indonesia (1)
		China (1)			
		Vietnam (1)			
		Sri Lanka (2)		Colombo Port (1)	
31	Tanzania	Tanzania (17)	Dar es Salaam Port (3)		Thailand (3)
		China (6)	Zanzibar Port (1)	Hong Kong (10)	China (7)
		Vietnam (1)			
		Singapore (1)			
		Taiwan (2)		Kaohsiung Port (1)	
1	Malawi	Kenya (1)			Japan (1)
1	Mozambique	Kenya (1)		J.K. Int. Airport (1)	
1	Zimbabwe	Singapore (2)			
1	Zambia	Singapore (1)			
1	Uganda	Singapore (1)			
1	Nigeria	Kenya (1)		J.K.Int. Airport (1)	
1	Congo DR	Kenya (1)			
1	South Africa	South Africa (1)	Cape town (1)	Hong Kong (1)	China (1)

**Table 3:** The pattern of interruption of illegal ivory trafficking from source country to the destination country: Numbers of news in parentheses show how many times illegally smuggled ivory was seized at a country or port of exit and entry. Destination either show where the interrupted ivory consignment was destined with numbers of events in parentheses. Empty spaces in the exit/entry port indicate unreported information in the newspapers. Both Kenya and Tanzania were severely impacted by elephant poaching and ivory trafficking during the study period.

Protected Area	frequency (%) of poaching news	Country
Selous Game reserve	9.5	Tanzania
Katavi National Park	1.2	Tanzania
Amboseli National park	1.2	Kenya
Kora National Park	1.2	Kenya
Laikipia Conservancy	1.2	Kenya
Ruaha N. Park	1.2	Tanzania
Burigi Game reserve	1.2	Tanzania
Serengeti N. Park	1.2	Tanzania
Tsavo N. Park	4.8	Kenya
Tsavo Conservancy Area	2.4	Kenya
Unknown #1	1.2	Malawi
Unknown #2	1.2	Uganda
Unknown #3	2.4	Zambia
Unknown #4	1.2	South Africa
Unknown #5	1.2	Nigeria
Unknown #6	1.2	Mozambique
Unknown #7	1.2	Congo DR
Unknown #8	6	Unknown
Unknown #9	42.1	Kenya
Unknown #10	17.2	Tanzania

**Table 4:** Reported news (N = 82) on illegal killing of elephants and ivory seizure by various authorities showing protected areas and countries of origin where illegal hunting was done. The news reporters did not indicate source protected area of several news reports on poaching (indicated as Unknown #).

Essentially, in economically-poor countries, under-budgeting in information sectors that are seemingly “insensitive” to the lives of the people may be a common phenomenon, which may then also lead to under-performance of such sectors. An alternative explanation could

be that due to the environmental backlash movement, there has been a shift from focus on environmental advocates by journalists to more emphasis on the economic issues. Curtin and Rhodenbaugh [67] contend that the backlash proponents have lost their objectivity by claiming that environmental issues are not dire enough to be given priority.

Climate change impacts associated with droughts and hunger were frequently reported during the period under review, most likely because of its immediate effects on the life of the people. Furthermore, over the past two decades, the effects of climate change have received considerable attention as a priority agenda in the global environmental politics [68,69], thus exciting interest among the journalists. The impacts of climate change are equally felt in urban areas through the increase of the prices of food and other commodities, floods and power rationing crisis. Tanzania depends on water as its major source of electricity. However, the increased droughts exacerbated by unsustainable land use practices such as overgrazing, deforestation, shifting cultivation and destruction of catchment areas have rendered the rivers and dams unable to produce adequate electricity to meet the demands of its customers. Power rationing affects industries, small entrepreneurs, office activities, private businesses and millions of domestic users who suffer financial losses and discomfort. In 2005 and 2006, Tanzania was hit by serious power cuts due to severe drought that struck hydropower generating plants. This forced the resignation of the Prime Minister and four other Tanzania Cabinet ministers and subsequently dissolution of the Cabinet by the President in 2008 [70].

In rural areas the impacts of climate change are also associated with increased human-wildlife conflicts. Frequencies of illegal entry and livestock grazing inside the protected areas and wildlife poaching are higher during the severe droughts [27,29,71]. Illegal activities inside the protected areas are, therefore, pursued as a coping strategy against economic hardships caused by drought [27]. Similarly, the

effects of problem animals such as crop raiding, destruction of infrastructure and killing or wounding people increase during the drought as wild animals are forced to search for food and water in the lands occupied and used by humans [72-74].

