

Deforestation-driven changes to hydrological dynamics in West Africa: A Systematic Review

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Introduction

- Previous studies have documented high rates of forest loss in West Africa, mainly driven by agricultural expansion.
- Studies indicate that periods of intense deforestation are generally associated with greater changes in key hydrological processes.
- Evidence on the impacts of deforestation on hydrology and sediment transport in West Africa remains limited and fragmented.

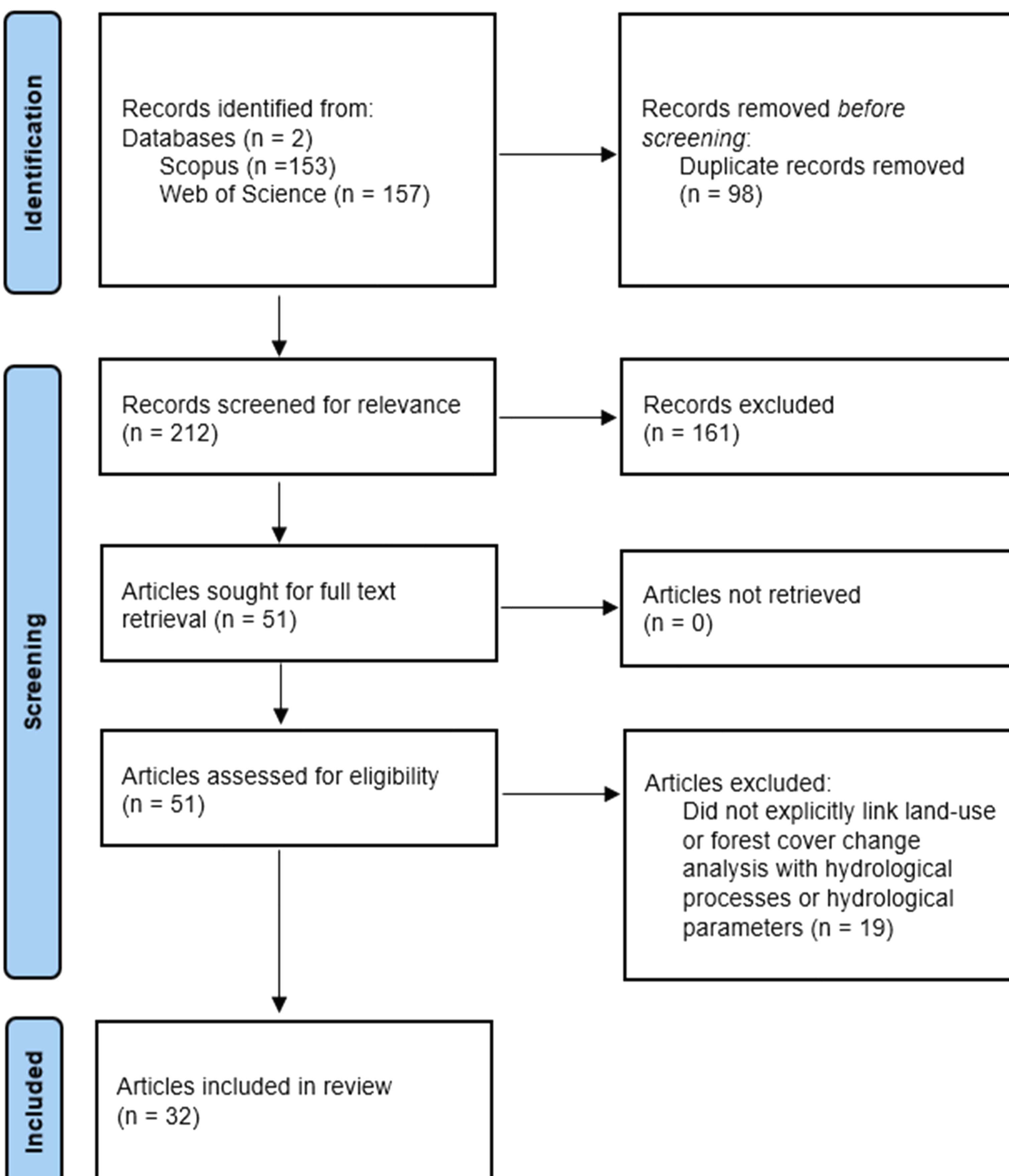
Objectives

- Synthesize evidence on forest loss in West Africa.
- Assess impacts on hydrology and sediment transport.
- Identify conditions influencing these impacts.

