



Ecological Ethics and Community Engagement Approach to Ecosystems Conservation: A Case Study of Volcanoes National Park in Rwanda

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Abstract: Ecosystems can only be preserved if there is an inter-link of ethics in conservation. An assortment of literature exists that encompasses ecological ethics which at times is also referred to as ecological integrity that involves the ethics of research as well as environmental ethics. The study set out to investigate how ecological ethics interlinks with conservation of the ecosystems or environment. The challenge was that ecological ethics implementation together with local community engagement were not strong which negatively affected the ecosystem conservation. The study was guided by three specific objectives that included; i) to investigate the trends in key policies linked to ecological ethics and ecosystem conservation in VNP; ii) to ascertain the impact of ecological ethics on ecosystem conservation in VNP; iii) to determine the benefits of engaging the local community in ecological ethics approach to ecosystem conservation. The literature focused on environmental ethics, policies linked to ethics and local community engagement. Under the methodology section the study used the descriptive research design and purposive sampling technique. The population of study was 52 households while the sample was 42 households living within 200 meters from the park boundary. The findings showed that ecological ethics were crucial in influencing how humans conserved the ecosystems. Further, the study findings found out that there were challenges encountered especially when lack of awareness of ecological ethics among the local community and less engagement affected ecosystem conservation. However, the findings also indicated that as much as there were challenges, on the hand ecological ethics if well embraced, can generate a number of benefits both for the park and local community. In conclusion, conservation cannot be successful without incorporating the ecological ethics. It was recommended that VNP should engage all the stakeholders in ecological ethics particularly in line with conservation to achieve sustainable ecosystem conservation.

Keywords: Ecological, Ethics, Engagement, Community, Ecosystem, Conservation

1. Introduction

Generally, ecological systems can only be preserved from individuals if there is an inter-link of ethics in conservation [47]. Also conservation is inter-disciplinary, covering evolutionary biology, ecology, anthropology, and economics which makes it complicated [36]. The crucial practical element of conservation is multifaceted and cuts across scales, sometimes the strategy is individually focused on the preservation or rehabilitation of a particular species, while in

other instances, it involves a universal focus on all entities of an at-risk ecosystem [5]. As such, all practicing conservationists such as the: biologists, ecologists, NGOs, and advocacy groups, legal frameworks and policies end up traversing complex ethical setting [47].

An assortment of literature exists that encompasses ecological ethics which at times is also referred to as ecological integrity that involves the ethics of research or science as well as environmental ethics [7]. It is also sometimes referred to as the ethics of biodiversity or

scientific research values. In the same line no detailed and focused study has been done on ecological ethics or biodiversity [19]. Ecological ethics therefore is looked at as a problem with a policy solution. However, earlier studies reveal that the only impediment exhibited is the diversity of disciplines that constitute the environment together with the diverse legal fields or frameworks [20]. For effective implementation it has to be presented in political arenas, social arenas as well as the legal or ethical arenas for a common understanding and its effective implementation. In addition, studies argue that ethics must be focused on managing the behavior of people or their attitude towards environment or ecosystems but not of land as an intrinsic element of ecological integrity [5].

Nevertheless, as much as the studies have been carried out and even indorsed in order to augment the ethics in conservation, through interdisciplinary arrangement and inter-sectors, there is still little to show that ethical concepts have been absorbed into conservation of the natural ecosystems [32]. Similarly, findings by Elliot, and Resnik, [17] who argued that although discussions have been carried out in the interest of conservation and the local community, the NGOs and business entities always take the dominant part. It is therefore worth noting that conservation policy plays a pivotal role in natural resources conservation but at the same time an ethical dilemma. So this is aimed at creating the advocacy role as well as to produce reliable conservation goals [21]. Additionally, more studies highlight that ecosystem conservation is a political arena that spans both at international level as well as between researchers from different domains and thus raises the question of appreciating ecological ethics [47].

Nonetheless environmental decisions affect the natural system and people in diverse ways. For example, while massive conversion of forests to oil palm plantations results in enormous economic benefits in export earnings, it will also lead to extensive environment degradation and habitat destruction [7]. This, in turn, produces an expanding web of adverse environmental effects that impact on ecological resilience and the natural resource-dependent indigenous forest dwellers [34]. The complex dynamics of these human-economic-environmental relationships reflect the divergence of stakeholder value judgments and perspectives in relation to the corrective treatment of environmental values that underpin resource use patterns [39].

