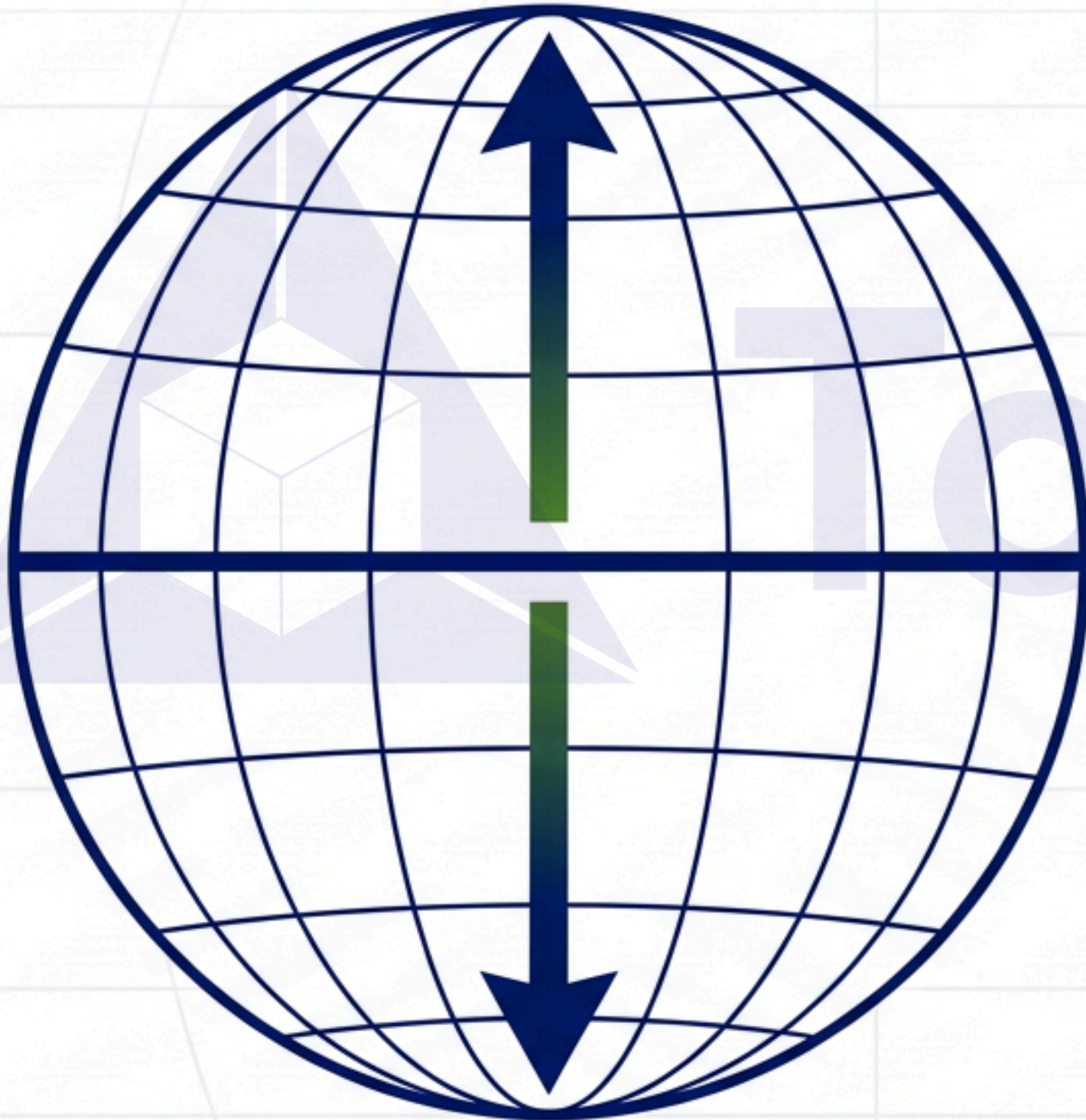


Why Tropics Have More Species

Understanding
Latitudinal Gradients
in Biodiversity



The core ecological rule: Diversity decreases from equator to poles



The Latitudinal Gradient is the most well-known pattern in global diversity, consistent across many groups of plants and animals.

