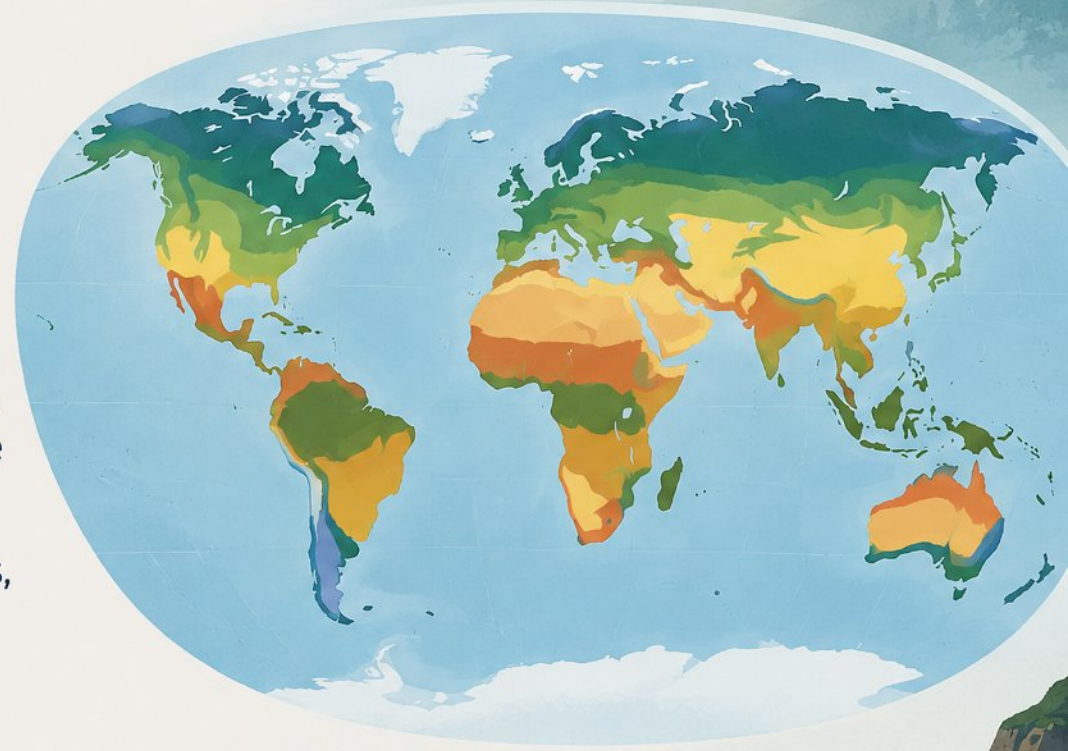
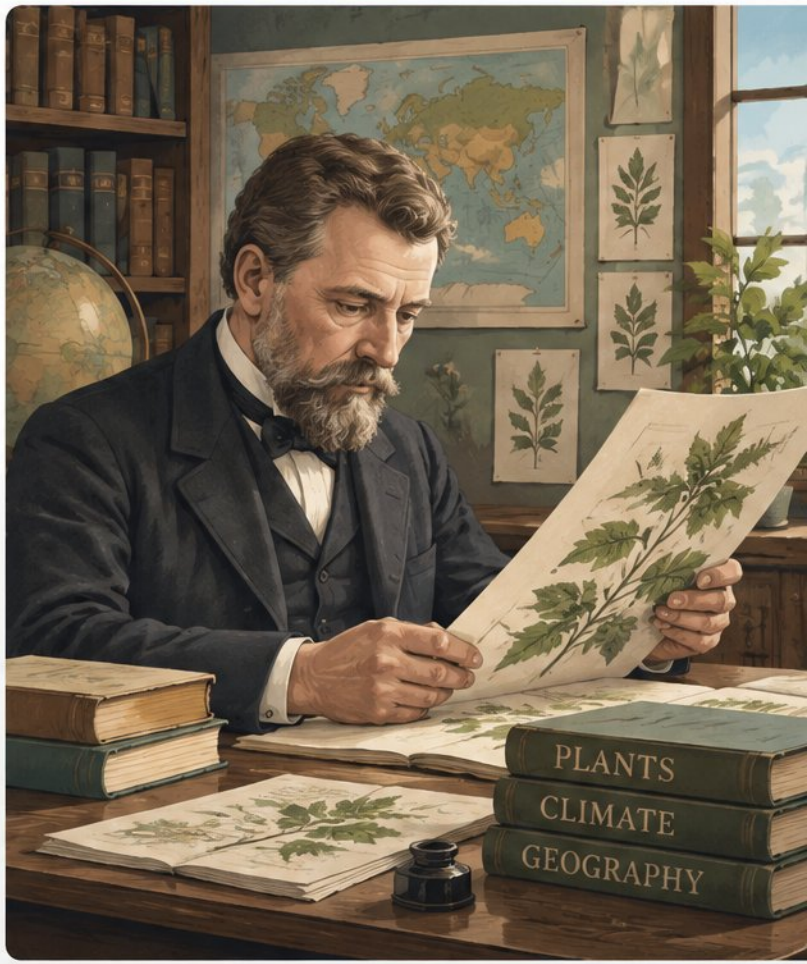
Climate Zones of the World: The Köppen Classification

