PRISMA 2020 Checklist Supplementary Material

This document provides supplementary methodological details specifically for the systematic literature review component of this study. While the main article reports findings from a mixed-method approach combining a systematic literature review and an empirical case study, the systematic literature review component detailed herein was conducted and reported in accordance with the PRISMA 2020 statement [72].

8. Selection process:

Two reviewers independently screened the titles and abstracts. Discrepancies were resolved through discussion and consensus, after which full texts were assessed.

9. Data collection process ：

Two reviewers independently extracted data using a standardized form covering study characteristics, methodology, and key findings. Discrepancies in data extraction were resolved through discussion

10a. / 10b. Supplementary Note: Data Extraction Protocol

To ensure consistency and transparency, data were extracted from the included studies using a structured protocol based on pre-defined domains.

(1) Study characteristics

The following descriptive information was extracted from each article: author(s), year of publication, title, geographical context, research design, data collection methods, transition context, and the type of farming population involved.

(2) Justice-related analytical domains

For each study, information was extracted on how justice was conceptualized, including whether the analysis addressed procedural, distributive, or recognitive justice, and how these dimensions were defined or operationalized in the empirical context.

(3) Procedural justice elements

Particular attention was paid to governance-related procedural elements, including access to information, consultation and participation mechanisms, stakeholder representation, transparency, accountability, and the extent to which farmers or local actors were able to influence decision-making.

(4) Reported outcomes for farmers and rural actors

The extraction also recorded the reported effects of transition governance on farmers and other agricultural actors, including policy acceptance, contestation, resistance, exclusion, displacement, adaptation, negotiation outcomes, and other consequences linked to justice-related governance arrangements.

(5) Relevance to the analytical framework

Where applicable, studies were also coded for recurring governance problems and justice-related mechanisms that could inform the analytical interpretation of the Huwei case.

11.Supplementary Note: Quality Assessment (Risk of Bias) Protocol

To assess the quality and rigor of the included empirical studies, a quality assessment was performed based on criteria adapted from the Critical Appraisal Skills Programme (CASP) qualitative checklist. The assessment focused on three core domains:

Clarity of Research Aims: Does the study clearly state its objectives regarding land-use transition or procedural justice?

Methodological Appropriateness: Is the research design (e.g., case study, interviews) appropriate for addressing the research question?
Data Rigor: Is the data collection and analysis process clearly described and sufficiently rigorous to support the conclusions?
Two reviewers independently assessed the quality of the included studies based on the predefined criteria. Any discrepancies in the assessment scores were resolved through discussion and consensus. Studies were not excluded based on quality scores but were assessed to ensure that all included articles provided credible empirical evidence

12. Supplementary Note: Effect Measures and Synthesis
Given the qualitative and heterogeneous nature of the included studies (focusing on governance processes and stakeholder perspectives), no statistical effect measures (e.g., risk ratios or mean differences) were calculated. The results were synthesized narratively to identify common themes regarding procedural justice.
Supplementary Note: Data Synthesis Methods (Items 13a-13f)

13a. Eligibility for Synthesis: All 55 studies included in the final sample were deemed eligible for synthesis. No studies were excluded at the synthesis stage.

13b. Data Preparation: Data were standardized into descriptive themes. No statistical conversions or handling of missing summary statistics were required as the synthesis was qualitative.

13c. Tabulation and Visual Display: A summary table (Table S2 in the main supplementary) displays the characteristics of each individual study. Results are presented visually using the PRISMA flow diagram (Figure 2) to illustrate the selection process.

13d. Synthesis Methods: Due to the heterogeneity of the included study designs, which comprised case studies, qualitative interviews, and mixed-methods research, as well as the conceptually interpretive nature of justice-related analysis, a statistical meta-analysis was not appropriate. Instead, a narrative synthesis approach was adopted. The included studies were analyzed thematically with attention to how they conceptualized and empirically examined distributive, recognitive, and procedural justice in transition contexts. Particular emphasis was placed on recurring procedural mechanisms—such as information asymmetry, limited participation, weak representation, and symbolic consultation—and on how these mechanisms were linked to distributive and recognitive outcomes affecting farmers and other agricultural actors.

