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A critical review of environmental sustainability policies in light of Saudi Arabia's Vision 2030

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ABSTRACT

Environmental sustainability has moved from the margins of Saudi public administration to the centre of national strategy under Vision 2030. That shift is politically significant, but it is easier to publicise than to evaluate. This critical integrative review assesses how environmental sustainability has been framed, institutionalised, financed, and contested within the policy architecture associated with Vision 2030. It synthesises more than 100 sources, including official Saudi strategy documents, legal texts, climate submissions, multilateral reports, and interdisciplinary scholarship on environmental governance, water policy, climate politics, biodiversity, waste management, urban development, and sustainability transitions. The article argues that Vision 2030 has performed three substantial policy moves. It has made environmental sustainability highly visible within the national reform narrative; it has built a more differentiated institutional architecture through the National Environment Strategy, the 2020 Environmental Law, specialised environmental centres, and green-finance mechanisms; and it has linked environmental policy to economic diversification, quality of life, and international positioning. These are not trivial achievements. Yet visibility and institutional proliferation are not the same as ecological effectiveness. Across water, waste, conservation, climate governance, and mega-project development, the policy field still shows persistent tensions between ambition and implementation, centralisation and participation, target-setting and accountability, carbon management and hydrocarbon continuity, and environmental branding and independently verifiable outcomes. Saudi Arabia's environmental turn is therefore best understood neither as empty rhetoric nor as settled transformation. It is an ambitious, state-led environmental transition whose long-term credibility will depend on whether legal authority, sectoral coordination, public data, and measurable ecological outcomes begin to align more closely than they do at present.

KEYWORDS: environmental sustainability, Saudi Arabia, Vision 2030, environmental governance, Saudi Green Initiative, National Environment Strategy, water policy, climate governance

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1. Introduction

Environmental sustainability now occupies a far more prominent place in Saudi Arabia's policy discourse than it did a decade ago. In the official language of Vision 2030, environmental protection is presented not only as an administrative objective but as an Islamic, human, and moral duty owed to present and future generations (Saudi Arabia, 2016). That formulation matters. It signals that the environment is no longer treated solely as a technical matter for sectoral agencies or as a downstream consequence of economic planning. It has become part of the Kingdom's wider story about national transformation, quality of life, institutional reform, and future-oriented development.

Yet the rise of sustainability rhetoric does not, by itself, settle the harder analytical questions. Vision 2030 has unquestionably increased the visibility of environmental concerns. It has also been accompanied by new institutions, new legal instruments, climate commitments, green-finance frameworks, water reforms, conservation programmes, and high-profile initiatives such as the Saudi Green Initiative (Ministry of Environment, Water and Agriculture [MEWA], 2018; Saudi Green Initiative [SGI], 2024a, 2024b; Saudi Arabia, 2024a). The real issue is not whether sustainability has entered the Saudi policy vocabulary. It plainly has. The issue is whether the resulting policy field is coherent, adequately institutionalised, operationally credible, and ecologically accountable.

That question is especially important in Saudi Arabia because environmental policy sits inside a wider national project defined by economic diversification, state restructuring, infrastructural expansion, and continued energy significance. In the Vision 2030 document, environmental sustainability appears alongside growth, competitiveness, investment, renewable energy, tourism, liveability, and administrative reform (Saudi Arabia, 2016; Saudi Vision 2030, 2025a). This adjacency is politically productive: it allows environmental policy to be defended as both ecological necessity and developmental strategy. But it also creates friction. Policies aimed at reducing pollution, improving water efficiency, expanding protected areas, or restoring degraded land have to coexist with mega-project development, industrial expansion, tourism intensification, new logistics corridors, and a still-powerful hydrocarbon economy (Al-Sarihi, 2019, 2022; Shehri, 2023; Yusuf, 2023). A serious review therefore has to examine not only policy intention but also policy integration, trade-offs, and contradictions.

Much of the existing literature does not do this in one place. Some studies focus on climate policy, especially net-zero discourse, renewable energy, or the circular carbon economy (Al-Sarihi, 2019, 2022; Shehri, 2023; Islam & Ali, 2024; King Abdullah Petroleum Studies and Research Center [KAPSARC], 2024a, 2024b). Others focus on water scarcity, desalination, groundwater depletion, or wastewater reuse (van der Merwe et al., 2013; Borgomeo et al., 2020; Alodah et al., 2023; Suhail et al., 2024). Another body of scholarship examines biodiversity, conservation, desertification, or protected areas (Abuzinada, 2003; Abuzinada et al., 2004; Al-Obaid et al., 2017; Alatawi, 2022; Ansari et al., 2022). Urban and planning work, meanwhile, often analyses smart cities, citizen participation, or mega-projects such as NEOM (Al Surf, 2017; Alamoudi et al., 2023; Aldegheishem et al., 2023; Yusuf, 2023). Legal analyses have begun to examine the Environmental Law 2020, future-generation rights, and the evolving Saudi regulatory framework (Al-Gilani, 1997; Aldosari, 2025; Alslamah, 2026). These strands are valuable, but they are often read separately.

This article brings them into the same frame. It treats Saudi environmental sustainability policy as a policy field rather than a list of sectoral achievements. The aim is not to deny that real institutional change has occurred. Nor is it to dismiss official ambitions as mere green branding. The point is to evaluate how environmental sustainability is being defined, justified, coordinated, financed, implemented, and measured under Vision 2030, and to ask where the strongest gains and most persistent limits now lie.