- Read, compare, and map world climates using the Köppen–Geiger classification
- Shared climate names enable regional comparison and natural-history observation
- Roadmap: origins, letter code, groups A–E, highland H, maps, teaching, climate change
- For geography learners, students, teachers, and natural history educators
- No prior meteorology required — all levels welcome



Background: Why Classify Climates, and What Köppen Built

- Climate = recurring average weather over ~30 years, not daily weather
- Wladimir Köppen (1846–1940), botanist-climatologist, tied climate boundaries to vegetation
- Timeline: 1884 first version, 1900 attempt, 1918 full version, 1936 final
- Rudolf Geiger added precipitation and temperature letters (1954, 1961): Köppen–Geiger
- Strengths: simple, global, map-friendly; limits: fixed empirical thresholds, coarse groups
- Misconceptions to address: climate vs. weather, permanent zone lines, alternatives like Thornthwaite





How the Letter Code Works: Three Positions, One Climate Formula

C s a

Different places.
A shared climate language.

First letter = main group

- **A** tropical
- **B** arid
- **C** temperate
- **D** continental
- **E** polar

Second letter = seasonal precipitation

- **f** wet year-round
- **s** dry summer
- **w** dry winter
- **m** monsoon

Third letter = temperature

- **a** hot summer
- **b** warm summer
- **c** cool summer
- **d** very cold winter

Special cases

- For B: W desert vs. S steppe; h hot vs. k cold.
- For E: T tundra vs. F ice cap.

