January 15, 2024

News and notes

Before going on to discuss the geology and geopolitics of Cameroon, here are some news items I thought were interesting.

Research

- Geophysics of planets: A Laboratory Model for Iron Snow in Planetary Cores; Phys.org summary here.
- Plate tectonics: Relation between rheological properties and the stress state in subducting slabs.
- The beginning of plate tectonics: Light oxygen isotopic composition in deep mantle reveals oceanic crust subduction before 3.3 billion years ago.
- Mineralogy and mineral formation: Radiocarbon ages of microcrystalline authigenic carbonate in Lake Neusiedl (Austria) suggest millennial-scale growth of Mg-calcite and protodolomite.
- Sedimentology: Carbonate production and reef building under ferruginous seawater conditions in the Cambrian rift branches of the Avalon Zone, Newfoundland.
- Tectonic setting and basin evolution: Implications of high-grade metamorphism on detrital zircon data sets: A case study from the Fraser Zone, Western Australia.
- Coastal geology: A global analysis of how human infrastructure squeezes sandy coasts; Phys.org summary here.

Paleontology

- Insects in amber: Mesozoic evolution of cicadas and their origins of vocalization and root feeding.
- Basicranial evidence suggests picrodontid mammals are not stem primates; Phys.org summary here.
- Whales: Coexistence of Oligocene toothed and baleen-assisted mysticetes in the northwestern Pacific.
- The last of the oldies: a basal rebbachisaurid (Sauropoda, Diplodocoidea) from the early Late Cretaceous (Cenomanian–Turonian) of Patagonia, Argentina; Sci. News summary here.
- A digital redescription of the Middle Miocene (Langhian) carettochelyid turtle *Allaeochelys libyca*.
- Snake like amphibians: The new problem of *Chinlestegophis* and the origin of caecilians (Amphibia, Gymnophionomorpha) is highly sensitive to old problems of sampling and character construction.

- The oldest teleosts (Teleosteomorpha): their early taxonomic, phenotypic, and ecological diversification during the Triassic.
- Comparative analysis of Hmx expression and the distribution of neuronal somata in the trigeminal ganglion in lamprey and shark: insights into the homology of the trigeminal nerve branches and the evolutionary origin of the vertebrate jaw; Phys.org summary here.
- Flowers in amber: First flower inclusion and fossil evidence of *Cryptocarya* (Laurales, Lauraceae) from Miocene amber of Zhangpu (China).

Mining and Energy

- Nature: First approval for controversial sea-bed mining worries scientists.
- Visual Capitalist: China Dominates the Supply of U.S. Critical Minerals List.
- World's Largest Uranium Miner Will Miss Production Targets.
- Alberta Posts Record Oil-Production.
- Dead Cow Shale: Argentina's Oil Revolution: Vaca Muerta Shale Fuels Economic Hope.
- Dr. Tim Morgan: At the end of the last delusion.
- Oil and geopolitics: How a New Middle East Alliance Could Reshape the Global Energy Landscape; related: China Replaces Western Energy Firms in Iraq's Supergiant Oil Field; and Geopolitical Risks Push Oil Prices Higher.
- Characterization and evaluation of oil shale based on terahertz spectroscopy: A review; Sci Tech Daily summary here.
- Big Spending Cements LNG in Energy Mix for Decades to Come.
- Geoscience BC study reaffirms geothermal potential in Kootenay Lake, BC, Canada.
- UK government sets out plans for 'biggest nuclear power expansion in 70 years.

Environmental Geology and Hydrogeology

- Mercury mining impacts: Assessment of hydrological, geological, and biological parameters of a river basin impacted by old Hg mining in NW Spain.
- Federal judge paves the way for PFAS class action suit against Saint-Gobain.
- Hydrogeology: Saltwater Intrusion Into a Confined Island Aquifer Driven by Erosion, Changing Recharge, Sea-Level Rise, and Coastal Flooding.
- Hemispheric-scale heavy metal pollution from South American and Australian mining and metallurgy during the Common Era; behind a paywall, Phys.org summary here.
- Geophysics, hydrogeology, and geothermal research: Comprehensive data set of in situ hydraulic stimulation experiments for geothermal purposes at the Äspö Hard Rock Laboratory (Sweden).