13e. Exploration of Heterogeneity: Heterogeneity across studies was explored by stratifying findings according to geographic context and type of just transition (energy, agricultural, and natural resource transitions). Patterns of procedural justice outcomes were qualitatively compared across these categories to identify contextual factors influencing study results.

13f. Sensitivity Analyses: Given the narrative nature of the review, formal statistical sensitivity analyses were not applicable.

14.Supplementary Note: Assessment of Reporting Bias (Item 14)

Due to the qualitative and descriptive nature of the synthesis, quantitative methods for assessing the risk of bias due to missing results were not applicable.

However, the review acknowledges potential sources of bias:

Language Bias: The search was restricted to English-language publications , which may exclude relevant local studies in other languages.

Publication Bias: Academic journals may favor studies that report significant conflicts or novel governance mechanisms, potentially leading to an underrepresentation of "routine" or "failed" land-use transitions that went unpublished.

The synthesis outcomes should be interpreted with these limitations in mind.

15.Supplementary Note: Certainty in the Body of Evidence (Item 15)

Due to the heterogeneous and predominantly qualitative nature of the included studies, formal evidence-grading approaches developed for quantitative synthesis were not appropriate. No statistical assessment of certainty was therefore undertaken. Instead, the review considered the relative strength of support for the synthesized themes by examining the methodological quality of the contributing studies, the consistency of patterns across cases and contexts, and the richness and adequacy of the empirical material. Findings that were supported by multiple studies across different settings and showed recurring patterns were interpreted with greater confidence, whereas findings based on more limited or context-specific evidence were treated more cautiously.

16b. Table S1. Characteristics of excluded studies

ID	Title	Reason for Exclusion
1	Just transition principles and criteria for food systems and beyond	Wrong Study Design: General conceptual framework lacking specific application to land-use transition cases.
2	A psychometric approach to assess justice perceptions in support of the governance of agricultural sustainability transitions	No substantive analysis: Focus on instrument validation rather than transition outcomes.
3	Between distributive and procedural justice claims: Reframing patterns of discursive resistance against climate action	Wrong Intervention: Focuses on national fiscal policy (carbon tax) rather than sectoral transition projects.
4	Green, innovative, and unfair: The case of unjust energy transitions and civic resistance and opposition in Portugal	Wrong Study Design: Perspective/Commentary (lacks formal research methodology).
5	Just destabilisation? Considering justice in the phase-out of peat	Study Focus: Theoretical contribution on destabilisation frameworks rather than empirical analysis.
6	Elucidating the capabilities of international mechanisms to foster procedural just system change – The case of the 2021 UN Food System Summit	Wrong Setting: Focus on global governance mechanisms (UN Summit) rather than local or national transition contexts.
7	Processes of power: Transitions and justice of energy infrastructure in Minnesota	Wrong Outcome: Focuses on successful social innovation models rather than analyzing land-use conflicts or injustices.

8	Harnessing social innovation for a just transition: A case study of tea industrialization in China's era of ecological civilization	Wrong Intervention: Focuses on agricultural modernization (value chain upgrading) without involving land-use conversion or displacement.
9	Policy mixes for just transitions: A holistic evaluation framework	Wrong Study Design: Conceptual framework for policy evaluation (lacks empirical data on farmer injustices).
10	Deep, hot and contested: Assembling the geothermal rush in Turkey	Wrong Outcome: Analyzes sociotechnical assemblages of development rather than direct justice impacts on farmer livelihoods.
11	Deepening democracy for the governance toward just transitions in agri-food systems	Study Focus: Theoretical discussion on governance and democracy dimensions, rather than an empirical analysis of land-use conflicts.
12	Introduction to the special issue on just food system transition: Tackling inequalities for sustainability	Wrong Publication Type: Editorial / Introduction to Special Issue.
13	Empowered but powerless? Reassessing the citizens' power dynamics of the German energy transition	Wrong Context: Analyzes power dynamics within energy market regulations (auction systems), rather than procedural justice in land-use planning or spatial siting processes.
14	Whose voices, whose choices? Pursuing climate resilient trajectories for the poor	Wrong Intervention: Focuses on climate change adaptation and resilience strategies, distinct from energy transition projects or mitigation policies.
15	Explaining success on community forestry through a lens of environmental justice: Local justice norms and practices in China	Wrong Outcome: Analyzes "success factors" and institutional stability, rather than documenting instances of injustice, displacement, or procedural exclusion.
16	What is the quality of participatory renewable energy planning in Europe? A comparative analysis of innovative practices in 25 projects	Lack of Specificity: Aggregate analysis of participation across multiple projects, preventing the extraction of specific data on farmers or agricultural land conflicts.
17	Impacts of hydropower development on locals' livelihoods in the Global South	Wrong Study Design: Secondary research (systematic review and meta-analysis), not an empirical primary study.