The observed high frequency of reports related to climate change was perhaps intended to create public awareness regarding ecological and economic sustainability. Similar efforts to raise public understanding of climate change impacts have been gaining ground in various parts for the world through various media [41,50,58,75,76] to seek collective actions for addressing the causes and impacts of climate change.

Publication of biodiversity news was not significantly different between the two newspapers but showed a growing trend from 2009 to 2013 for both outlets. This can be attributed to the mounting elephant poaching and illegal ivory trade which was fueled by increasing demand and price in Far East. The crisis attracted political interest locally and globally and was picked up by the local media. The government introduced *Operesheni Tokomeza Ujangili* (loosely translating to “Operation Eradicate Poaching”). The operation sparked a heated political debate and was terminated following widespread charges of human rights abuses. Four cabinet ministers resigned following these charges.

The pattern of coverage of tourism news increased over the course of the study period. This reflects the increasing efforts by the Tanzanian Government to popularize tourism attractions both within and outside the country. Because one of the reviewed local newspapers, Daily News is owned by the Government, it may have been used as a get way for raising tourism awareness among the public. This has been evident by the growth of Tanzania’s tourism sector during the past ten years and its contribution to foreign currency earnings and the country’s GDP [77]. On the other hand, the high proportion of coverage of other news such as socio-political issues (corruption and politics) was expected because these are linked directly to the editors’ preference, as most seem to prefer news that attracts greater public attention and potentially increase sales of the newspapers [78].

Most of the environmental and conservation issues reported emanated mostly from the urban rather than the rural areas. At least three reasons can explain this discrepancy: first, the journalists may have partly been constrained by financial resources, thus concentrating efforts only in relatively easy-to-reach urban and surrounding areas; Second, poor infrastructure and accommodation facilities in the rural areas may have also contributed to such minimal coverage; Third, the perceived limited skills among non-scientific journalists in reporting information published in scientific peer reviewed journals may have caused low coverage of environmental and conservation issues that are highly researched in rural areas, see also [38]. Additionally, it could be due to the limited popularization of research findings by the scientists themselves. Suleski and Ibaraki [39] contend that scientists are loud, but they talk mostly to each other. This, therefore, necessitates a need for increased communication of scientific findings by the scientists through media to increase public understanding of issues requiring public opinions and actions [37,41].

Furthermore, despite most news showing origin in non-scientific sources, the geographic areas (Figure 4) and species (Table 2) reportedly facing biodiversity and conservation threats in local newspapers seem to tally clearly with the available scientific information e.g.

Katavi (Rukwa) [8,13], Mara [28, 79], Morogoro [19,20,80], Manyara [33], Arusha [32], Iringa and Mbeya [13] and Dar es Salaam [31]. This may suggest that newspapers have the great potential to be a good source of reliable information if deliberate efforts are taken to improve the flow of scientific news from the scientists to the local newspapers.

Misreporting and inadequate analysis of biodiversity and conservation issues as presented in some articles signify a limited knowledge or inadequate attention given to conservation issues among the journalists or correspondents. This is not surprising since in Tanzania training in journalism is more general with no or minimal specialization. Misreporting and poor analysis has potential to mislead public and policy makers and thus undermining rather than enhancing biodiversity conservation work.

## Conservation Implications

This study has demonstrated that local newspapers can be a vehicle for promoting biodiversity conservation. Most of the threats facing biodiversity have received good coverage in the local newspapers, although with a bias in urban areas. The anthropogenic threats are widespread and have the potential to impact individual species, ecosystems and the livelihood of the people by disturbing the natural flow of ecosystem services. Tanzania is already a victim of local extirpation of species such as black rhino or extinction of Kihansi spray toads. More threats are reported, if unchecked, are likely to pose even more risks to several species.