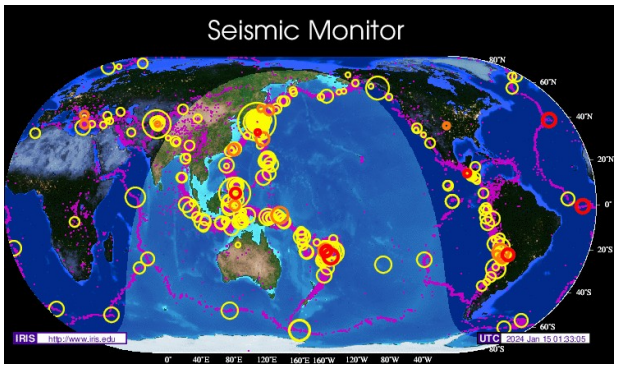
- Geophysics, hydrogeology and permafrost: A new repository of electrical resistivity tomography and ground penetrating radar data from summer 2022 near Ny-Ålesund, Svalbard.

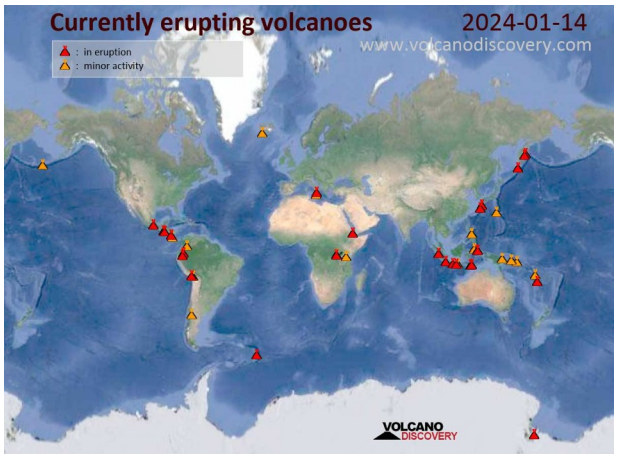
Glaciers and Climate

- Modeling Ice Melt Rates From Seawater Intrusions in the Grounding Zone of Petermann Gletscher, Greenland; Phys.org summary here.

- Last interglacial: Concurrent Asian monsoon strengthening and early modern human dispersal to East Asia during the last interglacial.

Volcanoes, Earthquakes and Geohazards





Seismic Monitor **Active Volcano Map**

- United States Geological Survey (USGS) Volcano Watch: Where is magma stored in Kīlauea?

- USGS Yellowstone Volcano Observatory: Caldera or crater…what's the difference?

- Smithsonian / USGS Weekly Volcanic Activity Report.

- Iceland: BBC News, Iceland volcano erupts near village; Livestream with Shawn Willsey.

- Indonesian Mt. Marapi volcano erupts.

- Seismicity patterns around the Jan 1 earthquake in Japan.

- M6.4 earthquake shakes Afghanistan and neighboring countries; USGS summary here.

- M5.9 earthquake off the coast of Southeast Alaska; USGS summary here.

- Earthquakes and plate tectonics: Methane-hydrogen-rich fluid migration may trigger seismic failure in subduction zones at forearc depths.

- Earthquakes and fracking: Fault roughness controls injection-induced seismicity.

- Geohazards: 'Very dangerous' avalanche warnings issued across Colorado mountains.

January 15, 2024

Geology and the Fate of Societies – Cameroon

Figure 1 – Map of Cameroon
Credit: CIA World Factbook – Cameroon, public domain

The Republic of Cameroon is a country in Central Africa east of the Bight of Biafra of the Gulf of Guinea, a part of the Atlantic Ocean. It has land borders with: Nigeria, to the northwest; Chad, to the northeast; the Central African Republic, to the east; with the Republic of the Congo, Gabon and Equatorial Guinea, to the south. According to the American Central Intelligence Agency's (CIA) World Factbook on Cameroon, the country has a total area of 475,440 square kilometres (km^2) of which 472,710 km^2 is land and 2,730 km^2 is water.

