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Peninsula Journal of Strategy and Policy

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Expert Commentaries

The Moon Belongs to Whoever Writes the Rules

Air Marshal M Matheswaran AVSM VM PhD (V)*

Artemis, the Quiet Death of Multilateral Space Law, and India's Pivotal Choice | A commentary on the geopolitical consequences of the Artemis return to the Moon.

When four astronauts looped around the Moon aboard Artemis II this April and returned safely after a decade of false starts, the headlines understandably dwelt on the human drama: the first crew to leave low-Earth orbit since 1972, the first woman and the first person of colour to make the journey. Yet the more consequential story is not who flew, but what the flight ratified. Artemis is the visible tip of an invisible project — a quiet, methodical effort to write the operating rules for the cislunar frontier before anyone else can, and to do so outside the multilateral institutions that have governed space for nearly sixty years. The mission was a demonstration of capability. The Artemis Accords are an attempt to convert that capability into law. It is the second of these that deserves our attention, because it is reshaping the politics of space far more profoundly than any rocket.

The conventional framing — that the Accords betray the Outer Space Treaty's promise that space is the "common heritage of mankind" — is emotionally satisfying yet legally imprecise, and that imprecision matters. That phrase appears nowhere in the 1967 Treaty. It belongs to the 1979 Moon Agreement, an instrument so thoroughly rejected by every serious spacefaring power that it functions today as a museum piece. What the Outer Space Treaty actually says is gentler and vaguer: that the exploration and use of space shall be carried out "for the benefit and in the interests of all countries," as the "province of all mankind," and that no nation may appropriate celestial territory. The genius — and the vulnerability — of that language is its ambiguity. It was drafted for an age of flags and footprints, not for an age of commercial mining and permanent bases. Into that ambiguity the Accords have stepped, and there lies the real story.

Consider the two provisions that have drawn the most fire. The first concerns resources: the Accords affirm that extracting and using space resources does not "inherently" constitute national appropriation under the Treaty's Article II. Notice the precision of the move. It does not claim a right to own the Moon; it claims, more modestly and more cunningly, that scooping up lunar ice and selling the water is not the same as planting a flag of sovereignty. This is a defensible reading of an ambiguous text — indeed, it is the reading already written into

American, Luxembourgish, and other national legislation — but it is a reading chosen unilaterally and then propagated through a coalition rather than negotiated in a treaty hall. The second provision concerns "safety zones": notification buffers around installations meant to prevent harmful interference. In a region as geographically constrained as the lunar south pole, where the sunlit ridges and ice-bearing craters are few and clustered, the distinction between a temporary safety buffer and a permanent keep-out zone is deliberately ambiguous and dangerously thin — and the Accords supply no mechanism to adjudicate it. A safety zone that no one can challenge and that sits atop the only nearby deposit of accessible water begins, after enough years, to look indistinguishable from the appropriation the Treaty forbids. The Accords have not abolished or violated Article II; they have found the space between its words.

So the accusation must be restated to be fair, and when restated, it becomes sharper rather than blunter. The Accords do not violate the letter of the Outer Space Treaty. What they do is quietly bury the egalitarian alternative — the redistributive, commons-managed vision of the Moon Agreement — and replace it with a regime of first-mover access, in which the Moon's best real estate is, in effect, allocated to whoever arrives first and with the most. The Treaty's promise of non-discriminatory access survives on paper while being hollowed out in practice. International law, in this domain, is no longer made in Vienna or New York. It is being made on the lunar surface and in the arithmetic of a growing signatory list, sixty-seven members deep as of this writing.

This is where the deeper continuity reveals itself, and it is one too few commentators acknowledge. The Accords did not spring from nowhere. They are the heirs to the European Union's ill-fated International Code of Conduct for Outer Space Activities, floated in 2008 in the wake of China's alarming anti-satellite test and finally abandoned at the United Nations in 2015. That effort failed for an instructive reason: the emerging powers — India, Brazil, Russia, China — refused to endorse a set of rules they had not helped write, suspecting, not unreasonably, that a code authored by incumbents would freeze their ambitions in place. The comparison many of them drew was the Nuclear Non-Proliferation Treaty: a bargain that divided the world into those permitted capabilities and those forever denied them. An "NPT in space" was precisely what the Global South feared.

