

Mount Cameroon Eruptions: Science Versus Superstition

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Abstract—The aim of this paper is to find out some of the signs the Bakweris saw warning them of Mount Cameroon eruption(s) and to present different views as to causes of eruptions held by the Bakweri indigenes and scientific viewpoints of seismologists. This paper argues that superstitious views of the Bakweris are at variance with scientific explanations as to causes of the Mount Cameroon eruptions of 1909, 1922, 1954, 1959, 1982, 1999, 2000 and the 2012 explosions. Striking a balance between Indigenous (superstitious) beliefs and scientific viewpoints with regards to causes of Mount Cameroon eruption has remained a serious issue or problematic. The methodology that this paper adopts is the historical approach and content analysis to get that seismicity in the like of magmatic activism is scientific basis for sufficient justification Mount Cameroon eruptions. So, adherence to Bakweri beliefs that the anger of Mountain god - Epasa Moto and the death of some traditional rulers among others should suffer from sufficiency of scientific evidence to justify eruptions. This paper is important in that it spotlights indigenous early warning mechanisms to re-orientate the Buea denizens and the people of Fako Division in general to take these indigenous early warning mechanisms seriously and though they have their beliefs as to causes of eruptions, they should also consider scientific evidence put forth as causes of eruptions. Seismic actions rather than indigenous beliefs caused Mount Cameroon eruptions.

Keywords—Mount Cameroon, Eruptions, Bakweris, Bakweri beliefs, seismicity

1. Introduction

A lot of literature exists pertaining to eruptions of Mount Cameroon written from a scientific perspective, most of which focus on the aspects, such as lava emplacement dynamics, petro-chemistry, petrography, geochemistry of volcanic eruptions, geological assessments and impacts of eruptions on socio-economic life – that is health, agriculture, soils, vegetation, infrastructure and psychology at any one point in time. For instance, the research works of Geiger, Barker and Troll [1] as well as Ambeh, Fairhead, Francis, Nnange, and Djallo [2] attributes eruptions to seismic actions such as the influence of magma in the earth's mantle, earthquakes and lava

flows. While, Wantim, Bonadonna, Gregg, Menom, Frischknecht, Kervyn, Ayonghe [3], Atanga, Meerve, Shemang, Suh, Njome, Asobo [4], Ateba, Dorbath, Ntepe, Frogneaux, Aka, Hell, Delmond, Manguelle [5], all consider the environmental and health impacts of volcanic eruptions of the Mount Cameroons on populations and their properties in Fako. But this paper aims at discussing some of the Bakweri indigenous early warning signals of Mount Cameroon Eruptions. Then it also seeks to discuss the divergent viewpoints/perceptions between the Bakweris and scientists with regards to causes of Mount Cameroon eruptions. The issue or problematic remain striking a balance between the indigenous Bakweri (superstitious) beliefs and scientific viewpoints pertaining to causes of Mount Cameroon eruptions.

Whenever Mount Cameroon erupts it is not just a Cameroonian concern but an African concern since the whole of Africa is represented in Cameroon [6]. Mount Cameroon eruption is just one of the many natural hazards which have befallen Cameroon in the past centuries – especially from the nineteenth century to the twenty first century [7].

Cameroon is Africa in miniature and the country has witnessed some volcanic activities especially along the Cameroon Volcanic line. The Cameroon volcanic line forms the intercontinental separate of a gently covered line major volcanic center with an extension of over 1000 kilometers from the South Atlantic into Central Cameroon. The Highest part of the volcanic highlands include: Mounts Kupe, Manenguba, Bamboutous, Oku, Mandara, Gotel and Cameroon. Mount Cameroon is a north north east (NNE) – south south west (SSW) trending tectonic creature situated in the West of Cameroon and runs roughly parallel to the border between Cameroon and Nigeria [8].