Also according to the CIA World Factbook on Cameroon, 30,135,732 people live in the Republic. Cameroon has a diverse ethnic mix of people. Of the 30.1 million people in Cameroon: 24.3% are Bamileke-Bamu; 21.6% are Beti/Bassa Mbam; 14.6% are Biu-Mandara; 11% are Arab-Choa/Hausa/Kanuri; 9.8% are Adamawa-Ubangi; 7.7% are Grassfields; 3.3% are Kako, Meka/Pygmy; 2.7% are Cotier/Ngoe/Oroko; 0.7% are generic Southwestern Bantu and the remaining 4.5% are foreign or other. While French and English are the official languages, all the different ethnic groups have their own tongues. In terms of religion: 70.7% are Christian (Roman Catholic 38.3%, Protestant 25.5%, other Christian 6.9%); 24.4% are Muslim, 2.2% are animist, and 2.7% are either non-religious or other. The demographic profile, Figure 2 below, of Cameroon shows a young country.

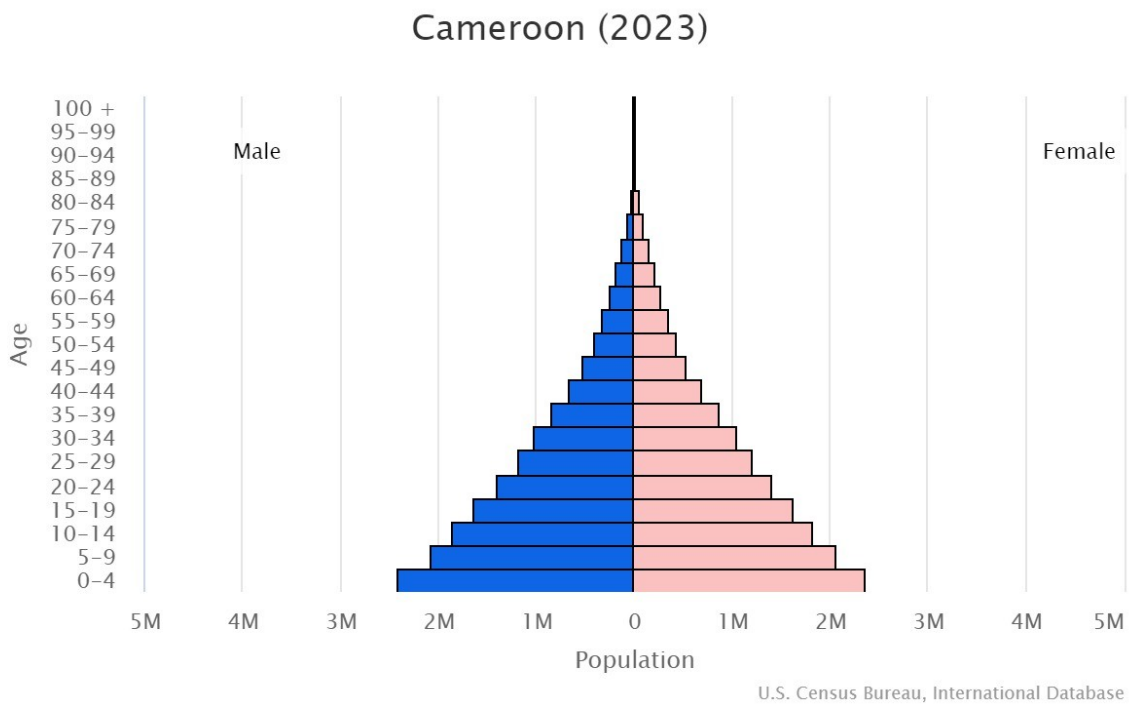


Figure 2 – Demographic Profile of Cameroon
Credit: U.S. Census Data, International Database, Cameroon, public domain

The government of Cameroon is a presidential republic where the head of state is also the head of government. The President, Paul Biya essentially rules as a dictator, although the government structure includes: a Prime Minister, Joseph Ngute; a Senate President, Marcel Niat Njifenji; and a National Assembly President, Cavayé Yéguié Djibril.

The Capital City of Cameroon is Yaoundé, pop. 2,765,600 and the largest city in the country is Douala, pop. 5,768,400.

