KILIMANJARO NATIONAL PARK

Celebrating the Golden Anniversary in Biodiversity Conservation and Tourism



Mawenzi Technical Climbing An Experience Of a Kind

The Royal Tour Program To boost tourism in Kilmanjaro YEARS 1973 - 2023



What to do while in Kilimanjaro National Park



Mountain Climbing



Paragliding



Mountain Cycling



Crater Camping



Mawenzi Technical Climbing



A Day Hiking to Lauwo Waterfalls

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Statement from the Chairman of the Board of Trustees



am grateful to the GOD Almighty to celebrate the 50th anniversary of Kilimanjaro National Park, the home of the roof of Africa, Mount Kilimanjaro with profound appreciation to H.E. Dr. Samia Suluhu Hassan, the President of the United Republic of Tanzania for yet trusting me to chair the Board of Trustees of Tanzania National Parks (TANAPA) for the third term. I promise Her Excellency and the public at large, in collaboration with the Members of the Board, to work tirelessly to ensure TANAPA is sailing to the next level globally.

Having said that, it is my pleasure to affably express my sincere gratitude to H.E. Dr. Philipp Isdor Mpango, the Vice President of the United Republic of Tanzania for honoring our invitation to preside over this important event in the history of Kilimanjaro National Park and the nation at large. You and all the distinguished delegates are cordially welcomed to Marangu, Kilimanjaro.

Before going any further as I am penning my brief note to mark these celebrations, I would not be fair enough not to acknowledge the vision the Father of our Nation, H.E. Mwalimu Julius Kambarage Nyerere, had on conservation of wildlife and their habitats therein. For that reason he set aside protected areas with various status, one of them being the national parks and one the national parks being Kilimanjaro which is turning fifty today. I also have to offer my sincere accolades to all other phases of Government that followed thereafter up to the sixth one under the leadership of H.E. Dr. Samia Suluhu Hassan for ensuring that they kept alive and in action the vision of the Father of the Nation that today we have 22 national parks in the fleet of TANAPA.

I would like to reiterate the significant contribution the national parks have to the economy of Tanzania through tourism activities, the Kilimanjaro being the second to Serengeti among the 22. Over the past ten financial years, i.e. from 2012/2013 through 2021/2022, the Park has contributed a total of TZS 581,802,267,423.00 billions from tourism whereby a total of 467,190 visitors. The park is among the five which generate enough revenue to break even and also supporting the remaining 17 which are yet to be there, but efforts are exerted to ensure that they will one day join the five. This success that we are proud of was not garnered by TANAPA alone, but is a contribution of a number of players including tourism stakeholders in their respective organizations such as TATO, KIATO and some prominent Tour Operators, Guides and Porters.

Of the special note, it is with honor that I am compelled to commend the efforts of "the Top Guide", H.E. Dr. Samia Suluhu Hassan for promoting the country through the famous "Tanzania-the Royal Tour" film. The film has exploded many parts of the world making people to know where this jewel called Tanzania is! We are fully confident that this is a tremendously huge marketing tool that will eventually lead to the flooding of tourists in the country as we have already seen. We at TANAPA in collaboration with tourism stakeholders are readying ourselves to provide services of high standards to this increasing number of visitors.

Though the life time of 50 years of Kilimanjaro National Park are embraced with a number of success stories, yet there are several challenges that have been keeping creeping in but of which we have been continually finding the workable solution to deal with. Such challenges include shrinking of ice cap on the mountain which is predicted to melt by 2050 due to climate change. The mountain with its year-round ice on its top is the main tourists' attraction of the Park, therefore once the ice is gone, that may reverse tourism trend in the Park. For that reason I would like to call upon all stakeholders to slow-down the drivers of climate change including deforestation. It should never escape our minds that the Park's benefits go beyond economic ones, tourism, but also include social and environmental ones such as carbon sink because of the presence of a thick forest at the foot of the mountain. On our side, TANAPA, are on a continual dissemination of conservation education to the communities around the Park.

Let me end my statement by expressing my gratitude to the Government of the United Republic of Tanzania by ensuring that Kilimanjaro stands its position to provide better services to the tourists through improvement of infrastructure including rescue services whereby an amount of TZS 806,781,340.00 was provided through Tanzania Covid Recovery Project (TCRP) to improve tourism infrastructure. On the other hand the Ministry of Communication has provided a high-speed internet services at Horombo to facilitate visitors' communications with their loved ones back home.

I wish to say that "enjoy the celebration of Kilimanjaro at 50"

Gen. George M. Waitara (Rtd) CHAIRMAN, BOARD OF TRUSTEES



Message from Conservation Commissioner



Today we commemorate the Golden Anniversary of the Kilimanjaro National Park since its gazettement on Government Notice Number 50 of 1973. I can term this as one of the priceless icons and a selling flag of the United Republic of Tanzania mainly because it is on this Park where the Mount Kilimanjaro is sitting. The Mountain Kilimanjaro is Africa's highest peak and highest free-standing mountain in the world. It is also an International symbol of the continent.

Mount Kilimanjaro has other distinctive features including its snow cap allyear round despite of being in the tropics and few miles from the equator. Its inimitability goes further as it supports almost every kind of ecological system including rain forest, heath, moorland, alpine desert and arctic desert. All these inimitable characteristics and features have been the main attractions to the tourists around the world to visit Tanzania hence its contributing lucratively to the revenue generation. The Park is second to the Serengeti in the fleet of 22 national parks for revenue accrual through tourism activities.

The mountain, including the surrounding forests from its foot to the altitude of 2,700m a.m.s.l provides several ecosystem services including regulation of microclimate and as one of the water-towers in the country and to the nearby areas in Kenya. Being a catchment forest, it has all along being the course of water downstream that contributes to the social, economic, and environmental aspects in the area. Socially it provides water to the local communities while environmentally the water sustains the surrounding forests among other benefits. Both large and small-scale farming practices including Tanganyika Planting Company, Simba farms, Chekereni and Africado Farms are benefiting significantly through irrigation water from Mount Kilimanjaro hence contributing to the food security, local people's livelihoods and economy in the country. Mount Kilimanjaro is one of the sources of Pangani River in which the Hale Hydroelectric Dam in Tanga is located. The dam is contributing a total of 21 Mega-Watts to the nation's power grid, as well as Nyumba ya Mungu.

Dear readers, for these few annotations of the benefits derived through the conservation of Kilimanjaro National Park, I would like to call upon all stakeholders to strengthen their supports to ensure the Park is sustainably conserved for the benefit of the many more generations to come.

Finally, but not the least, I would like to express my sincere gratitude to the Board of Trustees, Management of TANAPA and Members of Service of Kilimanjaro National Park for their notable contribution to ensure that the Park exists and continue to offer its many benefits to the livelihood of the people and the country's economy at large.

> William S. Mwakilema CONSERVATION COMMISSIONER



A word from the Zonal Conservation Commissioner



Kilimanjaro National Park, the home of Mount Kilimanjaro is turning 50 years since its establishment today. Currently covering an area of 1,668 km2, the Park was previously gazette on 16th of March 1973 on Government Notice Number 50 when it was only 756 km2 in size. Prior to that it was a Forest Reserve in 1921. One of the main reasons to elevate the status of the National Park was to safeguard its unique biodiversity in the ecosystem. The Park has other titles where it was designated as a World Heritage Site by UNESCO in 1987 and as a Natural Wander of Africa in 2013. It is housing a largest free-standing volcanic mass in the world which is the tallest in Africa, the Mount Kilimanjaro on which there are three volcanos, two of which are dormant, i.e. Kibo 5,895 meters above mean sea level (a.m.s.l) and Mawenzi 5,149m a.m.s.l. Shira, the extinct one, is the third with an altitude of 3,962m a.m.s.l.

Attaining of an age of 50, it may be obvious that the Park has gone through some historical events including its establishment of tourism activities in 1977 and its boundary expansion in 2005. During its establishment as a National Park in 1973, it included only the whole of the mountain above the tree line and six corridors stretching down the montane forest. The UNESCO's World Heritage Committee recommended for its expansion to include the montane forest belt which is the habitats of fauna species in there. The Government of the United Republic of Tanzania acted upon the recommendation and new boundaries of the Park were gazetted on GN Number 278 of 2005.

Briefly, the published Park's history goes a way back in 1849 when a Missionary Johann Rebmann published an account about the mountain. This resulted to the mountain to become part of a German Protectorate in 1885. In connection to that, the first African to summit the highest peak, Kibo, was Mr. Yohana Lauwo with two Europeans, Hans Meyer and Ludwig Purtscheller. The trio made this history in October, 1885.

Since the launching of tourism activities in 1977, the number of tourists has been increasing exponentially. Official data in the past 12 years (from 2008/2009 to 2019/2020) before the emergence of COVID-19 pandemic shows that a total of 611,838 (with an average annual percentage increase of 6.5) foreign tourists have visited the Park while the number of East Africans was 34,899 (with an average annual percentage increase of 19.4). The tourists generated a total of TZS 684,212,154,770.00 which is an annual average of TZS 57.018 billions and average annual percentage increase of 9.8.

Though the generated revenue is used for Park management, there are other expenditures including supporting the development projects initiated by the surrounding communities on which a total of TZS xx was spent in the past 12 years since 2008/2009 through 2019/2020. Such projects include educational and health in nature as well as infrastructure developments.

I would like to express my sincere appreciation to the Conservation Commissioner Mr. William Simon Mwakilema, Deputy Conservation Commissioner for Conservation and Business Development, Mr. Herman L. Batiho and Deputy conservation commissioner - Corporate Services, Mr. Juma Nassor Kuji as well as the entire Management of TANAPA Headquarters for their tireless efforts and constructive ideas on how best to manage the Park to ensure its sustainable conservation. I would like to congratulates the Park Management and all Members of the Service for all the efforts they exert to ensure that the Kilimanjaro National Park keep on selling the name of Tanzania globally through tourism and research activities.

Congratulations Kilimanjaro National Park on your Golden Anniversary

MOUNTAIN KILIMANJARO IS IN TANZANIA!!!!

A Word from Park Commander



I am very much pleased to extend my greetings to all stakeholders at this precious moment as we celebrate the Golden Anniversary of Kilimanjaro National Park in which the Mount Kilimanjaro is found. The Mount Kilimanjaro, the highest in Africa one hand and highest free-standing volcanic mass in the world.

