

December 1, 2024

## News and notes

Before going on to discuss the geology and geopolitics of [Ghana](#), here are some news items I thought were interesting. I am sending this out a day ahead of when I usually post the blog so that I can go to the [Saskatchewan Geological Open House](#) in Saskatoon.

## Free Geology Books

- Free geology books can be downloaded from these sites:
- [OreZone Readers and Experts Telegram Channel](#); the Ore Zone channel also shows employment opportunities for geologists.
- [The Groundwater Project](#).
- [Lithium in Nevada-origins, extent, role in the energy transition, and implications for economic development and national security](#).
- I'll add more sites when I find them.

## Geopolitics

- [Half of Austrians support 'comprehensive remigration'](#); they haven't forgotten the [Siege of Vienna](#).
- [The fading 'pipe dream' of Ukraine's foreign legion](#).
- [Chinese Ship's Crew Suspected of Deliberately Dragging Anchor for 100 Miles to Cut Baltic Cables](#).
- Expert analysis: [Trump is 'not safe' – Putin](#).
- From the Wall Street Journal: [The U.S. and Europe May Be Headed for a Divorce](#).

## Research and News

- [Fluvial-lacustrine interactions in the Marginal Triassic, Clevedon, Bristol Channel Basin, UK: deposition, dolomitization and silicification](#).
- [Effects of mineral mode and textural variation on the seismic anisotropy in lithospheric mantle: an example from Horoman peridotites](#).
- [Diffusion of Sr and Ba in plagioclase: Composition and silica activity dependencies, and application to volcanic rocks](#).
- From the American Association for the Advancement of Science: [A new vision for American science](#).
- [Present-day sedimentary processes on the shelves of inactive volcanic ocean islands: The case study of Porto Santo Island \(Madeira Archipelago\)](#).

- [Kyawthuite: Meet the world's rarest mineral. It was found only once.](#)
- From Nature: [Act now to stop millions of research papers from disappearing.](#)
- Also from Nature: [South China Sea records Late Miocene reorganization of western Pacific deep circulation.](#)
- Bad science: [Company linked to cloned journals of major publishers denies cloning journals of major publishers.](#)
- Geological history: [Late Ordovician ironstone and its relation to ocean redox instability, climate and glaciation.](#)
- [Trace and rare earth element geochemistry of black shales from the Upper Ordovician Utica Shale magnafacies.](#)

## Planetary Geology

- [Did the terrestrial planets of the solar system form by pebble accretion?](#)
- [This Mind-Blowing Vision Is The Biggest Simulation of The Universe Ever.](#)
- [The extent of liquid immiscibility in planetesimal cores.](#)
- [Phase separation of planetary ices explains nondipolar magnetic fields of Uranus and Neptune.](#)

## Plate Tectonics

- Video: [360 Drone Circle Above The Plate Boundaries in Iceland – Volcanic Wasteland.](#)
- [Fine-scale Southern California Moho structure uncovered with distributed acoustic sensing; Phys.org summary \[here\]\(#\).](#)
- [Slab-Plume Interactions Beneath Australia and New Zealand: New Insight From Whole-Mantle Tomography.](#)
- Geochemistry and plate tectonics: [The Pb, Sr and Nd isotopic composition of the upper continental crust: An Australian perspective.](#)
- [Quantifying the loss of continental crust into the mantle from volume/mass balance calculations in modern collisional mountains; Phys.org summary \[here\]\(#\).](#)

## Paleontology

- [Detrital U-Pb ages for the first well-preserved vascular plant \*Cooksonia\* from the UK and Irish macrofossil record.](#)
- [A new species of \*Cretospecium\* \(Hymenoptera: Angarosphecidae\) from the lower Albian Jinju Formation of South Korea.](#)
- [Iron sulfide-catalyzed gaseous CO<sub>2</sub> reduction and prebiotic carbon fixation in terrestrial hot springs; summary in \[The Conversation here\]\(#\).](#)

- [Lauraceous fossil woods from the early Eocene of Laguna del Hunco, Argentine Patagonia.](#)
- More from Argentina: [New chelid turtle with a flattened skull from the Late Cretaceous of Northern Patagonia, Argentina.](#)
- [A new and large monofenestratan reveals the evolutionary transition to the pterodactyloid pterosaurs](#); Smithsonian Magazine summary [here](#).
- [Fossil amphibian offers insights into the interplay between monsoons and amphibian evolution in palaeoequatorial Late Triassic systems](#); Phys.org summary [here](#).

