

# Kundelungu National Park: A Case Study in Environmental Education for Sustainable Management of Congolese National Parks

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## Abstract

As a multifunctional space, national park (NP) offers visitors a range of experiences, including environmental education (EE) programs, which help visitors learn about the park's ecosystems, biodiversity, and cultural heritage. These programs can take various forms, such as guided hikes, interpretive displays, educational workshops, and citizen science projects. This paper presents theoretical research and practice in EE in NPs, drawing on research conducted in the Democratic Republic of Congo (DRC) and other countries. The study aims to identify effective ways of implementing EE function in NPs, including planning the legislative system and educational activity content. Successful EE programs often involve collaboration between park staff, educators, and local communities, tailored to the specific needs and interests of different visitor groups. Challenges faced by Congolese NPs in implementing EE programs include limited funding, inadequate staffing, and a lack of public awareness and support. The study provides examples of successful EE programs in other national parks that could serve as models for Congolese NPs. To achieve EE function in NPs, the study proposes solutions such as developing partnerships with local schools and universities, using social media to raise awareness about EE programs, and integrating EE into park management plans and policies. By implementing these solutions, Congolese NPs can contribute to global efforts to conserve biodiversity and protect the planet's natural resources.

## Keywords

National Parks, Environmental Education, Biodiversity, Conservation, Sustainable Development, DRC

## 1. Introduction

After the creation of Yellowstone National Park, the first listed national park in the world, and as an answer to the achievement of ecological conservation and biodiversity restoration, a flow of new national parks all over the world began. According to the International Union for Conservation of Nature (IUCN), there are now over 200,000 protected areas worldwide, covering around 15% of the Earth's land surface (ICUN, 2016).

First, the developed countries did not just copy the existing system but implemented them to find solutions to the problems faced in the management of their resources. They managed to create a proper legislative and administrative system for each function of the national park. In addition to fulfilling the function of protecting the natural landscape, the parks can also be a source of income and leisure through tourism, and they can also be an educational place to provide environmental education.

Many African countries are full of rich wildlife biodiversity and natural resources, from gorgeous landscapes to unique animals and other minerals. Unfortunately, few of them are able to properly exploit and rationally use their resources. For instance, the Democratic Republic of the Congo (DRC) has experienced a decline in wildlife populations due to poaching, with elephants and rhinos being particularly affected. Deforestation is also a major issue, with the country losing around 1.5 million hectares of forest each year (Debroux, 2007). However, some countries like Kenya, South Africa, Tanzania, Zimbabwe, etc., managed to establish their NPs and assimilate the multiple functions of the parks to their culture, economy, and political system, creating facilities to provide leisure, tourism, research, and education, such as the Lake Nakuru in Kenya (Odada et al., 2006; Mulwa et al., 2018; Perry, 2012).

Unfortunately, other countries suffer from resource mismanagement due to various factors, such as population growth and urbanisation, climate and environmental challenges, inadequate technology and innovation..., including political or economic instability. Some countries such as Zimbabwe, DRC... with protected areas do not have the funds to meet the needs of maintaining the environment in a sustainable way or to incorporate better policies capable of engaging the population in making decisions about the protected areas. So it is imperative for those countries to find a proper way to manage these natural resources to get the most benefit and secure the future environment for the next generation. Located in the centre of Africa, the DRC is the second largest country in Africa after Algeria. The country is rich in natural resources, such as a huge part of the African equatorial forest and the Congo River, and owns some incredible national parks with great potential for biodiversity conservation and ecotourism (Noti et al., 2003; Inogwabini, 2014). According to the World Wildlife Fund (WWF), the DRC is home to more than half of Africa's forest elephants and the largest population of eastern lowland gorillas. The NPs in Congo also have unique landscape and fauna such as Congolese peacocks and okapis,

which can only be found in Congo (Mulongwa et al., 2010). The Congo's NPs attract visitors from all over the world to see and discover the beauty of nature. It is this amazing nature and the potential it has for the economy of the country that pushed the Congolese government to create NPs with the help of great scientists. Congolese NPs face and keep facing a variety of challenges, such as poaching, fishing, land use, conservation conflicts with humans and animals, and low levels of awareness towards the environment. Since some NPs were created without the full consent of the people living in the area, this results in a conflict between the citizens and the personnel appointed for the protection of the NPs.

Just as some countries found a solution to problems related to mismanagement and a broken relationship between the manager and the indigenous people, a lack of support and involvement of the population in activities in national parks was addressed by implementing EE in the park by applying educational methods to raise awareness of the population and involving their support and participation.

This paper will examine the EE function strategies used in DRC NPs by analyzing the environmental state of the country's institutions, national parks, and particularly the Kundelungu national park. The aim is to identify successful strategies and best practices that can be applied to other NPs in the DRC and other African countries facing similar challenges.