The park is the eighth in the fleet of the national parks of Tanzania and was established on 16th of March 1973. It has been one of the main tourists' attraction globally as since the launching of tourism activities the number of tourists has been increasing steadly and so the revenue proceeds. Kilimanjaro's tourism products have evolved from mountain climbing to many others including mountain biking, crater camping, paragliding, Mawenzi technical climbing and nature walk in the montane forest. Each of these activities is offering unique experience to the users and in their totality providing a wide range of choices and so attracting many visitors. The most popular tourism activity in the Park is scaling the highest peak of, Kibo which is 5,895 m above mean sea level (a.m.s.l). However, the park has been receiving both the summit and non – summit visitors. Ordinarily, visitors are required to spend not less than five days to ascend and descend the Kibo peak for the purpose of acclimatization. There is a total of six ascending routes which are Marangu (used for descending as well), Machame, Umbwe, Lemosho, Londorosi and Rongai. The seventh, Mweka route is only for descending visitors using Machame, Umbwe, Lemosho, Londorosi routes.

The presence of Kilimanjaro National Park has always been providing social, economic and environmental benefits to the surrounding communities and the public at large. The neighbouring communities have all along been benefiting economically through tourism activities, but also through TANAPA's Community Relations program. In this aspect the Park, as it is done in others, is supporting development projects initiated by the local communities as part of corporate social responsibility (CSR). The projects cover several sectors including educational, health and infrastructure development. On top of that, environmental and conservation education is disseminated to the communities including the best ways to reduce the effect of climate change. Another activity is to capacitate the communities economically through a program termed as "TANAPA's Income Generating Program-TIGP" in which established groups in some villages are facilitated to start and manage economic activities as an alternative source of income.

In spite of excelling in many areas including its contribution to the national coffer through tourism as it is the second in revenue generation among the 22 national parks, Kilimanjaro is facing a number of challenges in various fronts such as environmental (through climate change), waste control, occasional uncontrolled fires and others. I am indebted to express my sincere gratitude to many of our stakeholders for always being there whenever their assistance is needed in finding solution to those challenges. First and fore most I would like to extend my appreciations to the local communities around the Park as they are our most close neighbors. Others include tour operators; international organizations and other Government institutions including Pangani Water Basin and College of African Wildlife Management-Mweka. I am also grateful to the Senior Assistant Conservation Commissioner, Betrita James Lyimo the Northern Zone Commander and her entire Management for guidance and always ready to provide solutions on various issues whenever needed. Finally, the Park Management and all Members of Service for their cooperation and team work spirit which brings about the conducive environment to work in despite the challenging weather in higher altitudes.

I would like to end this brief note by assuring the whole public that we shall work tirelessly in our time here with a purpose of ensuring that the coming generations will see Kilimanjaro in much better outlook.

Thank you.

Angela F. Nyaki

Mountain Cycling

Discover a new way to summit the Kili

Get connected while on top of Mount Kili - The Roof Top of Africa

With the fast, secure and reliable internet!!

By Jully Bede Lyimo and Beatrice Yawingi Ntambi

Imagine communicating with the world while on top of Africa.

Now, you easily take a self-portrait photograph from your smart phone, on top of Mt Kilimanjaro and share it widely to the rest of the world.

Tweeting, live streaming and video calling while you are on Mount Kilimanjaro is now a reality, thanks to a reliable high-speed internet services installed by the government last year.

The broadband has been installed at an altitude of 12,200 feet and aims to bring connectivity to the summit of the 19,300-foot Africa's rooftop.

The move seeks to supporting tourism as well as safety while on top of the Mountain, according to Information, Communication and Technology Minister, Hon. Nape Nnauye while launching the service last year. "Tourists and other mountain climbers have more often than not, complained about poor receptions on top," he said.

"They were exposed to great risk due to lack of reliable communication; this service therefore comes in handy."

He said it was a bit dangerous for visitors and porters to navigate the mountain without internet service.



Hon. Nnauye was upbeat that the 146mn/- worth of project will address communication related challenges during the gruesome yet adventurous expeditions up and down Africa's Highest Mountain.

The Minister was also quick to point out the adventurous part of laying internet cables on top of the Mountain, saying it will enable the climbers take shots and share with the rest of the world once-in-alifetime experience of scaling the Kili.

"We hope to get many ambassadors who will be telling the world that Mt Kilimanjaro is indeed found in Tanzania only," explained Hon. Nnauye.

According to the Information, Communication and Information Technology Minister, at least 100 mountain climbers are set to benefit from the services during the ascent and descent annualy. He said that the initiative will also complement The of the United Republic of Tanzania President Dr. Samia Suluhu Hassan's Royal Tour documentary which is currently making headways in promoting destination Tanzania.

For his part Tanzania National Paks (TANAPA), Conservation Commissioner William S. Mwakilema; Internet service on top of Mt. Kilimanjaro is crucial in promoting the Mountain as a **must** visit in the country.

"It also not only promote and market the Mountain but help the climbers stay in touch with loved ones" said the TANAPA Conservation Commissioner.

The government's decision of installing internet services on Africa's rooftop has equally elicited excitement among players in the tourism industry. "This is very timely initiative that will go along adding value on Mt Kilimanjaro," opined Mr. Sirili Akko, Tanzania Association of Tour Operators (TATO) Chief Executive Officer.

Mr. Akko was optimistic that such a bold decision will hand the dormant volcanic mountain its due market share in international marketing space.

Mr. Loishiye Mollel, head of Tanzania Porters' Organisation (TPO) lauded the laying down of communication and internet signals up the Mountain describing it as a good promotion strategy.

"TTCL has done a commendable job because at times the climbers would want to share with their loved ones on their statuses during the expedition," he offered.

Likewise, Mr. Mollel admitted that the new initiative will help in rescue missions for climbers and porters.

Around 50,000 climbers tackle the 5,895 meters hike each year.

Many haven't shied away from sharing with the world the ultimate experience of walking mammoth journey to the summit.







Nountain Climbing

Climbing the mountain is more than reaching the summit, it's pinnacle encounter with nature than is unforgettable

6 Parts





Tanzania the Royal Tour Program: To Boost Tourism in Kilimanjaro National Park

By Dr. Jesse Mnaya, Jully Bede Lyimo and Beatrice Yawingi Ntambi

Less than a year since its launch, the popular Royal Tour documentary is paying dividends on the front, if the number of tourists flocking the country is anything to go by.

Starred by President Samia Suluhu Hassan under the guidance of renowned film director and producer Emmy Award-Winning journalist Peter Greenberg, the documentary which sought to showcase the natural and cultural heritage that Tanzania possesses has witnessed tourists flocking the country to sample its attractions, notably Mt Kilimanjaro.

Once international airlines touch down at the Kilimanjaro International Airport(KIA) curious tourists are normally greeted by the scenic view of Africa's highest mountain which majestically stands in front of them.

That's when the urge and thirst of scaling Africa's rooftop heralds.

The sheer number of climbers registering and accessing the Mountain through its different entry points such as the Marangu Gate, Machame Gate, Umbwe and several others, attests how the Royal Tour's ripple effect the 2bn/- a year industry, particularly Africa's rooftop.

The revenues accrued by the government from the tourism sector also speaks volumes on the ripple effect the film had in promoting Mt Kilimanjaro and other attractions found in Tanzania.



Our Mountain, Our Pride, Our Heritage



Likewise, tour operators and other key stakeholders have continued banking on the Royal Tour documentary as the country prepares to host five million tourists, in the next two years.

In his own submissions, James Mazigo who is also a Secretary with the Northern Tanzania Safari Guides Society commended the initiative, deeming it a 'silver bullet' to the Mountain.

"It will definitely have a big impact because it is the President herself selling the country," he says.

"I've traveled a lot, but honestly, it has never been easy to market a places like Mt Kilimanjaro, the sector is headed to greater heights with such a tour in sight," observes Mr. Emmanuel Mollel, who is also the Chairperson of Tanzania Tour Guides Association (TTGA). Mr Mollel equally commended the President for such an initiative which seeks to promote the Mountain globally.

Chief Executive Officer with the Tanzania Association of Tour Operators(TATO) Sirili Akko notes that the move has come at an opportune time when the sector still reeling from the effects of Covid-19 Pandemic.

"This is an an extremely opportune moment not only to support post-Covid -19 recovery initiatives, but also to reiterate to the world that Tanzania is truly a cradle of mankind and remains an unrivaled world-renown safari and investment destination" explains the TATO CEO.



Evolution of Cooking Energy

By Imani Kikoti

he mountain climbing and outdoor expeditions has been happening since the prehistory. This is justified by the discovery of human signs in the glaciers in the Alps. Furthermore, the history indicates that many people have been climbing mountains prior the formal development in the 19th century. Climbing Mount Kilimanjaro dates back in 1800s when European explorers and Missionaries came to East Africa. However, there were several unsuccessful climbs that happened during the particular time. It was in 1889 when Hans Meyer reached the peak of the mountain through guidance of Yohann Lauwo. Since then, many people have been climbing the mountain. However, the history indicates that cooking in the mountainous ecosystems remained one of the biggest challenges.

The history indicates that mountain climbers used woods as sources of energy and heating until 1990's when it was ceased. At that time, mountain hikers had inadequate protective gears and clothing therefore, apart from cooking, fires were used for heating against cold mountain weather. Most crews were sleeping in caves and using fire for heating/warming (see the plate indicating the charcoal remains at Shira caves). There is no wonder why KINAPA has many campsites and picnic sites with caves including Shira cave, Kimengelia cave, second cave, third cave among many others. The collection of woods was done from the trees adjacent to campsites / huts. The collection of firewood around Mandara, Horombo, and Kibo huts and other camping sites had a very serious local impacts on the vegetation of the park. At Mandara hut, there was sufficient deadwoods due to its closeness to the upper montane forest with abundant deadwoods. However, for Horombo and Kibo, deadwood scarcity was one of the big challenges due to the disappearance of trees in the higher altitude. Therefore, porters were travelling long distance in search of deadwoods for cooking and warming at Horombo and Kibo huts. Apart from the long-term search of woods, areas adjacent the tourist hut remained bare characterized by little or no vegetation due excessive collection of woods. This is due to continuous collection of fuelwoods and the resultant gradual degradation and eventually serious deforestation of the accessible areas. For example Newmark and Nguye (1991) reported that the broken



Plate 1: showing the cave that porters slept while lighting fire for warming

deadwoods were higher in areas adjacent to Horombo hut the areas far away. The authors found that at 1 km distance from the Horombo Hut 100% of the deadwood were broken, at 3 km distance (98% of stems were broken) and at 4 km distance (79% of deadwood were broken). Apart from the smoke from fuelwoods has strong health implications due to its effect on respiratory systems and may even affect the eyes of people exposed to such pollutions.