## Mining and Energy

- Ore deposit geology: [Auriferous Fluid Evolution and the Role of Carbonaceous Matter in a Saddle-Reef Gold Deposit: Dufferin Deposit, Meguma Terrane, Nova Scotia, Canada.](#)
- [China finds world's largest gold deposit worth over £63 billion.](#)
- [Amaroq pours first gold at Nalunaq mine in Greenland.](#)
- [Oil Prices Fall Ahead of OPEC+ Meeting.](#)
- [GEOTHERM FORA publishes report on technological trends in geothermal.](#)
- Opinion: [Why Energy Giants Won't Turn Their Backs on Oil.](#)
- Serious legal issues: [Mali arrests four senior employees of Canadian mining company as it presses firms for more taxes.](#)
- Legal issues: [Panama agrees \\$26m payment to settle dispute with US miner.](#)
- More legal issues, extra-judicial killings: [Barrick says Ontario Superior Court dismisses 2022 Tanzanian security case.](#)
- Video: [Trapped for gold: The dangers facing illegal miners in South Africa.](#)
- [Has Congo's cobalt boom caught Europe off guard? Let's ask the child slave labourers.](#)
- [Germany activates the most powerful generator: it's like nuclear power, but it's for another energy.](#)
- Newfoundland: [Calibre strikes high-grade gold near Valentine mine build as production nears.](#)
- [BP CEO: Global Oil Demand Keeps Exceeding Expectations.](#)
- [Northern Ont. First Nation files claim against Ontario and Newmont mining.](#)
- Turning waste heat into usable electricity: [Transverse Thermoelectric Conversion in the Mixed-Dimensional Semimetal WSi<sub>2</sub>](#); SciTechDaily summary [here](#).

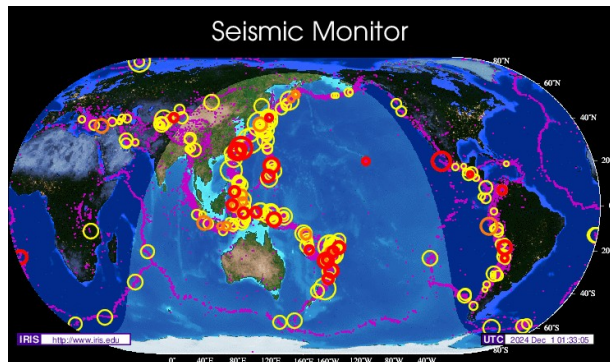
## Environmental Geology and Hydrogeology

- Ignace [Ontario site selected for nuclear waste underground repository.](#)
- [Suspected tailings leak at Wolverine Mine, Yukon gov't says.](#)
- [What's in the groundwater beneath Whitehorse? Research suggests some high levels of uranium.](#)
- Whiskey's for drinking, water's for fighting: [‘It’s not drought – it’s looting’: the Spanish villages where people are forced to buy back their own drinking water.](#)

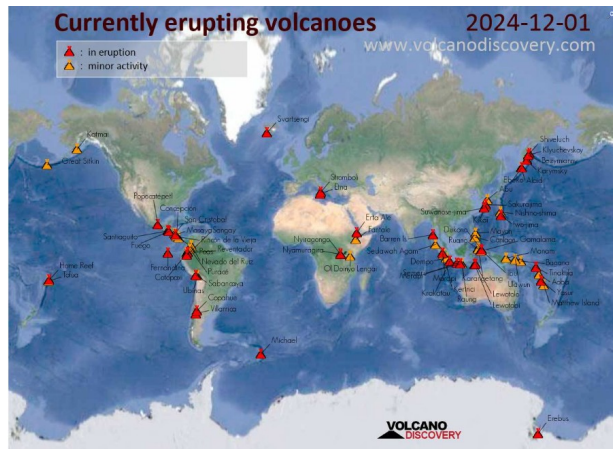
## Glaciers and Climate Change

- [Polar ice sheets are decisive contributors to uncertainty in climate tipping projections;](#) Phys.org summary [here.](#)
- Historic climate change: [Enhanced petrogenic organic carbon oxidation during the Paleocene-Eocene thermal maximum.](#)
- [A Factor Two Difference in 21st-Century Greenland Ice Sheet Surface Mass Balance Projections From Three Regional Climate Models Under a Strong Warming Scenario \(SSP5-8.5\);](#) Phys.org summary [here.](#)

## Volcanoes, Earthquakes and Geohazards



[Seismic Monitor](#)



[Active Volcano Map](#)

## Volcanoes

- United States Geological Survey (USGS) Volcano Watch: [What sounds the \(automated\) alarms at HVO?](#)
- USGS Yellowstone Volcano Observatory: [A tour of Norris Geyser Basin's backcountry thermal areas.](#)
- [Smithsonian / USGS Weekly Volcanic Activity Report.](#)

- [NASA Image Reveals Lava Pouring from Iceland Volcano Eruption.](#)
- Fire and ice: [Magma Chamber Response to Ice Unloading: Applications to Volcanism in the West Antarctic Rift System.](#)

### *Earthquakes*

- [Euro-Mediterranean Seismological Centre \(EMSC\).](#)
- [Earthquakes Monitoring Live Worldwide.](#)
- Earthquake research: [Contribution of aseismic slips to earthquake swarms at the Hakone volcano.](#)
- More research: [The role of fluids in earthquake swarms in northeastern Noto Peninsula, central Japan: insights from source mechanisms.](#)