Geology

Cameroon sits on the African Tectonic Plate. The geology of Cameroon basically consists of Precambrian aged basement rocks overlain, in places, by younger Phanerozoic formations. The basement rocks are, in turn, divided into two Archean to Proterozoic aged Congo Craton and Central African Mobile Zone (also called the Pan African Belt). The basement rocks consist of:

- Gneiss, granite and charnockite in the Congo Craton; and
- Mica schist, migmatite gneiss with plagioclase, and migmatites intruded by quartz veins, granodiorite and diorite in the Central African Mobile Zone.

The overlying Phanerozoic rocks consist of

- Cretaceous to Quaternary aged clay, mudstone, silt, sandstone, and limestone in the Lake Chad Basin, Garoua Basin, and Douala Basin; and

- Cenozoic aged volcanic deposits related to the Cameroon Volcanic Line that includes Mount Cameroon, the highest point in sub-Saharan western and central Africa.

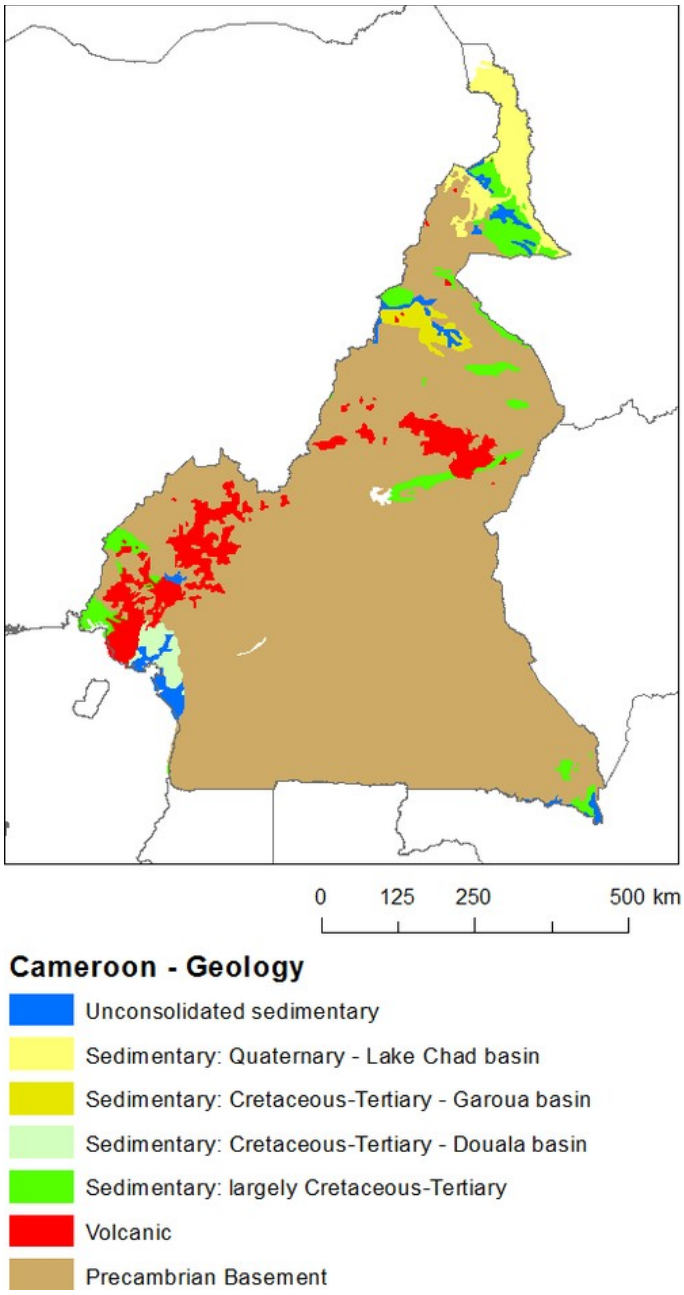


Figure 3 – Cameroon Geology
Credit: Africa Groundwater Atlas, Hydrogeology of Cameroon, public domain

An interesting aspect of the geology of Cameroon is the geohazard posed by two volcanic crater lakes (maar) in the country. In 1984, carbon dioxide gas released by Lake Monoun killed 37 people. Two years later, a similar carbon dioxide release from Lake Nyos killed 1,746 people. In both cases, carbon dioxide from volcanic activity seeped into the lake and remained dissolved in the layer of water at the bottom of the lake. This is an unstable situation over time and eventually a limnic eruption occurred and the carbon dioxide was released, catastrophically.