The above mentioned shortcomings of the use of fuelwoods, caused the KINAPA management and tourism stakeholders to think for better solutions in the 1990s. There were several trials of technologies such as use of coal for cooking and heating. However, the use of coals were not successful due negative effects to users. These include the strong heat that break the cooking utensils and health hazards emanating from harmful pollutant such as benzene, carbon monoxide and other polycyclic aromatic hydrocarbons.

Other trial was the use of kerosene for cooking, the initiative that was successful. However, majority of the stakeholders were not happy with this technology as it didn't serve the heating purposes. Nevertheless, the use of kerosene was a good initiative as it tackled the chronic problem of deforestation and the health hazards of the previous historical technologies. However, there were some few cases of complaints regarding using kerosene in particular due to careless contamination of visitor's food with kerosene. During this era, the park management invested energy in prohibiting the use of firewood and allowing the use of kerosene for cooking. This process went parallel with prohibition of sleeping in the caves. Private sectors played important role in promotion of the use of kerosene for cooking on the mountain station. For example, Mzee Kimaro opened a kerosene pump at Marangu gate for ensuring sustainable supply of kerosene to all hikers (see the plate of the kerosene pump). The park management acknowledges his great contribution in promotion of use of safe energy for cooking on the mountain to serve the mountain environments.

The transformation from the use of kerosene stoves to gas stoves were done in the 2000s. However, the shift to this technology had no objection by stakeholders as it was softly adopted by the majority. Today the park management cerebrates its 50th years anniversary with a great achievement in the fact that all mountain stakeholders are using gas stoves which is one of the safest and cleanest cooking energy technologies in terms of the user's health and environmental protection. The use of fire wood for cooking and warming has remained history in all mountain stations. The park management thanks our esteemed stakeholders for fully participation in this important transformation. Our Mountain, Our Pride, Our Heritage!



Pumps used for selling kerosene to tour operators at Marangu gate

Mawenzi Technical Climbing On Experience Of a Kind from TONOPO Staff





Mount Kilimanjaro is the highest mountain in Africa with three distinct peaks, Shira (3962m), Mawenzi (5149m), and Kibo (5895m). The rugged Mawenzi peak which lies to the east is the second highest peak on Kilimanjaro. The top of its western face is fairly steep with many crags, pinnacles and dyke swarms. Its eastern side falls in cliffs over 1,000m high in a complex of gullies and rock faces, rising above two deep gorges.

Mawenzi has seven peaks namely; Nordecke 5136m, - Hans Meyer 5149m, Purtscheller 5120 m, Borchers 5115m, Klute 5096m, Latham Peak 5087m and Londt 4945m. The terrain of Mawenzi peak makes most of its peaks unreachable except by technical roped ascents. Mawenzi climbing offers a unique experience and thrill to rock climbers adventure seekers.

Mawenzi Technical Climb is physically and demanding product. It tests climber's strength, endurance agility and balance along with mental control. Knowledge of proper climbing techniques and the use of specialized climbing equipment is crucial for the safe completion of the route.

Q: What pushed you to do Mawenzi Technical Climb?

A: The training on Technical Rock climbing, made me like to do challenging things. The experience acquired assisted me to rescue a guide who toss himself and found dead in the long valley near Kibo peak. I only use rope tied in the rocks of this summit, with the weather condition being at its peak extreme i.e. cold with low oxygen. I managed to get the dead body from the valley. Having being done this, I said to myself, I should try Mawenzi technical climb! It is from this pushed where I managed to do Mawenzi technical climb.

Q: How was the experience?

A: It was a dream come as I managed to do Mawenzi Technical climb as the first Tanzania and a park ranger. It was a hard experience because on this day the weather condition was not conducive to start the hike thus causing a delay until 11:00 am. During the waiting time my arms and leg fill froze, I could not move and touch anything. I started doing physical exercise to warm them. After the warm up, I managed to start the hike!

I will never forget the day when the stopper I used as an anchor accidentally got out off the rock! I was almost going to fall down but lucky enough I pinched two anchor so the other saved my life.

Q: What are the areas of oparation?

A: Thee are three authorized routes for Mawenzi Technical Climb;

These are:-

- i. Rongai route down Marangu gate;
- ii. Marangu route via Zebra rock down Marangu gate; and
- iii. Machame, Umbwe, Lemosho and Londorosi routes via Northern/Southern circuit down Mweka gate

Q: In order to do Mawenzi Technical Climb what are the tour operator requirement are needed?

A: The operator shall have:-

i. A valid mountain tourism license issued by Tanzania Tourism Licensing Board;

- ii. A clean business record; and
- iii. Technical mountain climbing guides.

Q: For one to do Mawenzi Technical Climb, what are the considerations?

- A: 1. Only experienced rock climbers shall be allowed to attempt Mawenzi technical climb;
 - 2. Briefing shall be conducted by guide prior to departure;
 - 3. Tour operator shall provide a first aid kit for the Mawenzi technical climbers;
 - Tour operator shall have a reliable communication system and rescue/ emergence response plan (including helicopter rescue);
 - Only one group of two climbers at a time shall be allowed during climbing Mawenzi Peak;
 - Minimum age allowed for the activity shall be of or above 18 years old;
 - 7. Climbers shall be careful to avoid accidents; and
 - 8. All climbers should adhere to all other park rules and regulations.

Q: Any specified gears to aid someone doing the Mawenzi Technical Climbing

A: In order for one to the Mawenzi Technical Climb, must carry the following gears:-

Long Slings, Medium length slings, Carabineers, Rappel device, 60m x 8.5mm ropes, Alpine harness, Locking carabineers, Climbing boots, Helmets, Ice axes, Crampons and First Aid Kit containing necessary items for Mawenzi climb.



Livinus Elias Kalungwizi



Steven Masaga Ndalahwa



Karimu Bakari Shekimweri



A Porter to Warden In-charge



Mzee Athanas Minja

is story to become a Warden In-charge of Kilimanjaro National Park begins in 1972 as a Park Ranger. Born in a nearby Mbahe Village, Mr. Minja is believed to have climbed Mount Kilimanjaro 366 times since 1967 working as a Porter. In 1969 he changed his job to tourists' guiding. "Those days were a difficult period to climb Mount Kilimanjaro because of too much rains and the snow started at lower altitudes, at Mandara. There were no sleeping hurts, walking trails were not in good condition. Bad enough availability of mountain gears such as shoes and warm clothes was difficult". No weighing scales were available and hence porters were carrying excess luggage than required. Iterated Mr. Minja.

From 1972 as a Park Ranger, Mr. Minja was appointed the Head of Rescue Team in 1978 and a Head of Rescue Operations in 1980. In the same year, 1980 he was appointed the Head of Kilimanjaro National Park until 1981. In 1985 he resigned from TANAPA and resumed his guiding work. "Mountain climbing is my hobby, office works denies me a lot of good things that I love", said Mr. Minja.

My guiding work exposed me to many people, this gave me an opportunity to visit many countries and eventually I managed to start my own Tour Company "Kibo Safari Adventure".

Mr. Minja said that "there has been a lot of development in terms of infrastructure including sleeping hurts for the mountain climbers, improved walking trails, toilets, climbing gears, access roads as well as rescue services". He added that, "I value my guiding job a lot as through it I managed to pay for the school fees of my children, building a house and buying a vehicle".

Paragliding

When adventure finds you, NEVER let it pass just dive into it! choose to paraglide today to make the best moment of your life



Understanding the Arthropods of Kilimanjaro National Park

By Claudia Hemp

The first recorded scientific expedition to Mt Kilimanjaro took place in 1848, when the German missionary Johann Ludwig Krapf and the British missionary Johann Rebmann reported sighting the mountain from a distance. However, it wasn't until the late 19th and early 20th centuries that more systematic scientific research began to take place on the mountain. In 1900, the German geographer Hans Meyer and the Austrian mountaineer Ludwig Purtscheller became the first people to successfully reach the summit of Mt Kilimanjaro. They collected plant and animal specimens and made meteorological measurements during their ascent.

Research on arthropods on Mt Kilimanjaro has a long history as well, dating back to the early 20th century. One of the first comprehensive studies of arthropod diversity on the mountain was conducted by Y. Sjöstedt, a Swedish entomologist, during his 19101912 expedition to East Africa. Sjöstedt collected a large number of arthropod specimens from various locations on Mt Kilimanjaro, and described several new species of insects and spiders. Another notable expedition was the 1930-1931 Graf Teleki Hungarian Expedition, which included a team of entomologists who collected arthropod specimens from the lower slopes of the mountain. The expedition identified a diverse range of arthropod species, including beetles, butterflies, and spiders.

What makes Mt Kilimanjaro special in its setting?

Mount Kilimanjaro is an ideal location for research due to its unique location, biodiversity, and ecological significance. Being the highest peak in Africa, Kilimanjaro represents a gradient of environmental conditions, from the tropical savannah at its base to the alpine desert and glacier on its summit. This diversity of habitats provides a unique opportunity for researchers to study a wide range of ecological and biological processes. Moreover, Kilimanjaro is home to a high number of endemic and rare species, including plants, animals, and insects, many of which are found only on the mountain. This high level of biodiversity makes Kilimanjaro an important site for conservation efforts and provides a wealth of opportunities for scientific inquiry. Finally, Kilimanjaro is an important part of the global climate system. Its forests provide critical water resources to surrounding communities, and changes in the mountain's climate could have farreaching impacts on the region and beyond. As a result, researchers on Kilimanjaro can contribute to our understanding of how climate change is affecting ecosystems and societies in Africa and around the world.

East Africa is characterized by a pattern of old basement mountains

with an age of more than 30 million years of which especially the Eastern Arc Mountains in Tanzania are documented as being hotspots of diversity and edemism. In recent years and due to more intense studies it became obvious that also the comparatively young volcanoes such as Mt. Kilimanjaro and Mt. Meru in Tanzania show a high diversity of plant and animal species and furthermore a high degree of endemism. This stands in contrast with the current scientific opinion that these volcanoes have a low diversity and low degree of endemism due to their young geological age. On the contrary, it was shown by Andreas Hemp for Mt. Kilimanjaro that in inaccessible steep gorges of the submontane zone many plant species and plant communities were found which were thought to be endemic to the Eastern Arc complex. The current assumption that Mt. Kilimanjaro is of low diversity and endemism was thus due only to insufficient research activity on this volcano.