The central argument is straightforward. Vision 2030 has elevated environmental sustainability from a secondary policy concern to a visible national priority, and that shift has produced meaningful institutional and legal change. But the significance of that change can only be judged through a closer examination of policy coherence, implementation capacity, ecological accountability, and the tension between green developmental narratives and the structural realities of centralised governance, hydrocarbon dependence, mega-project urbanism, and resource scarcity. Saudi Arabia's environmental transition is real, but it remains uneven. It is best understood as an ambitious, state-led project of ecological modernisation and policy integration that has moved decisively beyond symbolic neglect without yet resolving the deeper questions of participation, transparency, distributive justice, and long-term ecological performance (Hajer, 1995, 1996; Mol et al., 2009; Jordan & Lenschow, 2010; Meadowcroft, 2007; Al-Sarihi, 2022).

2. Methodological approach: a critical integrative review

This article adopts a critical integrative review design. It is not a systematic review and does not claim exhaustive coverage of every publication on Saudi sustainability policy. That would require a fully reproducible protocol, explicit database search strings, screen-by-screen inclusion decisions, and formal quality appraisal criteria that are not available here. Presenting the review as systematic would therefore create a false sense of procedural precision. A critical integrative review is more appropriate because the task is interpretive as well as documentary. The article is concerned with how a policy field has been assembled and narrated, how its parts relate to one another, and where the literature leaves key tensions under-analysed (Torraco, 2005; Snyder, 2019).

That interpretive stance is informed by wider scholarship on ecological modernisation, policy integration, sustainability transitions, water governance, environmental justice, and Gulf political economy. Those bodies of work matter here because they keep attention on institutions, power, uneven implementation, and the politics of coordination rather than allowing target language to stand in for environmental change (Adams, 2009; Bulkeley & Newell, 2010; Hanieh, 2011; Jordan & Huitema, 2014; Loorbach, 2010; Newell, 2008, 2019; Pahl-Wostl, 2007, 2009; Rockström et al., 2009; Steffen et al., 2015; Stirling, 2014; While et al., 2004; Young, 2002). The source base includes more than 100 real and traceable materials. These were selected purposively from four clusters. The first cluster consists of official Saudi documents and institutional sources: Vision 2030 texts, the National Environment Strategy, the National Water Strategy, the Environmental Law 2020, the Saudi Green Initiative, the Environment Fund, official webpages of specialised environmental centres, climate submissions to the UNFCCC, and the Kingdom's Green Financing Framework (Saudi Arabia, 2016; MEWA, 2018, 2025a, 2025b; Saudi Arabia, 2020, 2022, 2024a, 2024b, 2025a; SGI, 2024a, 2024b). These sources establish how the state presents its own environmental agenda, what institutional instruments it has created, and how it reports climate and sustainability commitments.

The second cluster consists of peer-reviewed and policy-oriented scholarship on Saudi Arabia, the Gulf, and the wider Arab region. This literature covers climate governance, diversification, water management, circular economy practices, biodiversity conservation, environmental law, urban sustainability, citizen participation, ESG disclosure, and mega-project development (Al-Sarihi, 2018, 2019, 2022; van der Merwe et al., 2013; Alodah et al., 2023; Suhail et al., 2024; Alatawi, 2022; Shehri, 2023; Islam & Ali, 2024; Alamoudi et al., 2023; Aldegheishem et al., 2023; Ali et al., 2025). This body of work is uneven in method and normative orientation, but that unevenness is analytically useful because it reveals where the Saudi policy turn is being understood as institutional reform, economic strategy, image-making, ecological transition, or some combination of all four.
The third cluster includes multilateral and international policy sources on climate, water, land degradation, and sustainability governance. These include reports and assessments from the IPCC, UNEP, UNCCD, IEA, IRENA, the World Bank, and related bodies (World Commission on Environment and Development [WCED], 1987; UNEP, 2019, 2023, 2024a, 2024b; IPCC, 2022a, 2022b, 2023; IEA, 2023; IRENA, 2019; World Bank, 2018; UNCCD, 2022). They are used not to benchmark Saudi Arabia mechanically against global norms, but to situate Saudi policy in the wider context of climate mitigation, adaptation, water stress, land restoration, and sustainability transitions.

The fourth cluster consists of foundational scholarship on environmental governance, sustainability transitions, environmental justice, policy integration, discourse, and state-led ecological change (Allan, 2001; Bulkeley, 2005; Bulkeley & Betsill, 2005; Bäckstrand & Lövbrand, 2006; Biermann, 2007; Meadowcroft, 2007, 2009; Ostrom, 2010; Markard et al., 2012; Geels, 2011, 2014; Schlosberg, 2007; Agyeman et al., 2003; Scoones et al., 2015; Köhler et al., 2019). These works provide the interpretive vocabulary needed to move beyond description. They help clarify questions of policy coherence, scalar politics, participation, legitimacy, transition strategy, and environmental justice.

The analysis proceeded thematically rather than chronologically. Sources were read across six recurring questions: how sustainability is framed; how institutions and legal authority are organised; how sectoral policies in water, waste, conservation, and climate are being reworked; how mega-project and urban development claims interact with environmental policy; how legitimacy and public participation are addressed; and how the literature distinguishes between policy visibility, policy design, and policy effectiveness. The method is therefore synthetic and critical. It asks what this mixed body of material allows us to conclude, where the evidence is strong, where it is suggestive rather than conclusive, and where public claims exceed what can presently be

verified.

This approach has limits. First, the field is moving quickly. Official webpages, reporting formats, and initiative counts change faster than many peer-reviewed analyses. Second, English-language scholarship remains more visible internationally than Arabic-language policy discussion, which risks biasing interpretation toward outward-facing narratives. Third, some sectors—especially water, energy, and climate—have more published material than others, such as waste enforcement or local environmental justice. Finally, initiative announcements and institutional creation are easier to document than actual ecological outcomes. A critical review of Saudi environmental policy must therefore remain cautious about treating visibility as effectiveness or institutional architecture as proof of implementation.