18.Quality Appraisal of Included Studies

ID	Article name	1. Clear Aims?	2. Appropriate Methodology?	3. Rigorous Data Analysis?	Overall Quality Assessment	Comments / Justification
1	Just transition towards a bioeconomy: Four	✓	✓	✓	High	Strong relevance for demonstrating that cross-regional comparison can clarify

	dimensions in Brazil, India and Indonesia					shared procedural justice dynamics across transition contexts.
2	After the leases are signed, it's a done deal": Exploring procedural injustices for utility-scale wind energy planning in the United States	✓	✓	✓	High	Strong relevance for demonstrating that qualitative empirical research can provide deep contextual insight into lived governance experiences.
3	An unjust and failed energy transition strategy? Taiwan's goal of becoming nuclear-free by 2025	✓	✓	✓	Good	Strong relevance for demonstrating that policy-focused analysis can reveal institutional weaknesses in procedural arrangements.
4	Can we have clean energy and grow our crops too? Solar siting on agricultural land in the United States	✓	✓	✓	High	Strong relevance for demonstrating that mixed-method research can integrate experimental evidence with stakeholder perspectives on transition governance.
5	Thinking, doing, organising: Prefiguring just and sustainable energy systems via collective prosumer ecosystems in Europe	✓	✓	✓	High	Strong relevance for demonstrating that collective energy initiatives may reproduce exclusion despite their inclusive normative claims.
6	A matter of energy injustice? A comparative analysis of biogas development in Brazil and Italy	✓	✓	✓	High	Strong relevance for demonstrating that comparative analysis can identify recurring governance deficits across different regulatory settings.
7	The dark side of the energy transition: Extractivist violence, energy (in)justice and lithium mining in Portugal	✓	✓	✓	High	Strong relevance for demonstrating that grounded case-based research can expose systemic exclusion and social stigmatization in extractive transition contexts.
8	Empowering onshore wind energy: A national choice experiment on financial benefits and citizen participation	✓	✓	✓	High	Strong relevance for demonstrating that choice-experiment research can generate robust quantitative evidence on public procedural preferences.
9	Are energy transitions reproducing inequalities? Power, social stigma and distributive (in)justice in	✓	✓	✓	High	Strong relevance for demonstrating that procedural mechanisms can obscure deeper structural power asymmetries.

	Mexico					
10	Just energy imaginaries? Examining realities of solar development on Pennsylvania's farmland	✓	✓	✓	High	Strong relevance for demonstrating that interview-based research can capture the nuanced procedural disadvantages experienced by farmers.
11	Government versus the people – The mismatch in value use to assess solar farms in the Netherlands	✓	✓	✓	Good	Strong relevance for demonstrating that policy content analysis can reveal gaps between formal assessment frameworks and public values.
12	Understanding energy conflicts: From epistemic disputes to competing conceptions of justice	✓	✓	✓	High	Strong relevance for demonstrating that qualitative analysis can distinguish epistemic disputes from deeper normative justice conflicts.
13	People of the Sun: Local resistance and solar energy (in)justice in southern Portugal	✓	✓	✓	High	Strong relevance for demonstrating that qualitative fieldwork can reveal the disconnect between developers' consultation processes and local realities.
14	Socio-technical tensions from community acceptance, energy transition, and energy justice: Lessons from solar photovoltaic projects in Taiwan	✓	✓	✓	High	Strong relevance for demonstrating that comparative case study analysis can clarify procedural injustices in renewable energy planning.
15	Rushing for the gold of the energy transition: An empirical exploration of the relevance of landownership for the wind energy expansion in Germany	✓	✓	✓	High	Strong relevance for demonstrating that land ownership structures can produce procedural exclusion in transition governance.
16	The process matters: Exploring public participation in solar energy projects in Brazil and Portugal	✓	✓	✓	High	Strong relevance for demonstrating that cross-national comparison can identify persistent gaps in participatory effectiveness despite formal mechanisms.
17	Sámi perspectives on energy justice and wind energy developments in Northern Norway	✓	✓	✓	High	Strong relevance for demonstrating that ethnographic fieldwork can expose the procedural marginalization of Indigenous stakeholders.
18	A technology to solve the water-energy-food crisis Mapping sociotechnical configurations of	✓	✓	✓	Good	Strong relevance for demonstrating that Q-methodology can map diverse stakeholder perspectives on emerging technologies.