Orthoptera Research Overview

The comparatively high degree of endemism of Orthoptera on Mt. Kilimanjaro shows that even on geological young mountains rapid speciation took place in the past 1.5-2 mio years which serves as a marker for radiation and speciation processes. For Mt. Kilimanjaro, it was shown that adjacent old basement mountains of the Eastern Arc complex served as a source for Orthoptera species restricted to montane habitats. These species reached the younger volcanoes like Mt. Kilimanjaro and Mt Meru probably during climatic periods with a more extensive forest cover and speciated rapidly after their isolation during dry periods. An integrative taxonomy approach was used to shed light on speciation mechanisms that led to such a high biodiversity and degree of endemism in northern Tanzania. Speciation in the area was mainly boosted by a combination of mechanisms: a special topography - mountains and mountain ranges looming to montane and even afroalpine heights arranged like

stepping stones from coastal habitats to the hinterland and climatic fluctuations of dry and more humid periods connecting and separating these mountains and mountain ranges. As shown in various papers by Claudia Hemp, climatic fluctuations of the past were the major drivers of speciation in the area. Evidence from lake sediments indicates humid periods for East Africa at 2.7-2.5, 1.9-1.7, and 1.1-0.9 Ma before present, the first two being humid and warm, the third one humid but cold. While the first two humid and warm periods favored the spread of lowland and submontane forest and with it its flora and fauna, driving montane forests to higher elevations, the third humid and cold period favored a spread of montane taxa by creating corridors of montane taxa by creating corridors of montane vegetation.

Research work of Claudia Hemp

Numerous studies have been conducted on the biodiversity of Mt. Kilimanjaro by Claudia Hemp who started her research in 1989. Some of the over 200 research papers, many from Mt. Kilimanjaro, are summarized below:

Molecular techniques were used to construct phylogenies of various genera of flightless grasshoppers. Also, papers focused on the landuse practices and vegetation patterns of Chagga homegardens. Further, the importance of cloud forests in East Africa as drivers for the speciation processes of flightless Orthoptera species was discussed. In the paper "Singing and hearing in Aerotegmina kilimandjarica," the communication behavior of the species was investigated, and in "Taxonomic changes and new species of the flightless genus Parepistaurus Karsch," new species and taxonomic changes were described. Additionally, a comprehensive list of Orthoptera species present on Mt. Kilimanjaro is provided in "Annotated list of Caelifera (Orthoptera) of Mt. Kilimanjaro (2009)." Another study investigated the biogeography and

molecular phylogeny of the East African genera Afroanthracites Hemp & Ingrisch and Afroagraecia Ingrisch & Hemp, while the conservation status of biodiversity within the Eastern Arc Mountains and coastal forests of Kenya and Tanzania was assessed in "Globally threatened biodiversity of the Eastern Arc Mountains and coastal forests of Kenya and Tanzania." Finally, the effects of climate change on the ecosystem of Mt. Kilimanjaro and its endemic species were discussed in "Broken bridges: The isolation of Kilimanjaro's ecosystem," and the effect of elevation on the morphological traits of Orthoptera assemblages in Mt. Kilimanjaro was investigated in "Beyond body size: Consistent decrease of traits within orthopteran assemblages with elevation."

Beside research papers together with Hugh Rowell C. Hemp authored 5 volumes of a Handbook series on East African grasshoppers (2015, 2017, 2018, 2020, 2021, vol. 6 in prep.) and she published a book on bushcrickets from southern Kenya and Tanzania (2021). The handseries books are focused on identifying and studying grasshoppers and locusts found in East and North East Africa. The series comprises of five volumes at present, each of which provides an identification handbook for different families and subfamilies of shorthorned grasshoppers. Additionally, Claudia Hemp authored a field guide to the bushcrickets, wetas, and raspy crickets of Tanzania and Kenya, published by Senckenberg Gesellschaft für Naturforschung. These books contain detailed information about the morphology, distribution, and behavior of the species and can be used as a reference by researchers and enthusiasts studying bush-crickets, grasshoppers and locusts in the region.



Bushcricket book (left) and cover of Volume 2 of the Handseries books on East African grasshoppers.

The Kili-Project

The Kili Project conducted beside other fundamental research arthropod research in Kilimanjaro National Park, Tanzania from 2010 to 2018. The project was a collaboration between several German and Tanzanian universities, including the University of Bayreuth, the University of Würzburg, the Senckenberg Research Institute, the Sokoine University and the University of Dar es Salaam among several other Tanzanian and German institutes. The project aimed to document and understand the biodiversity of insects in the region, particularly in relation to climate change and land-use change. Over the course of the project, the researchers collected and identified over 8,000 species of insects, many of which were new to science. They also studied the ecology, behavior, and genetics of various insect groups, such as bees, beetles, and ants. One notable finding was that higher-altitude insects were particularly vulnerable to climate change, as they have limited options to move to cooler habitats. The Kili Project also worked with local communities to promote conservation and sustainable land use practices. They provided training and resources to farmers and other stakeholders, encouraging them to adopt practices that support insect diversity and ecosystem health. Since 2021 a new research group

funded by the German Research Foundation works on the slopes of Mt Kilimanjaro, partly using the established infrastructure of 65 research plots, partly focusing on socio-economic and questions of governance structures.

Overall, the Kili Project contributed significantly to our understanding of insect biodiversity in Kilimanjaro National Park and the surrounding region, and helped to raise awareness about the importance of protecting these fragile ecosystems. A booklet summarizing the findings of the first research unit can be downloaded for free.



Millipede research

Millipede research on Mt Kilimanjaro has focused on documenting the diversity and distribution of millipedes in the region, as well as investigating the role of environmental factors in shaping their distribution patterns. Studies around the Danish professor Enghoff have shown that the millipede fauna on Mt Kilimanjaro is diverse and includes both endemic and non-endemic species. The distribution of millipedes is strongly influenced by altitude, with different species found at different elevations on the mountain. Additionally, factors such as vegetation type and soil characteristics also play a role in determining millipede distribution patterns. One study conducted on the mountain found that millipede diversity was highest in montane forest habitats, and decreased with increasing altitude and distance from the forest. Another study identified several new species of millipedes on the mountain, including a new genus and two new species within an existing genus. Overall, research on millipedes on Mt Kilimanjaro has contributed to our understanding of the distribution and diversity of these important soil-dwelling organisms in high-altitude environments, and highlights the importance of conservation efforts to protect their habitats.



Giant "Mombassa Trains", here Archispisostreptus gigas, were formerly common in lowland forests around Mt Kilimanjaro. Today, they are found only very rarely in remains of rivine forests e.g. in the Namalok Nature Reserve of TPC, Moshi.

Bee research

Several studies on Mt Kilimanjaro focused on bee diversity, and some of their key findings include that bees on Mt. Kilimanjaro are highly diverse, with over 200 species identified so far. Further, climate change is affecting the timing of flowering and bee activity, with some bees emerging earlier or later than usual in response to changes in temperature and rainfall. Landuse change, such as conversion of natural habitats to agriculture, is negatively impacting bee diversity and abundance on the mountain. Bees play an important role in pollinating crops and wild plants on Mt. Kilimanjaro, and their decline could have negative impacts on local ecosystems and human livelihoods.



Bees are one of the most important pollinator groups ensuring rich harvests for people.

Beetle Research

Beetles are one of the most diverse groups of insects, with over 400,000 known species. In tropical environments, beetles play a critical role in maintaining ecosystem health and stability. They are involved in a wide range of ecological functions such as pollination, decomposition, and nutrient cycling. Beetles are important pollinators, particularly for many tropical plant species that rely on them for reproduction. Some beetle species also play a key role in seed dispersal, helping to spread plant species throughout the ecosystem. In addition to their roles in pollination and dispersal, beetles are also important decomposers, breaking down dead plant and animal material and recycling nutrients back into

the soil. This process is critical for maintaining soil health and fertility in tropical environments. Moreover, many beetle species are also important food sources for other animals, such as birds, reptiles, and mammals. As a result, they contribute to the overall biodiversity and food web of tropical ecosystems. Overall, beetles are essential components of tropical environments, and their diversity and abundance play a vital role in maintaining the health and stability of these ecosystems.

Dung beetle diversity was studied on Mt. Kilimanjaro, finding that diversity is higher at lower elevations and in areas with higher vegetation cover. Another study also explored how plant traits mediate the effects of climate on phytophagous beetle diversity on Mt. Kilimanjaro, finding that certain plant traits, such as leaf size and toughness, can influence beetle diversity, and that the effects of climate on beetle diversity are stronger in areas with





Dung beetles are among the most important decomposers in savanna and other habitats on Kilimanjaro contributing significantly to soil fertility.

More information on arthropod diversity and their roles in the Kilimanjaro ecosystem can be found in the booklet mentioned earlier:

(https://kili-ses.senckenberg.de/en/ publications/literature/).

The booklet also contains a comprehensive list of publications of the research unit (2010-2018). On the Kili-SES webpage, further publications mentioned in this manuscirpt are listed.

Mawenzi Technical Climbing

Where strength meet determination! Plan to choose Kilimanjaro for this thrilling activity today.



Yohani Kinyala Lauwo – The First Tanzanian and African to summit the highest point in Africa for 74 consecutive years!

Yohani Kinyala Lauwo was only eighteen years old when he led Hans Meyer and Ludwig Purtscheller to the highest point of Africa on October 5th, 1889. His selection by the Mangi (the Chief of Chagga tribe) to be Hans Meyer's guide was accidental, but it forever changed his life. Kinyala (as he was called) was born and lived his entire life in the village of Marangu, nestled on the slopes of Mt. Kilimanjaro. Before Europeans came to East Africa, many of the Lauwo clan of the Chagga tribe hunted the forest elephants for ivory and sold them to the Swahili traders from the coast. The forest also supplied them with honey, timber, medicine and Colobus monkey hides.



By the time Hans Meyer arrived in Chaggaland, Kinyala Lauwo was a tall teenager who knew the forest like the back of his hand. By then, colonialism had started in Kinyala's homeland and young men were being forced to construct roads. Kinyala tried to dodge the 'draft', but was caught. As a result, he was summoned for trial at Mangi Marealli's palace. Coincidentally, Hans Meyer had just arrived at the palace asking for permission to climb the mountain and guides and porters. The Mangi's Wachili (advisors) spotted Kinyala, knowing that he was from Lauwo clan, and asked him to guide the expedition.