While newspapers play a big role in cultivating public understanding and awareness on environmental and conservation issues, this study has uncovered a limited interaction between the journalists and scientists. Insufficient communication between the two hinders dissemination of research findings on environmental and conservation issues to the general public and policy makers. It is particularly important that scientists make their research findings available and accessible to the public and to decision and policy makers so that common ground can be found on which to address the pressing environmental and conservation issues. There is also a need for further research to explore more reasons behind this miscommunication between scientists and journalists to increase the contribution of the media in enhancing public understanding of environmental and conservation issues. There is a need for policy action which will necessitate local newspapers to provide space for research scientists where research findings can be communicated to public in a simple and non-scientific language. Similarly, it is high time for media including newspapers to recruit journalists specialized in environment and conservation fields who can interpret the scientific information generated from research and other sources and report scientific related news in a language which can easily be understood by the public and policy makers. The media owners and other stakeholders should also plan training of journalists on environment and conservation fields and instill conservation interests in them by supporting them to visit rural areas and the conservation areas, where despite numerous issues available for reporting, they are often underrepresented. This will bear a huge impact in creating environmental and conservation awareness among the public and thus inspiring the public participation in the protection and conservation of biodiversity. Notwithstanding this, however, we are unsure whether the public is interested in reading conservation and biodiversity news published in local newspapers.

Future investigation into this would help to advance our understanding of the scientists-media-public links and impacts on biodiversity conservation.

## Acknowledgement

We are deeply indebted to the Management and staff of the Sokoine National Agricultural Library (SNAL) for granting us permission to access the local newspapers archive and three research assistants: Maajabu Juma, Latifa Mohamed and James Jonas for support they rendered in data collection. We further wish to thank the editorial team and anonymous reviewers for constructive criticisms that have immensely shaped this paper.