Methods

- Systematic literature review:** Conducted following PRISMA guidelines.
- Literature search:** Scopus and Web of Science searched using predefined keywords covering forest/land-use change, hydrology/sediment, and West Africa.
- Screening & selection:** 310 records identified → 212 unique records screened → 51 full texts assessed → 32 studies included in the final review and analysis.

Identification of studies



Results

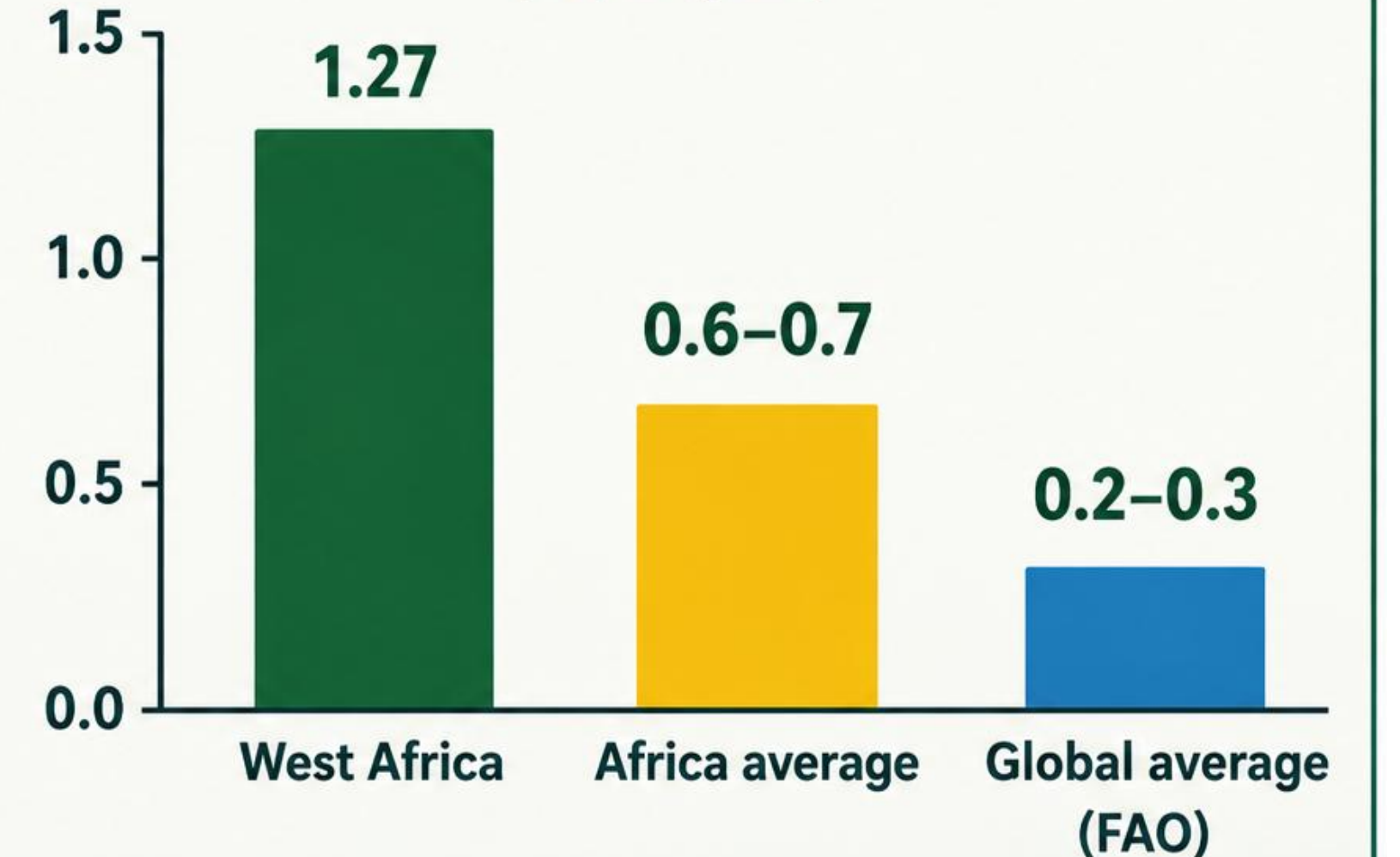
DEFORESTATION RATES

Average deforestation rate in West Africa

1.27% yr⁻¹

(range: 0.1 – 4% yr⁻¹ across forest types and periods)