The event led Kinyala (later called Mzee Lauwo) to guide Mt. Kilimanjaro climbs for more than seventy years! For his first climb, he was only wrapped in blankets. Over the years, he obtained appropriate clothing and hiking gear. When Mzee Lauwo turned one-hundred years old, the Tanzania National Parks gave him a beautiful, modern style house painted in light purple and pink pastels. Here he lived with his two wives until his death on May 10th, 1996, after a grand life of one-hundred twenty-five years!



Kilimanjaro Sister Parks

Kilimanjaro National Park falls in the Northern Zone, frequently regarded as The Capital of Safari since it harbors national parks that are renowned worldwide for untamed and unique wildlife experience

Tarangire National Park The Elephants' Paradise

The Park is celebrated for its highest concetration of wildlife in the Northern Zone. It is perfect destination for elephant lovers. It is also one of the finest binding destination in East Africa.

It has sprawling grassland dotted with majestic baobabs that lived up to 3000 years. These baobab trees have spent quite sometimes on the planet and seen a lot of history so, If only they could talk, they would surely be interesting story tellers.

Plant species such as acacia and

baobab trees make up the vegetation of this park. Notable species such as acacia tortilis, without forgetting the occasional palm trees beautify the park.

Tarangire River is the primary source of fresh water for wild animals in Tarangire ecosystem during the dry season.



Make your safari a once in a lifetime experience by planning a trip to Tarangire and enjoy the following experience.

- Day game drive
- Hot air Baloon safari
- Walking safari
- Night game drive

Contact:

- tnp@tanzaniaparks.go.tz
- (S) +255 689 062 248
- limite_national_park

Arusha National Park A rewarding hiking destination

The park is gifted with variety of attractions ranging from wildlife inhaling the wilderness to craters and mountain peaks.

Other attractions includes Serengeti Ndogo, where various animals in abundance can easily be seen, Ngurdoto forest, ngurdoto and meru crater, Tululusia Hill and waterfalls, Lake longil, Momela lakes, fig tree arch and Ngarenanyuki river.

What to do

- Walking safari
- Canoeing safari
- Horse riding

Contact:

- 💿 arusha@tanzaniaparks.go.tz
- (S) +255 689 062 363
- larusha_nationalpark



Lake Manyara National Park The Home of tree climbing lions

This park is marked by lush green vegetation consisting of tall trees of the ground water forest.

The forest open up into woodlands and swamps beyond the soda lake inhabited with thousands of pink hued flamingos. Other birds include pelicans, cormorants and stocks

This park is ideal for

- Day Game drive
- Canopy walkway
- Night game drive



- Bird watching
- Camping
- Bush meals
- Walking safari
- Canoeing and

Tree climbing lions, hot springs, Marang' Forest and high diversity of bird species are the common attractions easily seen.

Contact:

- manyara@tanzaniaparks.go.tz
- lake_manyara_national_park

Mkomazi National Park Home of Black Rhinos

Majestic Rhinos complemented with the breathtaking landscape, beauty scenery, unique wild animal species, abundant bird life and vegetation strand

What to see

Wild animals such as Fringe-eared Oryx, Generuk, Lesser Kudu, Gazelles, Black Rhinos, African Elephants, Buffalo, Lions and Leopards and African Wild dogs

What to do

- Day Game drive
- Walking safariBird watching
- Rhino viewing Rhino naming

Contact:

- mkomazi@tanzaniaparks.go.tz
- S +255 624 333 888
- mkomazi_park_tanzania



A New Tourism Marketing Strategy



By John Addison

Kili Marathon, to begin with, was simply an idea formed by event organiser Wild Frontiers and local Tourism Partners, in 2002, over a cold Kilimanjaro Lager, of a great way to draw tourism in to Tanzania – an iconic name and place for a marathon, using sport and a new marketing idea to attract runners to Tanzania, who would then climb the mountain, or go on safari after running the race. A sports and tourism mix that works well.

In 2023 the race enters its 21st year – a massive milestone and a tribute to all the sponsors and athletes who have been with us, and contributed to the growth and longevity of this fantastic race.

Year one, after generating some marketing on a tiny budget, attracted a mix of a few 'international' runners coupled with local interest – and ended up with a field of about 300 – 400 runners in total who enjoyed the race. Back in 2003, the local interest from villagers was piqued and they came out to see what was going on in their quiet town so early on a Sunday morning. Children followed some of the athletes, there were goats on the side of the roads, part of the course was on dirt, but generally most people went about their morning activities – like any other Sunday.





Today, the roads are brimming full with athletes – shoulder to shoulder at the start – as they pit for top honours. We now have, in addition to the Full and Half, a hugely popular Fun Run, ideal for families and people starting their running programme!

Over the years, our main sponsor Kilimanjaro Premium Lager, together with other sponsors have helped us turn this tiny event into a monster – the sponsors have to claim a large part of the credit for this success. The race serves to test Tanzania's upcoming top athletes, with world-class times being posted by these talented runners – as well as getting close to 12,000 runners over various distances, enjoying the morning out.

As well as being a great breeding ground for the local talent, the event draws quality runners from neighbouring countries, and from around the world – with up to 55 nationalities attending the event.

Apart from the 'sports' element, the event has a big pay off in the region, with sponsors building their CSR around the event, and the economic benefits to the country and the region are huge. Every true Tanzanian wants to participate in the "Kili" as it is known, and the medals are worn with pride from Tunduma to Taveta...





Status of Tourists' Visitation

he first recorded attempt of climbing Mount Kilimanjaro dates back to 1848. During this time, the what was called "bad weather" was the hindrance for many climbers to summit the mountain. In 1848, Vod de Decken, a German Officer managed to scale the mountain up to 14,000ft only. The third attempt by Otto Kersten and Baron von Decken in 1862. The two made it up to 15,000ft, adding a 1,000ft on the previous one. So here comes the good news! The conquerors of the 5895m, the highest peak, Kibo were Yohani Kinyala Lauwo (1872-1996), Dr. Hans Heinrich Joseph Meyer (1858-1929) and Ludwind Purtschelle (1849-1900). The trio reached the summit on 06th October 1889. This successful summiting of the mountain was a gateway for many more attempts and now the Kilimanjaro climbing is one of the most famous tourists' activities in the country, Tanzania.

Tourism activities in the Park were launched four years later (in 1977) following its gazettement as a National Park on 16th of March 1973, the day on which today we mark its Golden Anniversary. The number of visitors on the onset of tourism activities was only 3,162 (is it not 3,192??) using a single route used for

both ascending and descending. Currently there are eight routes of which one is for descending only and another one for both. There rest are for ascending only. The routes are Machame (which is the most popular with 40% of climbers), Londorosi/Shira/ Lemosho (with 18% of climbers), Rongai (12%) and Umbwe with 2%.

In the course of 50 years, more new tourists' products were launched (i.e. paragliding, mountain cycling, technical Mawenzi climb, crater camping and marathons) and so a significant increase on the number of tourists whereby year 2011/2012 recorded the highest number, i.e. 57,456 (figure 1 below) and so dubbed as "18 folds" because the number was 18 folds compared to that recorded during the first year of tourism activities which was only 3,192. The secret for this dramatic increase of visitors is the continual improvement of tourists' service including diversification of tourists' activities to meet customers expectation. This is coupled with good customer services rendered by all Members of Service as well as our esteemed tourism stakeholder-the tour operators, guides and porters.



Number of Tourists at Kilimanjaro National Park from 1978 to 2023

There are many other activities the tourists can engage on before or after summiting the Kibo Peak. The activities include visiting water falls, Shira plateau, Lake Chala (outside the park), Maundi crater and cultural sites such as Kifinika. The villages around the Park have to offer to contribute to the diversification of tourism activities such as tripping to the nearby cultural camps in the villages around like Kiinuka Mori waterfalls, Kibosho Vocation Centre, Magic Waterfalls Mnambe (Shimbwe - Uru Mashariki), Kilasia (waterfalls), Zambia (waterfalls-Mbahe), Kwa Barael waterfalls (Marangu), Underground Cave (Marangu) and Ngoma Waterfalls (Materuni-Uru Mashariki).

Welcome to Kilimanjaro National Park where the highest mountain in Africa, Kilimanjaro is found.





Opening of Machame Route 1977

By Paschal A Nguye

The idea of opening up of the new scenic Machame-Route came to existence in early June 1977 after a brief discussion among the three of us

- (i) The Chief Park Warden Mr. Alfred Labongo
- (ii) The NORAD-PROJECT EXPART at KINAPA Mr. Odd Eliasen
- (iii) The head of the Tourism Department KINAPA Mr. Paschal A. Nguye

The main objective was to spread out most of our mountain climbers who were really determined to reach the summit of Mount Kilimanjaro and avoid the over bookings of accommodation and other facilities up the mountain.

It was noted that the official Marangu-Route including other routes like RONGAI, UMBWE, MWEKA, LEMOSHO were becoming over used especially during the high peak seasons, resulting into unnecessary official complaints.

On 10th June 1977, I received some instructions from the Chief Park Ward to go and pick three other Park Rangers namely

- (i) William Fransis
- (ii) Hubert Damian [Late]
- (iii) Kalo Liweuli

To join forces and establish the Machame route.

Fortunately enough, we had already planned and organized that special Mountain safari via the unknown Machame route. We were required to survey the route, clean it up by cutting down the tall grasses and bushes so that it may be ready for use by climbers expected to arrive before the coming of the high peak season which begins in early July.

That same morning we had packed all our essential such as Mountain gear, tinned food, water, gas stoves, lighter, pangas, torches and 2-tins of Sadolin Red-paint, including the painting brush.

Four of us were picked up in the Land Cruiser and drove straight to Machame local market where the road ended by then.

We walked for 40 min up across human settlements until we reached the beginning of the forest zone (6000 ft. A.S.L.).

As we stopped to drink water, we saw two guys walking out of the forest carrying camphor-wood timbers, ready for sale. We greeted them and became friends. So we explained to them about our purpose of coming and planning to survey the new Machame route which in the near future is expected to attract many mountain climbers from abroad e.g. Europe, USA, Canada, Australia etc. Them coming here to climb would provide jobs to the local people as Mountain guides & porters. They will also generate a lot of revenue in the form of forex to the Government as well as to the local people. They believed us and loved the idea. So one of them became interested and volunteered to escort us half way up the mountain.

We started at 9:00 am. From Machame gate under the escort of Jacob. We were so impressed with the outstanding knowledge of Jacob about his environment around him.

We cleared the grass and bushes along the route our way up as we climbed. We also used to cut-off a little portion of the bark of some trees about 6 feet above the ground and paint them with RED-SADOLIN paint. The interval between the Red Painted tree and the next was about 15-20m. apart. The Red paint was visible to anyone ascending or descending in that foggy forest habitat.