3. Policy and literature context: from environmental clause to policy field

The environmental content of Vision 2030 is easy to overlook if one reads the programme only through the lenses of diversification, investment, or social reform. Yet the document gives the environment a recognisable place within the "vibrant society" pillar. It frames preservation of the environment and natural resources as an Islamic, human, and moral duty, and links environmental quality to everyday life, public amenity, and responsibility to future generations (Saudi Arabia, 2016). It also names a practical agenda: more efficient waste management, comprehensive recycling projects, reduced pollution, action against desertification, better water use, and protection and rehabilitation of beaches, reserves, and islands (Saudi Arabia, 2016). This is a relatively concise environmental statement, but its significance lies less in technical detail than in political positioning. The environment is brought inside the national reform narrative rather than left outside it.

Later policy documents expanded this initial framing substantially. The National Environment Strategy, prepared under MEWA, set out a broader institutional and policy framework, including environmental sustainability, economic sustainability, institutional robustness, and private-sector participation (MEWA, 2018). Its mission language is revealing: the strategy seeks to create the enablers for comprehensive policies, regulations, standards, and guidelines that protect the environment and achieve sustainability (MEWA, 2018). The emphasis is not only on ecological protection, but on sector-building. This is a hallmark of state-led sustainability agendas. They do not merely regulate environmental harm; they seek to create administrative, financial, and market conditions under which environmental governance can be scaled and stabilised (Jordan & Lenschow, 2010; Meadowcroft, 2007).

The institutional architecture that followed reflects this logic. The Environmental Law 2020 consolidated and updated the legal basis for protection, sustainability, compliance, and permitting (Saudi Arabia, 2020). The Environment Fund was established to support financial sustainability in the environment and meteorology sectors and to back the national centres responsible for compliance, vegetation cover, wildlife, and meteorology (Environment Fund, 2025a, 2025b). The National Center for Environmental Compliance, the National Center for Vegetation Cover Development and Combating Desertification, and the National Center for Wildlife gave the sector a more differentiated organisational structure, each with a specific mandate but all linked to the broader Vision 2030 transition (NCEC, 2025; NCVC, 2025; NCW, 2025). This matters because environmental policy often fails less from lack of ambition than from lack of specialised administrative capacity and stable financing (Lafferty & Hovden, 2003; Biermann et al., 2012).

The Saudi Green Initiative deepened the political visibility of this agenda. Official SGI materials present it as a whole-of-society platform that unites environmental protection, energy transition, and sustainability programmes under clear national targets (SGI, 2024a). As of late 2024, the initiative reported more than 85 active initiatives representing over SAR 705 billion in investment, organised around three broad objectives: emissions reduction, land and sea protection, and afforestation/land regeneration (SGI, 2024a). The initiative's 2030 targets include reducing carbon dioxide equivalent emissions by more than 278 million tonnes annually, protecting 30% of Saudi land and sea, and planting more than 600 million trees by 2030, while the wider climate roadmap is aligned with the Kingdom's net-zero-by-2060 commitment (SGI, 2024a, 2024b; Saudi Arabia, 2022, 2024a). Whatever one thinks of the politics of these targets, they have changed the scale at which environmental policy is discussed.

Academic scholarship has responded in three broad ways. A first strand reads the environmental turn primarily through the lens of energy transition, climate strategy, or ecological modernisation. This literature

highlights renewable energy, the circular carbon economy, energy efficiency, green hydrogen, and net-zero pathways, often stressing the state's capacity to mobilise capital and infrastructure at speed (Shehri, 2023; Islam & Ali, 2024; KAPSARC, 2024a, 2024b, 2024c). A second strand focuses on sectoral sustainability problems that long pre-date Vision 2030, especially water scarcity, desalination, groundwater depletion, biodiversity loss, wetland degradation, urbanisation, and waste management (van der Merwe et al., 2013; Al-Obaid et al., 2017; Radwan et al., 2019; Alatawi, 2022; Alodah et al., 2023; Suhail et al., 2024). A third, more critical strand asks whether the green turn is best understood as substantive institutional change, image management, legal transition, or state-led developmental repositioning under conditions of ongoing hydrocarbon dependence (Al-Sarihi, 2018, 2019, 2022; Aldosari, 2025; Alslamah, 2026).

These strands are not mutually exclusive. In fact, the literature is strongest when it acknowledges that Saudi sustainability policy is simultaneously environmental, economic, legal, geopolitical, and symbolic. Yet there is still a tendency to isolate sectors. Climate policy is discussed without sufficient attention to water; water is discussed without enough attention to land restoration or urban development; biodiversity is often separated from tourism, infrastructure, and finance; and the politics of mega-project sustainability are often analysed without integrating formal environmental governance. The result is a fragmented picture. This review addresses that fragmentation by treating environmental sustainability under Vision 2030 as a single field held together by a common reform narrative but marked by important internal tensions.

4. Thematic analysis

4.1 Sustainability in Vision 2030: moral language, developmental purpose

The first point that emerges from the literature is that Saudi environmental sustainability is framed through a hybrid language. It is moral, developmental, managerial, and geopolitical at once. Vision 2030 grounds preservation of the environment in Islamic and intergenerational duty, which gives environmental protection a normatively resonant place in official discourse (Saudi Arabia, 2016; Alslamah, 2026). But the same policy language also links sustainability to urban quality of life, resource efficiency, competitiveness, green investment, and national reputation (Saudi Arabia, 2016; Saudi Vision 2030, 2025a). That duality is not incidental. It is one reason the environmental agenda travels so well across policy domains.