## References

1. Waldron A, Miller DC, Redding D, Mooers A, Kuhn TS, et al. (2017) Reductions in global biodiversity loss predicted from conservation spending. *Nature* 551: 364-367.
2. <https://www.cbd.int/gbo/gbo4/publication/gbo4-en-hr.pdf>
3. Ceballos G, Ehrlich PR, Barnosky AD, García A, Pringle RM, et al. (2015) Accelerated modern human-induced species losses: Entering the sixth mass extinction. *Science Advances* 1: e1400253.
4. <https://www.iucnredlist.org>
5. WWF (2018) Living Planet Report - 2018: Aiming Higher. In: Grooten M and Almond REA (Eds). WWF, Gland, Switzerland.
6. WWF (2016) Living Planet: Report 2016: Risk and Resilience in a New Era. 2016: World wide fund for nature.
7. Craigie ID, Baillie JEM, Balmford A, Carbone C, Collen B, et al. (2010) Large mammal population declines in Africa's protected areas. *Biol Conserv* 143: 2221-2228.
8. Caro T (2008) Decline of large mammals in the Katavi-Rukwa ecosystem of western Tanzania. *Afr Zool* 43: 99-116.
9. Di Marco M, Buchanan GM, Szantoi Z, Holmgren M, Grottole Marasini G, et al. (2014) Drivers of extinction risk in African mammals: the interplay of distribution state, human pressure, conservation response and species biology. *Philos Trans R Soc Lond B Biol Sci* 369: 20130198.
10. Diplock N, Johnston K, Mellon A, Mitchell L, Moore M, et al. (2018) Large mammal declines and the incipient loss of mammal-bird mutualisms in an African savanna ecosystem. *PLoS one* 13: e0202536.
11. Brashares JS, Arcese P, Sam MK, Coppolillo PB, Sinclair ARE, et al. (2004) Bushmeat Hunting, Wildlife Declines, and Fish Supply in West Africa. *Science* 306: 1180-1183.
12. Rija AA (2013) Spatial pattern of illegal activities and the impact on wildlife populations in protected areas in the Serengeti Ecosystem. PhD thesis, University of York.
13. Rija A, Kideghesho JR, Mwamende K, Selemani I (2013) Emerging issues and challenges in conservation of biodiversity in the rangelands of Tanzania. *Nat Conserv* 6: 1-29.
14. Kideghesho JR, Nyahongo JW, Hassan SN, Tarimo TC, Mbije NE (2006) Factors and ecological impacts of wildlife habitat destruction in the Serengeti ecosystem in northern Tanzania. *AJEAM-RAGEE* 11: 17-32.
15. Rija AA, Goboro EM, Mwamende KA, Said A, Kohi EM, et al. (2014) Activity patterns and fine-scale resource partitioning in the gregarious Kihansi spray toad *Nectophrynoides asperginis* in captivity. *Zoo Biol* 33: 411-418.
16. Miller RI, Harris LD (1977) Isolation and extirpations in wildlife reserves. *Biol Conserv* 12: 311-315.
17. Newmark WD (1996) Insularization of Tanzanian parks and the local extinction of large mammals. *Conserv Biol* 10: 1549-1556.
18. Kideghesho JR (2016) Reversing the trend of wildlife crime in Tanzania: challenges and opportunities. *Biodivers Conserv* 25: 427-449.
19. Rija AA, Khatibu FH, Mwamende KA (2010) Reclaiming the lost world: Kihansi spray toad re-introduction in Tanzania. *Global Re-Introduction Perspectives: Additional case-studies from around the globe*, pp. 66.
20. Rija AA, Said A, Mwamende KA, Hassan SN, Madoffe SS, et al. (2014) Urban sprawl and species movement may decimate natural plant diversity in an Afro-tropical city. *Biodivers Conserv* 23: 963-978.
21. UN (2015) Transforming our world: The 2030 agenda for sustainable development. Resolution adopted by the General Assembly.
22. Kolandai Matchett K, Spellerberg I, Buchan GD, Early N (2009) Sustainability in journalism education: Assessment of a trial module in New Zealand. *Appl Environ Educ Comm Int J* 8: 204-215.
23. Martín López B, Iniesta Arandia I, García Llorente M, Palomo I, Casado-Arzuaga I, et al. (2012) Uncovering ecosystem service bundles through social preferences. *PLoS one* 7: e38970.
24. Riechers M, Strack M, Barkmann J, Tschamtk T (2019) Cultural ecosystem services provided by urban green change along an urban-periurban gradient. *Sustainability* 11: 645.
25. Washbourne CL, Goddard MA, Provost GL, Manning DAC, Manning P (2020) Trade-offs and synergies in the ecosystem service demand of urban brownfield stakeholders. *Ecosyst Serv* 42: 101074.
26. Campbell K, Hofer H (1995) People and wildlife: spatial dynamics and zones of interaction. *Serengeti II* pp. 534-570.
27. Loibooki M, Hofer H, Campbell KLI, East ML (2002) Bushmeat hunting by communities adjacent to the Serengeti National Park, Tanzania: the importance of livestock ownership and alternative sources of protein and income. *Environ conserve* 29: 391-398.
28. Kaltenborn BP, Nyahongo JW, Tingstad KM (2005) The nature of hunting around the Western Corridor of Serengeti National Park, Tanzania. *Eur J Wildlife Res* 51: 213-222.
29. Rija AA (2009) The long-term impacts of hunting on population viability of wild ungulates in Tarangire, northern Tanzania.
30. Jones T, Bamford AJ, Ferrol Schulte D, Hieronimo P, McWilliam N, et al. (2012) Vanishing wildlife corridors and options for restoration: a case study from Tanzania. *Trop Conserv Sci* 5: 463-474.
31. Msuya N, Masanya E, Temu AK (2011) Environmental burden of charcoal production and use in Dar es Salaam, Tanzania. *JEP* 2: 1364 -1369.
32. Kaswamila A (2009) Human-wildlife conflicts in Monduli District, Tanzania. *Int J Biodivers Sci Ecosyst Serv Manag* 5: 199-207.
33. Kissui BM (2008) Livestock predation by lions, leopards, spotted hyenas, and their vulnerability to retaliatory killing in the Maasai steppe, Tanzania. *Animal Conserv* 11: 422-432.
34. Kitula AGN (2006) The environmental and socio-economic impacts of mining on local livelihoods in Tanzania: A case study of Geita District. *J Cleaner Prod* 14: 405-414.
35. Rija AA, Said A, Mwita J, Mwamende KA (2013) Floss release, seed fall and germination of *Ceiba pentandra* in an urban environment. *Open J Ecol* 3: 423-430.
36. Waddell C (2002) So much research evidence, so little dissemination and uptake: mixing the useful with the pleasing. *Evid Based Ment Health* 5: 38-40.
37. Peters HP, Brossard D, de Cheveigné S, Dunwoody S, Kallfass M, et al. (2008) Interactions with the Mass Media. *Science* 321: 204-205.