	agrivoltaics					
19	Development in the context of electrification and the lithium industry: The view of the citizens of San Pedro de Atacama	✓	✓	✓	Good	Strong relevance for demonstrating that procedural injustice is shaped by participation exclusion, symbolic participation, information asymmetry, representation inequality, and risk redistribution.
20	Accidental adversaries in renewable energy projects: A system dynamics perspective on conflicts and procedural justice with local communities	✓	✓	✓	Good	Strong relevance for demonstrating that transition mechanisms remain analytically useful even when the study focuses on local communities rather than farmers.
21	Beyond the numbers: How green transitions can prioritise rural communities to ensure a more just transition	✓	✓	✓	Good	Strong relevance for showing that quantified benefits alone cannot substitute for meaningful community voice, respect, and long-term place-based inclusion.
22	Integrating energy justice and earth observation to examine the social dimensions of hydroelectric dams	✓	✓	✓	High	Strong relevance for revealing how official policy categories can obscure long-term and indirect harms to rural livelihoods, infrastructure access, and recognition.
23	No empty land: Comparing distributional outcomes of solar parks across land tenure regimes in India	✓	✓	✓	High	Strong relevance for demonstrating how formally recognized landholders can capture transition benefits while actual land users remain excluded and invisible.
24	Time on hold: Justice, governance, and the politics of transitions in critical mineral frontiers	✓	✓	✓	High	Strong relevance for illustrating how transition injustice can also arise through prolonged uncertainty, suspended livelihoods, and loss of temporal agency.
25	Voices unheard: Barriers to and opportunities for small farmers' participation in oil palm contract farming	✓	✓	✓	High	Strong relevance for demonstrating that contract farming arrangements can reproduce power imbalances and procedural deficits.
26	Impacts of hunting prohibitions on multidimensional	✓	✓	✓	High	Strong relevance for demonstrating that procedural exclusion in conservation policy can generate multidimensional well-being

	well-being					impacts.
27	Between a rock and a hard place:The burdens of uncontrolled fire for smallholders across the tropics	✓	✓	✓	High	Strong relevance for demonstrating that smallholder voices can be marginalized in fire governance despite diverse evidence bases.
28	Finnish dairy farmers'perceptions of justice in the transition to carbon-neutral farming	✓	✓	✓	High	Strong relevance for demonstrating that interview-based research can capture farmers' lived experiences of procedural injustice in climate policy.
29	Sustainability,justice and equity in food systems: Ideas and proposals in dispute in Brazil	✓	✓	✓	Good	Strong relevance for demonstrating that literature and policy analysis can clarify disputes over equity and participation in food system transitions.
30	Perceived justice of the Dutch food system transition	✓	✓	✓	High	Strong relevance for demonstrating that mixed-method research can effectively capture stakeholder perceptions of fairness in transition governance.
31	What is the future of pastoral livestock farming in the context of climate change? An environmental justice analysis of contested discursive justifications of pastoralism in the Pyrenees	✓	✓	✓	High	Strong relevance for demonstrating that participatory observation and interviews can illuminate contested justifications in pastoral governance.
32	Just transition frames: Recognition, representation, and distribution in Irish beef farming	✓	✓	✓	High	Strong relevance for demonstrating that transition conflict is shaped by representation, recognition, and meaningful participation, not distribution alone.
33	An analytical framework to consider social justice issues in farmland	✓	✓	✓	High	Strong relevance for demonstrating that land-use policy can systematically exclude weaker agricultural actors.