From the standpoint of environmental politics, this looks less like a rights-based ecological paradigm than a form of ecological modernisation adapted to a strong state and a hydrocarbon economy (Hajer, 1995, 1996; Mol et al., 2009; Bäckstrand & Lövbrand, 2006). Environmental improvement is not cast as a constraint on development but as a condition of more sophisticated development. Waste reduction, water efficiency, protected areas, low-carbon technologies, and green finance appear not as alternatives to growth but as instruments through which a modernised growth model can be made more durable and internationally credible. This helps explain why environmental policy has advanced as quickly as it has. It has been woven into the larger narrative of diversification, resilience, and national upgrading rather than presented as a separate or oppositional agenda. There are advantages to this framing. It brings the environment into the core of economic and administrative reform, which can widen political support and release investment. It also avoids the false dichotomy that often pits environmental protection against development in absolute terms. Yet the same framing can soften hard trade-offs. When sustainability is made to signify efficiency, competitiveness, liveability, reputation, and stewardship all at once, its meaning broadens but its evaluative sharpness can weaken (Dryzek, 2013; Scoones et al., 2015). In Saudi Arabia, the result is a policy discourse rich in ambition and inclusive in tone, but sometimes under-specific about which objectives prevail when growth, infrastructure, conservation, and climate mitigation pull in different directions.

4.2 Institutional architecture: stronger design, incomplete integration

The second pattern concerns institutionalisation. Saudi Arabia's environmental policy architecture is considerably more elaborate today than it was before Vision 2030. The National Environment Strategy, the Environmental Law 2020, the Environment Fund, specialised environmental centres, UNFCCC reporting, and green-finance tools all point to more serious administrative investment in the sector than was previously visible (MEWA, 2018; Saudi Arabia, 2020, 2022, 2024a, 2024b; Environment Fund, 2025a, 2025b). The architecture is not accidental. It reflects an understanding that environmental governance needs law, finance, specialised institutions, and

implementation pathways, not just aspiration.

This is an important achievement. Environmental policy integration scholarship has long argued that sustainability becomes credible when it moves from isolated regulation into cross-sector governance and when institutions have enough authority to influence decisions made elsewhere in the state (Lafferty & Hovden, 2003; Jordan & Lenschow, 2010). Saudi Arabia has moved in that direction. The National Center for Environmental Compliance addresses regulatory enforcement; the National Center for Vegetation Cover Development and Combating Desertification focuses on land rehabilitation and anti-desertification work; the National Center for Wildlife concentrates on biodiversity and protected areas; and the Environment Fund provides a financial support mechanism for sectoral continuity (NCEC, 2025; NCVC, 2025; NCW, 2025; Environment Fund, 2025a).

Still, stronger architecture is not the same as seamless integration. The literature on policy coordination warns that new institutions can multiply interfaces as much as they solve them (Meadowcroft, 2007; Ostrom, 2010; Biermann et al., 2012). Saudi environmental governance now intersects with ministries and agencies responsible for water, energy, tourism, municipal development, industrial policy, transport, sovereign investment, and mega-project delivery. That may be unavoidable. Environmental problems are cross-sectoral by nature. But it means that policy coherence depends on more than creating centres with specialised mandates. It requires interoperable data, clear regulatory precedence, dispute resolution across authorities, and the political ability to hold environmentally costly projects to account when they conflict with other priorities.

Here the evidence is less complete. Official sources describe coordination and oversight with confidence, especially in SGI governance and climate-related committees (SGI, 2024a). But the public record remains thinner on the ordinary workings of cross-sector coordination, the quality of independent monitoring, and the degree to which environmental requirements can alter decisions already backed by powerful growth imperatives. In that sense, Saudi Arabia has made more progress in institutional design than in publicly demonstrable integration. The architecture exists. Whether it consistently disciplines the wider development system is a more difficult question.

4.3 Water policy: the strongest test of sustainability beyond rhetoric

If one policy area shows the difference between environmental visibility and structural difficulty, it is water. Water scarcity in Saudi Arabia is not a newly discovered problem. It is a longstanding condition shaped by aridity, heavy agricultural abstraction, groundwater depletion, desalination dependence, population growth, and large infrastructure costs (Allan, 2001; Gleick, 2003; Borgomeo et al., 2020; Alodah et al., 2023; Suhail et al., 2024). That makes water a revealing case. It forces environmental policy to confront hard physical limits, not just narrative ambition.

The National Water Strategy reflects that seriousness. Officially, it identifies unsustainable resource use, rapidly depleted non-renewable groundwater, high agricultural demand, weak utilisation of treated wastewater, network losses, high desalination costs, and governance deficiencies as central challenges (MEWA, 2025b). Its stated vision is a sustainable water sector that safeguards natural resources and the environment while providing high-quality, cost-effective services (MEWA, 2025b). The strategy also signals a shift toward demand management, stronger regulation, wastewater reuse, innovation, resilience planning, and private-sector participation. Conceptually, this is a move away from pure supply expansion and toward a more integrated resource-governance model.

That shift is significant. It suggests that Saudi water policy is no longer relying on engineering capacity alone. It increasingly recognises pricing, leakage, institutional coordination, irrigation efficiency, reuse infrastructure, and regulatory oversight as environmental issues rather than merely service issues (MEWA, 2025b; Borgomeo et al., 2020; Alodah et al., 2023). This broadening is one of the more convincing examples of sustainability entering the policy mainstream.