The bitter irony is that the United States drew the opposite lesson from the Code's collapse than its critics did. Where the critics concluded that legitimate space law must be negotiated multilaterally and by consensus, Washington concluded that the search for consensus was the

problem. The Accords dispense with consensus entirely. Rather than seeking universal agreement and failing, the United States built its own coalition, one capital at a time, treating the Outer Space Treaty not as a foundation on which to construct new multilateral law but as a ceiling to be interpreted and then ratified by the sheer weight of its adherents. It is governance by accretion. And it has worked spectacularly, which is exactly why Russia and China regard it as illegitimate. Their objection is not fundamentally about lunar ice; it is about who holds the pen.

Their answer has been to grab a pen of their own. The China–Russia International Lunar Research Station, formalised in 2021, is not merely a rival construction project but a rival theory of how space should be governed — marketed, pointedly, under the banner of "co-consultation, joint construction, and shared benefits," a vocabulary calculated to appeal to exactly the Global South constituencies that distrusted the Western code. Beijing has assembled its own coalition, drawing in partners from Belarus to Pakistan to Venezuela, and has paired this diplomacy with hardware: the Chang'e-7 mission, prospecting the south pole for resources, and Chang'e-8, demonstrating the technologies to use them in place. Both are precursors to a permanent station and both target the same narrow polar band that Artemis covets. We therefore have two coalitions, two philosophies, and one piece of contested ground — a configuration that should make any student of terrestrial geopolitics uneasy.

It would be a mistake, though, to leap from this to the claim that the Accords are militarising space. The framework is explicitly civil, and the orbital arms race — the American "Golden Dome" interceptor programme, the Space Force's open embrace of war-fighting doctrine, the co-orbital "inspector" satellites and counterspace weapons that all three major powers now field — is proceeding on its own track, governed, or rather ungoverned, by its own logic. The honest analytical claim is subtler and, I think, more disquieting. The Accords do not deploy weapons; they harden the competitive environment in which weapons become attractive. When access to lunar resources and the prestige of presence are framed as a zero-sum contest between exclusive blocs, every actor reads the other's civilian infrastructure as a latent military advantage, and the security dilemma does the rest. The danger is not that Artemis carries guns. It is that Artemis sharpens the rivalry within which the guns are quietly being readied.

This brings me to a pivotal player whose strategic decisions are both enlightening and underappreciated beyond its borders: India. In a remarkable sequence of events, India not only signed the Artemis Accords but also achieved a historic milestone by landing Chandrayaan-3

near the lunar south pole, becoming the first nation to do so. This juxtaposition is striking, especially given India's previous vocal scepticism of the European code, which it critiqued for its incumbent bias. By endorsing the Accords, India has evidently recalibrated its stance. The rationale behind this shift is clear: New Delhi has astutely recognised that joining the leading coalition, with its unparalleled access to cutting-edge technology, advanced training, and significant influence in shaping rules, offers far greater benefits than clinging to a multilateral process. This strategic alignment is particularly crucial as a rival bloc, led by China, gains momentum. Far from abandoning its traditions, India is making a calculated decision that these traditions are best preserved and advanced from within the coalition's inner circle.

Yet India has been careful not to be absorbed. It signed the Accords but stayed out of the International Lunar Research Station. It has kept its space programme defiantly indigenous — a crewed Gaganyaan flight, a national space station planned for the mid-2030s, and an Indian on the Moon targeted for 2040 — and has preserved the strategic autonomy that has defined its statecraft since independence. And it is, not incidentally, a direct competitor with China in the very south-polar race the Accords have intensified, which folds the oldest of terrestrial rivalries into the newest of frontiers. India is thus the swing power of the emerging cislunar order: aligned with the American framework but not owned by it, capable of acting alone, and — should it choose to spend its accumulating capital this way — perhaps the only actor with both the standing and the interest to argue for pulling the rival coalitions back towards common, UN-anchored rules.

The question of whether New Delhi can answer this challenge remains uncertain, but what is undeniably clear is the urgent need for action. The structural forces at play are driving us towards fragmentation. The UN Committee on the Peaceful Uses of Outer Space has failed to produce a binding instrument since the ineffective Moon Agreement of 1979, as its consensus-driven approach lags behind the rapid pace of commercial advancements. In this void, coalitions have surged forward, establishing norms through practice rather than formal ratification. Once established, these norms tend to solidify into customary practice without widespread agreement. This is the true peril of our current situation—not the dramatic possibility of a clash at a lunar crater, but the insidious, gradual drift towards two incompatible legal frameworks. Each framework entrenches the advantages of early adopters, threatening to reduce the egalitarian promises of 1967 to mere rhetoric. We must act decisively to prevent this fragmentation and uphold the principles of equality and cooperation in outer space.