Mount Cameroon has a height of 13,350 ft. above sea level and is part of the Cameroon highlands extending to the Adamawa Plateaux and further North East to Central African Republic. It is an active volcanic mountain¹ of which geologists believe that the volcanic islands of Bota, Mondoli in Limbe, Fernando Po, Principe and Sao Tome are closely related. The Mountain has recorded numerous or history of

¹ Up to 1982, the Mountain rarely caused violent eruptions like the Peruvian Mountain – in Latin America which once erupted and killed thousands of people

eruptions [9] dating as far back as 500 B.C. when Hanno a Carthaginian explorer saw it in action and called it “the Chariots of the gods” [10]. During the twentieth century, the active volcano erupted in 1909, 1922, 1954, 1959, 1982, 1999 and 2000 [11]. Some slight tremors occurred in 1868, 1886, 1946, 1954 and 1977 respectively. These tremors were a bit scary but the administration of Buea advised the population of Buea not to panic because geologists – from British, German and Cameroonian origin predicted no danger [12].

Bakweris have a belief system which is a valuable aspect of their culture which connects them to the land [13]. The Bakweris have a legendary belief that events of great significance that put Bakweri clans into a state of either jubilation or anguish are preceded by or followed by an eruption of Mount Cameroon [14]. Some Bakweris in the Fako Division in general and the Buea subdivision in particular believe (d)epasa moto's conduct, the disappearance of chieftains and failure to perform cleansing or appeasing sacrifices, among others sparked eruptions. Bakweri beliefs as to causes of eruptions could be rooted in prognosis, metaphysics, illusionism, mysticism, spiritualism, supernaturalism, traditionalism, fantasy, or traditional African cosmology. Beliefs of the Bakweris as to the cause of eruptions have gained grounds among some Bakweri and non – Bakweri kin and kith. Curiosity pushes some of the Bakweris to adhere to such beliefs [15]. But the question is: how valid are their claims?

Though, the Bakweris had beliefs as to causes of Mount Cameroon eruptions, they were some signs which they saw prior to (most of) the eruptions and these signs told them that the mountain will erupt soon. Generally, from time immemorial till now the Bakweris have remained good “considerators” to signs. They read and interpret signs with the use of their instincts or senses. And to the Bakweris, each sign has a meaning and thus the meaning should not be taken lightly by the community. But not everyone in the Bakweri community knows how to identify, read or interpret signs. With the case of the Mount Cameroon eruptions, I realized during the course of interviewing some Bakweris kin and kiths that many of them do not know or cannot tell of the signs which the Bakweris saw pertaining to Mount Cameroon eruptions but some testify that they have witnesses to one, two, three or four eruptions at most [16]. For instance: Lysinge asserts that I witnessed the eruptions of 1999 and 2000 but cannot tell of the signs [17]. A few could tell some of these signs which are taken into consideration herein. Prior to delving into the examination of the signs and different views of causes of Mount Cameroon eruptions, it is incumbent to discuss the method on which this study hinges.

2. Materials and Method

To Enoh the historical methodology is a systematic procedure of ways of carrying out research. It is the scientific approach that the researcher employs to

carryout research and makes his results available accordingly [18]. To Kah, the historical method comprises the techniques and guidelines wherein historians use primary, secondary and tertiary sources to research and then to write histories [19]. Researchers are increasingly using Artificial Intelligence to scout, garner, and indulge in analysis of these sources, besides primary and secondary sources [20]. For primary sources files from the National Archives Buea (NAB) Buea, Cameroon pertaining to Mount Cameroon eruptions were consulted and also conducted interviews of indigenous Bakweris to find out the early warning signals which informed them of Mount Cameroon eruptions and the beliefs with regards to causes the Bakweris attributed to eruptions of Mount Cameroon. A total of twenty people were interviewed drawn from the communities of Bokwaongo, Buea Town, Bwassa, Great Soppo and Small Soppo. To get the interviews, Free Prior and Informed Consent (FPIC) of the Bakweri people was sought. For secondary sources, scientific articles in peer reviewed journals, newspaper reports principally from The Post as well as information from books were all consulted to build this paper. Most secondary sources consulted were scientific articles than new paper reports and books.

The author adopts the historical method and content analysis in order to discuss the signs that preceded eruptions and the causes of eruptions presenting the two sides of the coin being the indigenous superstitious beliefs and the scientific standpoint.

