

Election and Deforestation: A Systematic Literature Review of Empirical and Theoretical Evidence

Pre-Registered Protocol

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1. Problem Formulation

a. Rational - *Describe the rationale for the review in the context of what is already known*

At the Glasgow Conference of the Parties for UN-Biodiversity 15 in 2022, nations pledged to protect 30% of the world's areas, highlighting the critical need to address the carbon and climate implications of deforestation as integral components of global biodiversity and environmental strategies. Institutions are key drivers of sustainable resource use (Leblois et al. 2017) and the most pressing questions have become understanding which institutions are better able to cope with deforestation concerns.

A broad literature discusses the effect of democratic institutions on forest conservation efforts (Stein 2022). Democratic institutions, defined in the formal procedural sense as a system in which leaders are selected through periodic fair and competitive elections (Przeworski et al. 1999), may provide incentives to leaders to represent the interest of a majority of their constituents. Elections, as an instrument to provide democratic accountability, have been discussed as an important political component to ensure sustainability.

However, the link between elections and deforestation is theoretically complex and empirically difficult to study due to challenges such as endogeneity, variation in electoral institutions, and the difficulty of isolating electoral effects from broader political and economic contexts. This systematic literature review aims to fill that gap by systematically reviewing the theoretical arguments and their empirical foundation that have been discussed until now.

Since the 1990s, the blueprint approach to elections may have been the mainstream approach adopted in literature despite its lack of empirical support (Stein 2022). Such an approach overlooks the complex interrelationships among resource systems, user groups, governance systems, and broader political-economic contexts, which undermine the predictive value of implementing formal rules (Ostrom 2007). Formal systems are typically underpinned by complex norms shaped over long periods (Greif and Laitin 2004). Without these norms, formal rules are likely to be non-functional. Consequently, exporting electoral democratic institutions has proven to be extremely difficult (Humphreys et al. 2019). The review aims to shed lights on the various misconceptions and mis-conceptualization adopted by such an approach.

We expect four main explanations linking elections and reduced deforestation to prevail. First, there is a belief in the intrinsic advantages of competitive elections for reducing deforestation and

addressing ecological issues through electoral accountability. Through free, fair, and regularly held competitive elections, electoral democratic accountability could be guaranteed. It is believed to provide incentives to politicians to be responsive to a broader part of their electorates and therefore value public good provision such as the conservation of forest resources (Deacon 1994). The second argument suggests that competitive elections foster economic growth, which, according to the environmental Kuznets curve hypothesis, leads to higher environmental standards and, ultimately, reduced deforestation over time. The third explanation posits that competitive elections strengthen property rights, which support conservation efforts. Lastly, the fourth argument contends that competitive elections promote better ecological outcomes only when it is followed by substantial local devolution.

Importantly, these explanations may not operate uniformly across different contexts. The relationship between elections and deforestation is likely to vary depending on regime type (democratic vs. authoritarian elections), governance level (national vs. local elections), and the structure of forest governance (centralized vs. devolved control). Understanding these contextual differences is essential for drawing broader conclusions from the literature.

- b. **Define the research question:** *Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO).*

In this research project we are mainly interested in the two following research questions. How and why do elections influence deforestation dynamics? To do so, we will describe conceptually the multiple facets of leaders' selection through electoral tools. We will investigate the theoretical mechanisms debated in the literature linking those facets to forest outcomes and discuss their empirical support.

Beyond clarifying misconceptions, this review aims to systematically identify key theoretical debates, synthesize empirical findings across different contexts, and highlight methodological challenges that have shaped the study of elections and deforestation. By doing so, it seeks to provide a more nuanced understanding of the electoral drivers of environmental governance and contribute to future research directions in political ecology and environmental politics.

2. The review protocol

We will follow the following protocol based on the PRISMA guidelines (Moher, 2015). PRISMA provides a framework for documenting each step of the systematic review process, making it clear how studies were identified, screened, and selected.

Slought and Tison (2023) warn against the use of meta-analysis when cases lack measurement or contrasts harmonization. As we foresee a wide heterogeneity in the empirical design of studies, we decide to develop a narrative systematic review instead of a meta-analysis. Nevertheless, if more than 5 cases happen to be harmonized, we will implement a meta-analysis on those cases.