Studies carried out by Curzer, et al. [14] as well as Minter, et al. [36] argue that scientific methods should minimize disturbance and stress to biodiversity and any impacts should be explicitly justified. This therefore, increases a range of ethical issues at stake and questions the analogy of the diverse ethical approaches defended by the various disciplines involved [40]. Such aspects can result from a 'crisis situation' where a rapid decision should be taken, and they can reveal strong differences or divergence in the disciplinary frames of reference and differentiated positions regarding the priorities [39]. Work done on inter-professionalism and ethics has studied the obstacles

impeding an effective interdisciplinary development and it expresses such difficulties especially in ecosystem conservation [3].

Ecological studies carried by Bosworth, et al. [6] emphasized that policy makers are key to conservation because the natural environment is conveniently embraced as a means for the enhancement of socio-economic prosperity. This is the monist view of nature in which natural resources are instrumentally being monetized. Here, environmental conservation matters only insofar as overexploitation negatively impacts the continuous flow of economic benefits or result in an undue reduction of nature's inherent economic values, economic activity, or future productivity. This is an economically driven mode of environmental conservation [12]. Research by Casetta [11] argued that this is the standard single-disciplinary approach of development premised on value monism and anthropocentric (human-centered) behavioral orientation. This is the highest-ranking policy option for sustainable resource use in today's human-centered world, where a high value is placed on economic prosperity over environmental conservation [1].

Due to the crucial role ethics play, conservation could greatly benefit from clearly articulated and widely applied ethical principles [15]. Indeed, conservation advocates have called for help in avoiding ethical dilemmas, such as how to manage invasive species [17], balance the needs of individual and ecosystems and integrate human needs into conservation work [8]. Collaboration at the intersection of ecology, conservation, and philosophy could provide this needed guidance, but faces substantial challenges. However, to the indigenous forest dwellers, the natural environment is widely viewed as a natural system embedded in a web of cultural, social, ecological, and economic values. Their resource use patterns are intrinsically based on a diversity of interests, plurality of values, and cultural or ethical positions, this is called value pluralism [35].

Studies carried out also revealed that ethical framework frustrates conservations, as it currently does not meet a desired minimum level of ethical prescription for action work [8]. While the challenge of creating adequate prescriptive guidelines is quite a significant task, we suggest ways forward. As the field of conservation ethics continues to grow [47], our goal is to draw explicit attention to these challenges to better facilitate productive communication and collection among practitioners and philosophers. Lanjouw [28] argued that ecosystem resource values play an important role in environmental policy and resource management. Additionally, values perceived and recognized in decision-making are complex because they entail an interplay of different meanings, environmental worldviews, and the perceptions of sustainability [31]. Identifying and recognizing these values, is therefore, crucial for guiding sustainable resource use and policymaking [27].

The studies done by Garrard et al. [18] highlight the relationship between humans and nature has been a subject philosophers and natural scientists have grappled with throughout the nineteenth and twentieth century.

Conservation ethics is a sub-discipline of environmental ethics specifically focused on the applied question of how to best conserve ecosystems and wildlife. In spite of the philosophical works that constructively engage with conservation issues [25], productive collaboration issues between the fields of ecology, conservation, and ethics has been hindered by some philosophical works that explore topics relevant to conservation ethics, yet do not incorporate ecological realities.

In Rwanda the government has continuously formulated policies linked to ecological ethics and conservation over the last 20 years to guide the managers and local community to use and conserve natural resources [21]. In that regard, first is the Constitution of the Republic of Rwanda, 2003 [21] which points out that it is the duty and responsibility of every individual to protect and conserve the natural resources of the country. Organic law number 08/2005 of 12/07/2005 was enacted also for sustainable land use and protection, conservation and protection of natural resources in VNP [9]. Importantly, policies and institutional framework implementation had not been successful especially among the adjacent community due to the local community attitude towards ecosystems and inadequate financial resources to facilitate the process [45]. Also the Community Development Policy 2008 aimed at effective and sustainable participation of the community in its own development, in order to achieve poverty reduction and self-reliance based on the sustainable exploitation of available natural resources in and around VNP [21].