	preservation on the urban fringe. Insights from three French cases					
34	Prospects for the bioeconomy in achieving a Just Transition: perspectives from Irish beef farmers on future pathways	✓	✓	✓	High	Strong relevance for demonstrating that "green" transition pathways remain unjust when power asymmetries and income insecurity are left unaddressed.
35	Farming on the margins: Just transition and the resilience of peripheral farms	✓	✓	✓	High	Strong relevance for demonstrating that transition injustice emerges when policies ignore uneven farmer capacities, regional constraints, and proactive pathway-building.
36	Trusted land: land deals, climate vulnerability and adaptation in Northern Mozambique	✓	✓	✓	High	Strong relevance for demonstrating that land-use change can become unjust by disrupting farmers' adaptation strategies, livelihood spatiality, and risk-buffering practices.
37	Just wheat transitions?: Working toward constructive structural changes in wheat production	✓	✓	✓	High	Strong relevance for demonstrating that agricultural transitions fail when farmers are treated as objects of reform rather than subjects of justice.
38	Just agrifood transitions: a cross-country comparison of stakeholder perceptions between Finland and England	✓	✓	✓	High	Strong relevance for demonstrating that agrifood transitions break down when farmers feel blamed, misrecognized, and excluded from trustworthy participatory processes.
39	Adaptation isn't for farmers: narratives of injustice around climate adaptation in Irish agriculture	✓	✓	✓	High	Strong relevance for demonstrating that transition policies may fail when farmers experience them as externally imposed burdens rather than support for livelihood resilience.
40	Inclusive Innovation Governance for Just Transitions: Insights from the Bean Agri-Food System in the Brunca Region of Costa Rica	✓	✓	✓	High	Strong relevance for demonstrating that local participatory innovation alone is insufficient without inclusion in higher-level decision-making and resource allocation.
41	Finnish dairy farmers' perceptions of justice in the transition to	✓	✓	✓	High	Strong relevance for demonstrating that transition policies are unlikely to gain acceptance when they undermine

	carbon-neutral farming					livelihood security, stigmatize farmers, or impose uneven burdens.
42	Aquaculture isn't always the answer: rethinking blue transitions through justice and community experience	✓	✓	✓	High	Strong relevance for demonstrating that top-down green transitions can ignore local heterogeneity, weaken livelihoods, and produce procedural injustice.
43	An integrated, socially equitable design for sustainable water and energy supply in Iran	✓	✓	✓	Good	Strong relevance for demonstrating that system design research can integrate social equity considerations into technical modeling.
44	Making space for environmental justice in renewable energy planning	✓	✓	✓	High	Strong relevance for demonstrating that case study and policy analysis can support the integration of diverse perspectives in spatial planning.
45	Climate justice in land use planning: Exploring the potential and challenges of nature-based solutions	✓	✓	✓	Good	Strong relevance for demonstrating that conceptual analysis can clarify the procedural challenges of implementing nature-based solutions.
46	Groundwater allocation and the question of justice in Iran's rural communities	✓	✓	✓	High	Strong relevance for demonstrating that contextualized empirical research can reveal local disenfranchisement in resource governance.
47	Will the EU deforestation-free products regulation (EUDR) reduce tropical forest loss? Insights from political economy and justice perspectives	✓	✓	✓	Good	Strong relevance for demonstrating that documentary analysis can expose top-down procedural failure in international policy formulation.
48	Customary land tenure and climate land transitions: A justice lens on Ghana's land governance	✓	✓	✓	Good	Strong relevance for capturing procedural justice concerns in land-based climate governance.
49	Performative planning? Evaluating coexistence and procedural justice in Queensland's gas–agriculture interface	✓	✓	✓	High	Strong empirical relevance for documenting procedural failure and farmer marginalization in land-use governance.
50	Reviving rural "dead capital" through transferable development	✓	✓	✓	High	Strong analytical relevance for showing how institutional design reproduces rural injustice across multiple justice