Defining the boundary: Tropics span 23.5°N to 23.5°S





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$$E=mc^2$$



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The Avian Latitude Matrix: Colombia, New York, and Greenland

Colombia

Latitude: Near Equator

~1,400
bird species

New York

Latitude: 41° N

105
bird species

Greenland

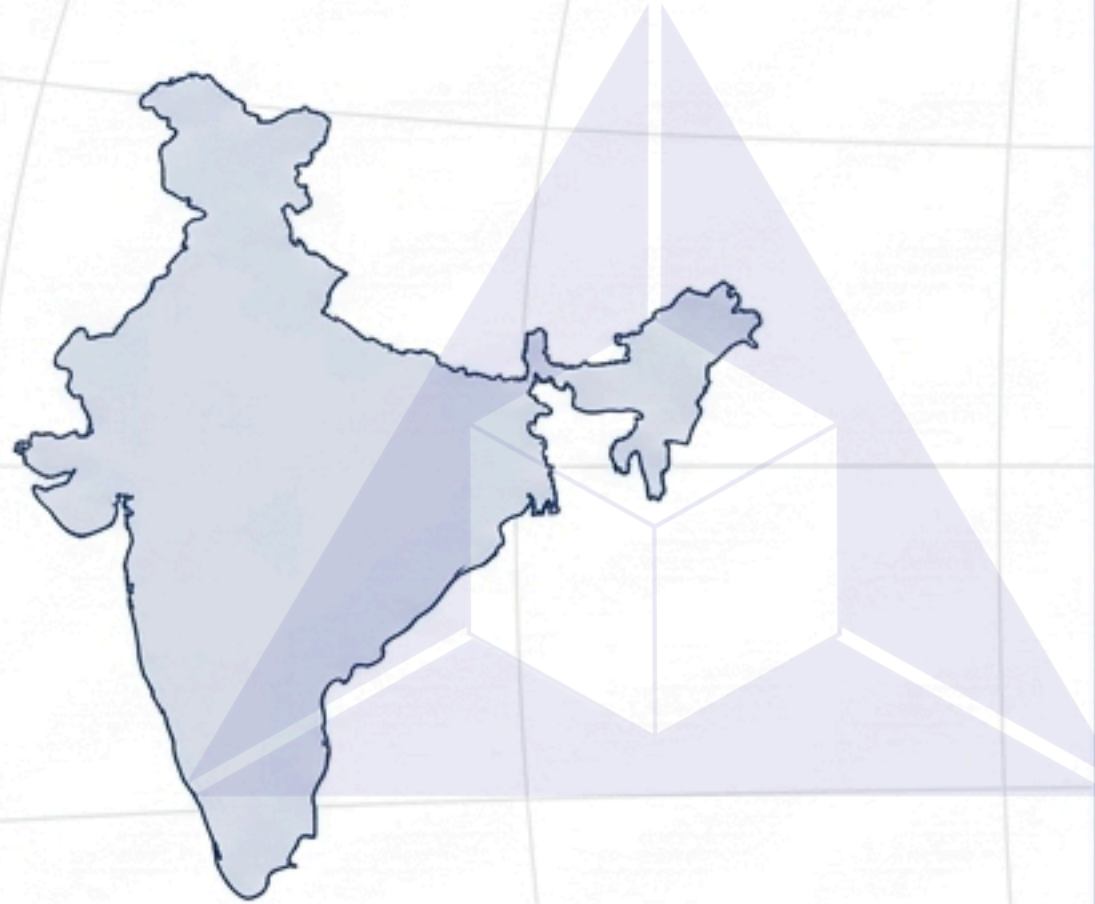
Latitude: 71° N

56
bird species



Tropical Megadiversity: The India and Amazon examples

India



Because much of its land area lies in tropical latitudes, India boasts more than 1,200 species of birds.