### *Tsunami and Landslides*

- [Traces of a giant landslide deep in the southern Baltic Sea—researchers investigate a potential tsunami.](#)

### **Upcoming Events**

- The Geological Society: [Hybrid Conferences, December 4, 2024 – September 9, 2025, Climate and Ecology: Off the Rails.](#)
- [The Saskatchewan Geological Open House, December 2 to 4, Delta Bessborough Hotel, Saskatoon;](#) the Bessborough Hotel is the most beautiful building in Saskatoon.
- [December 4, 2024, Thunder Bay, 12:00 – 1:00PM, Lakehead University, "Mineral Exploration in Ontario: Prospecting to Production".](#)
- [Groundwater Week 2024,](#) December 10-12 in Las Vegas, Nevada; related video [here.](#)
- [2024 National Pollution Prevention Training and Conference,](#) U.S. Environmental Protection Agency (USEPA), Washington, D.C., Dec. 10-11.
- European Geosciences Union: [EGU General Assembly 2025, Vienna, Austria & Online 27 April–2 May 2025](#)
- [Sedimentary Geology and the Energy Transition Conference, June 2-5, 2025 – Salt Lake City, UT USA.](#)
- [Copper to the World Conference, Tuesday 26 – Wednesday 27 August 2025,](#) in Adelaide, Australia; report on 2024 conference [here.](#)
- 2024-2025 [Society of Petroleum Engineers Distinguished Lecturer Schedule.](#)
- [List of geoscience events in 2025 from the International Union of Geological Sciences.](#)
- [American Geophysical Union List of Upcoming Meetings.](#)

December 1, 2024

## Geology and the Fate of Societies – Ghana



**Figure 1a – Ghana**

**Credit:** [CIA World Factbook](#), public domain



**Figure 1b – Location**

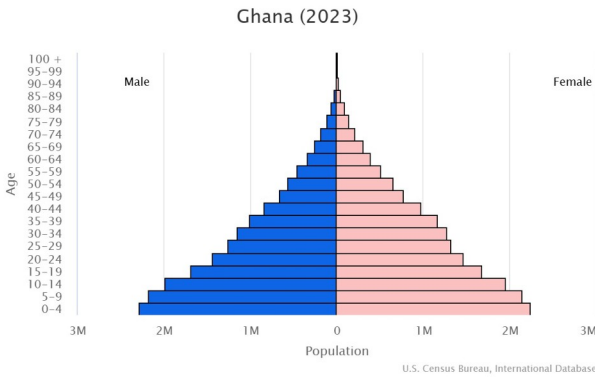
**Credit:** [CIA World Factbook](#), public domain

The [Republic of Ghana](#) is located in [West Africa](#) north of the [Gulf of Guinea](#), part of the [Atlantic Ocean](#). Ghana's land boundaries are: to the west is the [Côte d'Ivoire](#); to the north is [Burkina Faso](#); and to the east is [Togo](#). Ghana is a [unitary presidential republic](#); the President is [Nana Akufo-Addo](#); and the Vice President is [Mahamudu Bawumia](#). The legislature is called [Parliament](#), the Speaker of which is [Alban Bagbin](#). The Capital and largest city in Ghana is [Accra](#) (pop. 284,124).

According to the [Central Intelligence Agency's](#) (CIA) [World Factbook on Ghana](#), the total area of the country is 238,533 square kilometres (km<sup>2</sup>) of which 227,533 km<sup>2</sup> is land and 11,000 km<sup>2</sup> is water. Also according to the World Factbook, there are 34,589,092 Ghanaians, 59.2% of whom live in urban areas. Of the approximately 34.6 million people in Ghana: 45.7% are ethnic [Akan](#); 18.5% are [Mole-Dagbani](#); 12.8% are [Ewe](#); 7.1% are [Ga-Dangme](#); 6.4% are [Gurma](#); 3.2% are [Guan](#); 2.7% are [Grusi](#); 2% are [Mande](#); 1.6% are some other ethnicity. Although English is the official language, the languages of the different ethnic groups are also widely used.

[Christianity](#) is the major religion in Ghana, followed by 71.3% of the population, according to the CIA World Factbook. Major denominations of the Christian religion in Ghana include: [Pentecostal/Charismatic](#) churches (31.6%), various other [Protestant](#) churches (17.4%), [Catholics](#) (10%), and other Christian churches (12.3%). About 19.9% Ghanaians are Muslim; 5.6% follow some other faith or have no religion; and 3.2% practice [traditional African religions](#). In terms of education, the World Factbook indicates that 79% of people aged 15 and over can read and write and that Ghanaians can

