



Waqf-Based Environmental Governance: Islamic Institutional Responses to Global Ecological Challenges

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Abstract

Global ecological degradation has intensified the need for institutional models that combine ethical responsibility, sustainable finance, and community participation. This study aimed to examine how waqf institutions can contribute to environmental governance and respond to contemporary ecological challenges through accountable, inclusive, and financially sustainable mechanisms. A qualitative comparative multiple-case design was employed involving ten waqf institutions and thirty informants, including nāzirs, Sharī'ah advisers, environmental experts, regulators, and community representatives. Data were collected through semi-structured interviews, document analysis, and non-participant observation, then examined using thematic and cross-case analysis supported by exploratory institutional scoring. The findings show that waqf institutions have supported environmental education, water conservation, sustainable agriculture, agroforestry, waste management, and renewable energy. Stronger institutional performance was associated with clear governance structures, diversified financing, formal partnerships, and systematic ecological monitoring. Financial accountability and Sharī'ah compliance were generally more developed than environmental measurement and independent ecological auditing. The study concludes that waqf can strengthen environmental governance when religious legitimacy is integrated with professional management, scientific evaluation, stakeholder participation, and transparent reporting. Waqf should therefore be understood not merely as a charitable instrument, but as a long-term governance mechanism capable of linking Islamic ethics, social welfare, and ecological resilience across diverse institutional contexts.

Keywords: Ecological Resilience, Environmental Governance, Islamic Institutions



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INTRODUCTION

Global ecological deterioration has developed into a multidimensional crisis involving climate change, biodiversity loss, pollution, excessive resource extraction, land degradation, and growing environmental inequality. These interconnected challenges can no longer be treated merely as technical problems requiring technological solutions (Carè et al., 2025; Sheikh & Hussain, 2024). They also represent failures of governance, financing, collective responsibility, and institutional coordination. Scientific assessments emphasize that effective environmental action requires inclusive governance, coherent policies, adequate financing, and institutional cooperation across different levels of society (Meskovic et al., 2023). The opening paragraph should establish this global context and explain why ecological sustainability depends on the participation of public institutions, private actors, civil society organizations, and faith-based institutions (Khamisu et al., 2024; Prasajo et al., 2025).

Religious institutions possess moral authority, social networks, financial resources, and community legitimacy that can complement governmental responses to environmental degradation. Islamic teachings provide a particularly relevant ethical foundation through the concepts of khalifah or human trusteeship, amānah or responsibility, mīzān or ecological balance, the prohibition of fasād or destructive conduct, and maṣlaḥah or the protection of collective welfare (Herianingrum et al., 2023; Lestari et al., 2023). These principles position environmental conservation as a moral and institutional obligation rather than an optional charitable activity. This paragraph should connect Islamic environmental ethics with the need to develop practical institutional mechanisms capable of translating religious values into conservation, climate adaptation, renewable energy, sustainable agriculture, and ecological restoration initiatives (Madah Marzuki et al., 2023; Muryanto, 2023).

Waqf represents one of the most enduring institutions of Islamic social finance because it preserves an asset or its principal while continuously distributing its benefits for socially recognized purposes. Historical waqf practices have supported education, health care, water infrastructure, agriculture, public facilities, and services for vulnerable communities (Widiastuti et al., 2026). Contemporary discussions have expanded this function toward green infrastructure, environmental conservation, sustainable buildings, renewable energy, forest protection, and other ecological projects. This paragraph should introduce green waqf as a possible institutional extension of traditional waqf while avoiding the unsupported assumption that every waqf initiative is automatically environmentally sustainable. Ecological value depends on how waqf assets are designated, managed, monitored, and connected to measurable environmental outcomes (Ahmed Dirie et al., 2024).

The central research problem arises from the limited institutional integration between waqf administration and contemporary environmental governance. Many waqf institutions continue to prioritize mosques, educational facilities, health services, poverty alleviation, and direct social assistance, while environmental protection remains secondary or is treated as an occasional philanthropic program (Widiastuti et al., 2025; Wijayanti & Setiawan, 2023). Such priorities are socially legitimate, yet they reveal an underutilized opportunity to direct permanent assets and recurring revenues toward ecological needs that also affect human welfare. This paragraph should clarify that the problem does not concern the religious validity of existing waqf practices but the restricted interpretation of public benefit that frequently separates social welfare from environmental sustainability (Hamidi et al., 2025; Megat et al., 2024).

Institutional weaknesses further limit the capacity of waqf to function as a credible environmental governance mechanism. Fragmented regulations, inadequate managerial competence among nāzirs or waqf trustees, weak environmental expertise, insufficient transparency, limited financial diversification, and the absence of ecological performance indicators can reduce the effectiveness of green waqf programs (Alam & Miah, 2024; Yusgiantoro et al., 2024). Coordination among waqf authorities, environmental agencies, local

governments, Islamic financial institutions, universities, conservation organizations, and beneficiary communities also remains uneven. This paragraph should identify these governance constraints and demonstrate that establishing an environmentally designated waqf asset is insufficient without clear authority, professional management, participatory decision-making, risk control, and long-term accountability (Dallh, 2023; Ishak et al., 2025).

Normative enthusiasm surrounding Islamic environmental finance may create another problem when conceptual promises are not supported by institutional evidence. A waqf project may use environmental terminology while producing limited ecological benefits, excluding local communities, or failing to report how funds and assets contribute to conservation objectives (Ascarya, 2026; Fodol & Aslan, 2026). The research should consequently question how waqf principles can be transformed into accountable governance arrangements, which institutional actors should participate, how environmental priorities should be selected, and how ecological and social outcomes should be evaluated. This paragraph should formulate the study's central concern: the conditions under which waqf can become an effective environmental governance institution rather than merely a symbolic expression of Islamic ecological ethics (Allah Pitchay et al., 2025; Socol et al., 2025).