## **2. Research Status at Democratic Republic of the Congo and Abroad**

### **2.1. Research Status Abroad**

In recent years, scholars at home and abroad have done a lot of research on "environmental education" in NPs. Many developed countries, such as the United States, Britain, Australia, and Japan, have developed mature national park systems and accumulated rich practical experience in EE activities. For example, in the United States, the NP Service has been offering EE programs to visitors for decades, and research has shown that these programs can have a positive impact on visitors' knowledge, attitudes, and behaviors related to the environment (Butler & Boyd, 2000). Similarly, in Australia, the Great Barrier Reef Marine Park Authority has developed a range of educational materials and programs to raise awareness about the importance of protecting the reef and its ecosystem (Kenchington & Day, 2011).

Research on EE in NPs has also been conducted in other countries, such as Korea and China. In Korea, a study found that educational programs in NPs can lead to changes in visitors' attitudes and behaviors towards the environment (Honey, 1999; Xu & Fox, 2014). In China, researchers have explored the role of EE in promoting sustainable tourism practices in NPs, and have identified factors that can influence the effectiveness of such programs (Xu et al., 2013). Boyle (2004) believes that in nature reserves, the combination of environmental inter-

pretation and environmental education can effectively promote the connection between tourists and the natural environment and can affect tourists' destructive behaviour to the environment. In research and practise, people have noticed that the realization of the function of EE is affected by many factors, and the analysis of the influencing factors can promote the effective use of EE.

According to Reid and Scott (2006), there are four main factors that affect the impact of EE on tourists: educational content, information transmission mode, audience characteristics and theory, and theoretical support. The research conducted by Sirivongs and Tsuchiya (2012) shows that the decision and implementation of public environmental protection behaviour are highly related to their perception and attitude towards national parks and their willingness to participate in environmental protection. In addition, in order to get the full effect of EE, the environmental behaviour of tourists needs to be monitored and evaluated. Doren (2009) and others used infrared sensors and digital camera technology to track and analyze the behaviour of tourists and proposed that national parks implement the EE strategy of real-time tracking management. Ardoin et al. (2020) analysed relevant literature and found that when EE activities have four characteristics, namely, paying attention to local environmental problems, cooperating with scientists or community organizations, considering multiple influencing factors, or evaluating the effect of EE, it is easier for participants to have an awareness of environmental protection. We see EE as key to the sustainable development of a NP. Promoting and then realising sustainable development, internalising values, and educating can develop correct and sustainable behavior (Zhu et al., 2009).

In developing countries like China, which makes a good example on the matter of fast development, the country launched the 10 pilot national parks in 2020, involving EE role activities and advancing theoretical research and practical models, such as research on the clarification of interpretation and difference between the nature education and EE for better standardization of the framework of the EE system at the top-level design level, China has carried out EE activities in national nature reserves (Sun et al., 2020).

For example, Shaanxi Changqing Nature Reserve has formed an EE model of "accurate positioning, building a platform, carrying out activities, making good use of the situation, and team training". The development of EE in China's nature reserves is inseparable from eco-tourism. In order to reduce the damage caused by tourists to the environment, Yancheng Coastal Wetland and Qiandao Lake National Forest Park have carried out EE activities that are both having pedagogical meaning and interest by learning from the EE models of foreign national parks. The Yangmingshan Geopark in Taiwan has established an ecological conservation and environmental interpretation system that combines teaching with tourism in its actual operation. The Hong Kong Mai Po Nature Reserve has established a sound education system and a scientific management model that have become models for the development of EE. These studies aiming to

improve the EE system are becoming the key to promoting the development of EE in NPs. It is also an important way for the educational model to move from simplification to integration, from superficiality to refinement, and from fragmentation to grid.

## **2.2. Research Status in Democratic Republic of the Congo**

The Democratic Republic of the Congo (DRC) has nine NPs located in each province. The development of EE is promoted mainly through the organization of citizens and cooperation with national and international non-governmental organizations. Congo's "Green Citizens' Association", the only EE association in the country, currently operates in Kinshasa and plans to set up representative offices in other regions of the country in the next few years. The national environmental information centre is a department of the Ministry of Environment, which mainly promotes the development of EE at the national level. However, insufficient funds are a challenge for the development of environmental education. UNESCO also emphasizes that environmental education is a pillar of sustainable development. Only by cultivating a sense of responsibility for nature and promoting knowledge of environmental protection can we have a better future. The development of EE through national conferences, agreements, and debates has had a significant impact on environmental protection, and various professional public service organizations or departments have been created to manage the environment. It can be seen that EE has been given importance by public service departments such as the Ministry of Environment, Tourism, and Nature Protection, professional public institutions such as the Congolese Institute for Nature Conservation (ICCN), as well as bilateral projects for national park protection with the Ministry of Habitat and Agriculture. Children are aware of the importance of protecting the environment, including soil, water, air, and forests. Willy Bakonga said, "It is very important for children to grow up in a healthy environment for their physical and mental development." **Boris Ngounou (2020)** believes that integrating EE into the school curriculum will show children the complexity of environmental issues and their role in this common "struggle".