At around 2:00 pm our friend Jacob wished us good luck on our way up and decided to descend back to the gate to join his friend who was waiting with their camphor-wood timbers. We thanked him for his kindness and great help of guiding us through the thick foggy forest zone tinned beef and beans.

We continued climbing until around 6:00pm when we suddenly heard some water flowing way down the valley in the stream. We stopped and sent two of our park rangers to go down the stream and collect some water in their water bottles.

While waiting for fresh water, I looked around and saw a fallen big log which had been cut down with the chain-saw some years back by the poachers. The diameter of the log was estimated to be 11/2 meters.



With feeling of pleasure, I picked my painting brush and the Red-pain and wrote the word "NGUYE" on it, which is my surname. That name still exists until today. We cooked our dinner and slept there until morning.

Since that day of 10th June 1977, that camp has been named as "NGUYE POINT".

The Park Management have improved and even developed toilet facilities and sitting benches for people to rest and enjoy their picnic lunches. The guides and porter must also refill their water bottles and jerricans before they proceed on the Machame-Hut for overnight (9000M) A.S.L.

Today, Machame-route rated the most scenic, beautiful and popular route-to ascend to the summit of Kilimanjaro.



THE HISTORY OF MOUNT KILIMANJARO CONSERVATION

By Imani Kikoti and Angela Nyaki

At a height of 5,895 meters is the highest mountain peak in Africa known as Mount Kilimanjaro. This mountain is made up of three peaks namely Kibo (5,895m), Mawenzi (5,149m) and Shira (3,962m). Geology shows that Mount Kilimanjaro consists of a dormant volcano, where Kibo Peak emits gas at certain times. The name Kilimanjaro has had different interpretations, for example the early explorers Johann Ludwig Krapf explained that the meaning of Kilimanjaro is a big mountain. Jim Thompson added that it is a white mountain that Kilima stands for Mountain and Njaro is the old Kiswahili of 'Ng'ara' which means shining. Other authors have claimed that Kilimanjaro originates from Chagga language that the word Kileman part came from kileme which means defeats or kilelema which means difficult or impossible and jaro part originate from *jyaro* which means caravan. Therefore, the name Kilimanjaro may be derived from Chagga that it is the unclimbable mountain i.e. kilemajyaro or kilemanjaare. It was in 1880s when the Germany imperial took the administration of the East Africa and named Kilimanjaro as Kilima-Ndscharo, the Germany language that considered the Swahili components.

History shows that Johannes Rebmann (Plate 1) and Johann Ludwig Krapf were German explorers and missionaries who entered Africa through the Indian Ocean and first European to find Mount Kilimanjaro. Following the discovery of Mount Kilimanjaro, Rebmann made publication in the Church Missionary Intelligencer in May 1849. However, the news was ignored that it was a dream and vision of a missionary affected by malaria. The main reasons for opposing the existence of Mount Kilimanjaro was that it is impossible for snow to occur in such latitudes. However, the findings of Rebmann stimulates researchers to measure Mount Kilimanjaro where between 1861 - 1865 the Baron Karl Klaus von der Decken visited East Africa and confirmed the information of the Rebmann's that it was correct. The fame of Mount Kilimanjaro continued to spread throughout the world, especially after Hans Meyer (Plate 2) managed to reach the top of Mount Kilimanjaro in 1889 under the guidance the Tanzanian Yohannes Kinyala Lauwo.



Plate 1: Johannes Rebmann, the first European to find Mount Kilimanjaro in 1848



Plate 2: Hans Meyer, the first European to reach the top of Mount Kilimanjaro in 1889



Plate 3: Yohannes Kinyala Lauwo, the first Tanzanian and African to reach the top of Mount Kilimanjaro in 1889.

Mount Kilimanjaro is one of the oldest protected areas in Africa. The history indicates that the conservation of Mount Kilimanjaro went through various conservation categories. It was established as a Game Reserve by the Germany Colonial Government in the 1910, forest reserve in 1921 and subsequently upgraded by United Republic of Tanzania to a National Park in 1973 under the Government Notice No. 50 of March 16th 1973, in accordance with the National Parks Ordinance (Cap 412) of 1959. The Kilimanjaro National Park (KINAPA) was officially opened for tourism in 1977 by the Late Mwalimu Julius Nyerere. In September 2005, the park boundaries were adjusted to include the Kilimanjaro Forest Reserve. Following the expansion of the park, the newly park area became 1,712 km². Kilimanjaro National Park (KINAPA) acquired a UNESCO World Heritage site status in 1987. The park nomination was based on natural Criterion Vii about the largest volcanoes in the world, three peaks (Kibo, Mawenzi and Shira), snow-

capped peak, vegetation zonation that forms habitat of rare and endangered species. The combination of these features but mostly its height, its physical form, and snow cap was considered as an outstanding example of a superlative natural phenomenon.

Mount Kilimanjaro is characterized by five main vegetation zones namely sub-montane coffee agroforestry, montane rain forests, heath zone, alpine zone and summit (Plate 1). There is a different of eco – climate in each zone, for example the temperature has tendency of decreasing with increasing elevation towards the peak of Mount Kilimanjaro. Similarly, the rain increases with elevations up to the mid-montane forest at 2500 meters asl where it peaks (Plate 2). After that zone, the rains start to decrease with elevations towards the summit. The variation of the climate along the slopes of Mount Kilimanjaro, is so important in shaping the life of plants and animals that inhabit the particular zones. Some of the animals and plant species has developed an adaptation characteristic to suit the harsh weather condition particularly in the higher elevation where there is very low temperature (below freezing). Studies show that biodiversity increases with elevations up to 2,500 meters where it peaks, then it decreases with elevations towards the summit.



Plate 1: View of Mount Kilimanjaro showing vegetation zonation

There are several conservation setbacks of mountain that hinders the conservation efforts of KINAPA. The human population pressure around the slopes of Mount Kilimanjaro has triggered the land use changes from natural to human modified landscapes. These changes have been affecting the integrity of the mountain ecosystem. For example, the colline and sub-montane agroforestry zones of Mount Kilimanjaro are highly threatened by ever increasingly intensive cultivation, a situation which has been affecting the functioning and ecological resilience of the ecosystem. The decline in land cover and forest resources on the lower slopes of this unique mountain is also blamed for the retreating of glaciers by reducing the flow of moisture up the mountain.

The shrinking of the glacier is also attributed by the global climate change. Other impacts of global climate changes and human activities along the slopes of Mount Kilimanjaro are increased wildfires incidences, drying and decrease in flow rates of rivers from the mountain and loss of biodiversity among others. Nevertheless, the park management has invested great efforts in combating these challenges through intensifying the protection of the remaining montane forest (plate 2), removal of invasive species, sustainable tourism development, restoration of degraded areas of the park and strengthening community support in the conservation of the mountain.



Plate 2: Aerial view of Mount Kilimanjaro montane forest

THE CHANGE OF KIBO PEAK NAME FROM KAISER WILHELM'S TO UHURU

By Angela F. Nyaki and Imani Kikoti

Kilimanjaro Mount is stratovolcano composed of three peaks: Kibo, Mawenzi, and Shira. While Mawenzi and Shira are extinct volcanoes, Kibo peak is dormant and the last volcanic eruption occurred 360,000 years ago. The history indicates that the German geographer Hans Meyer and Austrian mountaineer Ludwig Purtscheller were the first Europeans to reach the highest point of Mount Kilimanjaro on October 6,1889 under the guidance of the Tanzanian Yohannes Kinyala Lauwo. Mount Kilimanjaro was then described as "The highest mountain in Germany" and highest point of Kibo as "Kaiser-Wilhelm-Spitze" (German: Kaiser Wilhelm's Peak) in honor of the German Emperor.

Tanganyika gained its independence from the British colonial government in 1961. The whole process of Tanganyika independence, cannot be explained without mentioning the great efforts of the Father of Nation the Late Mwalimu Julius Kambarage Nyerere (Plate 1) and Brigadier (Retired) Alexander Nyirenda (Plate 2). The late Mwalimu Nyerere was the founder and first president of the Tanganyika African national Union (TANU), the party that organised campaign and mobilized people of Tanganyika to demand for their independence. It was on 22nd March 1955, when Mwalimu resigned his paid teaching post at St. Francis College now Pugu Secondary School and opted for politics as a president TANU. On 9th December 1961, the Tanganyika attained its independence and Mwalimu Nyerere was sworn as the first Prime Minister of Tanganyika. During the Independence Day, he raised up the Tanganyika National flag and lit the Uhuru torch. The Uhuru Torch (Mwenge wa Uhuru in Swahili) is one of our National Symbols indicating our freedom and light.

Mwalimu Nyerere, tasked by then the Captain Alex Nyirenda, the military officer from the King's African Rifles to send and place the torch on the peak of Mount Kilimanjaro, when Tanganyika becomes independent at midnight 9th December 1961. Speaking at a ceremony when the torch was handed over to Captain Nyirenda, Mwalimu Nyerere, said the Uhuru torch symbolizes the hard work that independence will mean. According to Mwalimu Nyerere, the Uhuru Torch was placed at the peak of Mount Kilimanjaro as a symbol of hope for the independence of other African nations that were still under colonial rule. The philosophy of Uhuru torch was to shine the country and across the borders to bring hope where there is despair, love where there is enmity and respect where there is contempt. It was at that time when the peak of Mount Kilimanjaro was changed from Kaiser Wilhelm's to Uhuru peak (meaning freedom in Swahili). Therefore, the name represents the decolonization process of Tanganyika and Africa at large.



Plate 1: The Father of Nation, the Late Mwalimu Julius Kambarage Nyerere



Plate 2: Brigadier (Retired) Alexander Nyirenda in a mission of sending Uhuru torch to the summit of Mount Kilimanjaro on 9th December 1961

In commemorating the independence of Tanzania, the Tanzania People's Defense Force (TPDF) has been sending the national flag to the top of Mount Kilimanjaro every December, 9th. This usually done in close cooperation with the Tanzania National Parks Agency (TANAPA) mandated to preserve and protect the Mountain. In recently years, Uhuru expedition has gained high popularity due to the increase in number of participants including private and public institutions, journalists and citizens. The park management is highly grateful to General Mirisho Sarakikya (Retired) (Plate 3) and General George Waitara (Retired) (Plate 4) who tirelessly led the Uhuru expedition for many years. The statistics indicates that there has been increase in the number of domestic visitors attempting to summit Mount Kilimanjaro during the Uhuru anniversary. For example, in 2022 a total of number of 205 domestic

visitors climbed the mountain in marking the 61 years independence anniversary. Therefore, the Uhuru expedition has strong implications to promotion and marketing of Mount Kilimanjaro to domestic visitors. The park management calls upon many Tanzanians to join the Uhuru expedition for summiting in every December 9 to cherish the Father of our nation the Late Mwalimu Julius Nyerere.