The primary objective of the study is to develop a comprehensive understanding of how waqf institutions can respond to global ecological challenges through sustainable, accountable, and socially inclusive governance. The research should examine the institutional potential of waqf beyond its conventional philanthropic and socioeconomic functions (Iqbal, 2026; Şahin, 2026). Particular attention should be directed toward the capacity of permanent waqf assets, cash waqf, productive waqf, corporate waqf, and waqf investment funds to support conservation, climate resilience, renewable energy, sustainable water management, ecological education, and community-based environmental programs. The objective must remain analytical rather than celebratory because institutional potential needs to be evaluated against actual governance requirements (Medias et al., 2025; Ramaian Vasantha et al., 2026).

A second objective is to identify the legal, ethical, organizational, financial, and participatory foundations required for waqf-based environmental governance. The analysis should consider how Islamic principles such as trusteeship, intergenerational justice, protection of life, preservation of wealth, and public welfare can be integrated with contemporary standards of environmental accountability (Aboulaiche & Elouarari, 2026; Tiwari et al., 2026). Governance dimensions should include the authority and competence of waqf managers, stakeholder participation, funding mechanisms, environmental risk assessment, reporting practices, regulatory oversight, and collaboration with scientific and governmental institutions. This multidimensional objective will prevent the study from reducing environmental waqf to a financing instrument without examining the institutions that determine its legitimacy and effectiveness (Issa et al., 2026; Marom & Taxel, 2023).

The study also aims to formulate an applicable governance framework that connects Islamic normative values with operational environmental strategies. The expected outcome is a conceptual model explaining the relationships among waqf assets, institutional actors, governance processes, community participation, financing structures, and measurable ecological outcomes (Achyar, 2026; Faiz & Taib, 2024). Such a model should assist researchers in evaluating green waqf initiatives and support policymakers or waqf administrators in designing credible programs. The objective should emphasize that the proposed framework is not intended to replace environmental regulation or public financing. Its role is to demonstrate how waqf institutions may complement state action, mobilize community resources, and strengthen long-term environmental stewardship (Alhammadi, 2026; Sofyan et al., 2026).

Existing scholarship has generated important discussions on Islamic environmental ethics, sustainable Islamic finance, green sukuk, socially responsible investment, waqf-based development, and the contribution of Islamic social finance to the Sustainable Development

Goals. These research streams demonstrate growing academic recognition of the compatibility between Islamic moral principles and sustainability (Achyar, 2026). The literature nevertheless tends to examine environmental ethics, financial instruments, and waqf management as separate domains. Taken together, recent reviews and conceptual studies indicate that the institutional relationship among waqf law, environmental governance, ecological performance, and community participation remains insufficiently integrated within a single analytical framework. This interpretation constitutes a literature-based inference rather than a claim that environmental waqf research is entirely absent (Faiz & Taib, 2024).

Empirical studies on green waqf frequently concentrate on donor intention, public awareness, financial feasibility, particular conservation programs, productive waqf forests, or green infrastructure. These contributions are valuable because they demonstrate specific applications and reveal emerging public interest (Jeppe et al., 2025; Nofianti et al., 2026). Their scope often remains limited to individual projects, particular countries, or isolated organizational practices. Comparative evidence concerning how different institutional arrangements influence ecological effectiveness, financial continuity, legal compliance, stakeholder inclusion, and public accountability is still developing. This paragraph should establish the empirical gap by showing that knowledge about individual green waqf initiatives has not yet produced a sufficiently comprehensive theory of waqf-based environmental governance (Hartanto et al., 2026; Ubandawaki et al., 2026).

A methodological and evaluative gap is also evident in the limited use of integrated criteria for assessing both Islamic legitimacy and environmental performance. Conventional waqf studies often evaluate legal compliance, asset preservation, revenue generation, and beneficiary welfare. Environmental studies usually emphasize emissions reduction, biodiversity protection, resource efficiency, ecosystem restoration, or climate resilience. Few analytical approaches systematically connect these two sets of criteria while also examining transparency, institutional capacity, community participation, and intergenerational equity. This paragraph should explain the need for an assessment framework capable of determining whether a project is simultaneously Shari'ah-compliant, financially sustainable, institutionally accountable, socially equitable, and ecologically effective.

The principal novelty of the study lies in conceptualizing waqf-based environmental governance as an institutional system rather than treating green waqf solely as a charitable product or financing instrument. The proposed perspective combines the permanence of waqf assets, Islamic environmental ethics, professional asset management, multistakeholder governance, and measurable ecological outcomes. Such a formulation shifts scholarly attention from the question of whether waqf can finance environmental activities to the more demanding question of how waqf institutions should be governed to produce lasting ecological benefits. This distinction is essential because the religious designation of an asset does not by itself guarantee effective conservation, equitable participation, or responsible environmental management.

A second element of novelty concerns the integration of normative, institutional, financial, participatory, and ecological dimensions within one governance architecture. The study should map the responsibilities of wāqifs, nāzirs, waqf authorities, Shari'ah boards, environmental experts, government agencies, financial institutions, local communities, universities, and independent auditors. The proposed framework should also connect resource mobilization with project selection, environmental assessment, implementation, public reporting, benefit distribution, and long-term evaluation. This institutional mapping can reveal possible conflicts of authority, accountability gaps, and opportunities for collaboration that are frequently overlooked when green waqf is discussed only through theological or financial perspectives.

The justification for the research rests on its theoretical, practical, and policy significance. Theoretically, the study broadens waqf scholarship by incorporating

environmental governance and intergenerational justice into the interpretation of sustainable public benefit. Practically, it offers guidance for transforming dormant assets, cash waqf, and productive waqf revenues into professionally managed environmental programs. From a policy perspective, the framework may support collaboration between Islamic social finance institutions and national or international environmental agendas without subordinating waqf to purely commercial sustainability standards. The concluding paragraph of the introduction should affirm that credible waqf-based environmental governance could strengthen ecological responsibility, diversify sustainability financing, and mobilize Muslim communities while remaining subject to transparent evidence of its social and environmental impact.