2.1. Theory

2.1.1. Social Perception Theory of Natural Hazards

The theory of Social Perception of Natural Hazards is a formulation of Ferdinan Ngomba Vevanje in August 2023. This theory is developed drawing insights from varied authors/scholars whom have written on perception and or social perception of natural hazards in different contexts/scenarios in diverse parts of the world among whom are: Sherry Adomah Bempah, Arne Olav Oylus, Tina Plapp, Ute Werner, Jaroslaw Dzialek, Rodrigo Rudge Ramos Ribeiro, Samia Nascimento Sulaiman, Michel Bonatti, Stefan Sieber, Marcos Alberto Lana and Emmanuel YenshuVubo.

The Central point of these theory is that human beings view differently the challenges and hazards of their natural environment, which happen in a more direct way with a vital element in the study of risk perception which is to comprehend what people perceive versus what science can actually measure [21] [22] [23].

In Germany for instance, windstorms, floods and earthquakes are perceived heterogeneously with regards their general risk, risk characteristics and attributed cause-effect relationships. The cause-effect relationships in disaster risk analysis and discourses have been quintessential in Germany given the fact

that some parts of the country have suffered the risk of different hazards with consequence disastrous conditions arousing varied perceptions [24].

People's perceptions of natural hazards are socially constructed or contextual and subjective. Value laden is a key element in social perception due to the fact that natural hazards/disasters are to a significant/considerable extent perceived according to local values and beliefs ideologically oriented [25].

Dzialek further advances that perception of natural hazards and disasters involves intuitive judgments, beliefs and attitudes held by persons and groups of persons pertaining to the likelihood of occurrence and course and mechanisms of development of such phenomena. The subjective nature of the comprehending natural hazards influences people's decisions [26]. These decisions are based more or less on social categories of perceptions which stem from the political, socio-economic and cultural life of people.

Yenshu has contributed to this theory by advancing the social categories of perception that characterize the local people's representation of natural hazards, among which are: the Mount Cameroon eruptions. Social categories with regards to Mount Cameroon eruptions are political – association of earlier eruptions with political events, cultural dimension having to do with the attribution of eruptions to the demise of chieftains, annoyance of the Mountain god – *epasa moto*, spirits or ancestors. The natural dimension attributes volcanic eruptions to minerals, petroleum or molten rocks [27].

Although, perceptions count in disaster issues, there has remained constant/sustained conflict between cultural worldviews and scientific standpoints with regards to the characteristics, cause – effects, mutations and management of risks in different areas in Africa, Europe and Asia to cite these. This constitutes the basis for employing the Social Perception theory of natural hazards to discuss or present variations between indigenous and scientific views by zooming into the indigenous early warning signals about eruptions and the scientific explanations for eruptions of Mount Cameroon as well as to present the debate pertaining to the causes of Mount Cameroon eruptions.

3. Results

3.1. Indigenous Early Warning Signs pertaining to Mount Cameroon Eruptions

Early warning constitutes a main element of disaster risk reduction (DRR). It can conduce in the prevention and or reduction of human, economic and material casualties of natural hazards. For early warning systems to be effective there is the need to actively involve, the people and communities whom are risk-prone from a multiplicity of hazards. Also, there is the need for public education and to raise awareness of risks, spread information and warnings efficiently and ensuring consistency in preparedness

and taking of prompt actions in response to disasters [28] [29].

Never will Mount Cameroon erupt without the manifestation of a sign or signs in nature [30]. Signs are always warning signals to humanity. Unlike in Nepal, where the local population observed signs in the environment allowing them to resort to precautionary measures before a disaster occurs [31] and in Manam Island of Papua New Guinea wherein the Baliau community experienced some warning signs among them grass dying around the top of the volcano, blue smoke rings, continuous low tide and a very hot dry season which informed them of the eruption which happened in 2004 [32], so too there are some signs observed by the Bakweris which alert them of the likelihood of an eruption or eruptions to come. The traditional/indigenous early warning mechanisms are more pronounced than the scientific early warning mechanisms.