Yet the structural constraints remain severe. Desalination continues to underpin urban water security, and official strategy documents themselves acknowledge its environmental footprint, high energy use, and transmission costs (MEWA, 2025b). Groundwater still provides a large share of total supply, especially historically, and the legacy of over-abstraction cannot be undone quickly (Suhail et al., 2024). Treated wastewater reuse has improved but remains underutilised relative to potential, and agricultural demand still exerts enormous

pressure on the system (Mir et al., 2023; Alodah et al., 2023; Suhail et al., 2024). The central difficulty, then, is not whether Saudi Arabia has identified the right water challenges. It has. The difficulty lies in whether governance reform can reduce structural dependence on costly and environmentally intensive water solutions without destabilising food systems, urban service provision, or political expectations around access and subsidy. This is why water policy should be treated as more than a sectoral issue. It condenses the wider logic of Vision 2030 environmental reform. The state is trying to modernise resource governance through strategy, efficiency, pricing, infrastructure, and institutional redesign. That can produce real gains. But in water, as elsewhere, sustainability is constrained by inherited material systems. One cannot simply announce one's way out of aquifer depletion or desalination dependence. The promise of Saudi sustainability policy is visible here, but so are its hardest limits.

4.4 Waste, circularity, and the gap between grand strategy and municipal reality

Waste management presents a different but related pattern. It is one of the most frequently invoked areas in official sustainability language, appearing in Vision 2030 itself through commitments to improve waste management and establish recycling projects (Saudi Arabia, 2016). It also fits neatly into broader policy narratives around circular economy, resource efficiency, green entrepreneurship, and pollution reduction (SGI, 2024a; KAPSARC, 2024c). Yet the literature suggests that practical waste governance still lags behind the ambition of national circularity discourse.

Review studies of municipal solid waste in Saudi Arabia describe a system historically dominated by collection and landfill, with food waste and plastics occupying especially large shares of the waste stream (Anjum et al., 2016; Radwan et al., 2019). These studies repeatedly identify the same opportunities: source separation, improved data, recycling infrastructure, waste-to-energy technologies, stronger institutional coordination, and business models that treat waste as a recoverable resource rather than a disposal problem (Ouda & Cekirge, 2013; Nizami et al., 2015; Anjum et al., 2016; Radwan et al., 2019). More recent work on Riyadh and comparative circular economy practice suggests that the agenda has become more sophisticated, including life-cycle assessment, strategic planning, and alignment with wider national sustainability goals (Aldhafeeri et al., 2022; Alsaud et al., 2025). Yet household behaviour remains part of the policy problem. Earlier research on recycling practices among residents in Saudi Arabia pointed to uneven participation and the importance of awareness, convenience, and institutional support, a reminder that circularity is not only an infrastructure problem but also a behavioural and governance problem (Almoosa et al., 2015).

Even so, a persistent scale problem remains. Saudi Arabia has a strong macro-level vocabulary of circularity, especially through the circular carbon economy approach in climate diplomacy and energy policy. But municipal waste systems operate at the micro-level of collection contracts, sorting facilities, pricing, landfill regulation, informal practices, and citizen behaviour. The two levels do not automatically align. A state can champion circularity in global forums and still struggle with routine municipal waste separation and enforcement at home. Comparative analysis suggests that Saudi Arabia has advanced in policy signalling and institution-building, but the absence of a single, fully consolidated circular economy strategy continues to limit implementation coherence (Alsaud et al., 2025).

This does not make the circularity agenda insincere. It makes it incomplete. The environmental significance of waste policy depends on mundane administrative questions: who collects what, under which incentives, with what recovery targets, and under what environmental safeguards. Grand narratives about circular carbon and green leadership matter politically, but they do not substitute for reliable municipal systems. In this domain especially, the distance between strategic discourse and everyday implementation is what needs scholarly attention.

4.5 Conservation, desertification, and land restoration: continuity, scale, and ecological realism

Conservation and land restoration are among the most visible components of Saudi Arabia's green turn. They are also the areas most likely to attract supportive public attention because they can be represented through protected-area announcements, tree-planting targets, wildlife protection, and anti-desertification campaigns. Official SGI materials place afforestation, land regeneration, and land-and-sea protection at the centre of the programme, alongside emissions reduction (SGI, 2024a). The National Environment Strategy similarly gives

weight to biodiversity, wildlife, and conservation objectives (MEWA, 2018). These are important signals, especially in a region where desert ecologies are often reduced to emptiness in popular imagination.

The literature, however, shows that Saudi conservation policy did not begin with Vision 2030. Protected-area development, wildlife reintroduction, biodiversity reporting, and conservation legislation have a longer history, especially through the work of the former National Commission for Wildlife Conservation and Development and the Saudi Wildlife Authority (Abuzinada, 2003; Abuzinada et al., 2004; Alwelaie, 1994). Recognising this continuity matters. Vision 2030 has intensified, re-scaled, and rebranded conservation, but it did not create the field from nothing. That historical depth strengthens the argument that the current transition is not purely performative. It rests partly on older conservation infrastructures and scientific traditions.

Recent scholarship nonetheless makes clear that conservation pressures remain acute. Wetland degradation, habitat fragmentation, hunting, grazing pressure, urban expansion, and biodiversity stress outside protected areas continue to shape the ecological landscape (Al-Obaid et al., 2017; Alatawi, 2022; Ansari et al., 2022). Protected areas are crucial, but they are not enough by themselves. Several studies stress that long-term success depends on landscape-scale management, restoration beyond reserve boundaries, community awareness, and institutions able to regulate competing land uses (Alatawi, 2022; Al-Tokhais & Thapa, 2019; Al-Obaid et al., 2017). The recent expansion of royal reserves and protected landscapes may help, but their ecological value will depend on enforcement quality and habitat-level management, not simply on declared area.