38. Hartz J, Chappell R (1997) Worlds apart. How the distance between science and journalism threatens America's future. First Amendment Center, Nashville, TN, pp. 192.
39. Suleski J, Ibaraki M (2017) Scientists are talking, but mostly to each other: a quantitative analysis of research represented in mass media. *Public Understanding Sci* 19: 115-125.
40. Rees M (2006) *Science Communication: Survey of Factors Affecting Science Communication by Scientists and Engineers*. Royal Society, London, UK.
41. Williams AE (2011) Media evolution and public understanding of climate science. *Politics Life Sci* 30: 20-30.
42. Mikami S, Takeshita T, Kawabata M (1999) Influence of the mass media on the public awareness of global environmental issues in Japan. *Asian Geogr* 18: 87-97.
43. Legagneux P, Casajus N, Cazelles K, Chevallier C, Chevrinais M, et al. (2018) Our house is burning: discrepancy in climate change vs. biodiversity coverage in the media as compared to scientific literature. *Front Ecol Evol* 5: 175.
44. Maceviciute A (2000) The influence of the media on the development of public environmental consciousness: case study of Lithuanian press. Master's thesis, Lund University, Lund, Sweden.
45. Anderson A (2013) *Media, culture and the environment*. Routledge.
46. Park MS (2013) The dual role of the media in environmental communication as a public sphere and as political actors. *Forest Sci Tech* 9: 33-38.
47. Barua M (2010) Whose Issue? Representations of Human-Elephant Conflict in Indian and International Media. *Sci Commun* 32: 55-75.
48. Vuorisalo T, Lahtinen R, Laaksonen H (2001) Urban biodiversity in local newspapers: a historical perspective. *Biodivers Conserv* 10: 1739-1756.
49. Ashlin A, Ladle RJ (2007) 'Natural disasters' and newspapers: Post-tsunami environmental discourse. *Environ Hazards* 7: 330-341.
50. Boykoff MT (2007) Flogging a dead norm? Newspaper coverage of anthropogenic climate change in the United States and United Kingdom from 2003 to 2006. *Area* 39: 470-481.
51. Tsekos CA, Matthopoulos DP (2008) Environmental news in Greece: evaluation of the way newspapers deal with environmental issues. *Int J Environ Stud* 65: 209-218.
52. Ma S, Kirilenko AP (2020) Climate change and tourism in English-language newspaper publications. *J Travel Res* 59: 352-366.
53. Ungar S (2000) Knowledge, ignorance and the popular culture: climate change versus the ozone hole. *Public Understanding of Science* 9: 297-312.
54. Phillips M, Fish R, Agg J (2001) Putting together ruralities: towards a symbolic analysis of rurality in the British mass media. *J Rural Stud* 17: 1-27.
55. Clucas B, McHugh K, Caro T (2008) Flagship species on covers of US conservation and nature magazines. *Biodivers Conserv* 17: 1517.
56. Ladle RJ, Jepson P, Whittaker RJ (2005) Scientists and the media: the struggle for legitimacy in climate change and conservation science. *Interdiscipl Sci Rev* 30: 231-240.
57. Ladle RJ, Gillson L (2009) The (im)balance of nature: a public perception time-lag? *Public Underst Sci* 18: 229-242.
58. Schmidt A, Ivanova A, Schäfer MS (2013) Media attention for climate change around the world: A comparative analysis of newspaper coverage in 27 countries. *Global Environ Chang* 23: 1233-1248.
59. Novacek MJ (2008) Engaging the public in biodiversity issues. *PNAS* 105: 11571-11578.