We should be clear-eyed about what Artemis II actually accomplished, then. It returned humans to the vicinity of the Moon, which is a genuine achievement. But its lasting significance is political: it lent the momentum of a successful mission to a normative project that is rewriting the rules of space in the image of those powerful enough to reach it first. The Outer Space Treaty imagined the heavens as the province of all mankind. What is emerging instead is a frontier governed by coalitions, contested by blocs, and increasingly shadowed by the instruments of war — a Moon that will belong, in any sense that matters, to whoever writes its rules. The contest to hold that pen is the real space race of our era, and it is being run not on launchpads but in foreign ministries. India, improbably, may hold the deciding vote. We should watch what it does with it.

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Clausewitz's War Within the Chains of Reason versus Girard, the Apocalypse, and the Far-Right Christian Movement in the U.S.

Dr Andreas Herberg-Rothe*

The media's focus on the current U.S. president's personality can easily lead us to overlook deeper, underlying changes. It is well known that the French sociologist René Girard plays a significant role in shaping the self-image of Silicon Valley's tech billionaires. In particular, his disciple Peter Thiel, founder of Palantir, is advancing this agenda and strongly influencing U.S. Vice President J.D. Vance, whom Thiel financially supported during his campaign. This connection has produced a billionaire-backed far-right movement that grounds its legitimacy in a fundamentalist interpretation of Christianity. The phenomenon has already been amply documented in numerous U.S. debates. The rather helpless counter-reaction attempts to demonstrate that Girard is merely being exploited and misunderstood. He certainly is — but the central problem runs deeper: in his book Battling to the End, Girard himself describes an approaching apocalypse. To escape it, he recommends absolute nonviolence, which he sees as realized in Christianity. Peter Thiel and the other tech billionaires, by contrast, believe that in this approaching apocalypse one must fight to the bitter end in order to survive. It is no coincidence that the latest book by the U.S. "Minister of War," Pete Hegseth, is titled American Crusade; Hegseth even compared the rescue of an American pilot at Easter to the resurrection of Christ. Girard is indeed being instrumentalized by Thiel and others. The deeper issue, however, is that Girard himself adopts an apocalyptic framework and appears to give it scientific legitimacy by invoking a reductionist reading of Clausewitz — arguably the most significant theorist of war. It is only through this reference to Clausewitz that Girard's theory of mimesis acquires the political explosiveness that would otherwise have remained confined to academia.

Mimetic Desire and the Scapegoat Mechanism

René Girard's theories on mimesis, mimetic rivalry, scapegoating, and the role of myth and religion in the emergence of culture offer profound insights into human history and behavior. So what is mimetic desire?

Mimetic desire begins with human needs and desires. While needs are biologically rooted, desires are strongly shaped by others. Girard's identification of the basis of the human problem

is simple: most of the things we desire — be it a person, a relationship, an object, an experience, or a feeling — are based on imitation. We develop a desire for these things through our observation of others who desire or possess them, whether consciously or not. This explains the power of advertising (when we see enough people using something, we want it too) as well as the power of celebrity: we want the kind of house, car, clothes, or partner that the rich, famous, and powerful possess.

Children learn through imitation, acquiring language and the skills necessary for social success. By absorbing the ethos of their culture, they become part of the community and eventually pass it on to the next generation. In this respect, mimesis is unproblematic. However, for Girard, mimesis is also the primary cause of social unrest and violence, because it leads to rivalry when people compete for scarce resources. Sometimes class differences separate the object of rival desire — for example, when one harbors a mimetic desire for what the rich possess. In this situation, which Girard calls external mediation, violent conflict is unlikely. In internal mediation, however, where individuals or groups desire the same thing and are close to one another, the possibility of violence is real.

Girard asserts that mimetic rivalry is the primary cause of human violence: tribes fight over resources, two men desire the same woman, envy of another's wealth, fame, honor, or power escalates into violence. Without a corrective, such rivalry would destroy lives and even human civilization itself. The historical corrective, in Girard's view, is the scapegoat mechanism: by constructing a scapegoat, a community projects all of its problems onto a single person or group, casting them out or sacrificing them and thereby stabilizing its own identity. Determining who belongs to a community and who does not reunites the community.