There is not yet a concrete framework for EE in NPs, but with the help of the Congo Institute for Nature Conservation (ICCN), some national parks and non-governmental education organizations are displaying the environmental education function by creating small schools for the villagers, conducting research on the interpretation of the EE, and collecting information on the types of plants and fauna in different national parks. Virunga National Park, the oldest national park in Africa, is located in the east of the DRC on the land border between Rwanda and Congo. The paper conducted research on the implementation of the EE for, and these findings revealed the achievements from the impact of the EE and the environmental protection management on the sustainability of Virunga NP as foreign exchange, improvement in wildlife based tourism and

associated industries, infrastructure development, employment opportunities, increased income, improved macro-economies, and people's knowledge about the environment, the park, and its value. The study recommended that there is a need for environmental extension workers, transparency and accountability mechanisms, increased funding, and environmental laws and regulations (Mikuba, 2012).

### **3. The Environmental Education Function in National Park's in the USA and China**

Parks in the United States, national parks are designed to protect ecosystems, promote environmental education, and provide recreational opportunities for the public. The National Park Service (NPS) is in charge of overseeing the properties within the national park system. The agency was created on August 25, 1916, through the National Park Service Organic Act. The NPS being a bureau department of the Interior, its operations are directly regulated by the division's assistant secretary for fish, wildlife, and parks. The NPS is the agency in charge of the management of all the NPs and also plays a role in providing educational information about the NPs. In its core duties, it shows a statement consisting of the preservation of parks and historic properties and improving communities. For the purpose of creating a cooperative of educational institutes under a more liberated and long-lasting sponsorship than the government offered, the National Parks Association was created as a citizen support group for the NPS.

The National Parks Association, also known as the National Parks Conservation Association (NPCA), promotes in part the interpretation of the scientific resources of the parks, encourages school visits to the parks, provides educational materials to schools, and encourages the general development and distribution of information regarding the NPs. Various fields of research and education support the NPS. The educational as well as recreational uses of the NPs are explained in a practical way. Universities and high school classes require special facilities for their vacation period studies. Museums containing specimens of wild flowers, shrubs, and trees; mounted animals; birds; and fish native to the parks; and other exhibits of the character will be established as authorized. The United States considers NPs as properties in a non-commercial sense, such as the National Forest, but as some preserved nature for the rest, as recreational spaces, and as places to educate people. Since 1918, the National Parks Educational Committee has promoted the educational opportunities in NPs with the objective of educating the public to respect the nature and quality of the national park and to consider the national parks as a classroom and open museum of nature, using current technology, skills, and the educational system to deliver a wide outcome (Vaughn & Cortner, 2013). To consolidate in one interest the compassion and activities of schools, universities, and resident associations in all pieces of the country, study the history and science of each NP, and collect the data for future use Wray and Roberts (1998). With the passage of the National

Park Service Centennial (2016), one of the core missions of the National Park Service (NPS) was reinforced, which is to provide education to enhance public awareness, understanding, and appreciation of the resources of the park system through learner-centred, place-based materials and activities. Considering the full potential of America's NPs as the country's largest classrooms, the possibilities for impacting youth or adults appear nearly limitless. On the instance of the USA education standards since 2011, the US federal government has required publicly supported schools to annually assess student achievement in Consequentially, most EE programmes for youth in NPs provide experiences and curriculum that align with state and/or national education standards and support classroom learning through hands-on and direct experiences with nationally and globally significant cultural, environmental, and historical resources. The programmes mostly follow STEM (science, technology, engineering, and mathematics) standards. The standards most relevant for EE field trips for youth include ecological processes, the interdependence of organisms, the inter-connectivity of social and ecological systems, how humans may impact the environment, and how changes in the environment influence ecosystem function and human systems [e.g., Next Generation Science Standards lead states, 2013 (Reiser, 2013)]. Recognizing the important role that experiences in parks can play The NPS's service wide interdisciplinary strategic plan for Interpretation Education and volunteers (2014) and the vision Paper: 21st Century National Park Service Interpretation Skills [NPS-ABEC, 2014 (Powell, 2020)] prioritize enhancing environmental literacy, first-century skills, positive youth development, and meeting educational standards in all educational programs for youth. The NPS goals appear particularly relevant for identifying cross-cutting outcomes for EE. Overall, in the United States' national parks, EE is demonstrated through educational and research programmes, the construction of research and educational facilities, and the supervision of the National Park Service Department, with the collaboration and support of partner organisations and organizations such as the National Parks Conservation Association, the National Recreation and Parks Association, the National Environmental Education and Training Foundation, and the NPS. The education programs could be based on four policies 1) a good and reasonable interpretation of the resources of each park to the public by means of promoting lectures, exhibitions, field trips, and literature content; 2) accentuation on the way to get the visitors focusing on the real contact with nature, making opportunities to study things on the first hand; 3) equipping the field experience with personnel highly trained in the interpretation of laws of nature and able to develop concepts of the laws of life useful to all; and 4) a research programme that would furnish a continuous supply of dependable facts suitable for use in connection with the educational program. In the context of the continuous improvement of the global construction of national parks, in 2013, China began to carry out the pilot national park system, clarifying the important role of national parks in protecting the natural ecological environment and the authen-