60. Di Minin E, Tenkanen H, Toivonen T (2015) Prospects and challenges for social media data in conservation science. *Frontiers Environ Sci* 3.
61. Falk JH, Storksdieck M, Dierking LD (2007) Investigating public science interest and understanding: evidence for the importance of free-choice learning. *Public Underst Sci* 16: 455-469.
62. Appiah, B, Gastel B, Burdine JN, Russell LH (2014) Science reporting in Accra, Ghana: Sources, barriers and motivational factors. *Public Underst Sci* 24: 23-37.
63. Giannoulis C, Botetzagias I, Skanavis C (2010) Newspaper reporters' priorities and beliefs about environmental journalism: An application of Q-methodology. *Sci Commun* 32: 425-466.
64. URT (2004) *United Republic of Tanzania - National Environmental Policy of Tanzania*. Vice President's Office, Dar-es-Salaam.
65. URT (2007) *United Republic of Tanzania- The Wildlife Policy of Tanzania 2007*. Ministry of Natural Resources and Tourism, Dar-es-Salaam.
66. Ohkura Y (2003) The roles and limitations of newspapers in environmental reporting. Case study: Isahaya Bay land reclamation project issue. *Mar Pollut Bull* 47: 237-245.
67. Curtin PA, Rhodenbaugh E (2001) Building the news media agenda on the environment: a comparison of public relations and journalistic sources. *Public Relat Rev* 27: 179-195.
68. DiMento JF, Doughman P (2007) Climate change: how the world is responding. *Climate change: what it means for us, our children, and our grandchildren* pp. 101-138.
69. Hobbie SE, Grimm NB (2020) Nature-based approaches to managing climate change impacts in cities. *Philos T R Soc B* 375: 20190124.
70. EX-IMB, Export-Import Bank of US (cited as Ex-IM Bank) (2008) *Power Projects in Africa*. Export-Import Bank of the United States, Annual Conference April 17 & 18.
71. Shaffer LJ, Khadka KK, Hoek JVD, Naithani KJ (2019) *Human-Elephant Conflict: A Review of Current Management Strategies and Future Directions*. *Front Ecol Evol* 6.
72. Mariki SB, Svarstad H, Benjaminsen TA (2015) Elephants over the Cliff: Explaining Wildlife Killings in Tanzania. *Land Use Policy* 44: 19-30.
73. Graham MD, Douglas Hamilton I, Adams WM, Lee PC (2009) The movement of African elephants in a human-dominated land-use mosaic. *Anim Conserv* 12: 445-455.
74. Otiang'a Owiti G (2011) Impact of climate change on human-wildlife conflicts in East Africa. *Kenya Veterin* 35: 103-110.
75. O'Neil S, Boykoff MT (2011) The role of new media in engaging the public with climate change. *Engaging the public with climate change: behaviour change and communication 2011*: 233-251.
76. Billett S (2010) Dividing climate change: global warming in the Indian mass media. *Climatic Change* 99: 1-16.
77. Odhiambo NM (2011) Tourism development and economic growth in Tanzania: Empirical evidence from the ARDL-bounds testing approach. *Eco Comput Eco Cybern Stud Res* 45: 71-83.
78. Strömberg D (2004) Mass Media Competition, Political Competition, and Public Policy. *Rev Eco Stud* 71: 265-284.
79. Kideghesho JR (2008) Co-existence between the traditional societies and wildlife in western Serengeti, Tanzania: its relevancy in contemporary wildlife conservation efforts. *Biodivers Conserv* 17: 1861-1881.
80. Rovero F, Mtui AS, Kitegile AS, Nielsen MR (2012) Hunting or habitat degradation? Decline of primate populations in Udzungwa Mountains, Tanzania: An analysis of threats. *Biol Conserv* 146: 89-96.