The same caution applies to desertification and tree-planting narratives. Saudi Arabia's anti-desertification agenda is politically potent and environmentally necessary, especially in light of land degradation and broader regional concern about drought and restoration (NCVC, 2025; UNCCD, 2022). But arid ecosystems require ecological realism. Restoration in drylands cannot be reduced to generic afforestation targets imported from wetter contexts. Species choice, water availability, soil conditions, grazing control, local knowledge, and monitoring determine whether restoration is ecologically restorative or merely numerically impressive. In other words, the sustainability of greening depends on ecological fit as much as policy ambition.

This is a recurring theme in the Saudi case. High-visibility environmental commitments can be meaningful, but they need slower, less glamorous forms of ecological governance behind them: baseline data, ranger capacity, habitat science, monitoring, regulation, and community compliance. Conservation policy becomes persuasive when those routines are visible, not only when targets are.

4.6 Climate governance: ambitious repositioning without post-hydrocarbon rupture

Climate governance is the policy area in which Saudi Arabia has shifted most visibly on the international stage. Official documents and SGI materials now place net zero by 2060, the updated NDC target of reducing carbon dioxide equivalent emissions by more than 278 million tonnes per year by 2030, renewable energy expansion, carbon capture, methane reduction, and whole-of-society climate action at the forefront of state messaging (Saudi Arabia, 2022, 2024a; SGI, 2024a, 2024b). In diplomatic terms, this is a marked departure from older images of Saudi Arabia as primarily obstructionist in climate negotiations.

Scholarship on this shift is nuanced. Al-Sarihi's work is especially useful because it shows that Saudi climate policy has moved from reluctance and conditional engagement toward a more integrated relationship with diversification and domestic reform, but without abandoning the political economy of energy leadership (Al-Sarihi, 2018, 2019, 2022). Shehri (2023) makes a parallel argument through the circular carbon economy framework, showing how Saudi Arabia has adopted a climate narrative that foregrounds reduction, reuse, recycling, and removal rather than fossil-fuel phaseout. More recent energy and net-zero studies argue that the shift is analytically significant and institutionally real, while also warning that sectoral decarbonisation remains uneven and that stronger commitments will be needed if the 2060 objective is to be credible in economy-wide terms (Islam & Ali, 2024; KAPSARC, 2024a, 2024b; Kamboj et al., 2024).

The circular carbon economy deserves particular attention because it captures the distinctiveness of the Saudi approach. Rather than framing climate responsibility primarily through rapid fossil disengagement, the CCE framework frames responsibility through emissions management, technology, efficiency, carbon capture, and the retention of global energy security (Shehri, 2023; KAPSARC, 2024c). From the perspective of Saudi statecraft, this is not incoherent. It allows the Kingdom to expand climate action without renouncing its structural role in global energy systems. It also fits a broader Vision 2030 logic in which transformation is

pursued through optimisation, innovation, and diversification rather than rupture.

Analytically, however, this creates tension. The CCE approach is more ambitious than denial or passivity, but it is also less transformative than pathways built around managed fossil decline. That does not make it disingenuous. It makes it strategically selective. Saudi climate governance is oriented toward decarbonising while preserving room for continued hydrocarbon relevance, at least for a prolonged transition period. This may be politically realistic from a national perspective. It is also why the Saudi case should not be read through crude binaries of progress or failure. What is happening is a negotiated repositioning of a major hydrocarbon state within the climate order, using state capacity, finance, technological narratives, and international diplomacy to redefine what climate responsibility can mean.

The policy implication is clear. Climate ambition in Saudi Arabia should be assessed not only by headline targets, but by whether mitigation is spreading from energy diplomacy into binding sectoral practices, robust MRV systems, transparent emissions accounting, enforceable standards, and durable incentives. Climate reporting has undoubtedly improved through updated NDCs, BUR2, and the first Biennial Transparency Report (Saudi Arabia, 2024b, 2025a). Whether those reporting gains translate into sufficiently accelerated decarbonisation remains the harder question.

4.7 Mega-project sustainability: innovation, visibility, and the problem of independent verification

No part of Saudi sustainability policy is more globally visible than its mega-projects. NEOM, the Red Sea development, and other flagship projects are repeatedly presented as laboratories of renewable energy, circular systems, low-carbon urbanism, and next-generation planning. They condense many of the themes that define the Vision 2030 era: scale, ambition, technological futurity, global branding, investment attraction, and the promise of leapfrogging old infrastructural models (Yusuf, 2023; Saudi Vision 2030, 2025b). It is therefore tempting to treat them as proof that environmental sustainability is being embedded at the highest level of national development.

The literature offers a more careful reading. Case-based analyses of NEOM suggest that these projects do create opportunities for experimentation, especially in green hydrogen, renewable-powered infrastructure, sustainable urban design, and new planning standards (Yusuf, 2023). Studies on smart sustainable cities similarly show that the Saudi urban policy field is becoming more attentive to stakeholder management, conceptual frameworks for citizen participation, and the need to align urban transformation with broader sustainability goals (Alamoudi et al., 2023). These are genuine developments.