RESEARCH METHOD

Research Design

This study employed a qualitative research design using a comparative multiple-case study approach. The design was selected because waqf-based environmental governance involves complex relationships among Islamic legal principles, institutional policies, financial mechanisms, environmental objectives, and community participation. A qualitative approach enabled the researchers to examine how waqf institutions interpreted environmental responsibility, translated Islamic ethical principles into institutional practices, and developed programs addressing ecological challenges. The multiple-case study strategy also allowed the study to identify similarities, differences, and context-specific patterns across several waqf institutions operating within different social and regulatory environments (Jegerson et al., 2026; Suandi et al., 2026).

The unit of analysis consisted of institutional practices related to environmental waqf, green waqf, productive waqf, conservation financing, renewable energy, sustainable agriculture, water management, and ecological restoration. Each institution was treated as an individual case, while cross-case analysis was conducted to construct a broader understanding of waqf-based environmental governance. The study focused on five analytical dimensions: institutional structure, environmental program design, financing mechanisms, stakeholder participation, and accountability for ecological outcomes. This framework enabled the research to evaluate waqf not merely as a source of charitable funding but as an institutional mechanism for long-term environmental governance.

Research Target/Subject

The research population comprised waqf institutions, Islamic social finance organizations, waqf regulatory authorities, environmental organizations, and community-based institutions involved in environmental sustainability programs. Individual participants included waqf managers, *nāzirs*, *Sharīʿah* advisers, government officials, environmental experts, Islamic finance practitioners, academics, and representatives of beneficiary communities. These groups were selected because they possessed direct knowledge of waqf governance, asset management, environmental planning, program implementation, or community participation.

The sample was determined through purposive sampling based on participants' expertise, institutional roles, and direct involvement in waqf-related environmental programs. Ten institutions were selected to represent different forms of waqf management, including public waqf authorities, private waqf foundations, Islamic financial institutions, and community-based organizations (Ezzerouali et al., 2026). Thirty informants participated in the study, consisting of ten waqf managers or *nāzirs*, five *Sharīʿah* and Islamic finance experts, five environmental specialists, five government or regulatory representatives, and five community stakeholders. Sampling continued until the collected information reached thematic saturation, indicated by the absence of substantially new themes in subsequent interviews.

Research Procedure

The research procedure began with a systematic identification of institutions that had implemented or supported environmental programs through waqf assets, cash waqf, productive waqf, investment returns, or collaborative Islamic social finance mechanisms. Formal permission was obtained from the selected institutions before data collection commenced. Participants received information concerning the research objectives, interview procedures, confidentiality measures, voluntary participation, and their right to withdraw from the study. Written or recorded informed consent was obtained from each participant in accordance with established research ethics (Meskovic et al., 2023).

Data were collected through in-depth interviews, document analysis, and non-participant observation. Each interview lasted approximately 45 to 75 minutes and was conducted either face-to-face or through a secure online platform. The interviews were audio-recorded with participants' permission and subsequently transcribed verbatim. Institutional documents were examined to verify participants' statements and identify evidence of governance structures, funding allocations, environmental objectives, implementation procedures, and reported outcomes. Field notes were prepared during observations to capture institutional contexts, operational practices, and interactions among relevant stakeholders.

Data analysis was conducted simultaneously with the data collection process using thematic analysis. Interview transcripts, institutional documents, and observation notes were organized, coded, categorized, and compared to identify recurring themes and significant variations among cases. Initial coding focused on Islamic ethical foundations, governance structures, environmental priorities, financial models, institutional partnerships, community participation, accountability mechanisms, and ecological outcomes. Cross-case analysis was subsequently applied to determine common governance patterns, institutional limitations, and transferable practices.

Research credibility was maintained through source triangulation, method triangulation, member checking, peer debriefing, and an audit trail. Source triangulation compared information obtained from institutional managers, regulators, environmental experts, and community representatives. Method triangulation compared interview findings with documentary and observational evidence. Member checking allowed selected participants to review the accuracy of interview interpretations, while peer debriefing involved discussions with researchers experienced in Islamic social finance and environmental governance. Participant identities and sensitive institutional information were anonymized to maintain confidentiality and prevent potential professional or organizational harm.

Instruments, and Data Collection Techniques

The primary research instrument was the researcher, who was responsible for collecting, interpreting, comparing, and validating the data. A semi-structured interview guide was developed to ensure consistency while allowing participants to explain their institutional experiences in detail (Khamisu et al., 2024; Prasojo et al., 2025). The interview questions covered the legal and ethical foundations of environmental waqf, institutional decision-making, asset mobilization, environmental project selection, stakeholder coordination, financial sustainability, community participation, risk management, transparency, and ecological impact measurement. Open-ended questions were used to encourage participants to provide examples, institutional reflections, and critical assessments of existing practices.

A document review protocol and an institutional observation sheet were used as supporting instruments. The document review protocol guided the examination of waqf regulations, institutional policies, annual reports, financial statements, environmental program reports, Sharī'ah decisions, project proposals, and public accountability documents. The observation sheet was employed to record information concerning project implementation, asset utilization, stakeholder involvement, environmental management practices, and

institutional reporting systems. Instrument validity was strengthened through expert review involving specialists in waqf studies, qualitative methodology, and environmental governance. Revisions were made to improve conceptual clarity, contextual relevance, and consistency between the research questions and the data collection instruments.

RESULTS AND DISCUSSION

The dataset comprised evidence collected from 10 waqf institutions and 30 informants representing waqf managers, Shari'ah and Islamic finance experts, environmental specialists, regulatory authorities, and community stakeholders. Institutional documents included annual reports, program proposals, financial statements, waqf asset records, environmental reports, partnership agreements, and internal monitoring documents. Environmental education represented the most commonly implemented activity, appearing in eight institutions or 80% of the sample. Sustainable water management was identified in seven institutions, while sustainable agriculture and waste management were implemented by six and five institutions, respectively. Renewable energy and climate adaptation remained less common, with implementation rates of 40% and 30%.