ticity of natural resources. National parks have gradually become a natural outdoor education field for public welfare, bearing the important function of EE (NPCA, 1918-1919). At present, China has established 10 NP pilot projects, including Sanjiangyuan, Qilian Mountain, the northeast tiger and leopard, giant panda, Hainan tropical rainforest, Pudacuo, Shennongjia, Wuyishan, Hunan Nanshan, and Qianjiangyuan, a project involving 12 provinces (autonomous regions), including Qinghai, Jilin, Heilongjiang, Sichuan, Shaanxi, and Gansu, a rich environment in natural resources, covering diverse types of areas and other important ecosystems. China's development emphasizes ecological protection but also takes the rational utilization of internal natural resources as an integral part of the establishment of the national park system. On the system planning status, the direction for the function of NPs in China is pointed by the policy guidance, while in practical management and application, the realization of the environmental education function of national parks is more dependent on the overall planning and special EE plan of each national park. In the general planning of a NP, the general requirements, scope division, and system guarantee of NP construction are clearly stipulated. The provisions on EE in parks are also included in the general plan. In the master plan of each NP pilot, there are clear instructions on setting up EE facilities, education and training for the community, using online media to publicize, opening nature schools, and enhancing the natural experience of tourists. as an example Sanjiangyuan NP plans published in June 2017 include the building of an open website for the national park to publish the ecological environment of the park, carry out EE and information services, and actively use Wechat, Weibo, and other new media to promote, popularize ecological culture, improve ecological civilization awareness, cultivate ecological citizens, and form the active protection of the masses through extensive social participation. The Chinese legislative status for the ten national parks is still at local government level. Although the legislation for national parks has not yet been decided, in order to ensure the smooth implementation of the pilot work, local governments have been formulating relevant management regulations for national parks according to the requirements of the overall plan and the guidance, with Yunan Province as the first region in China to explore the establishment of the national park system. In November 2015, the Regulations on the Management of National Parks in Yunnan Province were passed and promulgated, becoming the first local regulations on national parks in China. As an example of the local regulation Wuyishan National Park regulations (Trial) November 2017, Article 7 stipulates that: We should strengthen the publicity and education of NP protection and popularize natural resources and human resources Cultural resources and environmental protection knowledge, as well as relevant laws and regulations, enhance the sense of responsibility and protection among local residents and other social groups. At present, carrying out EE activities within its NP is given priority. With natural observation and experience, many visitors to the park and surrounding communities of young students, us-



ing the resource advantages of its NP, adjust measures to local conditions according to their own environmental education knowledge system with distinctive features. The most frequent observation activities are identifying leaves and other plants, followed by bird-watching and bird-recognition activities. To a certain extent, participants' interest in understanding nature has been stimulated, and publicity and education in biological resources popularization and habitat protection have been achieved. Each NP in China has publicity and education systems in collaboration with environmental protection organizations and research universities. The environmental interpretation in national parks is not large. The environment of visitor interpretation in the form of self-guided interpretation, such as ecological tourism and printed publicity materials, hangs on the trees of environmental interpretation signs and national parks, as do the basic resources of signs and so on. In China's national parks, indoor facilities with EE functions include visitor centres, natural experience halls, exhibition halls, and museums, and the outdoor facilities currently include environmental interpretation signs, park guide maps, animal and plant interpretation signs, etc. Safety warning signs are mostly found in steep land forms or river areas, and environmental detection devices are generally hidden in the core protected areas of the national park, which are rarely accessible to the public. China National Park And finally, the public participation of China's national parks is made possible by the collaboration of different levels of organization, like professional institutions and research institutes in China and international institutions; community residents are exposed to EE through publicity activities with "nature" and "humanities" as the content, highlighting the basic core of cultural inheritance and ecological protection.

The primary and secondary schools are equipped with specialized knowledge education on environment. In the EE courses of primary and secondary schools, we use specimens, pictures, videos, and popular science books to carry out popular science education of animal and plant knowledge, understand the significance of national parks, introduce the important ecosystems and biological resources of NP, and guide students to know nature, love nature, and desire to walk into nature. Primary and secondary schools and kindergartens in the communities around NPs have taken advantage of natural geographical advantages to develop long-term cooperative relations with various national parks. In a nutshell, a high standard and effective EE in NPs can only be achieved, or should I say measured, by a few criteria First is the overall education system in a country Second is the master plan system of the NP, which must incorporate the education function in the process of construction, not at the end to facilitate And to clarify the multi-functional nature of the national park, the legislative status needs to be well treated to clarify the legalization of the NP system. Third, the national parks need to be equipped with facilities for environmental interpretation and the training of high standard rangers who are not just capable of protecting the national park but can also clearly interpret the resources of the

park and the environmental situation. Fourth, the NPs need good collaboration with diverse organizations (government and non-government), education institutes (high school and university), and research institutes. Fifth is the spreading of information and promotion of educational or recreational programmes to create public awareness, which causes public participation a general plan system plus legislative status, good facilities, interpretation, and public participation equals the EE function of NPs.

#### **4. The Environmental Education Function in Kundelungu National Park**

To the present time, there is not yet an EE system or function integrated into the NP planning system in the DRC, even though based on the decree of the creation of the NP, there is room for the EE figure. But with the decision made on July 13, 2020 by the Minister of Environment and Sustainable Development and the ministers responsible for education in primary, secondary, and technical education to provide EE courses and not as a subject or unit in other courses like it was before, there is hope for EE to be implemented in the NP and provide a solution to better management. The Democratic Republic of the Congo (DRC) has nine national parks, with the first established in 1925 and the Lomami National Park created in 1992 but formally declared in 2016.