Evaluation order

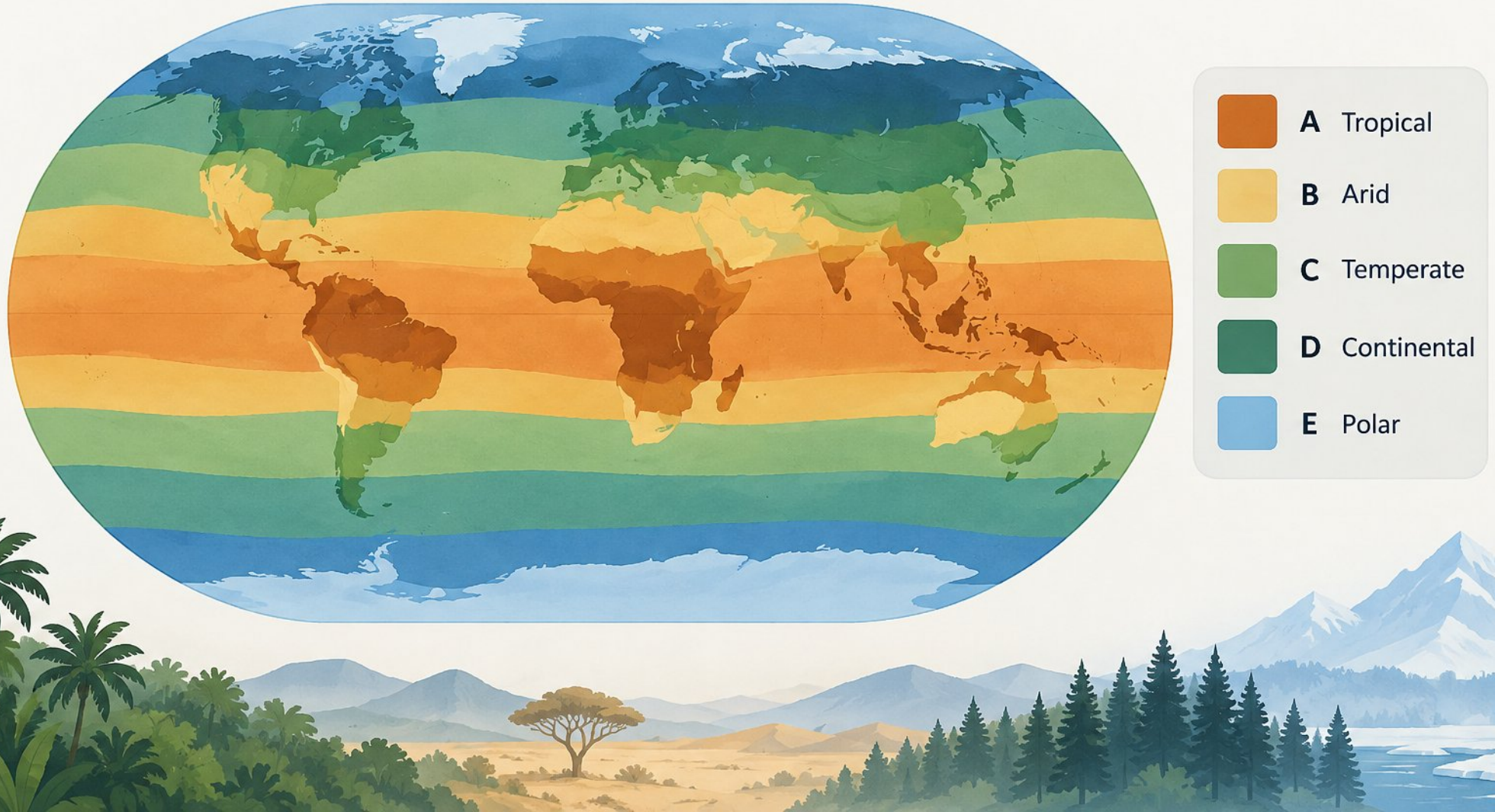
- Test E first, then B, then A/C/D — a place cannot be both polar and dry.

Worked examples

- Af rainforest
- BWh hot desert
- Csa Mediterranean
- Dfb continental
- EF ice cap

The Five Main Groups at a Glance: Thresholds and World Distribution

- A tropical (all months ≥18 °C), B arid (below aridity threshold), C temperate, D continental, E polar
- A: every month ≥18 °C; B: too dry for forests; C: coldest month −3 to 18 °C
- D: coldest month ≤−3 °C; E: warmest month ≤10 °C
- Latitude pattern: tropical near equator, dry 20°–35°, temperate mid-latitudes, continental interiors, polar
- Vegetation signature: rainforest, savanna, steppe, desert, broadleaf forest, boreal forest, tundra, ice