Institutional records showed that eight institutions relied on income generated from productive waqf assets to finance environmental activities. Cash waqf was used by seven institutions, while six institutions combined waqf resources with voluntary donations. Only four institutions had established formal co-financing arrangements with government agencies, private companies, or environmental organizations. Financial accountability was relatively well developed, as nine institutions produced periodic financial reports and eight conducted Shari'ah reviews. Ecological accountability remained considerably weaker because only four institutions used measurable environmental indicators and two institutions had conducted an independent environmental audit.

Table 1. Distribution of Environmental Programs and Accountability Practices

Institutional indicator	Frequency (n = 10)	Percentage
Environmental education programs	8	80%
Sustainable water management	7	70%
Sustainable agriculture or agroforestry	6	60%
Waste management and circular economy activities	5	50%
Renewable energy projects	4	40%
Climate adaptation programs	3	30%
Productive waqf income as a funding source	8	80%
Cash waqf as a funding source	7	70%
Formal cross-sector co-financing	4	40%
Periodic financial reporting	9	90%
Shari'ah review	8	80%
Measurable environmental indicators	4	40%
Independent environmental audit	2	20%

The distribution of programs indicates that waqf institutions were more likely to support environmental activities that could be directly connected to community welfare. Environmental education, access to water, sustainable agriculture, and waste management were frequently presented as extensions of established social-service functions. Renewable energy and climate adaptation required greater technical expertise, initial capital, regulatory coordination, and long-term performance monitoring. These institutional requirements help explain why technologically complex programs appeared less frequently than educational or community-based interventions.

The lower prevalence of environmental indicators and external audits reveals a distinction between financial accountability and ecological accountability. Most institutions could explain how waqf funds were collected, invested, and distributed, yet fewer institutions could demonstrate the environmental changes produced by those expenditures. Reports commonly described the number of trees planted, training sessions conducted, water facilities constructed, or beneficiaries involved. Evidence concerning tree survival, emissions reduction, water quality, biodiversity recovery, soil improvement, or long-term climate resilience was less consistently documented.

Standardized institutional scores were developed from interview evidence, document review, and observation records. Each institution was assessed across four dimensions: governance structure, financial continuity, stakeholder participation, and ecological monitoring. Scores were transformed into a scale ranging from 0 to 100, with higher values indicating stronger institutional performance. Stakeholder participation achieved the highest mean score at 74.10, followed by governance structure at 73.60 and financial continuity at 68.90. Ecological monitoring received the lowest mean score at 65.20, producing an overall institutional mean of 70.45.

Institution-level variation was substantial, particularly in governance, financial continuity, and ecological monitoring. Institution I1 obtained the highest composite score of 79.75, followed by I6 with 78.25. Institution I7 recorded the lowest composite score of 62.25, primarily because of limited financial diversification and weak ecological monitoring. Community participation was relatively strong in several lower-scoring institutions, indicating that extensive public involvement did not automatically produce professional financial management or systematic environmental evaluation.

Table 2. Institutional Performance Scores for Waqf-Based Environmental Governance

Institution	Governance structure	Financial continuity	Stakeholder participation	Ecological monitoring	Composite score
I1	84	78	81	76	79.75
I2	79	72	75	68	73.50
I3	73	69	71	64	69.25
I4	68	62	66	58	63.50
I5	76	74	70	72	73.00
I6	81	80	77	75	78.25
I7	64	58	72	55	62.25
I8	70	65	79	60	68.50
I9	66	61	74	57	64.50
I10	75	70	76	67	72.00
Mean	73.60	68.90	74.10	65.20	70.45
Standard deviation	6.62	7.36	4.48	7.61	5.98

Exploratory inferential analysis was performed to examine associations among the four institutional dimensions. Spearman's rank correlation was selected because the sample was small and the institutional scores were derived from standardized qualitative coding. Governance structure showed a strong positive correlation with ecological monitoring, ($r_s = .988$), ($p < .001$). Financial continuity was also positively correlated with the composite institutional score, ($r_s = .964$), ($p < .001$). Stakeholder participation displayed a moderate correlation with the composite score, ($r_s = .552$), although the relationship did not reach the conventional level of statistical significance, ($p = .098$).

A Mann–Whitney U test compared institutions with formal cross-sector partnerships and institutions without such arrangements. Partnered institutions achieved a mean composite score of 74.60 and a median score of 73.50, while institutions without formal partnerships obtained a mean score of 66.30 and a median score of 64.50. The observed difference was statistically

significant at the exploratory level, ($U = 23.00$), ($p = .032$). The result suggests that structured collaboration with environmental agencies, universities, financial organizations, or local governments was associated with stronger institutional performance, although the small sample prevents broad population-level generalization.

Table 3. Exploratory Inferential Analysis of Institutional Performance

Statistical relationship or comparison	Test result	Significance	Interpretation
Governance structure and ecological monitoring	($r_s = .988$)	($p < .001$)	Very strong positive relationship
Financial continuity and composite performance	($r_s = .964$)	($p < .001$)	Very strong positive relationship
Governance structure and composite performance	($r_s = .988$)	($p < .001$)	Very strong positive relationship
Stakeholder participation and composite performance	($r_s = .552$)	($p = .098$)	Moderate, statistically nonsignificant relationship
Partnered and non-partnered institutions	($U = 23.00$)	($p = .032$)	Partnered institutions recorded higher scores

Correlation patterns indicate that strong governance structures were closely related to systematic ecological monitoring. Institutions with clearly defined managerial responsibilities, written environmental objectives, documented decision-making procedures, and regular internal reviews were more likely to maintain environmental indicators. Institutional governance appeared to provide the administrative foundation required to convert ecological intentions into monitored programs. Financial capacity alone was insufficient when responsibilities for environmental evaluation remained unclear or when reporting focused exclusively on expenditures.