South America

The greatest biodiversity on Earth

Species Dashboard

>40,000
Plants

3,000
Fishes

1,300
Birds

427
Mammals

427
Amphibians

378
Reptiles

>125,000
Invertebrates

Scientists estimate 2 million+ undiscovered insect species exist here.

Hypothesis 1: Long, uninterrupted evolutionary time

Temperate
Regions



Subjected to frequent past glaciations (Ice Ages) which continuously disrupted life and reset biological clocks.

Tropical
Latitudes

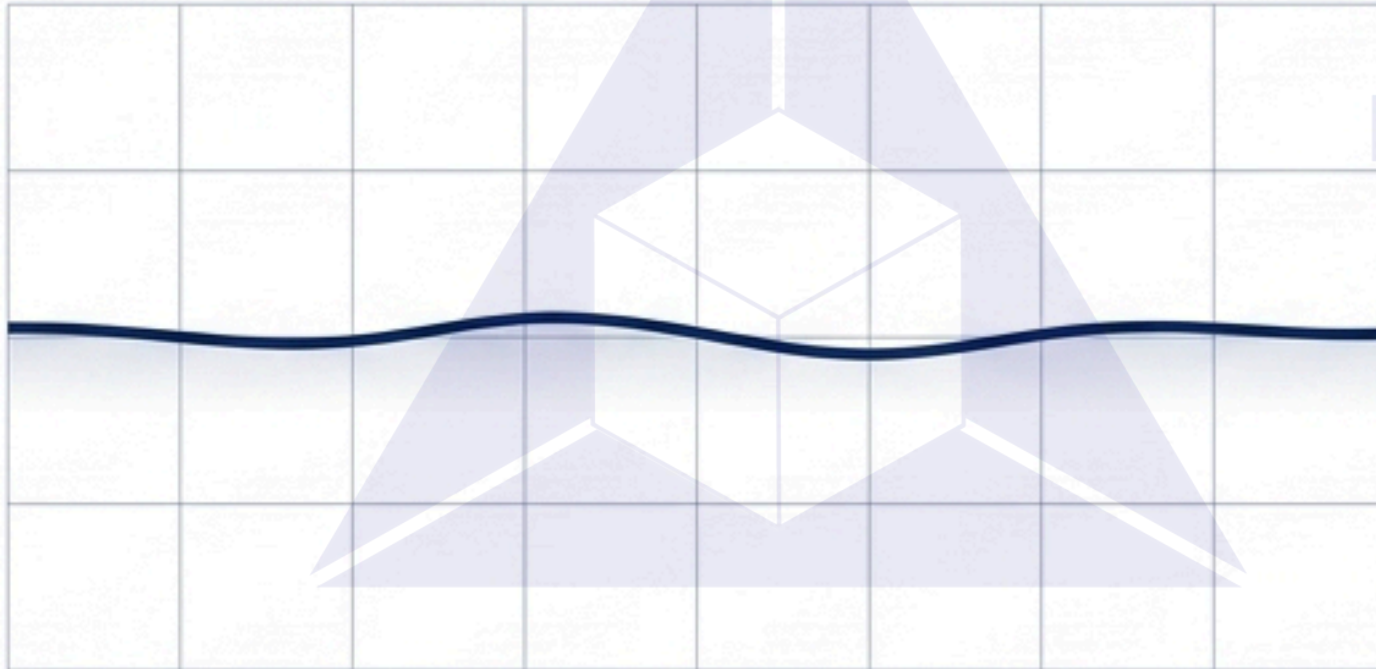


Remained relatively undisturbed for millions of years.