Due to this history, this event has continued to have a unique importance in remembering and honoring the words spoken by the late Mwalimu J.K. Nyerere when he freed the country from colonialism and granted Tanganyika Independence on December 9, 1961. Through this event. Tanzanians have continued to preserve our beautiful history of love, unity, peace and solidarity in honoring the late Mwalimu Julius Kambarage Nyerere. This event has been increasing the awareness of the current generation about the history of our country, as an individual that was born during the independence is rightly 60+ years old.



Plate 4: General George Waitara (Retired) and team during Uhuru expedition 2021

PARK SECURITY

By Mapinduzi Mdessa

The Park security has long been among Management priorities; this is necessitated partly to ensure protection of park's resources but also Kilimanjaro being one of country's best tourist attractions, to protect visitors and their properties.

In order to ensure security of Park resources and visitors strengthened, the Park management has from time to time been innovatively improving security means in the park.



During Park gazettement in 1973, security was organized through a few numbers of ranger's stations starting with Marangu and upper stations along the same route. The rangers stationed in these posts were responsible for the protection of park resources and general security of visitors and their belongings. Number of ranger's stations has increasingly been established to strengthen security both on the mountain and around the forest especially in the 1980s with much focus at highly threatened areas.

Up the mountain only three stations were established namely Mandara, Horombo and Kibo and they were supervised by rangers who were responsible for security and enforcing park rules.

The Park is surrounded by more than 90 villages and for the past 50 years the region population has almost

doubled from 902,437 to 1,861,934. These adjacent communities always craved for resources from the Park and causing many anthropogenic threats. Being surrounded by five districts of Rombo, Hai, Siha, Moshi and Longido; Moshi having about 40 villages more villages than other districts. Various threats emanate from almost all villages. Moshi, Rombo and Hai are known for illegal logging, firewood collection and livestock fodders. Illegal hunting for animals is most common in Rombo, Longido and Siha districts.



Mostly among common illegal activities in Kilimanjaro National Park are Illegal hunting that accounts for 9%, Illegal logging 85%, livestock incursions 5%, firewood collection and boundary encroachment among others which account for 1%.

Similarly, the Park is threated by wildfires which emanates from illegal activities.



Plate . Park rangers and adjacent community fighting wildfires



Plate. Illegal logging by women

Potentially the threats surrounding the park necessitated the Park Management to increase ranger posts in order to strengthen security of resources. This resulted into increase in number of ranger posts from four (4) to fourteen (14), among them which were developed into entry and exit gates. Equally on the mountain there were sporadically addition of ranger stations and camping sites making a total of 14 stations.



Plate . Showing poachers facilitating tools

Various means of patrols are conducted to ensure the safety of Park resources; foot, vehicle and aerial surveillance being among them





Plate . Rangers conducting foot, vehicle and aerial patrols

It is worth mentioning that in managing Kilimanjaro national park it is not a sole effort, contributions of other law enforcement and other stakeholders are paramount; the park has been collaborating with other agencies in performing its security duties through joint operations and professional expertise. Equally the community surrounding the Park has been playing an important role in conservation and strengthening of Park security through information sharing and participation in some of activities.

The Park does not only ensure security of its resources but also its adjacent communities. Collaboratively with other agencies, the Park has been making efforts to control problematic animals that threaten human lives and raiding their faming fields



There are several Park entry points used as gateways to mountain climbers; various improvements have been conducted to ensure that security is reinforced since the establishment of the Park. Currently there is establishment of CCTV cameras and security scanning systems in order to deter items that are not required into the Park



Plate. Tourist passing through walk through scanner

At present all Park visitors are electronically registered through reservation systems to ensure compliance to the number of days permitted and tracking of their stay in the Park. Again, as a means to strengthen security operations, the Park through the Organization has been able to establish intelligence, investigation and prosecution units to ensure that security procedures are adhered.



Fire, Climate and Land Use Changes on Kilimanjaro: Impacts on Biodiversity

By Claudia Hemp

Introduction

Tropical mountains in particular support unique ecosystems, which are hotspots of global biodiversity (Myers et al., 2000), while also providing important ecosystem services for human societies. Yet most tropical mountains are severely threatened by climate and land-use changes that have farreaching consequences for their biodiversity, the functioning of their ecosystems, and the wellbeing of the human societies that depend on such ecosystems.

This is especially true of Kilimanjaro in Tanzania, a mountain whose exceptional altitudinal range – spanning overalmost 5,000 m – incorporates a succession of climatic and vegetation zones ranging from hot, dry tropical savanna to alpine dwarf scrub.

Africa's highest mountain acts as a water tower in feeding major river systems, plays a dominant role in regulating regional climate, and provides local human populations

with many other vital ecosystem services. Its melting icecap probably the result of decreasing precipitation, rather than of increasing temperature (Kaser et al., 2004; Mölg et al., 2008) - reflects the accelerating trend of a change in regional climatic conditions. Largescale habitat conversion (Hemp & Hemp 2018 xx), the disturbing effects on habitats of larger and more frequent fires (Hemp, 2005), agricultural intensification and rapid human population growth have coalesced into a situation now typical of many regions in Africa. While Kilimanjaro may be seen as typical in this respect, it is also unique in combining - on one mountain - many different conditions that, elsewhere in East Africa, are widely dispersed.

Land use, climate change, the exploitation of natural resources, pollution and the spread of invasive species are the main direct anthropogenic drivers that affect biodiversity which is the base of ecosystem services and human well-being (Díaz et al. 2015a,b). Other human activities, such as nature conservation by designating protected areas can mitigate these negative impacts. These direct drivers are influenced by indirect drivers, including population growth and economic development.

In this contribution I will select some of these anthropogenic drivers considering their importance in the study area and assess their influence on biodiversity. In addition, I will include the role of Kilimanjaro National Park (KINAPA) for nature conservation and as potential mitigation factor. The focus will be placed on floristic and vegetation diversity, since vegetation is strongly related to the diversity of other taxa, and plays a fundamental role for the functioning of ecosystems, and hence ecosystem services. Furthermore, a rich data set compiled by the author over the past 30 years on 1600 vegetation plots and during KiLI 1 xx on 65 plots is available for this task.



Vegetation, biodiversity and land use outside KINAPA

Kilimanjaro's rich biodiversity, of vegetation types especially, stems largely from its huge altitudinal range and varied rainfall patterns. Below the National Park, the following vegetation zones can be differentiated:

Colline zone: Surrounding the mountain, at elevations of between 700 m and 1,100 m, on the northern side up to 1700 m is a hot, dry colline savanna zone, most of which is either under crop production or being used as pasture. Small relicts of indigenous savanna vegetation remain in secondary vents (savanna grasslands, woodlands and cliffs) and along rivers (riverine forests). Larger remnants of indigenous savanna vegetation still exist around Lake Chala on the eastern foothills, as well as on some of Kilimanjaro's western and northern foothills. Relicts of formerly widespread lowland groundwater forests exist in Rau forest reserve.

Sub-montane and lower montane

zone: Occupying the altitude range of 1,100–1,800 m, this zone, owing to favourable climatic conditions on the southern and eastern slopes, has taken on a unique land use, accommodating - among scattered tall trees - the dense 'banana forests' of the so-called Chagga home gardens, representing a special type of agro-forestry (Fig. 9). These homegardens harbour a huge biodiversity with over 500 vascular plant species and xx moss species, most of them forest species (hemp xx, Hemp et al. xx) and serve as an important refuge area for endemic grasshoppers (Hemp xx). Old forest remnants are found only in the deeper valleys and gorges, alongside disturbed forest, bush, riverine vegetation and grasslands.

Threats of biodiversity in the foothills outside KINAPA

Over the past 2,000 years, people have lived continuously on the slopes of Kilimanjaro (Odner, 1971a, 1971b). In recent decades this human population has increased dramatically, however. The first reliable census for Kilimanjaro,

conducted in 1913 (Raum, 1914), revealed a then total population of about 100,000 people. The population of Kilimanjaro (which today includes the districts of Moshi Rural, Moshi Urban, Rombo, Hai and Siha) was 267,700 in 1948, 840,386 in 1988, 1,053,204 in 2002, and 1,238,838 in 2012 (National Bureau of Statistics, 2003; 2012xx). As such, the population of the area increased 12-fold over 100 years. In general, the rate of increase has been exponential, and the population increase has been much higher in urban settlements than in rural areas. In Moshi town, for example, the population increased five-fold between 1967 and 2002.

As Kilimanjaro's human population has increased, so agriculture has both expanded and been intensified. The resulting land-use changes are most pronounced in the savanna zone. In the already densely populated coffee–banana belt, the land can be used more intensively only to a lesser degree.

Degradation of natural savanna vegetation

Between 1976 and 2000, 40 % of the natural savanna grasslands, dry forests and bush lands on the foothills of Kilimanjaro were converted into cultivated fields (Hemp, 2017), resulting in land degradation, in particular soil exhaustion and erosion, as well as the loss of wildlife habitat. In the 1960s, elephants frequented the lowland zone on both the southern and eastern sides of Kilimaniaro. Today they are restricted to the northern and western slopes (Hemp 2006a). Since savanna grasslands and woodlands are one of the most important habitat types in terms of plant species numbers, and because the highest diversity is found below 1,000 m (Hemp, 2001; Peters et al., 2016), the loss of natural savanna habitats represents a major threat to Kilimanjaro's biodiversity. This affects also traditional medicinal plants, most numerous in the lowlands of Kilimanjaro (Mollel, Fischer, & Hemp, 2017).







Disappeared forest corridor between Mt. Meru and Kilimanjaro.

A very striking example for these land cover changes is the disappeared forest corridor between Mt. Meru and ;Kilimanjaro. In 1976, Kilimanjaro and Mt. Meru were connected by a forested ridge at 1300-1400 m a.s.l., replaced by human settlements and agriculture in 2000 (Figure 1). Until recently this submontane forest bridge facilitated the dispersal of forest animals, illustrated by the large number of endemic submontane forest Orthoptera shared by both mountains (Hemp & Hemp 2018). Based on the endemicity patterns of forest Orthoptera, negative consequences are predicted due to the effects of isolation, in particular for larger forest animals. Kilimanjaro is becoming an increasingly isolated ecosystem with far reaching consequences for diversity and endemism. Forest bridges between East African mountains acted as important migratory corridors and are not only a prehistoric phenomenon during periods with other climatic conditions, but disappeared in some places recently due to increasing and direct anthropogenic impact.