Resources

Agriculture

Figure 4 – Harvesting Yams on a Farm in Bafia Cameroon
Credit: Bediong, Creative Commons Attribution-Share Alike 4.0 International license

Agriculture employs about 70% of the population and uses about 21% of the land in Cameroon. According to the United Nations Food and Agriculture Organization (FAO), agricultural production in Cameroon in 2018 included:

- 5 million tons of cassava;
- 3.9 million tonnes of plantain;
- 2.6 million tons of palm oil;
- 2.3 million tons of maize;
- 1.9 million tons of taro;
- 1.4 million tons of sorghum;
- 1.2 million tons of banana;
- 1.2 million tons of sugarcane;
- 1 million tons of tomato;
- 674 thousand tonnes of yam;
- 594 thousand tons of peanut;
- 410 thousand tons of sweet potato;
- 402 thousand tons of beans;
- 332 thousand tons of rice;

- 310 thousand tons of pineapple;
- 307 thousand tons of cocoa;
- 302 thousand tons of potato;
- 301 thousand tons of onion;
- 249 thousand tons of cotton;
- 33 thousand tons of coffee; and
- 55 thousand tons of natural rubber.

Livestock production in Cameroon is also important, in 2021, total production of meat in Cameroon was 312,180 tonnes. Livestock raised for food in Cameroon include cattle, especially in the northern and central area of the country, and chickens, often on small holdings run by women. Production of poultry meat in 2021 85,261 tonnes and the production of eggs was 15,619 tonnes.

All farmers and pastoralists are dependent on the weather; this is especially critical in places like Cameroon where subsistence farming and cattle raising is the norm. The United Nations Office for the Coordination of Humanitarian Affairs (OCHA) estimated that 3 million people in Cameroon (about 10% of the population) were acutely affected by food insecurity in 2023.

Forestry

Figure 5 – Cameroonian Rainforest
Credit: The Taxi Photographer, Creative Commons Attribution-Share Alike 4.0 International license

Forest covers about 42% of the land in Cameroon. Most of Cameroon's forest areas have been permanently designated for long-term forest production or conservation, while the rest is intended for traditional community forestry. Traditional, on-going, use of the forests by the local communities

includes wild food, medicines, fuel, and construction material. If this interests you, you can download an interactive atlas of forest use in Cameroon from this site.

Mineral Resources

Figure 6 – Woman Panning for Gold, i.e. Artisanal Gold Production, Cameroon
Credit: LA.Graphy, Creative Commons Attribution-Share Alike 4.0 International license

The mineral industry in Cameroon consists of three main sectors:

- Industrial minerals for the production of cement and building aggregate (3,000,000 tonnes of cement in 2019) and kyanite (200,000 kilograms (kg) in 2019);
- Artisanal production of gold (2,000 kg in 2019) and diamonds (12,000 carats in 2019);
- Petroleum and natural gas production from on-shore and off-shore fields (2,006 million cubic feet of natural gas and 25,996 barrels of crude oil in 2019).

Presently, mineral production is a minor part of the Cameroon economy, but there is great potential for future development. Undeveloped mineral resources include bauxite, cobalt, gold from lode deposits, granite, iron ore, nepheline syenite, nickel, and rutile.