Tropical Climates (Group A):
Rainforest, Monsoon, Savanna



Af rainforest



Am monsoon

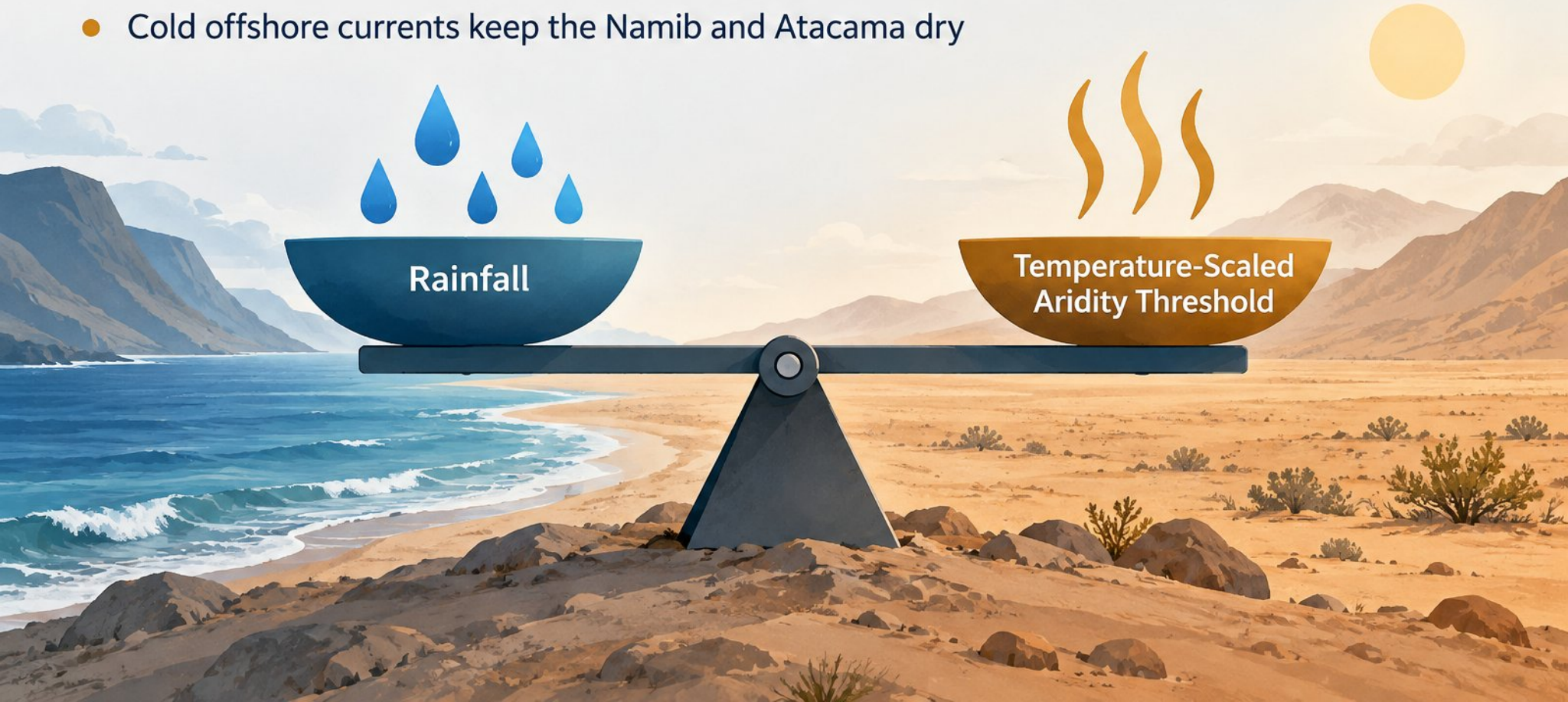


Aw/As savanna

- **Defining rule:** every month averages ≥18 °C
- **Af rainforest:** driest month ≥60 mm — Amazon, Congo, Indonesia
- **Am monsoon:** heavy wet season, short dry season
- **Aw/As savanna:** pronounced dry winter (Aw) or dry summer (As)
- **Teaching hook:** seasonality, not total heat, separates A subtypes

Dry Climates (Group B):
Why Aridity Is a Balance, Not a Number

- Aridity is a moisture balance, not a rainfall number
- Threshold ≈ 20 × mean annual temperature + 280, 140, or 0 (summer-rain share)
- Below half the threshold = BW desert; half to threshold = BS steppe
- Third letter: h hot (mean annual ≥18 °C) vs. k cold
- Examples: BWh Sahara; BWk Gobi and Patagonia; BSh Sahel; BSk US High Plains
- Cold offshore currents keep the Namib and Atacama dry



Temperate and Continental Climates (Groups C and D)