Ndombe, Mbua, Teke, Elondo, Ngeke and Mwambo share similar opinions as to the signs which preceded many Mount Cameroon eruptions (especially the major eruptions) of 1909, 1922, 1954, 1959, 1982, 1999, and 2000. All of them posit that from what their parents and elders told them and what they experienced, some of the signs which preceded eruptions at any one point in time include: people experiencing extreme heat throughout the year especially during the dry season, crop growth was timid, and change in animal behavior: animals moved far deep into the forest for their safety [33] [34] [35] [36] [37] [38]. Apart from the Mount Cameroon where unusual animal behavior was also experienced, this was also the case elsewhere. Kirschvink is in agreement stating how animal behavior of dogs and cats can detect a possible earthquake or volcanic eruption [39]. Unusual behavior of animals informed the 2001 Bhuj earthquake [40]. Also, the unusual behavior of animal was also experienced in Papua New Guinea prior to the 2004 [41]. Besides in the past prior to the Mount Merapi eruptions in Indonesia of 2010, 2013, 2018 and 2020 among the signs which informed those who live around the area of possible eruptions were herds of animals descending down the Mountain and fewer animals which could be spotted on it [42]. Thus, this is an indication of impending danger.

To Monyenge a sign which informs eruptions is the fact that plants, such as trees and herbs around the area where such an occurrence will likely happen will start shrinking or dying. That is up the Mountain. This is because they will be responding to the (over)heat [43]. Monangai asserts a warning sign that precedes some eruptions is that for the year when an eruption is bound to occur there are a lot of thunderstorms [44]. These were as well warning signals which preceded the 2004 eruption in Papua New Guinea [45].

Unusual dying or extremely slow growth of vegetation be it in the Mount or around human habitations usually informed the indigenous people –

the Bakweris that an eruption is about to happen. For instance, the dying of grasses and shrubs or their stunted growth was a warning sign [46] [47].

Bakweris who went for hunting in the mountain noticed that thick smoke came out from some craters prior to eruptions. This informed them that the Mountain could likely erupt so they came back and informed the community members [48].

Another later sign which preceded most volcanic eruptions was earth tremors as holds Nambongo, Lyonga, Esuka and Mongombe [49] [50] [51] [52]. Del Marmol et al. also corroborates by writing that earth tremors are felt only sometimes prior to an eruption and taken as warning signal [53]. All these signs ushered in different Mount Cameroon eruptions which the people (Bakweris) have attributed belief causes to or superstitious beliefs on.

The experience of these early warning signs by the Bakweris had to bring in the aspects of intuitive judgment as highlighted in the theory of social perception of natural hazards. Intuitive judgment, indigenous values and attitudes definitely inform the way natural hazards and their early, medium term or late warning signs are perceived.

The indigenous early warning systems are very feeble or limited. This does not mean that there are no scientific early warning mechanisms but the scientific early warning mechanisms are feeble because of lack of consistency in monitoring risk zones, such as the volcanically active Mount Cameroon region, due to poor, even complete lack of, maintenance of faulty monitoring equipment [54]. Besides these early warning mechanisms, there are causes of Mount Cameroon eruptions. But the issue has been divergence in views between the Bakweri indigenes and scientists or seismologists which is in line with the social perception theory of natural hazards.

3.2. Bakweri Beliefs on Mount Cameroon Eruptions

To Liwonjo and Arrey the Bakweris of Fako Division, South West Region of Cameroon believe that natural hazard that occur on Mount Cameroon like eruption signified *epasa moto's* annoyance [55] [56]. Yenshu expounds that the local indigenous people would attribute the eruption of the Mount Cameroon either to *Epasa Moto*², to the death of a chief or an impending event [57], spirit or ancestors [58] in line with the social perception theory of natural hazard. Certainly, their attributions should be driven by past experiences of eruptions, curiosity, vagueness, African traditional religion, magic, spirituality, [pre]conceptions, or sense of guiltiness that per adventure they have angered their divinities. They felt and came to terms that it was a grievous crime to make their divinities angry and in case their divinities were angry they (the Bakweris) thought it was necessary to appease them carrying out some

traditional rituals or otherwise traditional cleansing. Monono, Oduro, Sarfo-Mensah and Nana, traditional cleansing is a process practiced to appease the gods of the Mount Cameroon National Park (MCNP) [59].