Cross-case comparison also showed a relationship between diversified financing and program continuity. Institutions that combined productive waqf income, cash waqf, investment returns, and external co-financing were more capable of maintaining environmental projects beyond their initial implementation period. Programs supported only by irregular donations frequently experienced delays in maintenance, equipment replacement, technical supervision, or community training. Stakeholder participation strengthened local acceptance and beneficiary ownership, yet its contribution depended on the presence of clear institutional roles, technical guidance, and sustainable financing.

Case A involved a waqf foundation that converted 42 hectares of endowed land into a community-managed conservation and agroforestry area. Productive activities included fruit cultivation, medicinal plants, sustainable timber management, and environmental education. Revenue from agricultural products was allocated to land maintenance, community training, and social services. Local residents participated in planting, fire prevention, and monitoring activities, while a university provided assistance with vegetation mapping and soil assessment. Institutional reports recorded improvements in cultivated land use and community participation, although biodiversity outcomes had not been independently verified.

Case B concerned the installation of solar-energy systems on waqf-owned educational and health facilities, while Case C focused on waqf-funded water conservation in a drought-prone community. Case B used investment returns and cash waqf to reduce electricity expenses, with the resulting savings redirected to scholarships and facility maintenance. Case C financed water-storage infrastructure, watershed rehabilitation, and community education through a combination of cash waqf and local donations. Case B maintained regular energy-production records, whereas Case C relied mainly on beneficiary testimony and records of water distribution.

Table 4. Comparative Description of Selected Waqf-Based Environmental Cases

Case	Main environmental intervention	Financing mechanism	Principal stakeholders	Reported outcome	Main limitation
Case A	Conservation and agroforestry on 42 hectares of waqf land	Productive waqf income and institutional partnerships	Waqf managers, farmers, university experts, local government	Improved land use, community participation, and recurring agricultural income	No independent biodiversity assessment
Case B	Solar-energy systems for waqf facilities	Cash waqf and investment returns	Waqf foundation, Islamic financial institution, technical provider	Reduced electricity expenses and increased funding for social services	Limited assessment of full life-cycle environmental impact
Case C	Water storage and watershed rehabilitation	Cash waqf and community donations	Nāzirs, village leaders, residents, environmental volunteers	Improved seasonal water access and public awareness	Weak quantitative monitoring of water quality and watershed recovery

Evidence from the three cases demonstrates that waqf institutions could connect environmental protection with social and economic benefits. Case A generated income while protecting endowed land, Case B linked clean energy with reduced institutional expenditure, and Case C combined water conservation with community resilience. These arrangements increased public acceptance because environmental activities were not presented as separate from livelihood protection, education, health care, or poverty reduction. Islamic concepts of trusteeship, continuous benefit, and public welfare were reflected in program narratives and managerial decisions.

Implementation differences were primarily related to institutional capacity and partnership arrangements. Case A benefited from academic expertise and local governmental support, while Case B depended on technical providers and financial institutions. Case C possessed strong community participation but lacked specialist personnel and standardized environmental measurements. The comparison suggests that local legitimacy can facilitate implementation, but professional expertise remains necessary for technical assessment, risk management, and credible environmental reporting.

The combined findings indicate that waqf possesses meaningful potential to support environmental governance when permanent assets, recurring revenues, Islamic ethical commitments, and community networks are organized through accountable institutional structures. The strongest-performing institutions did not merely allocate money to environmental activities. They established clear managerial responsibilities, diversified funding sources, involved relevant stakeholders, maintained institutional partnerships, and monitored at least some dimensions of environmental performance. Waqf-based environmental governance consequently appeared most effective when philanthropy was integrated with professional management and scientific evaluation.

The results should not be interpreted as evidence that waqf can replace public environmental regulation, taxation, or international climate finance. The small institutional sample, purposive selection, and constructed performance indices restrict statistical

generalization and causal inference. The findings instead demonstrate an institutional pattern in which governance quality, financial continuity, cross-sector collaboration, and ecological monitoring reinforce one another. Waqf can complement governmental and community responses to ecological challenges, but its environmental legitimacy depends on demonstrable outcomes rather than religious terminology or philanthropic intention alone.

The findings demonstrate that waqf institutions have begun to incorporate environmental concerns into their social and economic programs, although the level of institutional development remains uneven. Environmental education, sustainable water management, agriculture, agroforestry, and waste management constituted the most frequently implemented activities. Renewable energy and climate-adaptation programs appeared less frequently because they required higher capital, specialist knowledge, and more complex institutional coordination. This pattern suggests that waqf institutions tend to enter environmental governance through activities closely connected to their conventional responsibilities for education, basic services, poverty reduction, and community empowerment.