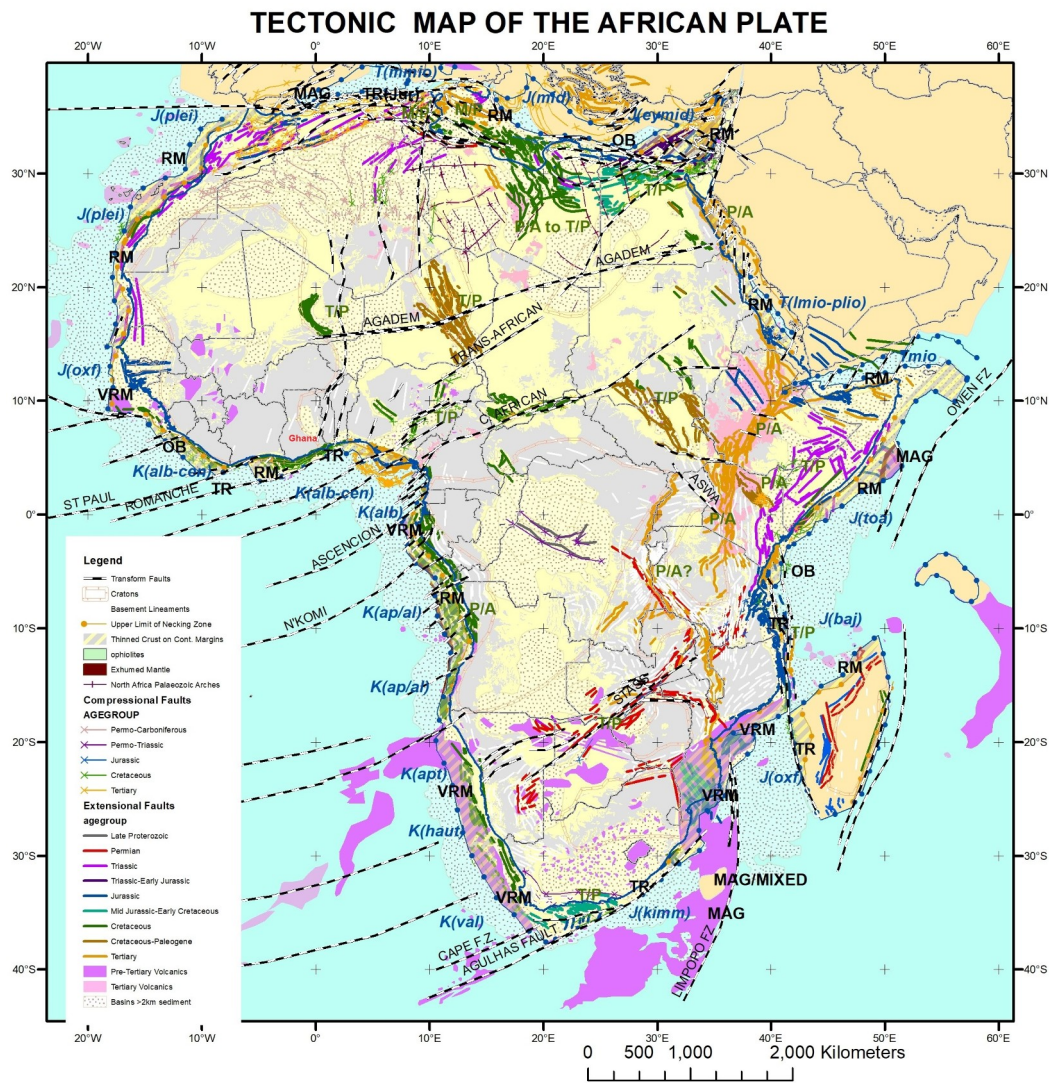
expect to spend 12 years in school. Economically, the per capita [GDP](#) is \$6,905; the [Gini](#) coefficient is 44, indicating medium inequality; and the [Human Development Index](#) is medium at 0.602.



The demographic profile of Ghana shows a young population, the median age is 21.4 and 56% of the population is under the age of 25. The total fertility rate is 3.61 births per woman resulting in an annual growth rate of 2.19%. Life expectancy at birth, for both sexes, is 69.7 years.