Ecosystem isolation during the last 50 years

Kilimanjaro is becoming an increasingly isolated ecosystem, an island. At present, it is entirely surrounded by cultivation, with the exception of one seven-kilometerwide strip of savanna bushland on the northern slope (the so-called Kitendeni Corridor) linking the mountain with the Amboseli National Park in Kenya (Figure 2). As a wildlife corridor, Kitendeni is meant to preserve access for elephants and other wild animals to the forests of the mountain's northern and NW slopes, as far even as the forests of West Kilimanjaro. Yet increasing human pressure, from cultivation and livestock grazing in particular, is reducing this corridor and forcing wildlife, especially elephants and buffaloes, to remain longer on Kilimanjaro, thus impacting further on the forests (Hemp 2017).

In the face of these immense changes in the foothills of Kilimanjaro, KINAPA stands like an unshakable fortress in front of the growing pressure.

Vegetation and biodiversity inside KINAPA

Inside the National Park, the following vegetation zones can be differentiated:

Montane zone: Closed-canopy mixed forests cover the montane zone engirdling as a closed belt the whole mountain. The lower forestline borders on cultivated areas of the southern and eastern slopes at altitudes of 1,600-1,800 m, and at 1,300 m on the western slopes. The upper forest-line reaches the 3,100m contour on many parts of the mountain. In particular the wet forests on the lower part of the southern slope, are - although of very small extent (15 km2) - of great biogeographical and palaeobotanical importance. They differ completely in species composition and structure from the forests of higher altitudes, resembling instead the diverse wet montane forest of the Pare and Usambara Mts. Here we found the tallest known tree of Africa belonging to the species Entandrophragma excelsum with over 80m and an age of over 600 years (Hemp et al. xx). Since only a few square kilometers of this habitat of Entandrophragma are left, Kilimanjaro

(and Africa) has to care not only for a unique biogeographical archive with highly diverse vegetation, but also for its tallest trees. Since most of these forests are now included into KINAPA, their protection should be guaranteed.

Subalpine zone: In this transition zone between montane and alpine vegetation montane forests are replaced with Erica bush. The dominant species are Erica arborea, Erica trimera, Protea caffra and Euryops dacrydioides. On the SE slopes, moorland vegetation, characterised by tussock grass and giant lobelias, fringes the forest. This ericaceous belt is typical of all high mountains in East Africa and is very highly inflammable.

Alpine zone: At an altitude of about 3900 – 4000 m, the subalpine Erica heathlands grade into an alpine Helichrysum cushion vegetation extending up to 4,600 m (Fig. 11). The higher altitudes are almost devoid of vegetation.

Disturbance

During the last 100 years the forests of Kilimanjaro have experienced major changes in their extent and species composition.

Logging. The results of an aerial survey of the year 2000 (Lambrechts et al., 2002) in combination with a ground survey revealed that the forests of Kilimanjaro are heavily impacted by logging of indigenous trees in most areas below 2500 m elevation. In particular the moist *Ocotea* forests that cover most of the southern slopes were undergoing serious destruction caused by the intensive illegal logging of camphor trees. On the eastern slopes this overexploitation has resulted in forests free of mature Ocotea but still with the same structure and otherwise the same species composition. These "potential montane Ocotea forests" cover an area of 110 km². This means one third of the actual camphor zone is already depleted and the remaining part is being heavily modified. Similar is the situation for the second most targeted tree species, Juniperus procera. Only

40 km² of cedar forest of a potential area of about 120 km² on the whole northern slope were left in 2000. However, most of the cedar forests were felled by legal sawmills up to the 1980s. Altogether nearly 8000 cut trees were counted during the aerial survey. Today, about 20 years later and after the incorporation of the former forest reserve into KINAPA in 2006 the situation seems to be better: *Juniperus* forests recover and illegal logging activities are decreasing.

Fire. Fire distribution on Kilimanjaro follows the precipitation regime. Regular fires occur every year in the colline savanna zone and in the upper montane and subalpine zone and to a lesser degree in the submontane and lower montane forest zone (Hemp, 2005c). Due to an increasingly drier climate, and higher anthropogenic impact, fires have played an increasingly destructive role in the forests of Kilimanjaro during the last 100 years and in particular over the last decades. During this time Kilimanjaro has lost about 300 km² of high altitude forests due to fire and the upper closed forest line was lowered by 900 m. As these forests have an important function for fog water collection, this has an impact on the water balance of the whole mountain (Hemp, 2005b). Most of these fires are anthropogenic, but natural fires do occur as well and old charcoal horizons in the soil suggest that fires occurred for a very long time, probably back to the ice age (Hemp & Beck, 2001, Schüler et al. xx), but would have been less frequent than today.

Fire causes sharp discontinuities in composition and structure of the tall (20-30 m canopy) upper montane Hagenia-Podocarpus forests at 2800-3000 m. The giant heather Erica excelsa becomes dominant at this altitude forming dense monospecific stands of about 10 m height (Fig. 5), consisting of multi- and single-stemmed trees of apparently similar age, suggesting simultaneous sprouting after a fire (Hemp & Beck, 2001). During long periods of dry climate with recurrent fires, the Erica forest boundary moves downslope and advances upslope during wet periods. The presence of Erica enhances fire risk, since even fresh Erica wood burns well, which in turn prevents the Podocarpus forest from reestablishing (Fig. 6). At high fire frequency, the closed Erica excelsa forest degrades into open bushland of ca. 1.5 m height dominated by E. trimera and E. arborea at elevations of between 3200 and 4000 m (the potential treeline). A high frequency of fires even destroys this bush, resulting in Helichrysum cushion vegetation, which is the climatic climax vegetation at altitudes above 4000 m. Due to the open canopy of the Erica forest the microclimate changes as is obvious from the composition of the herb layer: Montane forest species disappear and light demanding species of the alpine flora such as representatives of the genera Helichrysum or Senecio become dominant, which cannot successfully compete in shady forests. Therefore, on Kilimanjaro alpine plant species move downslope due to climate change, which is in most other mountains opposite.

Burning in low altitude forests changes species composition and structure as well. About 10% of the tree species in the drier submontane Croton-Calodendrum forests of the western and northern slopes were found to be deciduous. This habit is an adaptation to dry seasons, and also possibly to recurring fires. In the same forest type distinct fire-induced Olea europaea ssp. africana dominance stages are quite common, covering 41 km2. Similar to Olea, the fire-resistant trees Agarista salicifolia and Morella salicifolia (both with a thick, corky bark) are distributed in the fire-influenced forests of the lower montane zone and the upper montane zone (Hemp, 2006 xx).

Using vegetation and rainfall data the area of KINAPA was divided into 5 zones of fire risk (excluding the areas bare of vegetation above 4600 m, Hemp, 2016, unpub.): extremely high (e.g. subalpine ericaceous bushland), very high (e.g. montane Juniperus forests of the northern slope and submontane Croton-Calodendron forests of the northern and western slope), high (Podocarpus and Cassipourea forest), low (upper and lower montane Ocotea forests) and very low (middle montane Ocotea forests). Over 40% of KINAPA is located in very high and extremely high fire risk areas. The last large fires in October 2020 and 2022 destroyed about 100 km² mainly of subalpine bushland inside the zone of extremely high fire risk, meaning an annual loss of about 1.5 Million tons of fog water input (Hemp, unpub. data). Fires occur mainly at the end of the dry seasons in October or March. Regular monitoring flights with a helicopter or small airplane at the end of the dry seasons particularly over the high-risk areas above 2700m could reduce the danger of too late detected fire outbreaks. However, to extinguish such fires in a reasonable time a large firefighting airplane is needed, which could be based on Kilimanjaro Airport and serve also Mt. Meru National Park,

which is similarly affected by fires as well as the nearby located Pare Mts. with its Chome Nature Reserve. Here, uncontrolled fires devastated huge forest areas during the last decades.

Overall forest loss and its impact.

In addition to the losses of about 300 km2 of upper montane and subalpine forests from fire since 1880, losses due to clear cutting of lower elevation forests amount to 450 km2 since 1929, bringing the total loss to ca. 750 km2. Thus Kilimanjaro has lost about 50 percent of its former forest cover. Deforestation on mountain foothills raises mean cloud condensation level that results in a gradual shrinking of the cloud zone. A similar effect is caused by global warming and drying of the air (Bruijnzeel, 2001). In addition to changes in the water balance of the mountain loss of cloud cover may have added to the observed general decreasing trend in precipitation during the last century.

Conclusion

Kilimanjaro has a uniquely broad range of ecosystem types: on one hand wilderness areas on the other extremely densely-populated and used areas. However, its rich biodiversity with over 3000 plant species is under heavy pressure. Outside KINAPA land use change and intensification, driven by a strongly increasing population, have destroyed most of the natural vegetation and KINAPA still stands like an unshakable fortress in front of the growing pressure. Biodiversity and ecosystem functioning inside KINAPA is mainly affected by wild fires due to decreasing precipitation and increasing touristic activities. To cope with this protecting a world heritage site a large firefighting airplane is absolutely necessary.



CHIEF PARK WARDEN OF KILIMANARO NATIONAL PARK Since 1973 to 2023



BW. LORIVI MOSES MOIRANA 1973 - 1974



BW. EDWARD E. KISHE 1980 - 1979



BW. HORACE NASSARI 1983 - 1984



BW. BENJAMIN KANZA 1975 - 1975



BW. ATHANAS MINJA 1980 - 1981



BI. MARIETHA LOHAY KIBASA 1985 - 1986



BW. ALFRED LABONGO 1976 - 1978



BW. BALEKEBA JOBEGE MWASAGA 1981 - 1982



BW. JOSEPH MAGOMBI 1986 - 1989



BW. ELIAS KAPOLONDO 1978 - 1980



BW. PASCAL NGUYE 1982 - 1983



BW. ADAM MMARI 1989 - 1992



BW. BERNARD MAREGESI 1992 - 1996



BW. ERASTUS LUFUNGULO 2012 - 2016



BW. LORIVI MOSES MOIRANA 1996 - 2001



BI. BETRITA LYIMO 2016 - 2019



BW. NYAMAKUMBATI MAFURU 2001 - 2012



BI. ANJELA NYAKI 2019 - TO DATE

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