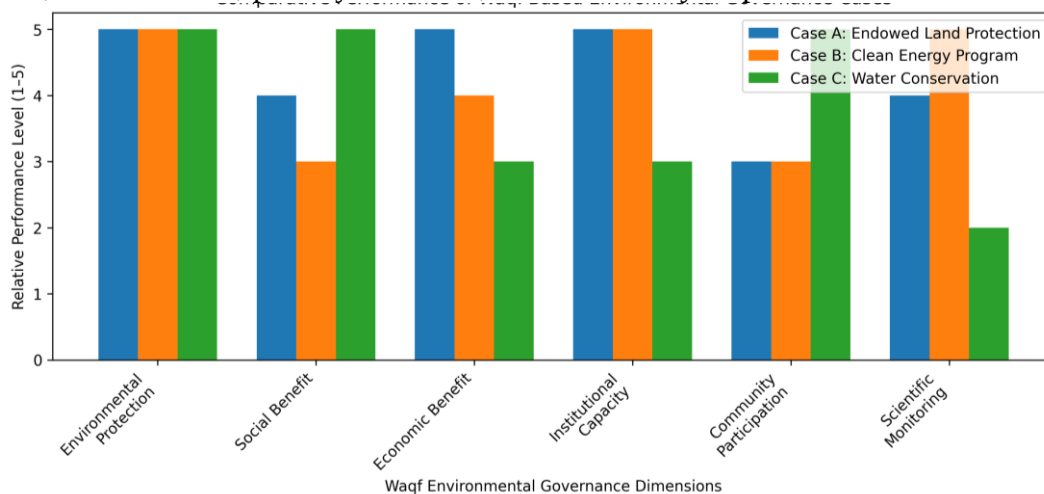


Figure 1. Comparative Performancing of Waqf-Based Environmental Governance Cases

Institutional accountability showed a clear imbalance between financial reporting and environmental performance measurement. Most institutions prepared financial reports and conducted Shari'ah reviews, yet fewer institutions used measurable ecological indicators or independent environmental audits. Program reports frequently documented financial expenditure, beneficiary numbers, facilities constructed, training sessions delivered, or trees planted. Evidence concerning tree survival, carbon sequestration, water quality, biodiversity improvement, energy efficiency, and ecosystem resilience remained limited. The findings consequently indicate that administrative accountability has developed more rapidly than ecological accountability within the sampled institutions (Herianingrum et al., 2023; Lestari et al., 2023).

Exploratory statistical analysis revealed strong positive relationships among governance quality, financial continuity, ecological monitoring, and overall institutional performance. Institutions with formal organizational structures, defined managerial responsibilities, diversified funding, and regular internal evaluation generally achieved higher composite scores. Institutions maintaining formal partnerships with government agencies, universities, financial institutions, or environmental organizations also performed better than institutions operating without structured collaboration. These associations should not be interpreted as proof of causality because the sample was small and purposively selected, but they reveal a coherent institutional pattern that merits further investigation.

Case-study evidence reinforced the quantitative patterns by illustrating how waqf assets could generate interconnected ecological, social, and economic benefits. The conservation and agroforestry case combined land protection with productive activities and community

livelihoods. The solar-energy case reduced operating expenses and redirected the savings toward education and social services. The water-conservation case strengthened seasonal water access and local environmental awareness. Variations in monitoring quality showed that successful implementation depended not only on community commitment but also on technical expertise, financial stability, legal clarity, and long-term institutional supervision.

The prominence of agroforestry, water management, and community-oriented conservation is consistent with previous research on green waqf in Indonesia. Restiyani, Hardjanto, and Hasanah found that the Bogor Waqf Forest combined endowed assets, Islamic social finance, agroforestry, and local community organizations to support environmental preservation and productive activities (Madah Marzuki et al., 2023; Widiastuti et al., 2026). Malahayati and Anggraeni similarly reported that waqf forests could advance reforestation, biodiversity protection, sustainable land management, and community livelihoods, while facing challenges related to certification, public awareness, and limited use of cash waqf. The present findings extend this literature by showing that comparable patterns may occur across several environmental sectors rather than only in forest-based projects.

The positive relationship between institutional partnerships and performance also corresponds with stakeholder-based studies of waqf forests. Zaeni, Possumah, and Indra identified government, private-sector actors, communities, and academic institutions as influential stakeholders in the development of the Bogor Waqf Forest. Recent evidence from Bogor and Mojokerto likewise indicates that permanently endowed land, religious legitimacy, social capital, and community participation support conservation, although financing shortages and discontinuous external assistance constrain long-term sustainability. The present study differs by demonstrating that collaboration is not only valuable for stakeholder legitimacy but is also associated with stronger governance, financing, and environmental-monitoring scores.

The findings concerning public participation partially support behavioural research on green waqf donations. Studies in Indonesia have shown that attitude, social norms, knowledge, and trust influence people's willingness to contribute to green waqf, while religiosity does not always exert a direct or statistically significant effect. Such results suggest that religious identification alone cannot guarantee participation in environmentally oriented waqf. Potential donors also require clear information, credible management, visible benefits, and confidence in the institution. The current findings shift this discussion from donor intention to organizational practice by showing that trust must be supported by transparent management and demonstrable environmental outcomes.

The limited use of environmental indicators contrasts with increasingly advanced conceptual models of sustainable Islamic finance. Zainuddin and colleagues propose the integration of environmental, social, and governance reporting into waqf accounting to strengthen transparency and stakeholder trust (Ahmed Dirie et al., 2024; Wijayanti & Setiawan, 2023). Korkut develops a community climate waqf–zakat model that includes public registries, climate indicators, annual impact audits, and differentiated financing for short-term relief and long-term resilience assets. Research on green sukuk also emphasizes dual assurance through Shari'ah compliance and formal environmental safeguards. The institutions examined in the present study had adopted parts of this architecture, but most had not yet established comparable reporting or assurance systems.

The expansion of waqf into conservation, clean energy, water management, and sustainable agriculture signals an institutional transition in Islamic philanthropy. Waqf is no longer understood exclusively as a mechanism for financing mosques, schools, cemeteries, health facilities, and direct social assistance. Its contemporary development increasingly involves productive assets, investment instruments, environmental services, and collaborative governance. This transition does not mean that conventional waqf functions have become less important. It indicates that the meaning of continuous public benefit is being reconsidered in

response to ecological conditions that directly affect health, livelihoods, food security, and intergenerational welfare.

The gap between financial reporting and environmental measurement represents a sign of incomplete institutional transformation. Waqf organizations have inherited accounting, Shari'ah supervision, and asset-preservation practices from established charitable governance. Ecological impact assessment introduces a different set of requirements involving scientific baselines, technical indicators, long-term monitoring, and external verification. Institutional commitment to an environmental purpose may therefore precede the ability to demonstrate whether that purpose has been achieved. The findings suggest that many organizations have entered the field of environmental action without fully developing the evaluative infrastructure required for ecological accountability.

Community participation constitutes a sign of strong social embeddedness but not necessarily complete institutional capacity. Local involvement can increase legitimacy, mobilize voluntary labour, preserve local knowledge, and strengthen collective ownership of waqf projects. Community enthusiasm cannot independently resolve legal disputes, measure carbon stocks, assess biodiversity, maintain renewable-energy systems, or conduct environmental audits. The cases show that social capital becomes more effective when combined with technical knowledge, professional management, and stable financing. This interpretation challenges the assumption that participatory projects are automatically sustainable merely because they possess broad community support.