Apart from that, The “Rwanda Protected Areas Concession Management Policy 2013” which emphasizes government collaborating ethically with the private sector to invest in tourism related activities in protected areas as well as improving attitude towards ecosystems and conserving the natural resources that support tourism [46]. In the same way The National Tourism Policy 2009 was enacted to protect natural resources and ensure sustainable use of natural resources for tourism development with emphasis on ethical approach [46]. The Rwanda Wildlife policy 2017 also formulated particularly to ensure protection of wildlife habitats and sustainable use of wildlife especially in protected areas in collaboration with legal frameworks inclined to ethical issues [29]. The Rwanda Biodiversity policy (2011) also focuses on the conservation and sustainable use of the biodiversity for tourism purposes ethically. Vision 2030 and Vision 2050 strategic plans have been government initiative to achieve economic goals through proper ethical use of its natural resources embracing all policies and legal frameworks with tourism as one of the economic pillars [44].

VNP is protected under the article 96 of the organic law number 04/2005 determining the modalities of protection, conservation and promotion of environment [19]. This policy plus a number of others that were formulated were put in place in order to influence ethics and conservation. Due to high exclusion cost nature of the resource system, this law has created incentives for free riders translating into a market failure [43]. As a solution, the GoR established a 10% of

VNP revenues to support community projects that should compensate the opportunity cost of foregone park users and practices [41]. Murphy [39] argued that that tourism revenues do not trickle down to compensate the farmers’ cost of conservation. Therefore, incorporating management attributes, and social-economic and institutional factors in decision making process would assist park managers with estimating the value associated with preserving its resources. Nevertheless, limited information on these values has been observed. It is crucial to assess the economic values attached to VNP management attributes if the desired goal of conservation and maintaining of environmental integrity is to be achieved [27].

2. Methodology

Created in 1925, the Volcanoes National Park is one of the first parks in Africa. It was then part of the Congo’s Albert National Park, which became after the independence in 1960 the Virunga National park. With its ecological, tourist, scientific, social and cultural values, the park is very much renowned both at regional and international levels. Volcanoes National Park is especially World famous on being home of remaining hundreds of the endangered mountain Gorilla “*Gorilla gorilla beringei*”, which are endemic to the Virunga Massif, in addition to numerous other animal species endemic to the Albertine Rift Region [9].

Volcano National Park (VNP) lies along 1°21’-1°35’ South and 29°22’- 29°44’ East in North-West Rwanda. It is adjacent to the Virunga National Park in DRC and Mgahinga Gorilla National Park in Uganda. The area adjacent to the park extends in two district namely Musanze and Rubavu districts [19]. The park is surrounded by the highest population density in the East African region that ranges from 500 to 1,041 individuals per km² [44]. The communities adjacent practice subsistence farming and have remained with little opportunity for diversification into off-farm sources and limited investment in tourism business and culture industry. After the protected area acquiring the park status, the attitude of the local community changed and rampantly engaged in illegal activities harvesting the forest resources [43].

VNP harbors most of endangered species, fauna and flora with a total of 86 mammals, 258 birds and 878 plants species protected at national and international levels [9]. The park is well known for its warm climate [44]. The climate is favorable for fauna and flora in the protected area as well as the agricultural activities in the surrounding areas adjacent to the park [29]. Additionally, water ecosystems availability in the VNP area is vital for improved ecological functions in terms of rainfall, climate regulation, agriculture, livestock watering among others [46]. A growing number on environmental valuation studies applied hedonic price and travel cost methods to assess use values [2].

The research design was descriptive as well as the purposive sampling technique was used and the sampling frame was the National population census of 2012. The study

population was 52 households and sample composed of 42 key informants that were put in focus group discussions and included; the elders, local leaders, local community and park management staff who were all part of the discussion groups. The convenience sampling technique was used to select the sample and the respondents were put in focus discussion group regardless of gender. The study considered the participants from the four cells close to the park in a distance range of 200 meters from the park boundary. The data collection techniques was the focus discussion group and the total number of the respondents was 42. The Linkerts' 5 point scale was used to rank the opinions of the respondents which they gave. It was ranked from 1 = very weak, 2= weak, 3 = Fair, 4 = strong, 5 = very strong. These enabled the study to quantify the opinions given by the respondents during the focus group discussions and data presentation was by use of tables. The objectives of the study were threefold, i) to determine the trend in policies linked to ecological ethics and conservations in VNP; ii) to ascertain the benefits of engaging the local community in ecological ethics and conservation of ecosystems in VNP; iii) to investigate the challenges encountered in implementing the ecological ethics and conservation of the ecosystems. The study was guided by three objectives that included; i) to investigate the trends in key policies linked to ecological ethics and ecosystem conservation in VNP; ii) to ascertain the impact of ecological ethics on ecosystem conservation in VNP; iii) to determine the benefits of engaging the local community in ecological ethics approach to ecosystem conservation.