From April 26 to June 1909, Mount Cameroon erupted. The eruptions of 1909 therefore were the first to be recorded in any great detail, with data taken by a significant and concerned colonial administration well ensconced in the locality (of Buea). Though, some Bakweri approaches to the issue were rather emotive [60] and anchored on beliefs or superstition. Certainly, the Bakweris believed the mountain erupted as a result of the fierce fury of *epasa mote* disregarding the road construction by the Germans to the Mountain. Mwambo and Ewome, shares similar vein as to what their forbears told them caused the eruption of 1909: The Germans commenced the road construction work without asking the Bakweri indigenes to perform libations, rites or sacrifices so that *epasa moto* could let them go ahead with the road works. So, the Bakweris believed that the eruption occurred to terminate the road construction. In response, some Bakweris went up the Mountain to do appeasement sacrifices to the gods. They took along animals of white fur, such as a goat, a sheep, a fowl, a dog as well as an albino [61] [62]. Roughly, about one and a half decade, running the mountain erupted again in 1922 and the Bakweris had a belief about it.

The eruption of 1922 occurred coinciding with the League of Nations, permitting Britain and France to partition former German Kamerun. This partition pushed *Epasa Moto* to burst out in anger pertaining to the separation of the once united and vibrant Kamerun between Britain and France. It is believed that *epasa moto* could not sit, watch and fold his arms in euphoria applauding the partition but had no choice than to use the Mount Cameroon to express his anger [63] [64]. Within a time interval of *circa* thirty years from the former eruption of 1922, Mount Cameroon erupted in 1954. The Bakweris had a belief as to the cause of the eruption which is not different from the view of Schmidt-Soltau.

Schmidt-Soltau pinpoints that the 1954 eruption was linked with the victory of the conservative political forces over progressive Union des Population du Cameroon (UPC) forces fighting for the independence of Cameroon [65]. The Bakweri indigenes corroborate this, his view as postulate Hannah Mwambo based on what she was told: The eruption of 1954 was as a result of political tensions in the country at the time between states forces and the UPC [66]. Within about 5 years, Mount Cameroon vomited lava again that is in 1959 which the Bakweris had a superstitious belief about.

Njimini asserts that the 1959 eruption was caused by the anger of the Mountain God *epasa moto*: since political power had changed hands from a Bakweri indigene – Dr. Emmanuel MbellaLifafaEndeley to a non – indigene (Dr. John Ngu Foncha). Hannah Mwambo interviewed narrates what she was told by

² Or *Ifas a Moto orihvarza mote*

her elders some of whom have passed away and corroborates Njimini thus: the 1959 eruption was as a result of the fact that *epasa moto* was angry with the political fate suffered by Dr. Endeley in the elections of 1959 [67]. The Bakweris superstitiously believed that power changing hands engendered the 1959 eruption. Some Bakweris inclusive Dr. Endeley went up the Mountain to do sacrifices to appease the gods/traditional cleansing. They took along an albino, a white dog, a white cat, a white fowl, and a white dog. And the Bakweris believed that these sacrifices helped to make the eruption to subside [68] [69]. Per adventure, right up to this point in the narrative/content analysis, it can be observed that the Bakweris have apportioned more blames to the anger of the gods as cause for eruptions than the death of traditional rulers among others.

Passing away of some Bakweris traditional rulers was believed by the Bakweris as responsible for some eruptions of the Mount Cameroon. The eruption of 1982 coincided with the demise of the Paramount chief of Buea – Gervasius Mbella Endeley. On Sunday October 17, 1982, barely a few hours after the interment of the chief, the mountain erupted [70]. The Bakweris took advantage of this event and attached a lot of superstition to the eruption. They came up with the belief that the eruption was sparked by the disappearance of their chief [71] [72] [73]. Mbwaye and Elondo corroborate: Mount Cameroon eruption of 1982 was sparked by the demise of Chief Endeley [74] [75]. In the course of the 1982 eruption, Bakweri chiefs and elders performed some traditional rituals in Buea to appease the ancestors and the gods of Fako. A number of animals of white fur were sacrificed [76], such as goats, sheep, dogs, cats, *inter alia* to *epasa moto*. The chiefs and elders who did the sacrifices took a few days and climbed up the mountain to a place known as *Navico* – a very deep hollow or valley where they stood somewhere beside and did the sacrifices [77] [78] [79].