Climate

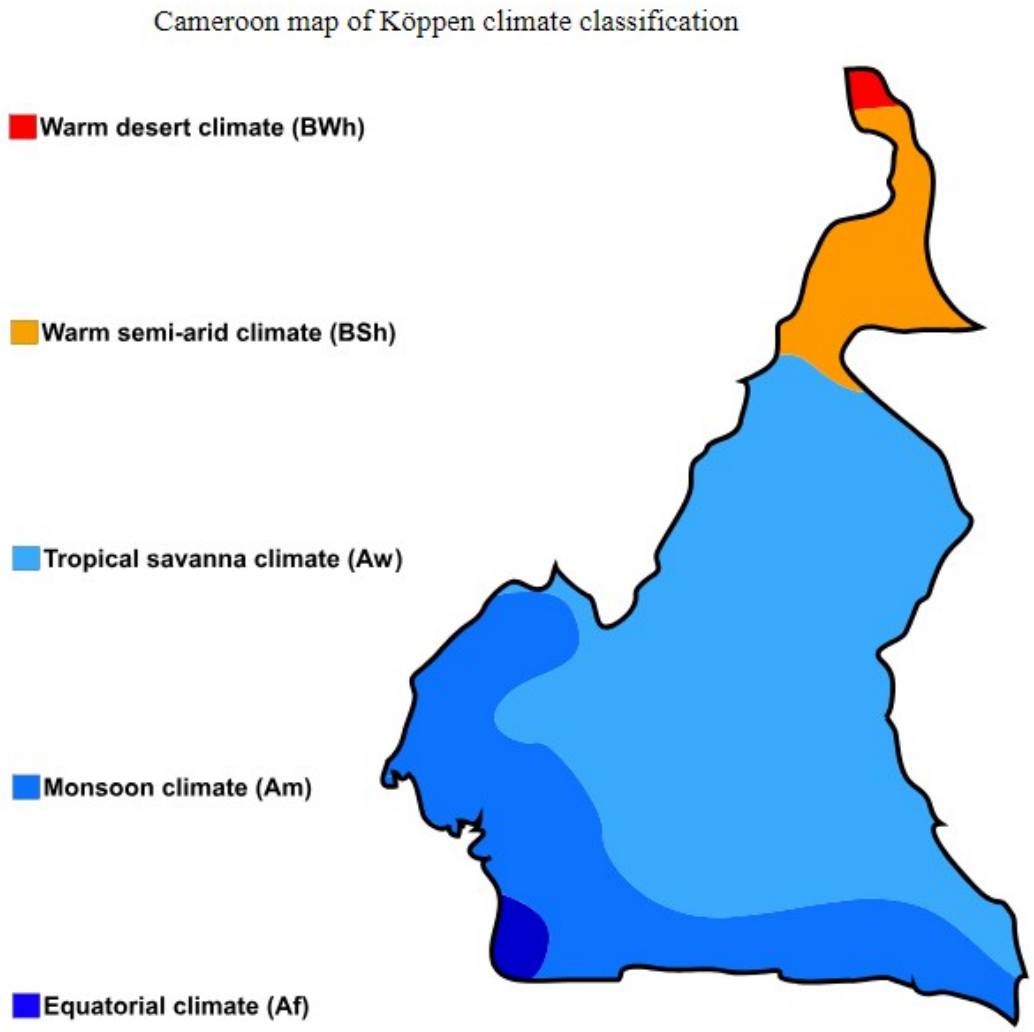


Figure 7 – Köppen Climate Classification of Cameroon
Credit: Ali Zifan, Creative Commons Attribution-Share Alike 4.0 International license

The climate of Cameroon is hot and varies in precipitation from wet in the south to dry in the north. The climate zones shown on Figure 7 are:

- In the south, equatorial climate, Af, also called tropical rainforest climate;
- Going north, tropical monsoon climate, Am;
- Tropical savanna climate, Aw;
- Warm semi-arid climate, BSh; and
- Warm desert climate, BWh.

If you plan to visit Cameroon you might want to visit this site, this site, and this site.