The nine NPs cover almost all the province in the DRC, possessing a large ecosystem and a huge amount of biodiversity, which could play a big role in providing EE. The area could be a place of meeting between humans and nature in its wild state, and the national parks could play a major role as a touristic source of income (Albright, 1985). The DRC, under Act 14/003, defines the national park as a category of protected areas, including large-scale natural or quasi natural areas reserved for the protection of large-scale ecological processes as well as the species and characteristics of the regional ecosystem, which also provide the basis for spiritual, scientific, educational, and recreational tourism while respecting the environment and culture of local communities. These exhibits show the educational function that has to be integrated into the national parks. We chose the Kundelungu National Park (KNP) as a case study and survey. The survey mainly consisted of collecting data about the national park, and a questionnaire was made to collect suggestions and estimate the efficiency of the park management at the same time as thinking about a proper way to implement the EE function in the national park. The KNP, classified by the IUCN as category 2, was created according to Decree No. 70-317 of the 30th of November 1970, with 7600 sq km. It covers the two administrative districts of Kasenga and Mitwaba in Haut Katanga province. For good monitoring, it is divided into five parts: Kato-way, Lubanda, Masala, Mandumvila, and Kuperu. The KNP is managed by the Congo Institute for Conservation of Nature (ICCN) in partnership with the Society for Agricultural Projects (SAP), a German consulting firm, and other technical (LIMAINCOR) and financial (KFW) partners. The park protects a vast

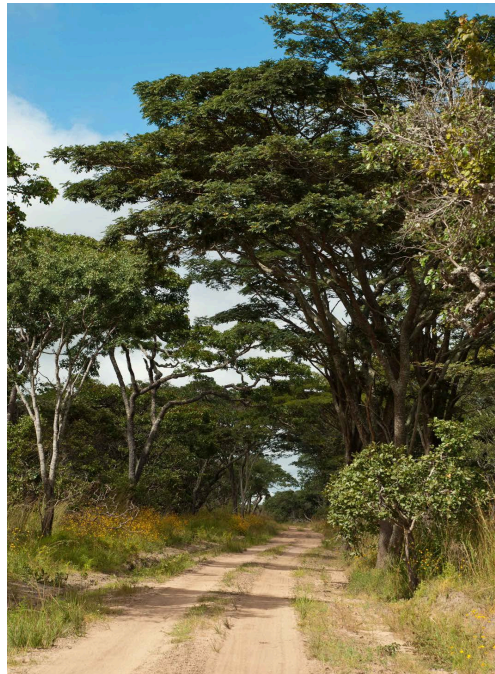
ecological area and has rich biodiversity. The park's area is covered with a fascinating landscape, ideal for safari activities like nature walks and hiking, in Miombo woods with other types of vegetation such as savannah and forest grassland, and the fauna includes monkeys, African antelope, and more than 1800 bird species, the KNP has amazing water falls such The Lofoi Falls (also known as the Chutes Kaloba and the Chutes Lofoi) is a waterfall in Kundelungu National Park, Katanga Province, Democratic Republic of the Congo. Plunging down for an unbroken 340 m, it is one of the largest waterfalls in Central Africa. The waters of the Lofoi are a tributary of the Lufira River. From the research conducted by the ICCN in collaboration with the DRC and international organizations, more details are found on the landscape and the ecosystem (**Pictures 1-5**).



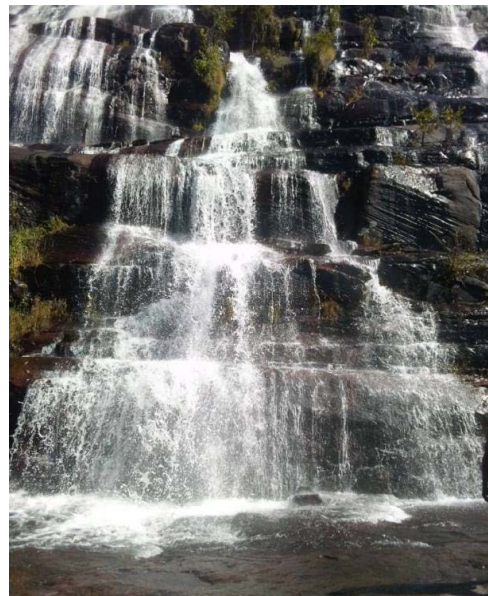
**Picture 1.** “Lofoi waterfall”/source: took during survey.