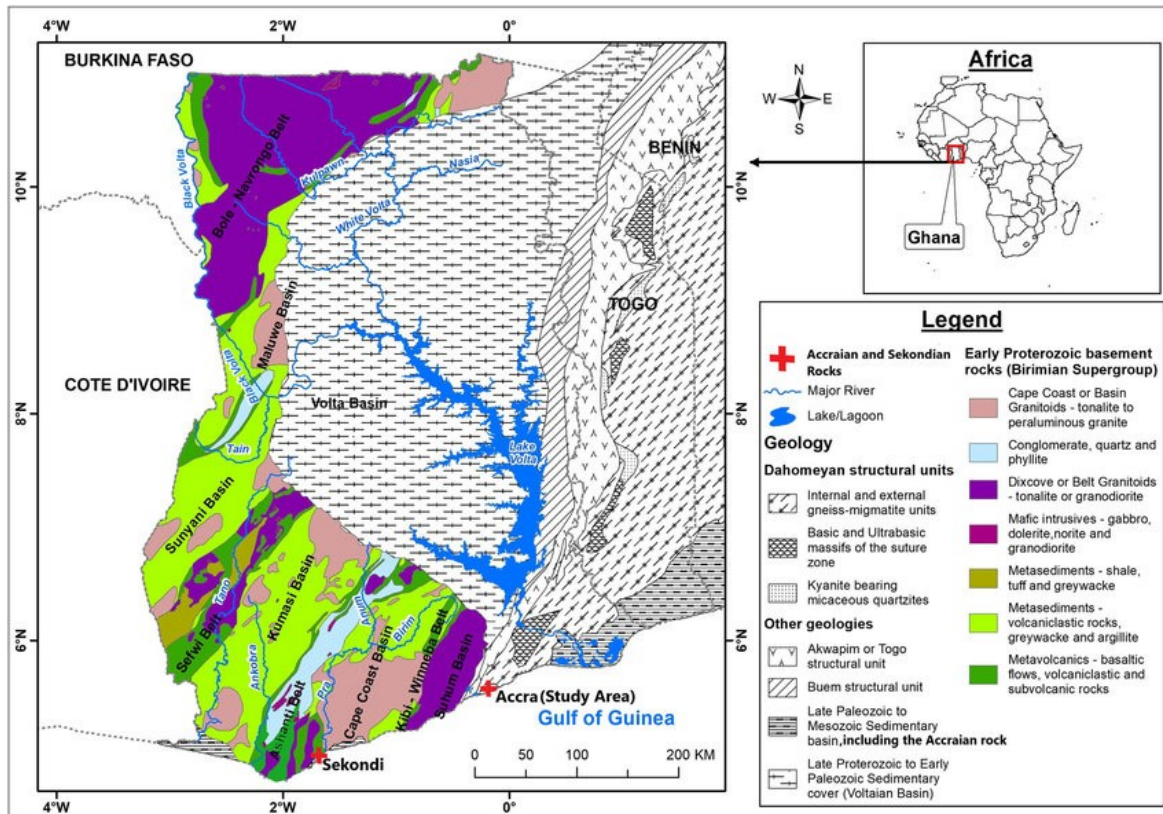
**Figure 2 – Demographic Profile of Ghana**  
 Credit: [U.S. Census Bureau, International Database](#); public domain

## Geology



**Figure 3 – Tectonic Map of the African Plate**  
 Credit: [Dr. Duncan Macgregor](#), ©Africa Geological Atlas Project, Free use for Non-Commercial Purposes

Tectonically, Ghana sits on the [African Plate](#), as shown on Figure 3, compiled by [Dr. Duncan Macgregor](#) in the [The Africa Geological Atlas Project](#). South of Ghana is a [Jurassic](#) aged [extensional fault](#), south of which are numerous [Cretaceous](#) aged [compressional faults](#). Along the east side of Ghana runs north-south [transform related passive rift](#) related to the breakup of [Pangaea](#).



**Figure 4 – Geological Map of Ghana**  
 Credit: Figure 2 in [Mahu & Anani, 2019](#)

Starting with the most recent deposits, we can summarize the [geology of Ghana](#) as follows:

- [Quaternary](#) aged [alluvial](#) deposits along river valleys of the [Tano Basin](#);
- [Sand](#), [gravel](#), [siltstone](#), [shale](#) and [clays](#) with layers of [fossiliferous limestone](#) of the [Keta Basin Series](#) ranging in age from [Mesozoic](#) to [Cenozoic](#), found in the extreme southeast of Ghana;
- [Pliocene](#) to [Holocene](#) aged interbedded soft pebbly [grits](#), [conglomerate](#), [micaceous sandstone](#), [arkose](#), shales and clays of the [Amissian Formation](#);
- [Cretaceous](#) to [Eocene](#) aged marine sedimentary sandstones, clays and occasionally fossiliferous limestones of the [Apollonian Formation](#), found in the extreme southwest of Ghana;
- [Devonian](#) to Cretaceous aged sandstones and shales with conglomerates, pebble beds, grits and mudstones of the [Sekondian Series](#), this series rests on a major [unconformity](#) overlying a [Precambrian](#) complex of [granites](#), [gneisses](#) and [schists](#), at least six formations are recognized in this series;