| Eligibility Criteria (Inclusion and exclusion criteria) | | |
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| Criteria | Rule | Justification |
| Topic | <u>Population:</u> Cross-country and single country analysis <u>Intervention:</u> Election at any kind of level from different institutional arrangements (in and outside democracy) <u>Comparison:</u> get the electoral components based on the theoretical literature on elections (electoral component yes or no). Qualitative → single case study (1) – comparative qualitative case-study = f(number) because it is difficult to assess the quality. <u>Outcomes:</u> Deforestation / Forest conservation / Forest degradation / Reforestation / (forest carbon (?)) | |
| Temporal scope | 1990 (?) - 2024 | The first satellites developed in the 70s. Third wave of democratization in the 90s. Democratic index granularity (with electoral components) arrived YYYY. VDEM /// Freedom House /// Polity |
| Geographical scope | Any | |
| Area of study | Economics and Political Science (priority), and relevant other disciplines | |
| Types of study (methodologically) | Qualitative (excluding single N) and quantitative | As we are interested in mapping out theoretical mechanisms, both qualitative and quantitative will be of interests. |
| Literature type | Peer-reviewed, and working papers, and grey literature dependent on size | |
| Language | English, Spanish and French | |
| Database | Web of Science, Scopus, and Google Scholar | Justification of the dataset and add the relevant one. |
| Search strategy | (“elections” OR “democracy” OR “leader selection” OR “campaign” OR “political cycle”) AND (“deforestation” OR “forest conversion” OR “forest plantation” OR “Forest conservation” OR “Forest degradation” OR “Reforestation” OR “Forest Carbon” OR “tree cover loss”) | Partially taken from Wolff and Schweinle (2022). |
| Citation tracking and screening process | <u>Screening process:</u> a) delete duplicates, b) screen abstract, c) read the full text of eligibility to assess inclusion. <u>Citation tracking:</u> we will track papers not included from the references of the papers read from the pool of articles that meet the eligibility criteria. | What do they cite as articles to add them? How do we screen from the first outcome of the search |
| Empirical strategy | | |
| Criteria | Rule | Justification |
| Data and record management | | |
| Selection of the study process | (a) the outcome variable is directly related to forest ecosystems (broadly defined). (b) the treatment is related to elections broadly defined. | The PRISMA 2020 statement (Page et al., 2021) used for instance by Scheiring et al. (2024) |

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| | <p>(c) the study identifies a causal association through observationa quasi-experiment, field experiment, or survey experiment. OR provides enrich theoretical mechanisms linking (a) and (b)</p> <p>(d) the study relies on original, primary empirical research. We exclude literature review.</p> | |
| Method to extract data | Parallel coding from 2/3 independent researchers | |
| Data collection extraction form | <p><u>1. Independent variable -Election conceptualization</u></p> <p>1a) Definition of elections (Dahl, 1971) as competitive process of popular participation, or Schumpeter (1942) that focuses more on the procedural aspects rather than the ones focused on proper concept of democracy.</p> <p>1b) Dimensions of elections:</p> <ul style="list-style-type: none"> - Election Type: Presidential, legislative, gubernatorial, local/municipal vs national. - Electoral System: Majoritarian (first-past-the-post, two-round system), proportional representation (closed-list, open-list), mixed systems. - Competitiveness: Margin of victory, level of political competition, opposition strength. - Incumbent Status: Re-election of incumbent vs. change in leadership. - Partisan Orientation: Left-wing vs. right-wing government, environmentalist vs. non-environmentalist platforms. - Electoral Cycles: Pre-election vs. post-election periods and their effects on deforestation. - Turnout: Voter participation rate, demographic differences in turnout. - Coalitions: Presence of multi-party coalitions, stability of governing alliances. - Regime Type & Democratic Quality: Degree of electoral integrity, presence of authoritarian vs. democratic institutions affecting policy implementation. - Clientelism, Patronage and corruption. - Campaign fundings and presence of donors and groups of interest. - Competitiveness – Measures the level of political contestation in an election, including factors such as margin of victory, opposition strength, and overall political competition, which influence policy responsiveness and governance. - District Magnitude – Refers to the number of representatives elected per district. <p>It is important to mention that we anticipate that certain election characteristics will serve as scope conditions rather than independent variables, as many of the papers analyzed focus on single-country case studies. Therefore, the following categories will apply to studies conducting cross-national analyses or will be</p> | We partially used the data extraction form from Scheiring et al. (2024). |