Yet the same literature also points to weak spots. Community participation in Saudi urban planning remains limited in practice, even where the language of participation is present (Aldegheishem et al., 2023). Public awareness around sustainable urbanism has improved only unevenly (Al Surf, 2017). And more recent critical analyses of environmental impact assessment in the context of Vision 2030 mega-projects identify familiar governance problems: fragmented coordination, limited public participation, and weak enforcement relative to the scale of development ambition (Aloufi, 2025 [publication details to verify]). Even supportive case studies acknowledge that claims about sustainability can outrun the currently available evidence, particularly where financial transparency, baseline ecological data, or long-term performance data are scarce (Yusuf, 2023). This matters because mega-projects are not only infrastructural undertakings; they are also discursive machines. They produce images of the future. They allow sustainability to be seen, circulated, and monetised. That is one source of their political value. But precisely because they are so visible, they can distort evaluation. If sustainability becomes associated mainly with spectacular projects, there is a risk that ordinary governance—waste sorting, water pricing, emissions monitoring, habitat management, enforcement, public consultation—looks secondary when it is actually decisive. The credibility of Saudi environmental policy will not be decided by imagery alone. It will be decided by whether the underlying systems of review, compliance, environmental data, and public accountability are strong enough to govern projects whose scale and speed create unusual ecological risk.

4.8 Ethics, participation, and environmental justice: the underdeveloped social dimension

Saudi environmental policy has acquired stronger moral and intergenerational language, but its social dimension remains less developed than its managerial and investment dimensions. Vision 2030 explicitly links environmental

preservation to duty toward future generations (Saudi Arabia, 2016). Recent legal and bioethical analysis suggests that the Environmental Law 2020 has given greater domestic recognition to environmental rights and obligations, including questions of stewardship and future-oriented responsibility (Alslamah, 2026). This should not be dismissed. Ethical language matters because it broadens the justificatory basis of environmental action beyond efficiency.

Even so, the literature suggests that public participation remains relatively thin as a structuring principle of environmental governance. In official discourse, society is often invited to support, comply with, or benefit from sustainability initiatives. What appears less frequently is a strong commitment to co-decision, deliberative planning, or publicly contestable environmental assessment. This is not unique to Saudi Arabia. Many state-led sustainability programmes privilege delivery and coordination over participatory pluralism (Bulkeley, 2005; Newell et al., 2012; Scoones et al., 2015). But the issue matters because participation is not simply a democratic add-on. It improves information quality, legitimacy, social learning, and the durability of environmental policy. Survey-based work on sustainability perceptions and public awareness in Saudi settings suggests that awareness is improving, but unevenly and often through sector-specific pathways rather than through a deeply embedded public culture of environmental deliberation (Aldosari, 2026; Al Surf, 2017).

Environmental justice sharpens the point further. Justice-oriented sustainability scholarship asks who bears environmental burdens, who receives benefits, whose knowledge counts, and whose futures are protected or discounted (Agyeman et al., 2003; Schlosberg, 2007). These questions are still not central in most official Saudi environmental materials. Yet they are relevant across the policy field: communities affected by urban expansion, users exposed to water tariff reform or unequal service quality, people living near waste sites or industrial zones, pastoral practices shaped by vegetation and protected-area rules, or those impacted by land acquisition and relocation in large-scale developments. A policy field can be institutionally sophisticated and still be socially narrow in the way it defines stakeholders.

The Saudi case therefore raises an important analytical challenge. Environmental sustainability has clearly become more visible, better funded, and more institutionally differentiated. But the transition has been stronger on state capacity than on participatory depth. That balance may help explain the speed of reform, yet it also creates a legitimacy question that is likely to become more important as implementation moves from announcement to enforcement and from flagship initiatives to distributional consequences.

5. Discussion

The evidence reviewed here suggests that Saudi environmental sustainability policy under Vision 2030 is best understood as an ambitious transition under centralised stewardship. That formulation is important because it avoids two familiar distortions. One is celebratory overreading, in which initiative counts, target announcements, and flagship projects are taken as sufficient evidence of transformation. The other is dismissive underreading, in which the green turn is reduced to public relations or geopolitical rebranding. Neither position captures the policy field adequately. The Saudi case fits neither a simple success narrative nor a simple greenwashing narrative. It is closer to what ecological-modernisation and transition scholars would describe as a state-led attempt to reorganise environmental governance under developmental pressure: ambitious, strategically narrated, institutionally real, but still uneven in social depth, accountability, and systemic reach (Hajer, 1996; Mol et al., 2009; Meadowcroft, 2009; Loorbach, 2010; Newell, 2019).

There has been substantive change. Environmental sustainability now has strategic visibility at the highest level of national planning. The environmental agenda has been translated into legal instruments, specialised institutions, climate submissions, finance frameworks, water reform, and restoration programmes. That combination of visibility, law, administration, and finance marks a real shift in state priorities (Saudi Arabia, 2016; MEWA, 2018; Saudi Arabia, 2020, 2022, 2024a; Environment Fund, 2025a; SGI, 2024a). The policy field is far more institutionalised than it was before Vision 2030.

But institutionalisation does not settle the question of effectiveness. The review points to a more uneven picture when one moves from visibility to implementation. Water policy is more integrated than before, yet still constrained by desalination dependence, groundwater legacies, and high agricultural demand. Waste policy speaks increasingly in the language of circularity, yet routine municipal systems remain the bottleneck. Conservation and restoration have expanded, but ecological success depends on monitoring, habitat realism, and enforcement,

not only on area or tree targets. Climate policy has become more articulate and internationally legible, yet it is structured through a circular carbon economy framework designed to reconcile mitigation with ongoing hydrocarbon relevance rather than supersede it. Mega-project sustainability is technologically imaginative, but the verification of long-term environmental performance still trails the scale of public narrative. These are not minor caveats. They define the difference between announced sustainability and governed sustainability.