Similarly, in 1999, Bakweri indigenous beliefs holds that the demise of the second class chief Otto Monono of Great Soppo on March 27, 1999, engendered the eruption of the Mount Cameroon whose genesis in 1999 was shuddering of the earth experienced by Buea denizens on Saturday March 27 and Sunday March 28 [80]. Monono corroborates:

It will not be fair if I do not do justice to myself by saying that the eruption of 1999 happened when my father Otto Ewumbue Monono died. When he was still in the mortuary the mountain erupted. The “natives” attributed the eruption to his death [81].

This eruption lasted from March 28 to April 22, 1999. Besides, Etengene, Mbua and Mwambo pinpoint that some of the Bakweris belief that the disappearance of the chief Monono of Buea caused Mount Cameroon to erupt [82] [83] [84]. The administration brushed this idea as belief system and regarded the eruption as a natural course [85]. Appeasement sacrifices perhaps were done very

early in the morning or late at night to appease *epasa moto* or stop the lava flow from entering human habitations and thereby bringing spoilage to the land.

When the eruption of 2000 happened, the Bakweris at the time (superstitiously) believed that it was caused by the anger of the Mount God *epasa moto*. This belief was sustained among the Bakweris with some rituals and appeasement sacrifices done by a few Bakweri chieftains and elders to appease *epasa moto*.

A few Bakweris certainly believed that the Mount Cameroon explosions or minor eruption of 2012 indicated that *epasa moto* wants to get angry again. This explosion took place in February and lasted a couple of seconds wherein some tourist guides, tourists and porters such as Peter Buma Linonge – a tourist guide testified of experiencing the violent explosions characterized by earth tremors, outburst of ashes and flames into the air. Among the porters and guides, who were up the mountain at the time of the explosion, two of them sustained light injuries which ultimately needed medical attention [86] [87] [88].

It is believed by the Bakweris that those whom did sacrifices inclusive some Bakweris chiefs, elders and great *ngangas* – traditional doctors were of clear minds. It is also believed that if they are not of clear minds, the sacrifices will not be accepted or some element(s) to be used for the sacrifices will get missing in the process of journeying to the spot where the sacrifices are to be done or something dreadful will happen to any one of the team members while they journey along [89] [90].

To Akiyode and Samba while updating and adopting effective policy for disaster risk reduction, the socio – cultural beliefs of the indigenous people must be included in the strategies [91]. On the contrary, inclusion of indigenous socio – cultural beliefs of indigenous populations should not be obligatory since as indigenous beliefs, like those of the Bakweris concerning the eruptions may either be subjective, ‘contemplatory’, porous, judgmental, ‘teasible’, feeble or of low validity and reliability.

The question is: Does it mean if the Bakweri indigenes cannot provide scientific explanation (s) to Mount Cameroon eruptions their beliefs concerning the eruptions should be swiftly dismissed as superstition or superstitious? This question is almost similar to what Mukoko – Mokeba writes: It would be just as foolish to dismiss sorcery, witchcraft, voodoo or *nyongo* as superstition simply because the ‘natives’ offer no scientific explanations for them as it would be to say that the law of gravity did not exist before Isaac Newton discovered it [92].

To some of the Bakweris validity of these beliefs is sure and they hold to them so dearly and they even think their beliefs should not be argued, judged, quarreled, interfered with or questioned. For they presuppose anyone who argues, judges, quarrels, interferes with or questions their beliefs will suffer from

the wrath of the gods. So, convincing Bakweri believers of the fact that science played a quintessential role in eruptions may be or seem difficult. Although, the Bakweris hold on to some beliefs as cause(s) of the 1909, 1922, 1954, 1959, 1982, 1999 and 2000 eruptions, science should certainly provide more convincing justifications as to the cause(s) of Mount Cameroon eruptions. Seismic actions such as: magmatic pressure, and lava flows/outflows can be adhered to with little or no dubiety.

3.3 Seismic Activities – Responsible for Eruptions

Drawing from the social perception theory of natural hazards science has an explanation to the occurrence of varied natural hazards based on scientific investigations. With the case of volcanic eruptions, several seismic and tectonic factors may be responsible for any volcanic eruption, but three are predominant: magma buoyancy, pressure from the gases in the magma and injection of new batch of magma into an already filled magma chamber as well as plate tectonics which likely with resultant earthquakes [93].