	rights: A spatial justice analysis of online citizen–government interactions in China					dimensions.
51	Resistance as agency: Reimagining participation in forest landscape restoration in Tigray, Ethiopia	✓	✓	✓	High	Strong empirical relevance for demonstrating that exclusionary restoration governance generates resistance as a marker of multidimensional injustice.
52	Displacement by design? Short- to medium-term effectiveness of Zimbabwe's 2014 Tugwi-Mukosi resettlement plan and management	✓	✓	✓	High	Strong relevance for showing that compensation and relocation alone are insufficient when long-term livelihood recovery is undermined.
53	Environmental justice lens as a necessity and an opportunity in relocation: The case of the Noordwaard and the Eferding Basin	✓	✓	✓	High	Strong relevance for demonstrating that compensation-based relocation can still reproduce procedural and distributive injustice when non-monetary loss is overlooked.
54	Perceived Equity in Compulsory Land Acquisition Process for Industrialization in Vietnam	✓	✓	✓	High	Strong empirical relevance for showing that procedural fairness and respectful treatment can outweigh distributive outcomes in shaping perceived equity.
55	What is Fair in Groundwater Allocation? Distributive and Procedural Fairness Perceptions of California's Sustainable Groundwater Management Act	✓	✓	✓	High	Strong relevance for demonstrating that policy acceptance depends on locally legitimate, procedurally fair, and trusted decision-making institutions.

20.Supplementary Note: Results of Syntheses (Items 20a-20d)

20a. Characteristics and Risk of Bias: The included studies were predominantly qualitative case studies and mixed-method studies. The overall risk of bias was moderate; while most studies clearly defined their research aims, the level of detail regarding participant recruitment varied. The studies

covered diverse geographic contexts, which were closely linked to the specific types of land-use transition under investigation.

20b. Statistical Syntheses: No statistical meta-analysis was conducted due to the methodological heterogeneity (qualitative vs. quantitative) and the conceptual nature of the outcome (procedural justice). Therefore, no summary estimates (e.g., confidence intervals) or statistical tests are reported. Results are presented through **narrative synthesis**, organized by key themes.

20c. Investigation of Heterogeneity: Variations in findings (heterogeneity) were explored qualitatively by examining the relationship between the **type of land-use transition** and **geographic context**. We observed distinct patterns where specific transition types were concentrated in different regions. For instance, studies focusing on **energy transitions** (e.g., just transition in renewables) were predominantly situated in **developed economies**, emphasizing planning participation. In contrast, studies concerning **natural resource allocation** were more frequently found in **developing contexts**, often focusing on basic rights and displacement. This variation suggests that the challenges of procedural justice are context-dependent.

20d. Sensitivity Analyses: Not applicable due to the narrative nature of the synthesis.

21.Supplementary Note: Results of Assessment of Risk of Bias due to Missing Results (Item 21)

As stated in Item 14, no statistical assessment (e.g., funnel plots or Egger's test) was conducted due to the qualitative nature of the review. Therefore, no quantitative estimates of reporting bias are available.

However, based on the qualitative synthesis, we identified two potential sources of missing results:

Under-representation of "Success" Stories: The included studies predominantly focused on cases of conflict, resistance, and injustice. There appears to be a reporting bias where smooth, non-conflictual land transitions are less likely to be studied or published, potentially skewing the literature towards negative procedural outcomes.

Geographic gaps: While energy transitions were well-documented in developed contexts, similar transitions in non-English speaking developing regions (outside of the sampled literature) may be under-reported due to language barriers in the search strategy.

Consequently, the synthesized findings should be viewed as highlighting potential risks in land-use transitions rather than capturing the universe of all transition outcomes.

24. Registration and Protocol (Items 24a–24c)

24a. The systematic review was retrospectively registered on the Open Science Framework (OSF). As the registration is currently embargoed to maintain blind peer review, it can be accessed via the following anonymized view-only link:https://osf.io/p9zhf/overview?view_only=060702ef7d8b4c518345c9bbcd76e039

24b. The review protocol is available on the OSF platform at the link provided in Item 24a.

24c. Amendments:

Not applicable. As the protocol was registered retrospectively, there were no deviations from the methodology described in the registration.

27. Supplementary Note: Data Availability Statement The datasets supporting the conclusions of this systematic review are included in this published article and its Supplementary Information files. However, raw data associated with the empirical case study are subject to availability restrictions to protect participant privacy.

Specifically:

Data Extraction Forms: The specific data extracted from the 32 included studies are fully presented in Table S2 & S4.

Analytic Code: Not applicable, as no custom code or statistical software was used for the narrative synthesis.

Case Study Data: Raw interview transcripts from the Huwei case study are not publicly available due to privacy and ethical restrictions regarding the anonymity of interviewees.