3. Results

The findings revealed by the majority of the key informants showed that the policies linked to conservation that influence ethics existed. However, the 20% of respondents agreed that they had little knowledge about the implemented policies linked to ethics. Taking 2000 as the base year, it was discovered that these policies were in place most them from early 2000s. The Key informant indicated that ethically, the conservation policies showed a trend that started in 2004 till 2013. The ethically linked policies as highlighted by 70% of the respondents included the National Land policy which was designed to ensure proper land-use practices to achieve sustainable protection of the environment, promote conservation and wetland use and was implemented in 2004.

The key informants also emphasized that to ensure ethically protected ecosystems. The respondents noted that The constitution of the Republic of Rwanda under the Law N° 70/2013 of 02/09/2013, and The environment Organic Law N° 04/2005 of 08/04/2005, were formulated to improve ethical aspects as regards the degradation and protection of ecosystems and the environment in general. Further, 90% of key informants agreed that Rwanda Tourism policy was promulgated in 2009 to strengthen the other existing ethical policies that were formulated to ensure the local community refrain from activities that degraded the ecosystems as well economically benefit from their goods and services. Whereas the 10% of the respondents mentioned that they had not realized the relevance of the tourism in their daily life due to reduced forest resource use. In addition, 85% of the key informants argued that the trend in policy formulation evident in National Forest policy formulated in 2010 while National Policy for water resources management, Green growth and climate change policy respectively promulgated in 2011 lean a lot on the ways the ecosystems and environment were conserved. The highlighted policies emphasize the conservation and sustainable use of the biodiversity in forest and water ecosystems as well as to minimize impacts on water use and ecosystem services and products. All these policies emphasize the participation of the local community to ensure sustainable conservation of the ecosystems especially in gazetted areas. The trend in the results also revealed that in 2013, more ethically linked conservation policies were formulated. The Key informants emphatically pointed out that due to reluctance of the stakeholder to act ethically and continued degradation of the ecosystems, the government of Rwanda formulated more policies that included; Rwanda wildlife policy; Rwanda Protected areas concession policy and The constitution of the Republic of Rwanda (Law N° 70/2013 of 02/09/2013). The key informants said that these were to ensure that wildlife inside and outside the protected area are well managed and encourage stakeholders' participation in wildlife management. Also guide in the management of protected areas in accordance with the fundamental purpose for conserving their beauty, wildlife, natural and historic sites. Additionally to guide in environmental conservation of the natural resources and biodiversity conservation. The trend is indicated in figure 1 below.

Trends in Key policies linked to ecological ethics and ecosystem conservation.

Table 1. Rankings on impact of ecological ethics on ecosystem conservation by the respondents.

Respondents' opinion	Rankings (1-5)					Total
	1	2	3	4	5	
Less engagement of the local community	5	14	7	10	6	42
Inadequate funds to facilitate implementation	8	9	6	15	4	42
Overlap of the policies and legalities	1	8	11	17	5	42
Poverty amongst the local community	7	2	3	12	18	42
Local community attitude about conservation	3	1	9	16	13	42
Unequal distribution of benefits	2	1	13	18	8	42
High demand for land for settlement and agriculture	1	4	10	15	12	42
Illiteracy	3	5	6	13	15	42
Population pressure	4	3	7	10	18	42