Earthquakes have stood as a conspicuous activity pertaining to Mount Cameroon eruption for most former years of recorded eruptions. Earth tremors ushered in Mount Cameroon eruptions at any one point in time. The eruption of the mountain since 500BC can be explained by the sufficiency of pressure in the magma chamber beyond the chamber to bear. Tsafack, Wandji, Bardintzeff, Bellon and Guillou opines that magmas beneath the Mount Cameroon are generated at great depth (more than 60 km), in a garnet-hercynite mantle, with a contribution of spinel-hercynite with a small degree melting roughly 0.2 – 2% [94]. Inability of the magma chamber to bear this pressure should have precipitated upward release through vents of different sizes and orientations as was the case in 1922, *inter alia*. Njie corroborates by saying that science has explanation to eruptions which is: magmatic activism precisely pressure from gases within the earth's mantle which having a way of escape flow out. Thus, eruptions are a geographical course [95].

A characteristic feature of most eruptions of the Cameroon Mountain was the flow of lava as a result of risen magma. Exposure of magma to the surface during any eruption of Mount Cameroon flows as lava either molten or basaltic. For instance: In the 1922 eruption, lava flowed out from several small cones situated at a height of about 7, 500 feet on the Western flank of the Cameroon Mountain. The fountains of glowing lava were a unique characteristic of the eruption and an indication of seismic activism within the earth [96]. The flow eventually reached the sea near Bibundi – destroying the forest, and other properties in its path [97]. Furthermore, on June 22, 1922 lava flow breakthrough Dollmanshöhe bungalow belonging to the Bibundi Estate and followed the

course of the stream at Bibundi. It threatened health units at Dollsmanshöhe and Jantzenhof [98].

These earth tremors were intense during February 6 and 7, 1959 and subsided, an indication of seismic action [99]. Also, during the 1959 eruptions, some vents flowed out lava obvious brain child of seismicity at work. A vent at an altitude of 7500 feet emitted lava profusely from February 7 – 9, 1959. Whereas from February 8 towards the close of the month of March 1959, three vents at an altitude of about 8000 feet flowed considerable lava which at one point threatened the trunk road between Victoria and Kumba [100].

Also, the ability of the 1999 eruption to take place at an altitude of 3000 meters high was a clear indication that the magma chambers beneath Mount Cameroon were under sufficient pressures capable of building up sufficient internal energy as to enable magma to rise up to the surface through sub surface fractures, at such an altitude. And from such fissures were emissions of superheated gases. Upon release, these gases expanded extensively as they blew pulverized rocks and lava. The quantity of lava flow has as determinant the quantity of magma in upward movement. Such movements through fractures and for such distances were definitely accompanied with ground shaking (earth quaking/earth tremor) and fracturing – manifestations of seismic activity [101]. The 1999 eruption was characterized by voluminous lava flow vomited by the vent at about 1400 meters above sea level. This flow moved in south southwest direction through dense rainforest through Bakingili and people were evacuated. The 10 – 12 meters thick flow cut about 80meters of the quintessential Limbe-Idenau road and ceased about 200meters from the Atlantic Coast [102].

Also, small-volume magma batches actively migrate through the plumbing system during repose intervals. Evolving and migrating magma parcels potentially cause (d) temporary unrest and short-lived explosive outbursts and maybe remobilized during major eruptions that are fed from sub-moho magma reservoirs [103]. Certainly, this was the main cause of the 2012 explosions of the Mount Cameroon.

According to Ikundi, seismic action has over the past decades played a key role as far as Mount Cameroon eruptions are concerned irrespective of the different beliefs held by the Bakweris as pertaining to varied eruptions. Seismologists both from Cameroon and without who have research about the Mountain and specifically the Mount Cameroon eruption pinpoint that Mount Cameroon shakes every second (mildly). A station to check the seismic development of Cameroon is found in Ekona Mbenge. Ikundi holds strongly that the seismic action has contributed significantly to resulting to Mount Cameroon eruptions (than Bakweri traditional beliefs). The Bakweris are quick to resort to beliefs or thoughts whenever an eruption of the Mount Cameroon occurs, but just a

handful of them see the occurrence of an eruption as a natural course [104].