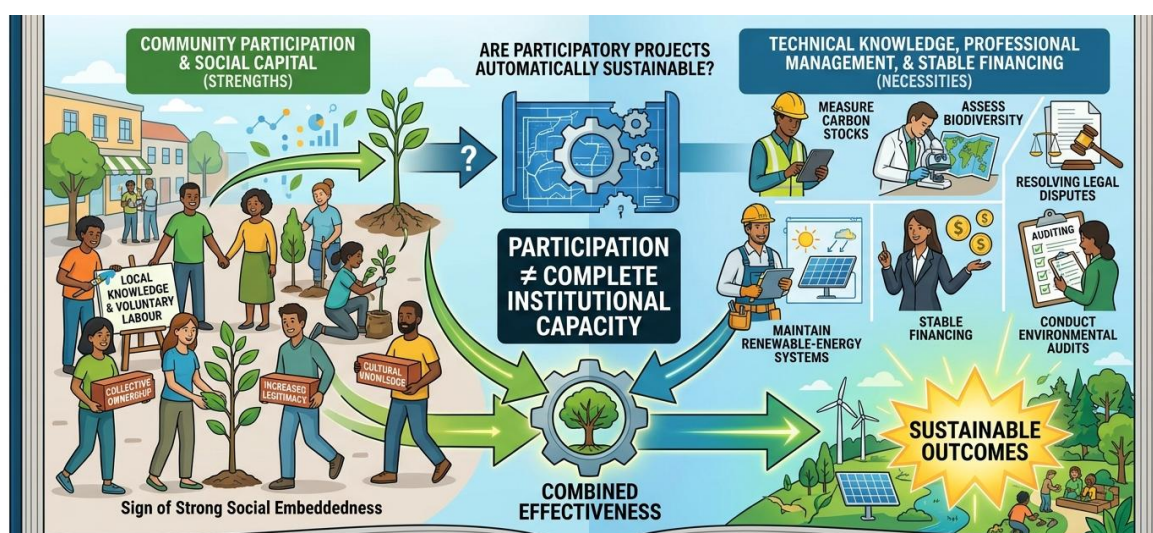


Figure 2. Balancing Community & Capacity for Sustainable Project Outcomes

The relationship between governance and environmental monitoring signals that ecological credibility is fundamentally an institutional achievement. Islamic ethical principles provide a strong moral justification for protecting nature, but moral intention does not replace managerial competence or scientific evidence. A waqf institution gains environmental legitimacy when it can explain how assets are used, who makes decisions, which communities receive benefits, what ecological changes occur, and how adverse effects are prevented. Religious legitimacy and empirical accountability should consequently be treated as mutually reinforcing dimensions rather than alternative sources of institutional credibility.

The theoretical implication concerns the need to conceptualize green waqf as a governance system rather than merely a funding instrument. Existing discussions frequently emphasize the capacity of cash waqf, endowed land, waqf-linked sukuk, or investment returns to finance environmental activities (Hamidi et al., 2025; Widiastuti et al., 2025). The present findings show that the availability of funding explains only part of institutional effectiveness. Governance arrangements, technical expertise, stakeholder relations, environmental safeguards,

and monitoring systems determine whether financial resources produce sustained ecological benefits. Waqf-based environmental governance should therefore be examined through an integrated framework connecting Islamic ethics, asset perpetuity, institutional accountability, community participation, and ecological performance.

The managerial implication requires waqf administrators to broaden the competencies expected of *nāzirs*. Conventional competence in Shari'ah compliance, asset administration, fundraising, and financial reporting remains necessary but is no longer sufficient for environmental programs. Managers need the ability to conduct environmental risk assessment, develop measurable indicators, organize technical partnerships, manage long-term maintenance, and communicate ecological outcomes to donors and beneficiaries. Specialist knowledge does not need to be concentrated entirely within a waqf organization, but institutional leaders must be capable of identifying, contracting, coordinating, and evaluating relevant expertise (Alam & Miah, 2024; Megat et al., 2024).

The policy implication concerns the integration of waqf regulation with environmental, land, energy, water, and climate-governance frameworks. Forest-waqf research has shown that legalization can involve several public authorities and that unclear ownership, certification, and usage rights can obstruct project development. Environmental waqf policies should specify the legal status of assets, responsibilities of *nāzirs*, permissible financing arrangements, reporting obligations, ecological safeguards, and procedures for interagency coordination. Dual assurance combining Shari'ah review with environmental and social verification would strengthen public confidence without reducing waqf to a conventional ESG product.

The financial implication supports the use of diversified and carefully structured funding mechanisms. Productive waqf income, cash waqf, green sukuk, corporate partnerships, public grants, and philanthropic contributions can serve different stages of an environmental project. Diversification can reduce dependence on irregular donations and provide resources for maintenance, monitoring, and technical services. Financial innovation must remain subordinate to the waqf purpose because excessive commercial orientation may create mission drift, prioritize measurable revenue over ecological necessity, or exclude communities that cannot produce attractive financial returns. The preservation of social justice and public benefit remains essential to the legitimacy of waqf-based environmental finance.

The prevalence of education, water, agriculture, and waste-management programs can be explained by institutional path dependence. Waqf organizations possess long-standing experience in providing services that generate direct and visible community benefits. Environmental education can be incorporated into schools and religious institutions, while water and agricultural projects can be framed as responses to poverty, health, and food insecurity. Climate adaptation, biodiversity assessment, carbon trading, and renewable-energy infrastructure require institutional routines that many waqf organizations have not yet developed. Organizations consequently begin with activities that resemble their existing functions and gradually extend them toward more specialized ecological interventions.