- C: coldest month −3 to 18 °C, at least one month above 10 °C
- D: at least one month at or below −3 °C, warmest month above 10 °C
- Second letter: s dry summer, w dry winter, f no dry season
- Third letter: a hot summer, b warm, c cool, d very cold winter (below −38 °C)
- Examples: Csa Mediterranean, Cfa SE United States, Cfb British Isles, Dfb US Midwest, Dfc Siberia, Dfd eastern Siberia



C D



Mediterranean coast



Temperate forest



Boreal interior

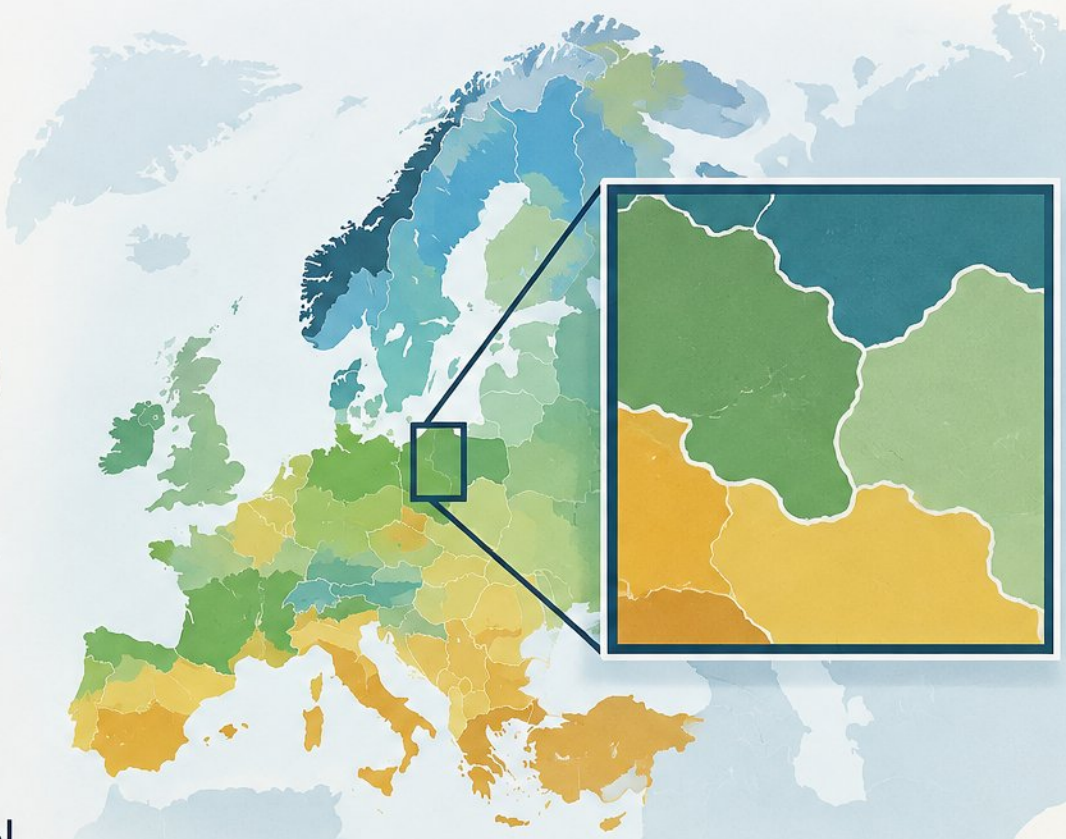
Polar and Highland Climates (Groups E and H)

- **E:** warmest month ≤10 °C — too cold for tree growth
- **ET tundra:** warmest month 0–10 °C;
  EF ice cap: every month below 0 °C
- **Examples:** Arctic coastlines (ET); interior Greenland and Antarctica (EF)
- **Highland H:** lapse rate ~6.5 °C per 1,000 m stacks climate belts; added by Trewartha
- **Map caution:** some maps label land above ~1,000 m as H; modern maps resolve it



Reading and Interpreting Köppen Maps

- Maps show long-term climate averages, not landscape photos
- Beck et al. (2023): ~1 km (0.01°); coarser 0.1°, 0.5°, 1° versions
- Older maps like Kottek et al. (2006) sit at 0.5° resolution
- Updated datasets shift boundaries: EFSA (2026) shows European class changes
- Boundaries are thresholds — small temperature changes can flip a pixel
- Guided exercise: assign a code from station data and justify each letter