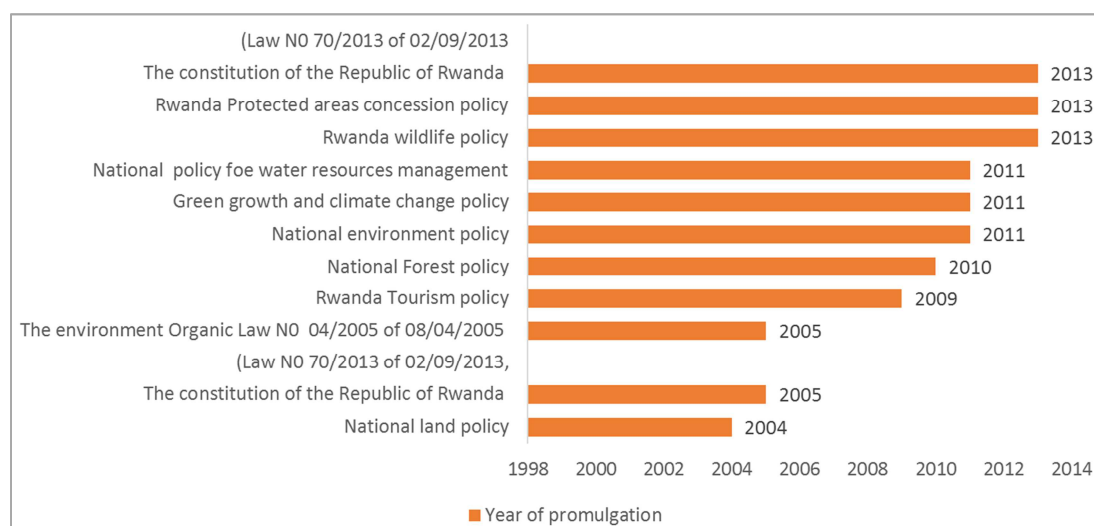


Figure 1. Trends in policies linked to ecological ethics and conservation.

The findings in Table 1, indicated results about the ecological ethics factors that impacted on conservation. The focus discussion groups highlighted the key factors and ranked them. The majority of focus discussion groups highlighted that less engagement of the local community strongly agreed that it affected ecological ethics and conservation. Whereas some strongly agreed that without engaging the local community in understanding the ethics then conservation failed. Findings also revealed that majority of the focus discussion groups agreed that inadequate funding played a crucial role in implementing the ethics and conservation. The smallest focus discussion group strongly agreed that inadequate funds influence the implementation of ecological ethics and conservation process. While the second biggest focus group discussion argued that inadequate funds weakly impacted on the implementation of ecological ethics and conservation. The results in Table 1, indicated that policy overlap was highlighted by the focus discussion group as crucial. The majority agreed that some policies over-lapped and thus contradicted each other of ethics and conservation aspects. The second biggest focus discussion group said overlap fairly impacted the impacted the ecological ethics and conservation. While the smallest number in focus discussion group strongly agreed that policy overlap impacted ethics and conservation. Another factor highlighted was poverty amongst the local community. The majority of the respondents indicated that they strongly agreed that poverty influenced the ethics related to conservation. The

second biggest majority also agreed that poverty played a role in the ecological and conservation aspects. Contrary some respondents argued that poverty was weakly impacting the ethics and conservation of ecosystems.

Linkert's 5 point scale ranking of the ecological ethics factors that impacted on conservation. (Scale range, 1= very weak, 2= weak, 3= fair, 4 strong, 5= very strong).

The results in Table 2, from focus group discussion about benefits of engaging the local community were identified and ranked. First of all majority of the respondents emphasized that engaging the local community motivated them and drives them to develop a positive attitude in terms of ecological ethics and conservation. In the same line they argued that when they get involved then it enhances the conservation of the protected area. On the other hand focus group discussion also agreed that as a result of involving them, it creates a sense of ownership and thus improves the ethics. Further, findings in Table 2 indicated that majority of the focus group discussion ranked strongly the increase in ecosystem services and goods as a result of involving the stakeholders. In the same line, focus discussion groups argued that availability of the ecosystem services and goods created opportunities for employment and enabled the local community to be economically empowered thus improving their attitude towards the ecosystems. As pointed out by some of the participants, conservation of the forest resources attracted the more visitors which resulted to increased revenue sharing (Table 2 below).

Table 2. Ranked benefits of engaging the local community.

Respondents' opinion	Rankings (1-5)					Total
	1	2	3	4	5	
Engagement improves positive attitude of local community	3	5	9	14	11	42
Enhances conservation of the protected area	2	6	9	13	12	42
Creates sense of ownership	5	3	8	16	10	42
Promotes conservation of the protected area	1	7	10	12	14	42
Increases availability of ecosystem services and products	1	3	7	15	16	42
Leads to increased employment	1	4	8	12	17	42
Increased revenue sharing	3	5	6	13	15	42
Creates awareness of ethics in conservation	4	3	7	10	18	42

Linkert's 5 point scale Ranked Benefits of engaging the local community in ecological ethics activities for conservation (Scale range, 1= Very weak, 2= weak, 3= fair, 4 agree, 5 = strongly agree.

The results in Table 3, indicated the identified factors and the rankings form the focus discussion groups. The majority of the participants agreed that empowering the local community was the best strategies used to minimize the degradation of the conserved ecosystems. The findings also revealed that majority of participants agreed that enhancing ethic laws was another strategy to improve ecological ethics and conservation. The results further, in Table 3, indicated that in addition to the above, majority of respondents agreed

that sensitization of the stakeholders about the relevance of ecological ethics in conservation was crucial. In the same line, majority of focus discussion groups agreed that implementing heavy penalties especially those who displayed negative attitude towards conservation and ecological ethics. In addition, the focus discussion groups agreed that the government formulates and implements the relevant policies as well as rules and regulations to strengthen the ecological ethics and conservation of ecosystems in protected areas (Table 3 below).