- Advances In Industrial Biotechnology | ISSN: 2639-5665
- Advances In Microbiology Research | ISSN: 2689-694X
- Archives Of Surgery And Surgical Education | ISSN: 2689-3126
- Archives Of Urology
- Archives Of Zoological Studies | ISSN: 2640-7779
- Current Trends Medical And Biological Engineering
- International Journal Of Case Reports And Therapeutic Studies | ISSN: 2689-310X
- Journal Of Addiction & Addictive Disorders | ISSN: 2578-7276
- Journal Of Agronomy & Agricultural Science | ISSN: 2689-8292
- Journal Of AIDS Clinical Research & STDs | ISSN: 2572-7370
- Journal Of Alcoholism Drug Abuse & Substance Dependence | ISSN: 2572-9594
- Journal Of Allergy Disorders & Therapy | ISSN: 2470-749X
- Journal Of Alternative Complementary & Integrative Medicine | ISSN: 2470-7562
- Journal Of Alzheimers & Neurodegenerative Diseases | ISSN: 2572-9608
- Journal Of Anesthesia & Clinical Care | ISSN: 2378-8879
- Journal Of Angiology & Vascular Surgery | ISSN: 2572-7397
- Journal Of Animal Research & Veterinary Science | ISSN: 2639-3751
- Journal Of Aquaculture & Fisheries | ISSN: 2576-5523
- Journal Of Atmospheric & Earth Sciences | ISSN: 2689-8780
- Journal Of Biotech Research & Biochemistry
- Journal Of Brain & Neuroscience Research
- Journal Of Cancer Biology & Treatment | ISSN: 2470-7546
- Journal Of Cardiology Study & Research | ISSN: 2640-768X
- Journal Of Cell Biology & Cell Metabolism | ISSN: 2381-1943
- Journal Of Clinical Dermatology & Therapy | ISSN: 2378-8771
- Journal Of Clinical Immunology & Immunotherapy | ISSN: 2378-8844
- Journal Of Clinical Studies & Medical Case Reports | ISSN: 2378-8801
- Journal Of Community Medicine & Public Health Care | ISSN: 2381-1978
- Journal Of Cytology & Tissue Biology | ISSN: 2378-9107
- Journal Of Dairy Research & Technology | ISSN: 2688-9315
- Journal Of Dentistry Oral Health & Cosmesis | ISSN: 2473-6783
- Journal Of Diabetes & Metabolic Disorders | ISSN: 2381-201X
- Journal Of Emergency Medicine Trauma & Surgical Care | ISSN: 2378-8798
- Journal Of Environmental Science Current Research | ISSN: 2643-5020
- Journal Of Food Science & Nutrition | ISSN: 2470-1076
- Journal Of Forensic Legal & Investigative Sciences | ISSN: 2473-733X
- Journal Of Gastroenterology & Hepatology Research | ISSN: 2574-2566
- Journal Of Genetics & Genomic Sciences | ISSN: 2574-2485
- Journal Of Gerontology & Geriatric Medicine | ISSN: 2381-8662
- Journal Of Hematology Blood Transfusion & Disorders | ISSN: 2572-2999
- Journal Of Hospice & Palliative Medical Care
- Journal Of Human Endocrinology | ISSN: 2572-9640
- Journal Of Infectious & Non Infectious Diseases | ISSN: 2381-8654
- Journal Of Internal Medicine & Primary Healthcare | ISSN: 2574-2493
- Journal Of Light & Laser Current Trends
- Journal Of Medicine Study & Research | ISSN: 2639-5657
- Journal Of Modern Chemical Sciences
- Journal Of Nanotechnology Nanomedicine & Nanobiotechnology | ISSN: 2381-2044
- Journal Of Neonatology & Clinical Pediatrics | ISSN: 2378-878X
- Journal Of Nephrology & Renal Therapy | ISSN: 2473-7313
- Journal Of Non Invasive Vascular Investigation | ISSN: 2572-7400
- Journal Of Nuclear Medicine Radiology & Radiation Therapy | ISSN: 2572-7419
- Journal Of Obesity & Weight Loss | ISSN: 2473-7372
- Journal Of Ophthalmology & Clinical Research | ISSN: 2378-8887
- Journal Of Orthopedic Research & Physiotherapy | ISSN: 2381-2052
- Journal Of Otolaryngology Head & Neck Surgery | ISSN: 2573-010X
- Journal Of Pathology Clinical & Medical Research
- Journal Of Pharmacology Pharmaceutics & Pharmacovigilance | ISSN: 2639-5649
- Journal Of Physical Medicine Rehabilitation & Disabilities | ISSN: 2381-8670
- Journal Of Plant Science Current Research | ISSN: 2639-3743
- Journal Of Practical & Professional Nursing | ISSN: 2639-5681
- Journal Of Protein Research & Bioinformatics
- Journal Of Psychiatry Depression & Anxiety | ISSN: 2573-0150
- Journal Of Pulmonary Medicine & Respiratory Research | ISSN: 2573-0177
- Journal Of Reproductive Medicine Gynaecology & Obstetrics | ISSN: 2574-2574
- Journal Of Stem Cells Research Development & Therapy | ISSN: 2381-2060
- Journal Of Surgery Current Trends & Innovations | ISSN: 2578-7284
- Journal Of Toxicology Current Research | ISSN: 2639-3735
- Journal Of Translational Science And Research
- Journal Of Vaccines Research & Vaccination | ISSN: 2573-0193
- Journal Of Virology & Antivirals
- Sports Medicine And Injury Care Journal | ISSN: 2689-8829
- Trends In Anatomy & Physiology | ISSN: 2640-7752

Submit Your Manuscript: <https://www.heraldopenaccess.us/submit-manuscript>