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| | <p>used to identify the scope conditions in single-case studies.</p> <p>1c) Data source: common data sources are V-Dem, Freedom House, Polity (cover almost all the world for the XX and XXI centuries), but for certain characteristics as turnout, coalitions other more specific datasets (Electoral system design database, CLEA, Global Elections Database, ParlGov for Europe).</p> <p>1d) Primary independent variables:</p> <ul style="list-style-type: none"> • Election Occurrence (Timing & Cycle) Binary indicator: Election year (1 = election year, 0 = non-election year). Election cycle phase: Pre-election, election year, post-election. • Election Type Categorical variable: <ul style="list-style-type: none"> ○ Presidential election ○ Legislative election (parliamentary, congressional, or local) ○ Municipal election ○ Regional election (gubernatorial, state-level) ○ Referendum • Electoral System Categorical variable: <ul style="list-style-type: none"> ○ Majoritarian (e.g., First-Past-the-Post, Two-Round System) ○ Proportional Representation (Closed List, Open List) ○ Mixed System • Competitiveness of Elections Vote margin: Difference in percentage points between the top two candidates/parties. Close vs. landslide elections: Threshold indicator (e.g., margin <5% as competitive). Incumbent re-election: 1 = incumbent won, 0 = new leader elected. Opposition strength: Vote share of opposition parties. • Political Orientation of the Winning Party/Government Categorical variable: <ul style="list-style-type: none"> ○ Left-wing, right-wing, center. ○ Pro-environmental vs. pro-development/industrial. Binary indicator: 1 = Green/environmental party in power, 0 = non-environmental. • Coalition Composition Binary indicator: 1 = Coalition government, 0 = Single-party government. Type of coalition: Left-wing, right-wing, mixed. • Voter Turnout | |
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| | <p>Percentage variable: Total votes cast as a percentage of eligible voters. Categorical: High (>70%), Medium (50-70%), Low (<50%).</p> <ul style="list-style-type: none"> Electoral Integrity & Democracy Level Freedom House Score: Democracy ranking (1-7 scale). Electoral Integrity Index: Score of election fairness. Regime Type (Polity IV or V-Dem): Autocracy, Anocracy, Democracy. <p><u>2. Outcome conceptualization</u> 2a) Primary outcome (concept – deforestation, degradation, other), and give definition 2b) Primary outcome variable type (measurement strategy: percentage, change) 2c) Data source 2d) Primary outcome variable level (pixels, administrative units, etc.)</p> <p><u>3) Settings:</u> 3a) Geographical setting (country, sub regions, etc.) 3b) Temporal setting 3c) Unit of analysis 3d) Further characteristics of the variable: type of forest, location of the forest (tropical vs non tropical).</p> <p><u>4. Methodology</u> 4a) What methodology is used (quantitative or qualitative or mixed); 4b) [if quantitative or mixed] is it observational, quasi-experimental, or experimental (RCT), 4c) [If quasi experimental] What method is used? (IV, DiD, matching, RDD) 4d) [If quasi experimental or experimental] Qualify the counterfactual groups 4e) [If quasi experimental or experimental] Qualify the models 4f) What assumptions are required for the estimation strategy to be unbiased 4g) Assess the plausibility of the assumption (1: low, 2: medium, 3: high, -1=unknown) 4h) Assess the robustness of the estimation strategy to i) alternative measurement (1=low, to 3=high, -1=unknown), ii) alternative models (1=low, to 3=high, -1=unknown) 4i) Primary model family (linear, logistic, hierarchical) 4j) Data structure in primary model (Cross-sectional, panel) 4k) Primary model estimator (OLS, 2SLS, etc.) 4l) Approach to missing data (NA, None, imputation, exclusion, No missing data) 4m) Regression weights 4n) Sample size 4o) Estimate 4p) SE 4r) test statistic value (t)</p> <p><u>5. Theoretical mechanisms</u></p> | |
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| | 5a) Accountability: provision of public good -> meeting expectation of voters 5b) Vote buying (timber as an electoral resources) the context of competitive election 5c) Others (open text box) 6. Further results 6a) Moderators (concept and definition) 6b) Moderators type variable (measurement strategy) 6c) Moderator – effect relationship 6d) Mediators (concept and definition) 6e) Mediators type variable (measurement strategy) 6f) Treatment effect on the mediators 6g) SE of f) 6h) t statistic of f) 6i) Valuation of the robustness of the mediation analysis (1: low, 2: medium, 3: high) | |
| Risk of bias assessment | Study design, data validity, and methodological rigor. | |
| Planned meta-analysis | We don't but we report point estimate + with / without moderators. | |
| Planned summary of the evidence | Narrative synthesis | |
| Meta-biases assessment | None | |
| Strength of the evidence | Narrative synthesis | |

In addition to the following protocol, we will exchange with key experts in the field to evaluate the search strategy and key publications to be included (and or not yet published working papers).

3. Process

a. Stage 1: Title and Abstract Screening

Upload all references into a reference management tool (e.g., Zotero, Mendeley, or EndNote) or systematic review software (Rayyan). Screen titles and abstracts against inclusion and exclusion criteria. Tag studies as **“include,” “exclude,”** or **“maybe”** based on relevance. Work in teams (if possible) to ensure accuracy and reduce individual bias by having a second reviewer validate decisions.

b. Stage 2: Full-Text Screening

Obtain full texts of the studies marked as **“include”** or **“maybe”** during the first stage. Read each study carefully, focusing on the research question alignment, the methodology, the theoretical contribution. Use a data extraction template to collect key details for included studies (e.g., authors, year, methods, findings).

c. Data extraction

Develop a data extraction form: Include variables like author, year, country, type of election, measures of deforestation, study methods, and findings.

Parallel coding: Two reviewers independently extract data and resolve discrepancies.

d. Data analysis and synthesis

e. Reporting

Limitations, Policy implications (Highlight how findings can inform political and environmental governance), **Future research** (Identify gaps, such as regions or time periods with insufficient data.)

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