Linkert's 5 point scale Ranked strategies to ecological ethics challenges to conservation (Scale range, 1= Very weak, 2= weak, 3= fair, 4 agree, 5= strongly agree.

Table 3. Ranked remedies to ecological ethics and conservation challenges.

Respondents' opinion	Rankings (1-5)					Total
	1	2	3	4	5	
Empower the local community	2	4	8	16	12	42
Enhance ecological ethic laws	2	4	11	12	13	42
Sensitize the stakeholders	5	3	9	15	10	42
Implement the penalties for offenders	1	3	7	15	16	42
Put policies and regulations in place	1	5	8	11	17	42

4. Discussion

The findings in line with the objectives indicated that ecological ethics plays a crucial role in ensuring that conservation is sustainable. The findings revealed that the key policies linked to conservation had a lot of ethical considerations entrenched in them. These policies and ecological ethics acted as guidelines to sustainable conservation of the ecosystems. The trend in these policies indicated that there was continuous formulation of the policies over the last decade to guide the use and conservation of the ecosystems. These findings are in agreement with researchers such as Watson *et al.* [47] who agreed that to preserve ecological entities from individuals to ecosystems there is need to interlink ethics in conservation. Additionally, in the same argument, Horton [22] highlighted that it is important to appreciate that conservation policy plays a pivotal role in natural resources conservation but at the same time an ethical dilemma. In agreement with findings, Convention on Biodiversity [12] emphasized that policy makers are key to because the natural environment is conveniently embraced as a means for the enhancement of socio-economic prosperity [20]. The results also indicated that ecological ethics has not been so successful as a result of factors that impacted on the implementation process. The findings revealed that factors such as, not engaging the community, poverty, inadequate funds, overlap of policies, population pressure, illiteracy and unequal distribution of resources led to poor implementation of the ecological ethics and thus conservation as agreed by Azevedo *et al.* [3].

Further, results were in agreement with earlier studies carried out by Manuel *et al.* [31] who agreed that collaboration is at the intersection of ecology, conservation,

and philosophy which could provide this needed guidance, but faces substantial challenges of say less engaging the community. Further, resource use patterns are intrinsically based on a diversity of interests, plurality of values, and cultural or ethical positions, which is called value pluralism [30]. In agreement to the findings, studies by other researchers found out that ethical framework frustrates conservations, as it currently does not meet a desired minimum level of ethical prescription for action [28]. The study findings also revealed that engaging the local community created more ecological ethics benefits as well as conservation of ecosystems. The results indicated that as a result of engaging the local community benefits such as increased revenue sharing, improved conservation, improved attitude, sense of ownership of the resources as well as job opportunities increased. These results were in agreement with Horton *et al.* [22] that emphasized that policy makers are key to conservation because the natural environment is conveniently embraced as a means for the enhancement of socio-economic prosperity.

5. Conclusion

It was concluded that, ecological ethics plays a crucial role in the conservation process. Well sensitized stakeholders in both ecological ethics and conservation yielded benefits which enhanced sustainability of the ecosystems as well as community well-being. In reference to the findings and discussion above, it was concluded also that implementation of the ethics and conservation process encountered challenges. These were linked to poverty, lack of community engagement, insufficient funds and policies overlap among others. Conclusively, the trends in policies linked to ethical and conservation processes indicated a positive trend which

implied that laws and legal frameworks were put in place to instil ethics in conservation. This was concluded that as much as there were ethical dilemmas and poor attitudes, there were guidelines in place to the local community and other stakeholders in the sustainable utilization of the ecosystems and their conservation.