**Picture 2.** “Lofoi fall”/source: took during survey.



**Picture 3.** “Miombo Woods in KNP”/source: geobobford.com.



**Picture 4.** “Masansa Fall”/source: took during survey.

The KNP is surrounded by a lot of villages, and within them, 16 villages have been selected and 130 persons have been interviewed by selecting almost 10 people from each village. Based on the collected data, it was revealed that 14 schools were built from 16 surveys under ACT No. 14/003, Article 28 (**Table 1**). One of the schools was established in the national park for the ranger families. The NP has facilities for training the rangers, and the school’s curriculum is





**Picture 5.** “One of the ten tents installed at Luchipuka Falls, 28 kilometers from the headquarters Katwo station”/source: during the survey.

content-rich, including a basic course but also some extra subjects on the environment and certain methods to protect the environment. Students inside the national park sometimes have the privilege of having practical classes as outdoor classes.

On the legislative level, some regulations have already been implemented, such as the law related to the NP construction based on Act 14/003, Articles 29 and 32 (**Table 1**).

Based on the survey, KNP public participation is achieved by creating some community organizations that are able to take part in the decision-making process for new projects or during the creation of new regulations for the better protection of the fauna and flora. Members of community organisations are chosen from the survey with the assistance of the villagers. Only five villages have community organisation representatives. The tourism part of the publication of information on the state of the national park and the organisation in charge of the national park is not constant and is not properly done because of low content research, from the interview of the villager, only the name of the state service that manages KNP is given. From the collection of data, some problems have been noticed and need to be solved to create the opportunity for a proper EE implementation.

## **5. The Challenges Faced by Kundelungu National Park in Park Management**

### **5.1. Main Pressure Faced by the Kundelungu National Park**

Before the establishment of the KNP, the people were depending on the resources

**Table 1.** Article from law No. 14/003 of February 11, 2014 on Nature Conservation.

Act 14/003 law regarded to the nature conservation	
Article 28	Buffer zones are necessary for the development of local communities and their activities, and their management should be consistent with the conservation objectives and management plans of each relevant protected area. When determining the allowable activity system in the buffer zone, the forest use rights of residents in the buffer zone should be respected. Countries and provinces should promote sustainable and environmentally sound development.
Article 29	Any development, infrastructure, or operation of any industrial, commercial, agricultural, forestry, mining, telecommunication, or other activity in the buffer zone is subject to the fact that it does not have a negative impact on the protected area and is subject to a prior environmental and social impact assessment with its management plan duly approved in accordance with the law.
Article 32	Any proposal to establish a protected area must be subject to prior public investigation, environmental and social impact assessment, and a management plan formally approved in accordance with the law. The purpose of the public survey is to: 1) Inform the public, especially local residents, of the project; 2) collect information about the nature and scope of the rights that the third party may have in the project affected area; 3) Determine the way of compensation or compensation in case of possible requisition or population displacement; 4) Collect assessments, suggestions, and counter suggestions so that the competent authority has all the information necessary to make a decision.

of the place by living a hunting, agricultural, and animal husbandry lifestyle, but since the creation of the parks, some villagers have ended up living in the absence of food and sources of income. So even up to now, a lot of villagers are still doing the same activity despite the regulation about protecting the animals. At the present time, the main pressures faced by the KNP are Poaching, agricultural holding, illegal fishing, uncontrolled wildfire.

## 5.2. Low Budget Al. Located for the Park

The NP lacks funding, the available budget for research and management operations of the park only comes from activities-related income such as fishing, a small amount of money allocated by the government for the protection of the environment (including the protection of the fauna and flora-protection of the fauna and flora), and tourism, as well as from organizations like the United Nations Development Programme (UNDP). The budget for research in the national park is unsafe because it relies on funding from UNDP. A few years ago, the NP went through some financial crisis, and was only with the director's interim relief support. Through the NGO Forget the Park Foundation (FPF), the ICCN

Grant Katanga managed to run some protection activities and maintenance that helped the park survive for a period of time.

At the present time, the ICCN organization in charge of the KNP is in collaboration with the GFA and KfW, which provide some funding.

### **5.3. The Inadequate Performance of a Member of the Staff**

The number of staff members does not meet the requirements for the essential management functions. There are 112 people working for KNP. The management believes that they will need approximately 40 more security officers and one researcher. The school that has been constructed in the national park has a total of three teachers in charge of it. Moreover, the majority of the country's NPs are affected by this issue.

There are some people on the staff of the NP who have received enough training, but there are not nearly enough of them to accomplish the work of protecting the park's resources, providing interpretation of those resources, and enforcing the regulations that govern the park (Laina et al., 2021). The difficulty is remedied by the recruitment and training of some residents of the community to serve as rangers; however, the training that the villagers receive is extremely fundamental in nature and covers topics such as how to operate certain pieces of the rangers' equipment. This presents a further challenge.

### **5.4. Recreation and Tourism**

The rate of tourism in the KNP is very low due to some conflict that occurred in the park's history as well as minimal budget al. location. Park admission fees are paid for by tourists, while fisheries product development taxes are paid for by local governments (as defined in the creativity act and Act 69-041). Approximately 10% of the admission charge is given back to the traditional chiefs, and approximately 50% of the profits is directly reinvested in the management of the KNP. This is in accordance with the regulatory regulations that are in place. The impracticality of the roads in the NP is one of the factors that has a negative impact on the tourism industry there. Because of the poor condition of the roads, visitors to the national park will have a difficult time getting there during the rainy season and on rainy days. The DRC needs to broaden its range of commercial partners and strengthen its ties with its immediate neighbors. Additionally, it needs to make substantial investments in the public infrastructure in order to attract a greater number of tourists. The DRC will be connected to major ports in other African countries via public infrastructure, such as roads (Kuka et al., 2021).