History and Geopolitics

History – Shifting Borders

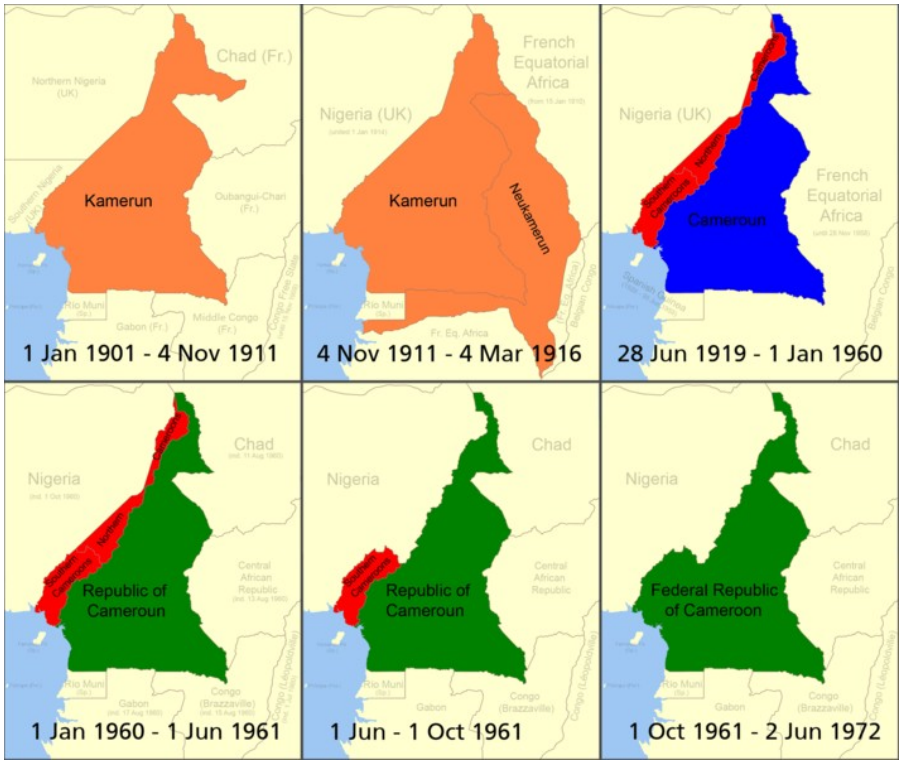


Figure 8 – Cameroon Boundary Changes
Credit: Roke, Creative Commons Attribution-Share Alike 3.0 Unported license

You can divide the history of Cameroon can be divided in to three basic periods: the precolonial period, the colonial period and the modern period.

The Precolonial Period

The precolonial period goes back to the earliest human habitation of the country during the Paleolithic. The earliest discovered archaeological evidence of humans dates from around 30,000 years ago at Shum Laka.

Beginning around 2000 B.C., Bantu speaking peoples from the Mambilla region, on the border between Cameroon and Nigeria, began their expansion into the rest of Sub-Saharan Africa. Many of the languages spoken in Sub-Saharan Africa trace their origin to the Bantu Expansion. One of the consequences of the Bantu Expansion was the displacement of other tribes such as the forest-dwelling Central African Pygmies. The keys to the expansion of the Bantu peoples was an agricultural system that was suitable for the tropical environment and the adoption of iron technology for tools and weapons.

The earliest state level polities in Cameroon were in the northern part of the country. The Sao Civilization flourished from the 6th or 5th century BC to as late as the 16th century AD. The introduction of Islam in North Africa around 709 AD saw the Moslem Kanem-Bornu Empire come into conflict with the Sao. In the early 1800's the Sokoto Caliphate displaced the Kanem-Bornu following the Fulani War. The Sokoto ruled in Cameroon through their vassals, the Adamawa Emirate.

Colonial Period

The first Europeans to arrive in what is now Cameroon were the Portuguese who arrived in the 15th century to trade in various items but especially slaves. It was the Portuguese who gave the country its name, calling the Wouri river, the *Rio dos Camarões*, or River of Shrimp after a prolific shrimp species, ghost shrimp. Around the same time of the arrival of the Portuguese, a state level polity, the Aro Confederacy was expanding into the southern part of Cameroon.

During the late 1800's, seeking their "place in the sun", Germany established a colony in the Cameroon. Following the end of the First World War, Cameroon was divided between France and the United Kingdom. French and British colonial rule lasted until 1960.

Post-colonial Period

The post colonial period was marked by:

- The independence of British and French Cameroon in 1960;
- The union of the former French and British colonies into the current Republic in 1961;
- Civil war from 1961 to 1970;
- The rule of Paul Biya from 1982 to present, as de facto President for Life.