Using Climographs to Verify a Location's Code

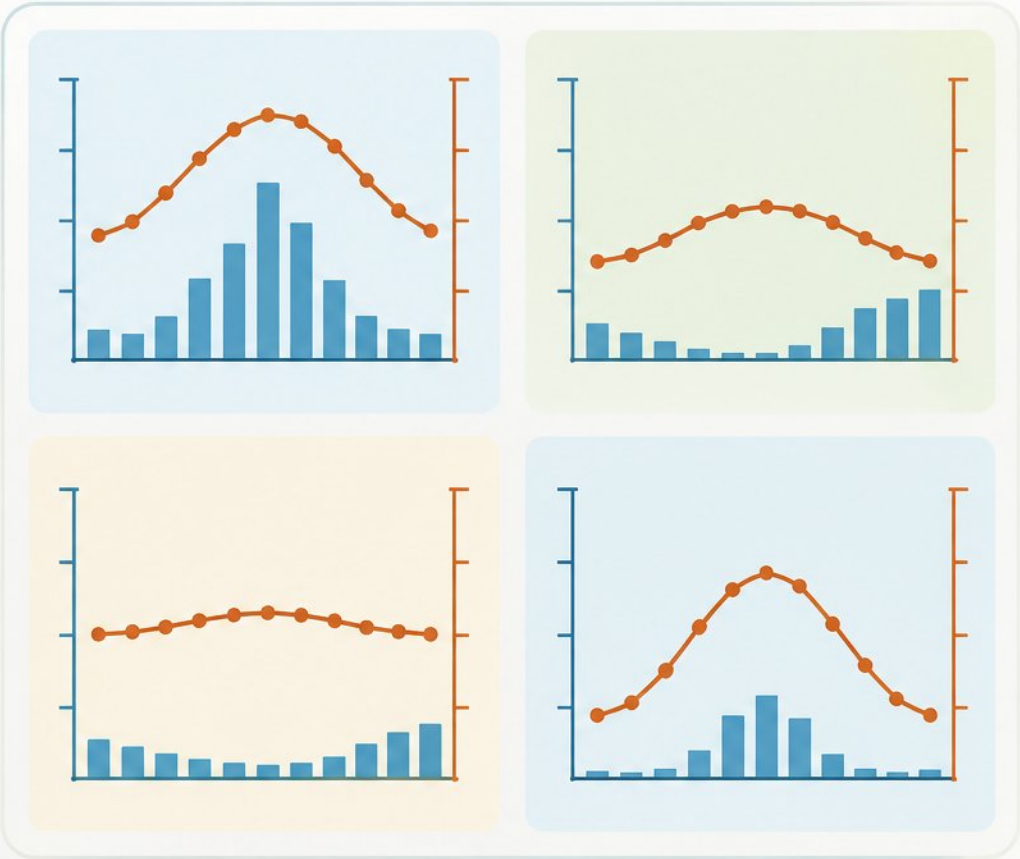
Read axes first: months horizontal; temperature and precipitation on separate scales

Check hemisphere: temperature curve shape reveals north or south

Test in order: polar (warmest ≤10 °C) → dry threshold → coldest-month split

Match graphs to Af, BWh, Csa, Cfb, Dfb, ET; name the decisive criterion

Common errors: high rainfall ≠ wet climate; ignore seasons and confuse letter roles



Teaching Sequence for Classrooms and Nature Education

A B C D E

From big ideas to local places

Sequence:
weather vs. climate → vegetation and seasons → five groups → letter logic → map and climograph practice

Active formats:
'Where in the World is Wladimir Köppen?" board game, climate postcards, dichotomous keys

Adapt by audience:
local, concrete examples for students; data and map depth for educators