### **5.5. Conflict between Park Guards and Villagers**

The conflict between the park's guardian and the surrounding or within-park population is one of the most common problems in national parks. Diverse factors contribute to the conflict; based on the interviews, several villagers complain about park officers crossing the boundary in the name of protection by over-



controlling, inspecting cooking pots, and demanding taxes that do not exist. It was reported that park officers fined individuals who entered the park without following the legal procedure (Verweijen et al., 2020) and without respecting the village custom of performing rituals before entering certain areas of the village before entering the park.

### **5.6. Poverty Rate among the Community**

Poverty at the level of the local population, poverty in rural areas far from urban metropolitan centers, and underemployment are all issues that plague the area. The population residing in remote areas far from the city has trouble obtaining food, and the lack of employment makes the situation worse. Difficult access to food forces the population to engage in illegal fisheries within the boundaries of protected areas, illegal hunting, deforestation, and mineral extraction.

This issue is one of the primary factors why the local community cannot assimilate and implement environmental education concepts. The fundamental needs for food or access to potable water remain unmet, so the population is forced to engage in illegal activities in order to survive, and children are unable to attend school because they must help their parents obtain food.

## **6. The Challenges Faced by Kundelungu National Park in Park Management**

The NPs of the Democratic Republic of the Congo (DRC) are currently confronting a number of issues, and it will require a great deal of policy effort and funding to make a difference and reach a point where environmental functions can be implemented.

### **6.1. Main Pressure Faced by the Kundelungu National Park**

More education facilities must be established; these schools must implement a curriculum capable of raising environmental awareness; the courses must provide a deeper understanding of the human-environment relationship; and they must develop critical thinking skills that enable responsible decision-making and environmental activism. The outdoor facilities must also be established, and each tourist site must have some information displayed. During a tourist's visit to the park, the guards of the park and the eco-guards are in charge of the tour; the eco-guards give a brief introduction to each site, but to make the visit more interesting and to highlight the availability of more information to the tourist, it would be prudent to install information panels. These panels could provide detailed information about the history, ecology, and cultural significance of each site. Additionally, they could include maps and directions to help tourists navigate the park more easily.

### **6.2. Advanced Researches**

National parks in the Democratic Republic of the Congo must conduct addi-

tional research to acquire more data. Since the establishment of national parks, the flora has been the primary subject of study, even in terms of their preservation. The published papers emphasized animal monitoring, resolving conflicts between animals and the local population, and the preservation of endangered animals. But the horticultural aspect has been neglected, and research on the landscape has only recently begun. It is essential to conduct exhaustive research on the national park's terrain, fauna, and flora. These researches serve educational purposes, and aid in the preservation of the ecosystem and its isotopes. As a result of the research, the local populace could benefit from a variety of agricultural and fisheries techniques, as well as eco-friendly food procurement alternatives. By increasing collaboration with research institutes and universities, the research can be accomplished. This collaboration can lead to the development of more sustainable and efficient methods of food production, which can have a positive impact on the environment and local economy.

### **6.3. Staff Training**

It is essential to have rangers who have received adequate training, and the villagers who are recruited for the role must be given comprehensive training in order to make the management process easier. Instead of depending on an outside organization to train the new rangers, the government should invest in the institution to produce new trainers, specifically local trainers, who will form a special core responsible for training new members locally. This core will be in charge of training new rangers in their respective regions.

The training should also incorporate effective local traditions that are known as "spiritual customs" or "religions". These are the traditional ways of protecting the forest, such as ritualistic practices (respect toward healing trees), and holy forests that require some specific ritual before entering in order to create an atmosphere of respect for the indigenous culture. These traditions should be incorporated into the training because they are efficient.

### **6.4. Condition for an Efficient Environmental Education in a National Park**

A national park to have a proper and efficient EE function need to reach certain standard such us

#### 1) Proper Planning System Supported by a Legislative Regulation:

Having a clear plan for environmental education is important for ensuring that goals and objectives are defined, resources are allocated appropriately, and programs are implemented effectively. A legislative regulation can help ensure that environmental education programs are properly funded, staffed, and executed. A comprehensive plan should include specific goals, objectives, and strategies for delivering EE programs to various audiences, such as students, visitors, and local communities.

#### 2) Systematization of Multi-department Collaborative Management of EE:

Collaboration across departments and stakeholders is crucial for a successful environmental education program. This ensures that different departments are working together towards common goals, reducing duplication of effort and ensuring efficient use of resources. The NPS should work closely with local communities, schools, and NGOs to implement effective environmental education programs that reach diverse audiences.

### 3) Systematization of Research, Judgment, and Monitoring of Environmental Education Resources:

Research, judgment, and monitoring of environmental education resources help ensure that EE programs are effective and meet their intended goals. Research can include assessments of visitor knowledge and attitudes, analysis of program effectiveness, and identification of best practices. Monitoring can help track the implementation of the EE program and identify areas for improvement.