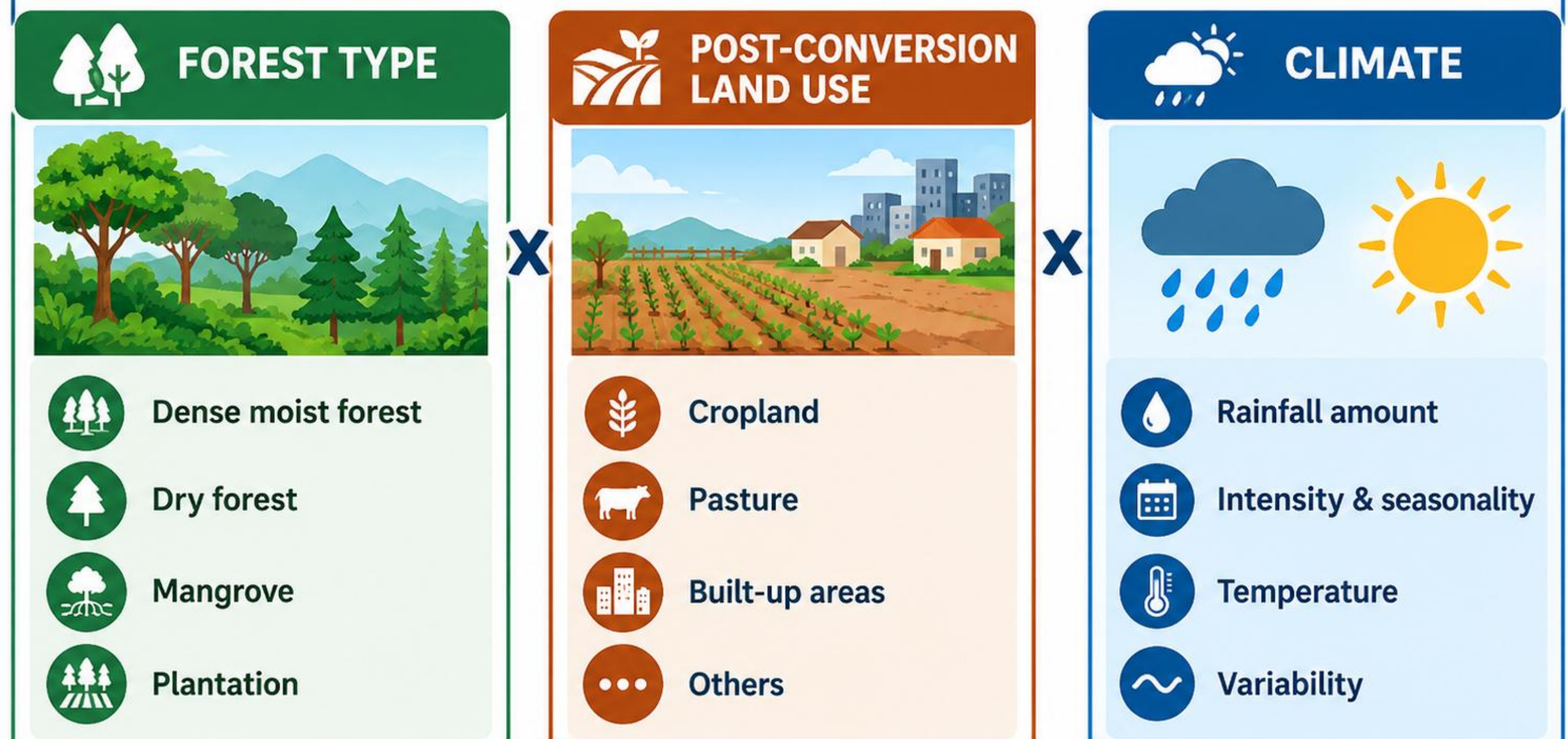
COMPARISON OF ANNUAL DEFORESTATION RATES (% per year)



West Africa's average rate substantially exceeds Africa's and global averages.



CONTEXT MATTERS: DRIVERS OF HYDROLOGICAL RESPONSE



The magnitude and direction of hydrological responses vary with the combination of these factors.

Conclusion

- Deforestation in West Africa is occurring at rates above global and continental averages and is consistently associated with altered hydrological regimes.
- Increasing forest cover has the potential to enhance water availability without necessarily increasing surface runoff.
- Hydrological responses to forest cover are strongly context-dependent.

Research gaps

- Limited evidence:** West Africa accounts for only 1.6% of global studies on these impacts.
- Limited causal evidence:** Few studies isolate deforestation as a distinct driver.
- Methodological gaps:** Research is dominated by modelling, with few field-based and experimental studies.