**Result: A long
evolutionary
time allowing
for massive
species
diversification.**

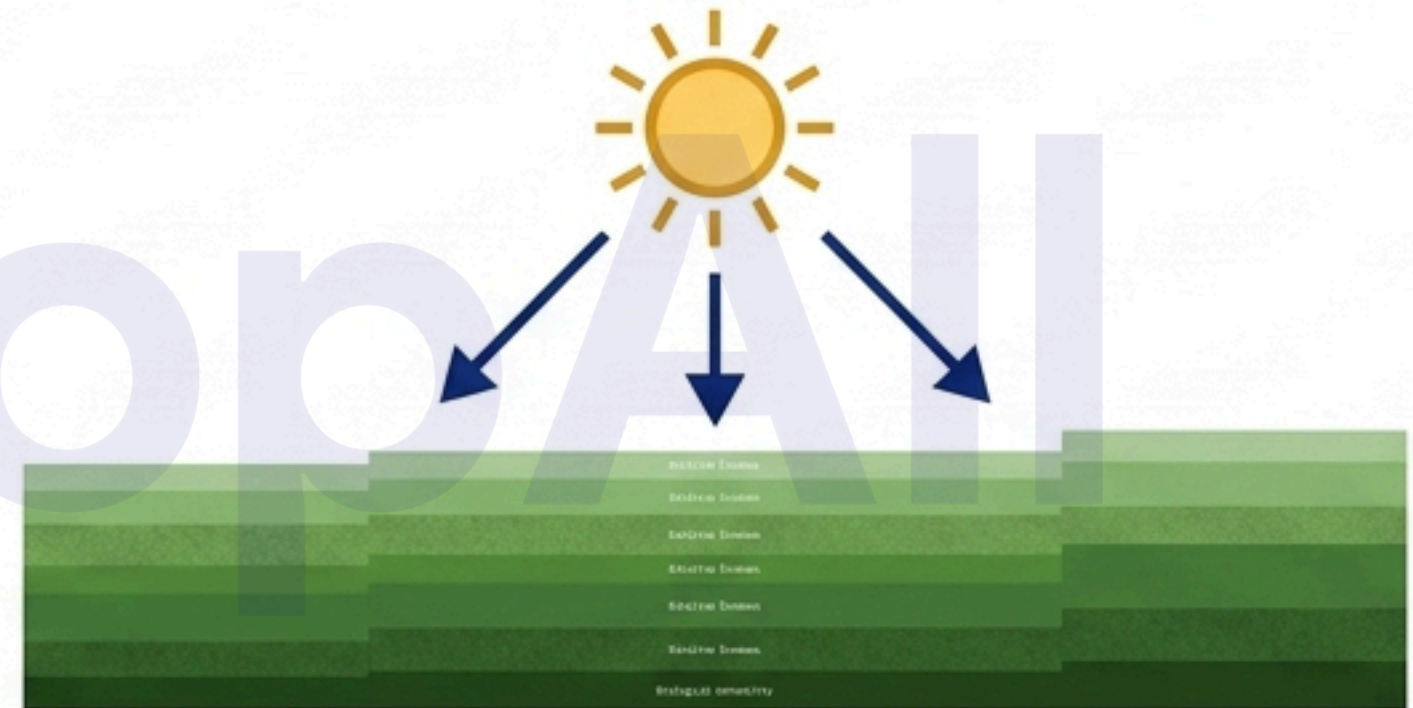
Hypothesis 2 & 3: Constant climate and abundant solar energy

Climate (Hypothesis 2)



Less seasonal, more constant, and predictable. This stability promotes niche specialisation, leading to greater species diversity.

Solar Energy (Hypothesis 3)



More solar energy is available in the tropics. This contributes to higher overall productivity, indirectly sustaining vastly complex food webs and greater diversity.

The Geographic Sweet Spot

The immense biodiversity of the tropics is not a random accident. It is the result of a global geographic sweet spot—combining millions of years of uninterrupted evolution, a highly predictable climate, and abundant solar energy.





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