### 4) Systematization of Personnel Training for the Main Body of Environmental Education:

Proper training is essential for environmental education staff to deliver high-quality programs that are engaging and informative. The NPS should provide staff with training on EE pedagogy, natural and cultural resources, and interpretation techniques. Professional development opportunities, such as workshops, conferences, and webinars, can help ensure that staff stay up-to-date on the latest trends and best practices in EE.

### 5) Systematization of Environmental Education Interpretation:

EE interpretation refers to the process of communicating information about the environment and natural resources to visitors. Interpretation should be engaging, interactive, and tailored to different audiences. Interpretation can include exhibits, displays, guided tours, and interactive programs that help visitors understand the natural and cultural resources of the NP.

### 6) Systematization of the Spatial Layout of Environmental Education:

The spatial layout of EE refers to the physical space where EE programs are delivered. This includes visitor centers, classrooms, outdoor learning spaces, and interpretive trails. The layout should be designed in a way that is comfortable and engaging for visitors, with clear signage, interactive exhibits, and opportunities for hands-on learning.

### 7) Systematized Evaluation of Environmental Education Effectiveness:

Evaluation of EE effectiveness helps ensure that programs are achieving their goals and making a positive impact. Evaluation can include pre- and post-program assessments of visitor knowledge and attitudes, analysis of attendance and participation rates, and surveys of stakeholder satisfaction. By evaluating the effectiveness of their programs, national parks can continually improve and refine their environmental education offerings.

## 7. Conclusion

To conclude, in order for a national park to be profitable to a country by serving

as a source of income and knowledge through the understanding of nature, to attract more visitors, and to protect nature in a sustainable manner, the appropriate law and system management must be developed based on the existing conditions and resources, and the appropriate environmental education, interpretation, public participation functions, and technological tools must be implemented. The use of technology and digital media, such as mobile apps and social media platform can help engage visitor and promote deeper understanding of the park ecological significance; however, it is important to assure that these tools are accessible to all visitors and do not have negative impact on the park environment.

National park must continue to respect appropriately to apply law governing natural conservation and environmental education, while developing effective management strategies that balance the needs of conservation, tourism, and local communities. By doing so, national parks can serve as valuable resources for environmental education, sustainable tourism, and nature conservation.

## 8. Suggestion

In the interview, some suggestions were collected as ideas to improve the KNP:

- Better cooperation between the organizations responsible for the NP and the local people: This can be implemented by creating regular communication channels through town hall meetings, community forums, and feedback mechanisms. These platforms will enable the organizations to understand the needs and concerns of the locals and engage them in decision-making processes that affect their lives. Regular sensitization seminars and workshops should also be organized where the locals and the organizations can educate each other on their roles and responsibilities for better cooperation.
- Educate and raise awareness about environmental education: This can be implemented by organizing community events, workshops, and training sessions for the locals on environmental conservation and sustainable use of resources. The organizations responsible for the park can also partner with schools and universities to integrate environmental education into the curriculum, ensuring that the younger generation is educated on the importance of conservation.
- Construction of hospitals and health centers: This can be implemented by working with the government and other non-profit organizations to set up health facilities that cater to the needs of the locals. The organizations responsible for the park can provide support in terms of funding and technical expertise to ensure that the hospitals and health centers are sustainable and meet the needs of the community.
- Creation of technical schools and construction of other schools: This can be implemented by working with the government and other stakeholders to set up technical schools that offer skills training to the locals. This will equip them with the necessary skills for entrepreneurship, farming, and other in-

come-generating activities. The organizations responsible for the park can also contribute to building schools that offer quality education to the children in the community.

- Strengthening health structures in medicine and qualified personnel: This can be implemented by providing training and resources to health workers in the community. The organizations responsible for the park can also work with the government to attract healthcare professionals to the area and provide incentives to encourage them to stay.
- Creation of alternatives (farming, fish farming): This can be implemented by providing grants and other resources to the locals to start alternative forms of income-generating activities such as farming and fish farming. The organizations responsible for the park can also provide technical expertise and training to ensure that these activities are sustainable and ecologically sound.
- Supervision of farmers for seeds and tools: This can be implemented by creating a system of supervision and support for farmers to ensure that they have access to quality seeds and tools. The organizations responsible for the park can also work with local seed and tool providers to ensure that the farmers have access to affordable options.
- Development of wells in the villages: This can be implemented by partnering with the government and other stakeholders to provide resources for the construction of wells in the villages. The organizations responsible for the park can also work with the community to ensure that the wells are maintained and accessible to all.
- The boundaries of the park should be clearly defined: This can be implemented by working with the government and other stakeholders to clearly define the boundaries of the park and communicate this to the locals. This will help to prevent conflicts between the park and the locals and promote understanding and cooperation.
- Publish more studies on the Internet and raise awareness on TV; involve traditional leaders more fully in awareness campaigns: This can be implemented by creating a dedicated website for the park where research studies and reports can be published. The organizations responsible for the park can also work with local media outlets to raise awareness about the park and its importance. Engaging traditional leaders in these efforts can also help to promote understanding and cooperation between the park and the locals.

### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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