The lower frequency of renewable-energy and climate projects reflects their financial and technical complexity. Solar installations require feasibility assessments, procurement standards, maintenance systems, and calculations of energy output. Climate-adaptation programs require hazard analysis, vulnerability mapping, and coordination with public infrastructure planning. Forest-carbon initiatives demand adequate land area, technical measurement, certification, regulatory compliance, and market access. Research on waqf-based forests and carbon trading similarly identifies limited technical knowledge, land constraints, and regulatory uncertainty as barriers to participation in carbon markets.

The weakness of ecological reporting can also be attributed to an asymmetry in institutional incentives. Financial statements and Shari'ah compliance reports are commonly required by regulators, donors, governing boards, or religious authorities. Environmental-impact reports may remain voluntary, particularly when no standardized green-waqf

framework exists (Dallh, 2023; Yusgiantoro et al., 2024). Managers facing limited resources are likely to prioritize mandatory reporting over technically demanding ecological assessments. Output indicators such as the number of trees planted or facilities constructed are also easier and less expensive to collect than outcome indicators such as ecosystem recovery, avoided emissions, or long-term improvements in community resilience.

The superior performance of partnered institutions can be explained through resource complementarity. Waqf institutions contribute religious legitimacy, permanent assets, donor networks, and community trust. Universities provide research capacity and environmental measurement, while government agencies contribute regulatory authority and policy coordination. Financial institutions offer investment structures and payment infrastructure, while environmental organizations contribute technical experience and conservation networks. Collaboration enables institutions to access resources that would be difficult to develop independently. Weakly institutionalized partnerships may still fail when responsibilities are ambiguous, making formal agreements, shared indicators, and clear decision-making procedures essential.

The next institutional step should involve the development of a standardized waqf-based environmental governance framework. The framework should establish minimum requirements for project eligibility, environmental assessment, Sharī'ah review, stakeholder consultation, financial reporting, impact measurement, risk management, and public disclosure. Indicators should be adapted to different sectors because forest conservation, water security, renewable energy, waste management, and sustainable agriculture produce distinct environmental outcomes. A uniform governance architecture can provide consistency, while sector-specific metrics can preserve scientific relevance.

The next operational step should consist of carefully evaluated pilot projects supported by transparent data systems. Selected waqf institutions could establish baseline environmental conditions, annual targets, financing plans, maintenance obligations, and independent review procedures before implementation. A digital registry could disclose the legal status of waqf assets, project objectives, funding sources, expenditures, service outputs, ecological outcomes, and audit findings. Public reporting would allow donors, regulators, researchers, and beneficiary communities to evaluate whether projects preserve both the waqf asset and its environmental purpose. The registry concept corresponds with emerging climate-waqf models that advocate machine-readable public reporting and annual impact assurance.

The next capacity-building step should prioritize professional development and durable cross-sector partnerships. Training for nāzirs should cover environmental governance, project management, ecological indicators, climate finance, community facilitation, and digital reporting. Universities can establish technical-assistance units, while environmental agencies can prepare sectoral guidelines for waqf institutions. Islamic banks and investment institutions can design financing mechanisms that protect the perpetuity of waqf assets and provide predictable resources for maintenance. Community organizations should remain involved in planning and monitoring to ensure that technical professionalization does not weaken local ownership.

The next research step should move beyond conceptual advocacy and small exploratory samples. Comparative studies across countries are needed to examine how legal systems, waqf traditions, environmental conditions, and institutional structures affect program performance. Longitudinal research should measure ecological and social outcomes over several years rather than relying only on initial outputs. Quasi-experimental designs, social-return analysis, ecological-impact assessment, and comparative case studies could evaluate which governance models generate the strongest results. Future inquiry should also examine potential failures, including greenwashing, elite capture, unequal benefit distribution, financial mission drift, and conflicts between asset productivity and ecosystem protection.

CONCLUSION

The most important finding of this study is that waqf-based environmental governance becomes effective only when Islamic ethical commitments are supported by professional institutional management, diversified financing, cross-sector collaboration, and measurable ecological accountability. The examined institutions demonstrated that waqf assets could support environmental education, water conservation, sustainable agriculture, agroforestry, renewable energy, and community resilience. The findings also revealed a significant imbalance between financial accountability and ecological accountability. Most institutions maintained financial reports and Shari'ah supervision, while only a limited number applied environmental indicators or independent ecological audits. This distinction shows that religious legitimacy and philanthropic intention alone are insufficient to guarantee sustainable environmental outcomes.

The principal contribution of this research lies in its conceptualization of environmental waqf as an integrated governance system rather than merely a charitable donation model or Islamic financing instrument. The proposed perspective connects the permanence of waqf assets, Islamic environmental ethics, institutional accountability, stakeholder participation, financial continuity, and ecological impact assessment within a single analytical framework. The study also offers a methodological contribution by combining qualitative case analysis, institutional document review, stakeholder interviews, standardized performance assessment, and exploratory statistical analysis. This integrated approach provides a more comprehensive basis for evaluating whether environmental waqf programs are legally legitimate, financially sustainable, socially inclusive, institutionally accountable, and ecologically effective.

The limitations of this study arise from the small purposively selected sample, the restricted institutional coverage, and the exploratory nature of the statistical analysis. The findings cannot be generalized to all waqf institutions or national regulatory contexts, while the use of institutional reports may be affected by incomplete documentation and self-reporting bias. The cross-sectional design also limits the capacity to assess long-term environmental outcomes, institutional continuity, and causal relationships among governance variables. Future research should involve larger cross-country samples, longitudinal environmental measurements, comparative regulatory analysis, and independent ecological audits. Further investigation should also examine potential institutional risks, including greenwashing, elite domination, unequal benefit distribution, financial mission drift, and conflicts between revenue generation and ecosystem protection.

DECLARATION OF AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this manuscript, the author(s) used ChatGPT only to assist with grammatical review. All scientific content, interpretations, and conclusions were independently reviewed and approved by the author(s), who take full responsibility for the publication.

AUTHOR CONTRIBUTIONS

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

Author 2: Conceptualization; Data curation; Investigation.

Author 3: Data curation; Investigation.

DECLARATION OF COMPETING INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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