- Devonian aged alternating shales and thin-bedded micaceous sandstone, overlain by massive [cross-bedded](#) sandstone, and a thick sequence of sometimes fossiliferous shale and [mudstone](#) of the [Accraian Series](#);
- [Upper Ordovician](#) to [Upper Carboniferous](#) aged massive, coarse-grained, [feldspathic](#) sandstones and thin-bedded [quartzitic](#) sandstones with siltstones and mudstones of the gently folded Upper [Voltaian Obosum Group](#);
- [Neoproterozoic \(Lower Ediacaran\)](#) to [Lower Ordovician](#) aged basal sandstone including shales and [tillite-dolomite](#) limestone of the gently folded Middle Voltaian [Oti-Penjari Group](#);
- [Mesoproterozoic](#) to Neoproterozoic aged mudstone, claystone and siltstone interbedded with sandstone and conglomerate of the gently folded Lower Voltaian [Bombouaka-Kwahu Group](#);
- A [Proterozoic](#) aged [orogenic belt](#) consisting of: mafic gneiss, [quartzite](#) and mica schist of the [Dahomeyan Formation](#); metamorphosed and folded sedimentary strata, including [phyllite](#), quartzite and schist of the [Togo Formation](#); together with the sandstone, shale and volcanic rocks of the [Buem Formation](#);
- At the bottom is a [Paleoproterozoic basement](#) consisting of metamorphosed sedimentary rocks (schist, quartzite, slate and phyllite) alternating with five parallel, generally evenly-spaced volcanic belts ([greenstone](#) belts) of the well fractured and [isoclinally folded Birimian Supergroup](#).

## Resources

### *Agriculture*



Figure 5 – Vegetable Farm in Northern Ghana

Credit: Ibn Shiraz, [Creative Commons Attribution-Share Alike 4.0 International](#) license

According to the CIA World Factbook on Ghana, 69.1% of the land in the country is agricultural (20.7% [arable land](#), 11.9% [permanent crops](#), 36.5% permanent [pasture](#)). Of the remainder, 21.2% is forest and 9.7% has other use.

Major crops in Ghana include [cassava](#), [yam](#), [plantain](#), [palm oil](#), [maize](#), [taro](#), [cocoa](#), [rice](#), [oranges](#), [pineapples](#), [peanuts](#), [sweet potato](#), [natural rubber](#), and [tobacco](#). Livestock raised in Ghana include [cattle](#), [sheep](#), [goats](#), [pigs](#), and [chickens](#). The presence of the [Tsetse fly](#) is a major drain on livestock production. Production statistics from the [Food and Agricultural Organization](#) (FAO) for agricultural production in Ghana can be found [here](#).

The FAO also indicates that [42.4% \(!!!\) of the population experienced moderate to severe food insecurity](#) 2022-23. Information on current agricultural conditions in Ghana can be found [here](#).

### *Forestry*



**Figure 6 – A Natural Forest Reserve in Northern Ghana**

**Credit:** Sheihu Salawatia, [Creative Commons Attribution-Share Alike 4.0 International](#) license

Forests cover 21.2% of the land area of Ghana and the forestry harvest is major economic activity including 2,214,000 m<sup>3</sup> of industrial roundwood and 50,166,000 m<sup>3</sup> of wood fuel. Perhaps the harvest is too successful, since [deforestation has become a major problem](#). Over [300 hardwood trees](#) species grow into timber size across the tropical forest in Ghana; the major species harvested include [mahogany](#), [wawa](#), [sapele](#), and [iroko](#).

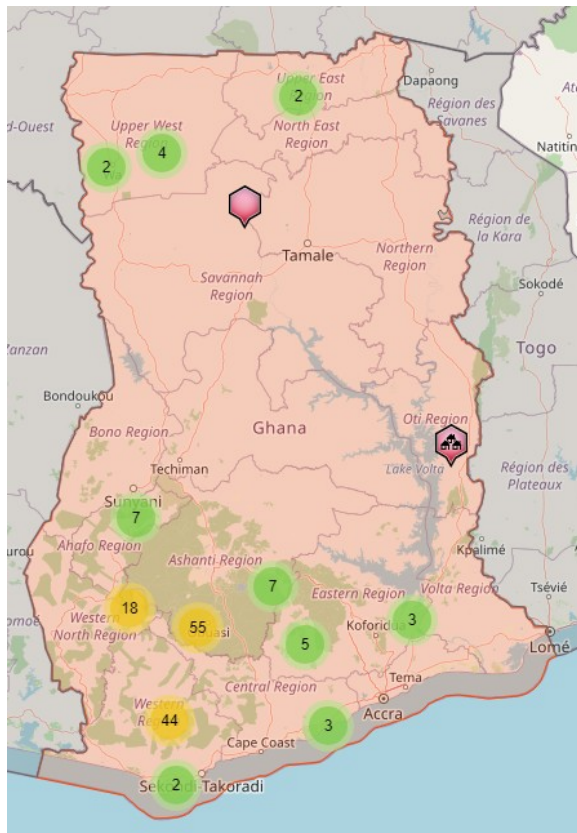
Statistics on forestry production in Ghana from the FAO can be found [here](#).