Geopolitics of Cameroon

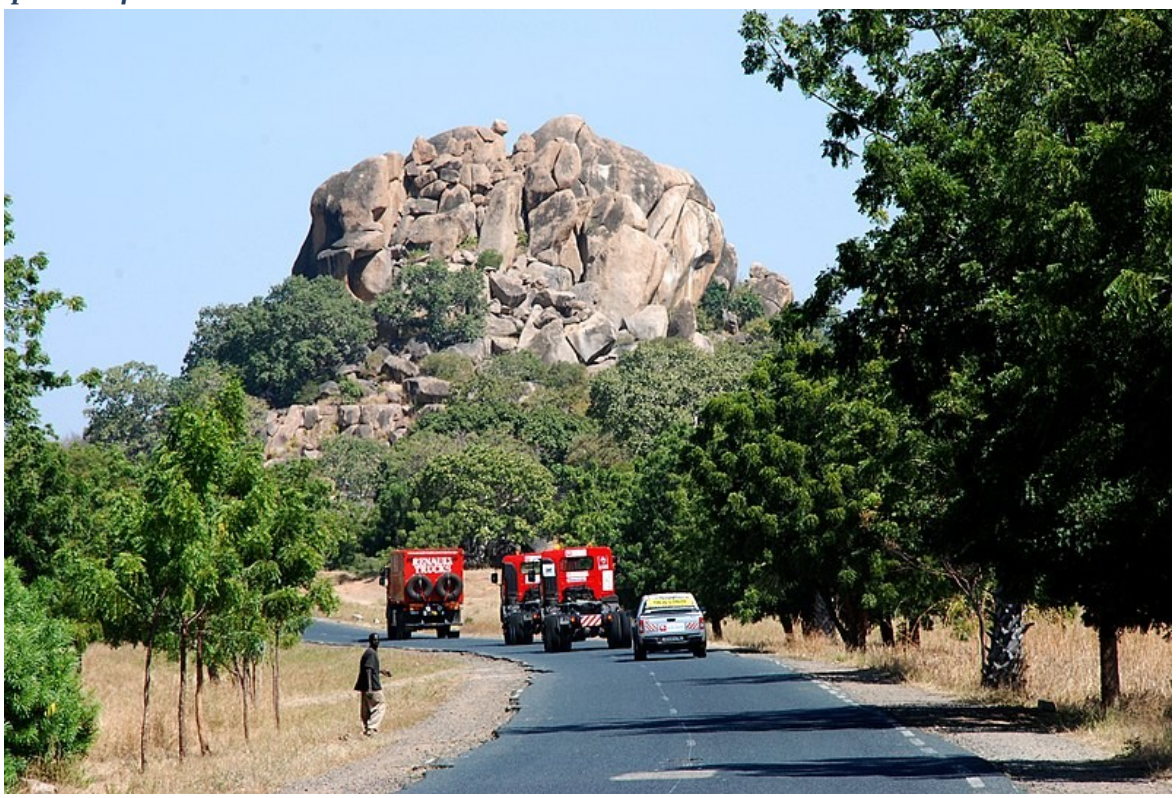


Figure 9 – Road in Northern Cameroon
Credit: Photokadaffi, Creative Commons Attribution-Share Alike 4.0 International license

Internally, Cameroon has a number of difficult problems, including:

- Poverty and food insecurity;
- Government corruption;
- Conflict between the English speaking and French speaking population, the Ambazonia War; and
- Terrorism by Boko Haram in Northern Cameroon.

Any one of these problems would severely task a well off country. For a poor country, like Cameroon, these problems make it difficult to improve people's lives. Assuming, of course, that the powers-that-be in Cameroon want to do so. The only power that counts in Cameroon is the President. Rather than pass judgment on the man, I suggest that you examine his record for yourself and make up you own mind. Although he has been in power for more than 40 years, Paul Biya retains the confidence of most of the Cameroon people.

Externally, Cameroon maintains its closest relations with France. Its just as well, since Cameroon has an unfriendly relationship with Nigeria over the Bakassi Peninsula; this is a dispute that goes back to independence. It doesn't help that the Bakassi region is also the haunt of the aforementioned Boko Harm.

That kind of winds up this short look at Cameroon. It's hard for people in well off countries like my own (Canada) to understand the political realities of poor nations like Cameroon. However, as we have seen so far in our look at the geopolitics of various nations that we started in April 2023, there seems to be a strong relationship between those countries that minimize corruption and respect human rights and the overall happiness of the people in the country. Corruption, as we usually understand it, is a form of malinvestment that diverts capital away from productive use. Living under a regime that respects human rights should be a self-evident requirement for a reasonably happy existence with reasonable security.

Follow the links provided if any of the things in this posting interest you.

Standard Caveat