References

- [1] Anderson, M., Anderson, S. L., (2011). *Machine ethics*. Cambridge University Press; (Google Scholar).
- [2] Azevedo, C., Corringan, J. R., and Crooker, J. (2008). Testing for internal consistence of choice. Experiments using Explicit Ranking of lake attributes. Lake pollution Research progress. Hauppauge, NY, Nova publishers.
- [3] Balsamo, A. and Mitcham C. (2012). *Interdisciplinarity in ethics and the ethics of interdisciplinarity*, In: Frodeman R., Klein, J. T and Mitchman C, editors. The Oxford handbook of interdisciplinarity. Oxford: Oxford University Press.
- [4] Batavia, C. Nelson, M. P., and Wallach, A. D., (2020). The moral residue of conservation. *Conservation biology*, 34 114-1121.
- [5] Biasetti, P., and De Mori, B. (2016). A framework of values: reasons for conserving biodiversity and natural environments. *Ethics and Politics*. Xviii (3) 527-545.
- [6] Bosworth, A., Chaipraditkul, N, Cheng, M. M., Gupta, A., Junmookda, K, Kadam, P., Macer D, Millet, M, Sangaroonthog, J., and Waller, A. (2011). *Ethics and biodiversity*. Bangkok: UNESCO Office Bangkok.
- [7] Brall, C, Maeckelberghe, E, Porz, R, Makhoul J, Schoeder-Baeck, P., (2017) Research ethics 2; new perspective on norms, values and integrity in genomic research in times of even scarcer resources. *Public Health genomics* 20 (1) 27-35.
- [8] Brittain, S, Ibbert, H., Lange, E., Dorward, L, Hoyte, S., Marino, A. Lewis, J. (2020). Ethical considerations when conservation research involves people. *Conservation Biology*, 34, 925-933.
- [9] Bush, G. K., Ikirezi, M., Daconto, G., Gray, M., and Facett, K., (2010). Assessing impacts from community conservation interventions around VNP, Rwanda.
- [10] Carroll, C., Hartl, B., Goldman, G. T., Treves, A., Kerr, J. T., Ritchie, E. G., Kingsford, R. T., Gibbs, K. E., Maron, M., and Watson, J. E M (2017). Defending the Scientific Integrity of conservation policy process. *Conservation Biology* 31 (5) 967-975.
- [11] Casetta, E., (2015). The values of biodiversity. An introduction. *Rivista di Estetica*., 59: 3-13.
- [12] Convention on Biodiversity (2011). *Tkarihwaie Ri Code of ethical conduct to ensure respect for the cultural and intellectual heritage of indigenous and local communities relevant to the conservation and sustainable use of biological biodiversity*. Montreal: secretariat of the Convention on Biological Diversity.
- [13] Costello, M. J., Beard, K. H, Corlett, R. T., Cumming, G. S., Devictor, V., Loyola, R., Mass, B., Miller-Rushing, A, J., Pakeman, R., and Primack, R. B., (2016). Field Work ethics in biological research. *Biological Conservation*. 303: 268-271.
- [14] Curzer, H. J., Wallace, M. C, Perry, G., Muhberger, P., J., and Perry D (2013). The ethics of wildlife research.; A nine R theory. *ILAR, Journal* 54, 52-57.
- [15] De Leo Giulo, A., and Levin, S (1997). The multifaceted aspects of ecosystems integrity. *Conservation Ecology*. 1 (1) 3.
- [16] Edwards, J, R., and Dabiel M. C. (2009). The values of congruence. *Journal of Applied Psychology*, 94 (3) 654-677.
- [17] Elliot, K. C, and Resnik, D. B. (2014). Science, policy, and the transparency of values. *Environmental Health Perspective.*, 122 (7) 647-650.
- [18] Garrard, G. E., Fidler, F., Wintle, B. C., Chee, Y. E., and Barkessy, S. A.,(2016) Beyond advocacy: making space for conservation scientists in public debate. *Conservation letters.*, 9 (9); 208-221.
- [19] Gray, M. (2012). 20 years of IGCP: Lessons learned in mountain conservation. *World development*, 28 (11) 1972-2003.
- [20] Government of Rwanda (2009). Ministry of Trade and Tourism (MINCOM), Rwanda Tourism, Kigali, Rwanda.
- [21] Harte, J. (2001). Land-use, biodiversity, and ecosystem integrity: the challenge of preserving Earth's life support system. *Ecology Law Quarterly.*, 27 (929-966).
- [22] Horton, C. C., Tarla, R. P., Paulami, B., and Marcus, J. P. (2016). Credibility and advocacy in conservation science. *Conservation Biology* 30 (1): 23-32.
- [23] Indigenous Partnership on Agro-biodiversity and Food sovereignty. (2011) Code of ethics. Code of ethics final, 28 February 2011.
- [24] IUCN Commission on Environmental Law (2010). The biosphere ethics initiatives; building global solidarity for the future of life.
- [25] IUCN Biosphere Ethics Project Interim Coordinating Group (2008). The biosphere ethics projects; implementing the Bangkok world conservation congress resolution to draft and promote a code of ethics for biodiversity conservation. Glad; IUCN International Union for Conservation of Nature and Natural Resources.
- [26] Jolibert, C., and Wesselink, A. (2012). Research Impacts and impacts on research in biodiversity conservation; the influence of stakeholders engagement. *Environment Science and Policy.*, 22: 100-111.
- [27] Komie, D., Stjepan, L., Marusic. (2015). Research integrity and research ethics in professional codes of ethics; survey of terminology used by professional organizations across research disciplines. *Olos One* 10 (7): 145 (5). 688-696.
- [28] Lanjouw A., A. Kayitare, H. Rainer, E. Rutagarama, M. Sivha, S. Asuma, and J. Kalpers. (2001) *Beyond Boundaries: Transboundary Natural Resource Management for Mountain Gorillas in the Virunga-Bwindi Region*. Washington, D. C., U.S.A.: Biodiversity Support Program.
- [29] Lindsay, G. (2011). Transnational ethical guidance and the development of the EFPA mata-code of ethics. *European psychologist*. !6: 121-131.