## Mineral Resources



Figure 7 – [Damang Gold Mine, Ghana](#)

Credit: [Enock4seth, Creative Commons Attribution-Share Alike 4.0 International license](#)



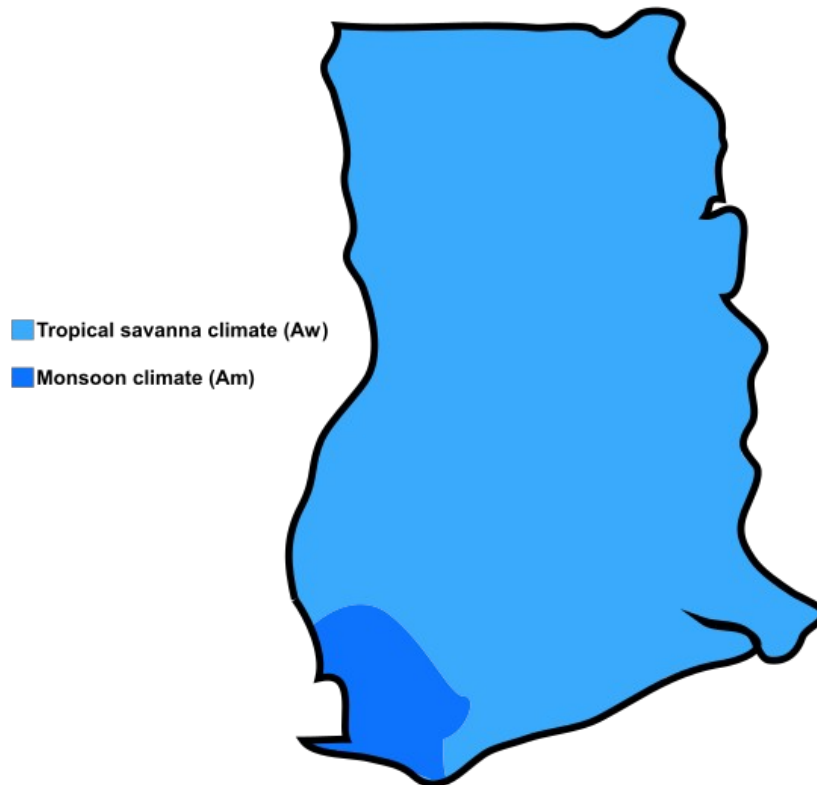
The [mineral industry in Ghana](#) produces metallic minerals, industrial minerals and energy minerals. Metallic minerals include gold, aluminum (from [bauxite](#)), lead and manganese. Industrial minerals include salt, diamonds and cement; and the energy minerals produced include petroleum and natural gas.

Statistics on mineral production in Ghana from the USGS can be found [here](#). The various mines and oil/gas production sites are also listed on Table 2 of this [USGS publication](#). Figure 8, from [Mindat.org](#), links to an interactive map of mineral occurrences in Ghana.

Figure 8 – [Interactive Mineral Occurrences Map of Ghana](#), Credit: [©Mindat.org](#)

## Climate

Ghana map of Köppen climate classification



**Figure 9 – Map of Köppen Climate Classification, Ghana**

**Credit: [Ali Zifan](#), [Creative Commons Attribution-Share Alike 4.0 International](#) license**

The CIA World Factbook describes the climate in Ghana as “tropical; warm and comparatively dry along southeast coast; hot and humid in southwest; hot and dry in north”. As shown on figure 9, there are two main climate zones: monsoon climate ([Am](#)), in the southwest; and tropical savanna climate ([Aw](#)), in the rest of the country.

As winter approaches the northern hemisphere, warm tropical destinations are very inviting; the official [tourism website](#) for Ghana certainly makes it look so. However, the travel advisories for Ghana ([here](#) and [here](#)) make it clear that travel to Ghana is not for the fainthearted. Violent crime, petty crime, and fraud appear to be the main concerns, but there are also the risks from inter-ethnic violence in some areas. Political terrorism and offshore piracy also seem to be threats.

Health-wise, there are lots of communicable diseases in the country such as [Hepatitis A & B](#), [Yellow Fever](#), [Measles](#), [Influenza](#), [Meningococcal Disease](#), [Malaria](#), [Rabies](#), Tuberculosis and [Polio](#). If you like to live on the wild side of life, be aware that [HIV/Aids](#) and other [sexually transmitted diseases](#) are common in the country. So if you go, take precautions.

If you still want to go to Ghana, check out [Climates to Travel](#) and [Lonely Planet](#).

## History and Geopolitics

### The Gold Coast



Figure 10 – Asante Empire in the 19th century  
[Credit, public domain](#)

We can divide the [history of Ghana](#) into seven broad categories:

1. [Early history \(pre-1902\)](#);
2. [British rule \(1821–1957\)](#);
3. [Dominion \(1957–1960\)](#);
4. [First Republic \(1960–1966\)](#);
5. [Second Republic \(1966–1979\)](#);
6. [Third Republic \(1979–1993\)](#); and
7. [Fourth Republic \(1993–present\)](#).