4 Discussion

Taking into consideration impact of eruptions on local population (in Buea, Fako Division and or Cameroon), there is the need for an early warning mechanism either indigenous or scientific. Early warning mechanisms play a pre-emptive role especially towards precautions. The issue has always been the response to early warning mechanisms. It is obvious that when early warning mechanisms are known by indigenous people, not everyone seems to take these early warning mechanisms seriously. That is some people adopt a carefree attitude as response to indigenous early warning mechanisms with regards to the occurrence of eruptions. Early warning mechanisms have been spotlighted to re-orientate the people of Buea subdivision and Fako division to take indigenous early warning mechanisms seriously for their own safety [105].

Early warning mechanisms not doubt signal eruptions, but a probable question which could be asked by anyone is: what are causes of Mount Cameroon eruptions? The answer has remained debatable given the fact that the indigenous populations inclusive the Bakweris have put forward different explanations as to causes of Mount Cameroon eruptions which science disputes or counteracts. It is significant for the denizens of Buea or Fako to adhere to scientific investigations than superstitious beliefs.

5. Conclusion

Generally, anything which cannot be explained is attributed to mystery and superstition even the death of anything on earth [106]. African people still stick to their own traditional World views which largely govern their lives. This would explain the local chiefs' sacrifices to the Mountain God as well as interpretation of the 1999 eruption in terms of prevailing social categories of perceptions [107], such as: beliefs. So, Bakweri (superstitious) beliefs of the anger of *Epasa Moto* and the demise of some traditional rulers as responsible for the Mount Cameroon eruptions lack scientific evidence. The lack of scientific evidence to support their claims could give rise to mythical/mythological interpretations. Such mythical interpretations could give rise to misinterpretations or misconceptions. Mythical beliefs cannot provide sufficient scientific explanation to the disturbances (lava flows, and earthquakes) of the Mount Cameroon. But scientific justification in the like of seismicity should do as established in this paper.

Definitely, the height of the Mount Cameroon of 4095m should be the resultant of seismicity. The Mountain prides itself as the highest peak in West and Central Africa. Given the active nature of the Mount Cameroon volcano there is possibility that as future eruptions are likely to occur, the height will rise to even 4500m in the next century. Simply, this will only

be realistic should there be great magmatic pressure than that which provoked previous eruptions of the mountain. Traditional beliefs of the Bakweris attempt explanation to the growing height of the Mountain as a factor of numerous eruptions. Should it be Mount Cameroon erupts within a biennium or siennium³ or in the nearest future⁴; traditional belief systems may attempt explanation to course/causes whose scientificity maybe questionable or objectionable or mythological or partial.

Bakweri traditional or superstitious beliefs as to causes of Mount Cameroon eruptions which have occurred over the past two centuries evidently are completely at variance with scientific evidence. Per adventure, it may seem cumbersome to strike a balance between scientific evidence(s) and Bakweris superstitious beliefs as to causes of Mount Cameroon eruptions. This is because the Bakweris belief system is somewhat deeply entrenched among some of the diehards of the Bakweri culture. And also, the Bakweri belief system has worn the hearts of some Bakweris whom also think or hold that the last three eruptions for instance, were as a result of the anger of *Epasa Moto* and the death of some traditional rulers.

It is also advisable that whenever the Mountain erupts the indigenes and others settlers should avoid swiftly taking the risk to ascend the Mountain in the name of going to look at the direction of lava flow because, they would not know where they may be any possible lava outburst. Only accredited researchers and those (elders/indigenes) whom have been assigned by their communities are supposed to go up the mountain to do some necessary findings and check direction(s) of lava flow in the course of eruption. Such ventures are usually (very) risky in nature.

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³a period of six years

⁴ I presume the next eruption (after that of 2000) will be catastrophic leading to a lot of psychological and material casualties, such as high rate of fear, panic and insecurity as well as destruction or collapsing of many buildings, perturbing of water quality, destruction of farmlands, and (maybe) some human casualties simply because of a probable intense seismic activity in future and also because the denizens of Buea most especially have been disrespecting building norms. For example: people have built more than two stories of which this is not supposed to be for a town like Buea at the foot of an active volcanic mountain.

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