- [30] Mackey, B. (2005). Ecological integrity: A commitment to life on Earth. In blaze Corcoran P, editor. The Earth charter in action: towards a sustainable development, Amsterdam. Royal Tropical Institute.
- [31] Manuel, N. D., Kay J. J., Doldeman, D., (2004) Ecological integritydiscourses; linking ecology with cultural transformation. *Human Ecology Review.*, 11 (3): 215-229.
- [32] Masood, E. (2028). The battle for the soul of biodiversity. *Nature.*, 560: 423.
- [33] Meyer, J. L., Frumboff, P. C., de la Rosa, C, and Humburg S. P. (2010). Above the din but in the fray/; environment scientific as effective advocates. *Frontiers in Ecology and the Environment.* 8: 299-305.
- [34] Miller, T., Ben, M., and Leon, M. (2011). The new conservation debate; the view from practical ethics *Biological Conservation* 144: 948-957.
- [35] Minter, B. A and Collins, J. P. (2005) Why we need an ecological ethics? *Frontiers in Ecology and the Environment*, 3: 332-337.
- [36] Minter, B. A, and Collins, J. P. (2010) Ecological ethics; building a new tool kit for ecologists and biodiiversity managers. *Conservation biology*, 19: 1803-1812.
- [37] Minter, B. A, and Collins, J. P. (2013) Ecological ethics in captivity, balancing values and responsibilities in zoo and aquarium research under rapid global change. *ILAR Journal* 53 (1): 41-51.
- [38] Morand, S, and Claire, L. (2017). Ethics, Values and responsibilities, in biodiversity and health. Linking life, ecosystems and societies. London: Elsevier ISTE Press.
- [39] Murphy, C. (2005). Lon Fuller and the Moral value of the Rule of Law. *Law and Philosophy*, 24: 239-262.
- [40] Musahara, H. and C. Huggins. (2004) "Land reform, land scarcity and post conflict reconstruction: a case study of Rwanda." *Eco-conflicts, volume 3, number 3, October 2004.*
- [41] Oommen, M. A., Cooney, R. Ramesh, M., Archer, M., Brockeington, D., Buscher, B., Shanker, K (2019). The fatalflws of compassionate conservation. *Conservation Biology*, 33.784-787.
- [42] Owunji, I., Plumtre, A. J., Behangana, M., Davenport, T., Kahindo, C., Kityo R., Ndomba, E., Nkuutu, D., Ssegawa, P. (2004). The biodiversity of the Albertine Rift, *Albertine Rift Technical Report*, 3, 105.
- [43] Pavegeau, C., Butterfiled, R., and Tiani, A. M. (2013). Current Vulnerability in the Virunga Landscape, Rwanda. *Center for International Forest Research (CIFOR)*, Bogor, Indonesia.
- [44] Rwanda Development Board, 2013. Annual Report of 2012 year achievements, Kigali, Rwanda.
- [45] Rwanda Development Board, 2014. Annual Report of 2013, Kigali Rwanda.
- [46] Wallach, A. D., Bekoff, M., Batavia, C., Nelson, M. P., and Ramp, D. 92018) Summoning compassion to address the challenges of conservation; Comapassionate conservation. *Conservation Biology*, 32, 1255-1265.
- [47] Watson, J. E. M, Venter, O., Lee, J., Jones, K. R., Robinson, J. G., Possingham, H. P., and Allan, J. R. (2018). *Protect the last of the wild Nature* 563: 37.