If you like going into the details of Ghanaian history, check out the links provided. Of special interest is the pre-colonial, or early history, of the country, since it set the cultural tone for much of what followed after Ghana received independence in 1957. The various kingdoms ruled over a multi-ethnic mixture of many tribes, each with its own headman that the titular king had to work through. Gold was one of the main trade items with the outside world, as were other resources such as tropical hardwoods, elephant ivory, and human beings captured and sold into the [slave trade](#). The rulers benefited most from the trade, receiving manufactured goods such as guns as well as [salt](#) they got from trade with the Moslem kingdoms of the north. The arrival of the [British in 1821](#) suppressed the slave trade, [after 1833](#). Otherwise the British simply continued the existing trade and political arrangements, ruling the country through the local elites and skimming off their piece of the action.

With independence, local elites replaced their former colonial masters and much of the political churn has been to see who gets a piece of the action. This political churn included tax revolts, military coup d'état, one-party rule, and since 1993, a more orderly democratic churn.

### *Geopolitics – In a Corner of West Africa*



**Figure 11 – Parliament House (State House), the Parliament of Ghana**  
**Credit: [Wgsohne](#), [Creative Commons Attribution-Share Alike 3.0 Unported](#) license**

Internally, Ghana's biggest challenges are further development of their people, i.e. raising that Human Development Index, reducing corruption to levels that do little overall harm, and reducing the crime that makes life difficult for people who are already struggling. The [crime issue](#) is the most obvious, development is difficult or even impossible unless people have simple security.

With regards to the [malinvestment](#) represented by political corruption, [Transparency International](#) puts Ghana in the middle ranks, at 70<sup>th</sup> out of 180 countries on the list. This means that while it is not a perfect situation, there are many countries that are far worse off. The ample resource revenues from gold and other mineral production are tempting targets for ambitious politicians seeking to enrich themselves, so getting rid of corruption is a difficult task.

[Managed wisely](#), however, natural resource revenues are an opportunity to invest in the people of Ghana through education and infrastructure development. Such improvements should include reducing or eliminating the use of [child labour in mineral and agricultural production](#), especially in [artisanal gold extraction](#) and [cocoa production](#). Ghana would have a better future if their children were in school rather than the work place.

Ghana's relations with its neighbours are generally peaceful but tense since problems in those countries may spill over into Ghana. [Ghana and the Côte d'Ivoire](#) had a longstanding dispute over their maritime boundary – of course oil resources were involved. The dispute was resolved peacefully through the [International Tribunal for the Law of the Sea in 2017](#).

Ghana's [relations with Burkina Faso](#) were peaceful until 2022 when [Ghana accused the Burkina Faso government of hiring mercenaries](#) from the Russian [Wagner Group](#), potentially destabilizing the region. More recently, the two countries have resolved a [boundary dispute](#) adjacent the Upper East Region Ghana. One worrying issue for Ghana is the [rising violence in Burkina Faso](#) and possible spill over into Ghana.

[Ghana's relations with Togo](#) are also affected by the rise in violence. [Recently a terrorist gang based in Burkina Faso attacked people in a town in Togo](#) – this must worry the Ghanaians. In other issues, [Ghana and Togo have settled their recent border dispute](#). To complicate matters, there are people in eastern Ghana, mostly of the Ewe tribe, who would rather be part of Togo where a lot of Ewe people also live. They call the eastern part of Ghana [Western Togoland](#). This secessionist movement could be a source of future trouble.

Outside its immediate neighbours, one issue that must concern Ghana's leadership has been the rise of [Jihadi terrorism in Chad, Libya, Sudan, the Central African Republic, Cameroon, Nigeria and Niger](#). [This concern](#) was a factor in the recent Ghanaian elections. They wonder if [Ghana is the next target?](#) [Nigeria](#) is an important player, since they have the [potential to be a regional power](#) and may tempted to flex their muscles in order to deal with the disorder in their neighbourhood.

Further afield are [Ghana's relations with the United States](#) and [with China](#). With regards to the United States, [Vice President Harris of the United States visited Ghana](#) in May 2024. The the two countries have [common interests and concerns](#), mostly with regards to trade and diplomatic efforts to maintain peace. [China has similar interests in Ghana](#), especially with regards to trade. Ghana may find opportunity in the Great Power rivalry between China and the United States to get good deals for trade. Ghana may also need help from the Great Powers if the security situation in Africa becomes more difficult.

That kind of wraps up this quick look at Ghana. I am optimistic for the country, they have great potential if they can focus on developing their people and infrastructure instead of frittering away their wealth in the malinvestment represented by corruption. Follow the links for further information.

## **Standard Caveat**

### **[J. Robert Oppenheimer on freedom and scientific inquiry](#)**

The purpose of my weblog postings is to spark people's curiosity in geology. Don't entirely believe me until you've done your own research and checked the evidence. If I have sparked your curiosity in the subject of this posting, follow up with some of the links provided here. If you want to, go out into the field and examine some rocks on your own with the help of a good field guide. Follow the evidence and make up your own mind.

In science, the only authority is the evidence.