The review therefore suggests a three-level distinction that is useful both analytically and practically. The first level is policy visibility. On this measure, Saudi Arabia has advanced considerably. Environmental sustainability is now part of national identity-building and reform language. The second level is policy design and institutionalisation. Here, too, progress is significant: the architecture is denser, the law more recent, the climate commitments clearer, and the financing instruments more developed. The third level is policy effectiveness, meaning demonstrable ecological outcomes backed by transparent data, consistent enforcement, and credible monitoring. On this level, the field is still unsettled. The problem is not absence of movement; it is the uneven translation of strategy into evidence.

This distinction carries a theoretical implication. The Saudi case sits uneasily with standard narratives that classify states as either environmental laggards or transition leaders. It is more productively read as a case of state-led ecological modernisation in a hydrocarbon economy, where environmental policy is advanced not through post-growth politics or strong grassroots mobilisation but through central strategic planning, institutional differentiation, green industrial policy, and reputational repositioning (Hajer, 1995; Mol et al., 2009; Bridge et al., 2013). That model has strengths. Strong central authority can speed coordination, mobilise capital, and align environmental objectives with wider development strategy. Yet it also has weaknesses. It can privilege measurable targets over socially negotiated priorities, encourage narrative coherence where practical trade-offs remain unresolved, and underplay the role of participation, contestation, and independent scrutiny.
For Gulf and Middle East scholarship, this matters because it complicates how sustainability transition is usually framed. In the Saudi case, environmental policy is not external to state development strategy; it is one of the ways that strategy is being updated. Nor is climate policy simply imported through international pressure. It is being domesticated through frameworks—such as the circular carbon economy—that make climate action compatible with national energy and diversification priorities (Al-Sarihi, 2019, 2022; Shehri, 2023). This does not eliminate contradiction. It shows how contradiction is being managed institutionally and discursively.

The review also highlights where future research needs to be more precise. First, there is a need for closer work on implementation, not just policy design. The literature remains rich on targets and frameworks but thinner on enforcement practices, inter-agency coordination, and environmental outcomes over time. Second, more attention is needed to the social side of sustainability: participation, access to environmental information, local knowledge, and justice implications across class, region, and community. Third, mega-project sustainability needs to be evaluated through independent ecological and governance criteria rather than through promotional claims alone. Fourth, Arabic-language sources and domestic policy debate deserve more systematic integration into future reviews, not only because they may contain additional information but because they may frame environmental responsibility differently from outward-facing English-language materials.

The policy implications are equally direct. If Saudi Arabia wants the environmental turn under Vision 2030 to be judged as durable governance rather than exceptional ambition, four areas deserve priority. The first is transparent environmental data: emissions, compliance outcomes, water losses, restoration quality, waste diversion, protected-area effectiveness, and project-level environmental performance should be more routinely accessible. The second is cross-sector integration: environment ministries and centres cannot shoulder sustainability alone if water, energy, tourism, transport, municipal systems, and sovereign investment authorities are not governed through compatible environmental standards. The third is implementation depth: routine municipal systems, not only flagship programmes, need sustained attention. The fourth is legitimacy: participation, consultation, and accessible remedial pathways will matter more, not less, as environmental regulation begins to redistribute costs and responsibilities.

Taken together, these findings suggest that Saudi environmental sustainability policy is no longer peripheral, improvised, or easily dismissed. But it has not yet reached the point where strategic narrative, legal architecture, and ecological accountability move in full alignment. That remains the central unfinished task.

6. Conclusion

Saudi Arabia's Vision 2030 has changed the place of environmental sustainability in the national policy imagination. It has made the environment more visible, endowed it with stronger moral language, linked it to quality of life and diversification, and backed that shift with institutions, law, climate reporting, and finance. The National Environment Strategy, the Environmental Law 2020, the Environment Fund, the specialised environmental centres, the Saudi Green Initiative, and the Kingdom's evolving climate commitments together demonstrate that environmental policy now occupies a far more serious place in Saudi governance than it once did.

That said, the strongest conclusion of this review is not that Saudi environmental policy has become coherent in every respect. It is that coherence remains the central challenge. Environmental sustainability under Vision 2030 has become politically central, but it is still being translated unevenly across sectors and scales. Water reform is more sophisticated but still structurally constrained. Waste policy is more ambitious but still municipally fragile. Conservation has expanded but depends on ecological realism and long-term monitoring. Climate governance has advanced but remains shaped by a strategy of carbon management compatible with continued hydrocarbon relevance. Mega-project sustainability has become a potent symbol of the future, but its credibility depends on ordinary practices of assessment, enforcement, and public accountability.

The article's contribution is therefore twofold. Conceptually, it argues that Saudi Arabia should be read as a case of ambitious, state-led environmental transition rather than as either a simple green success story or a merely rhetorical petro-state exception. Empirically, it brings together policy domains that are too often discussed in isolation and shows that the decisive question is not whether sustainability has entered the national agenda, but how far it has been operationalised as accountable ecological governance.

That question matters beyond Saudi Arabia. Many states now pursue sustainability through development visions, green finance, institutional restructuring, and climate diplomacy while still managing dependence on resource-intensive sectors. The Saudi case makes visible both the promise and the strain of that model. It shows that environmental transformation can be accelerated through strong state capacity, but it also shows that capacity alone does not resolve questions of transparency, participation, trade-off, or justice. The real measure of the Kingdom's green turn will not be the number of initiatives announced or the elegance of its future-oriented imagery, but whether environmental improvement becomes a routine, measurable, and publicly accountable feature of governance rather than an exceptional performance of ambition.

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