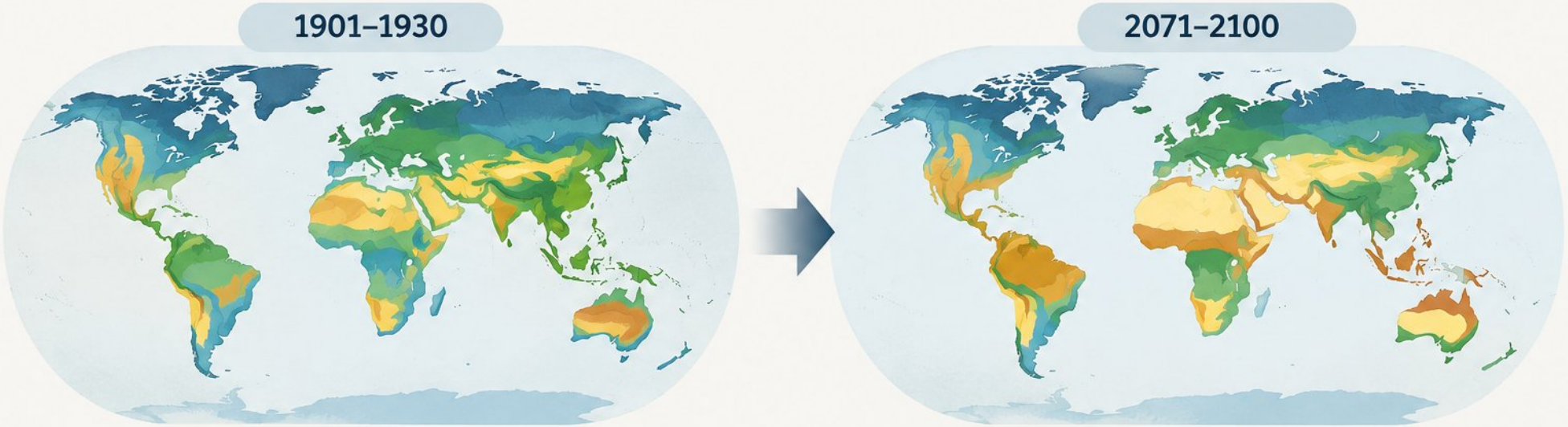
Fieldwork:
match local vegetation, phenology, and seasonal water to your area's code

Misconception checks:
labeling by heat alone, treating zones as permanent, overgeneralizing coastal moderation



Limitations and a Changing Climate

The criteria may stay the same, but the places that meet them are not.



Fixed thresholds, moving climate:
criteria stay, the areas meeting them shift

Observed:
~5% of global land changed major class, 1901–1930 to 1991–2020

Projected:
Aw and BWh expand; Dfc, ET, EF contract

SSP5-8.5:
~13.6% of land shifts primary group by 2071–2100

Main pathways:
D→C, C→B, C→A

Caveats:
model uncertainty, differing map versions, balanced language

Applying Köppen in Conservation, Agriculture, and Education

Conservation:
Köppen classes frame species distribution, vegetation mapping, habitat suitability

Agriculture:
codes guide crop suitability, growing-season length, and frost risk

Practice:
C/D boundary and third-letter heat are especially useful

Education:
organize with codes, link each letter to something observable

Plan for change:
compare baseline and projected maps, not fixed boundaries

Case study:
choose a local ecosystem and explain its code's management value



Review and Assessment

A B C D E H

KÖPPEN CLIMATE CLASSIFICATION

- Recap the arc: origins, three-letter code, groups A–E, highland H
- Decode five codes and justify each decisive criterion
- Match codes to stations, regions, and climographs
- Discuss: teaching one group with a local example
- Resources: GloH2O/Beck et al. (2023) 1-km maps; Kottek et al. (2006); Met Office and NOAA explainers



Five Stations to Decode

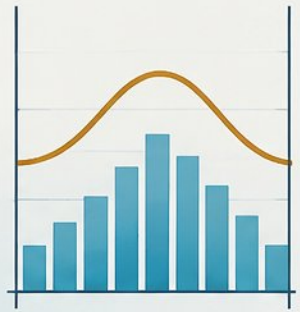


___	___	___	___	___

World Map



Climograph



PersonWise.

PersonWise • AI digital-human course platform



Scan the code or click anywhere to watch this course live, with voice Q&A

personwise.ai/t/0f80d409/public