A famous example is Kaiser Wilhelm II's declaration before World War I: "I no longer know of any parties; I know only Germans." Anti-Semitism rests on the same combination of exclusion and sacrifice — elevated, in essence, to a seemingly sacred act.

Girard argues that Jesus's voluntary sacrificial death broke this mechanism once and for all, since he took the sins of the world upon himself. Yet regardless of any theological assessment, this interpretation clearly does not fit the Crusades, the religious wars of the Middle Ages, colonization, the two world wars, or the Holocaust. On the contrary, one could read these events as repetitions of the scapegoat mechanism — unity created through the "sacrifice" of others. This raises a fundamental question: is Christianity characterized by a particular form of nonviolence, as devout Christians will argue, or by a particular escalation of violence aimed at

establishing "eternal peace" already here on earth, as its universal claim suggests? Historically, societies that understood themselves as Christian have a distinct history of violence (as does Islam, which likewise views itself as fundamentally peaceful). The victims of colonization and the Holocaust would not concur with the self-image of a peaceful religion.

Girard's Appeal to Clausewitz

To lend greater legitimacy to his controversial position, Girard explicitly invokes the most significant theorist of warfare, Carl von Clausewitz. In his three propositions on the escalation of war, Clausewitz did in fact advance what looks like a mimetic position. He accompanies the mutual escalation to the extreme with the words "the enemy does the same." He justifies this in two ways: first, whoever escalates the spiral of violence gains the upper hand and wins the war; second, as long as I have not subdued the enemy, I must fear that he will subdue and defeat me. It is the fear and dread of defeat that compels both adversaries to escalate further and further. Ultimately, it is the mutual striving for power on both sides that drives the escalation. In parts of his book, Clausewitz indeed treats the absolute and the extreme as the ideal of warfare. To this extent, one could follow Girard. But Girard overlooks decisive differences. Clausewitz's three dynamics of escalation are followed by three dynamics of moderation, and these likewise occur on both sides. The crucial point is that the desired post-war political condition — and thus peace — exerts a retroactive influence on the conduct of war. At the end of the first chapter, Clausewitz emphasizes that war consists of inherent violence, the interplay of probabilities and chance, and the subordinate role of war as a political instrument. He assigns this last dimension to pure reason. The tendency toward extremes that Girard reads in Clausewitz is therefore real, but it is bounded and contained by the "pure reason" Clausewitz associates with politics. Girard, in extracting only the escalatory side of Clausewitz, turns a theory of war within the chains of reason into a theory of inevitable apocalyptic escalation.

The Tech Billionaires' Reading: From Mimesis to Survivalism

The political danger of this reductionist reading becomes fully visible only when one looks at how Peter Thiel and his network have translated Girard into a worldview. Thiel encountered Girard as a student at Stanford and has repeatedly described him as the most important intellectual influence of his life. For Thiel, Girard's diagnosis is not a warning but a strategic map. If mimetic rivalry inevitably destroys liberal-democratic societies — because equality

and proximity intensify rivalry rather than soothe it — then the political task is not to defend liberal institutions but to escape them. Several recurring motifs follow from this:

- Anti-mimetic exceptionalism. Thiel's famous slogan "competition is for losers" is a direct application of Girard. The entrepreneur, the monopolist, and ultimately the sovereign should step out of the mimetic crowd. From this perspective, democratic pluralism is not a value but a mimetic trap, and oligarchic exit becomes a virtue.
- The katechon. Thiel has repeatedly invoked the Pauline figure of the katechon — the "one who restrains" the coming of the Antichrist. In his speeches and essays, the role of the katechon is increasingly assigned to a strong executive, to U.S. technological supremacy, or to a Christian-civilizational bloc holding back chaos. This theologizes politics: the state is no longer an arena of compromise but a dam against the apocalypse.
- Surveillance as sacred order. Palantir's business model — total data integration in the service of state and military power — fits seamlessly into this frame. If society is on the brink of mimetic dissolution, then comprehensive visibility, predictive policing, and targeting infrastructure appear not as authoritarian tools but as instruments

  of ordering against impending chaos. Girard's diagnosis is used to sanctify what would otherwise require liberal justification.
- The scapegoat, reactivated. Where Girard saw the gospel as having exposed and disabled scapegoating, the new far right openly re-embraces it. Migrants, "globalists," trans people, and "woke" elites are designated as the source of internal corruption whose expulsion will restore the community. The Christian vocabulary of sacrifice and purification is not a remnant; it is the operating system.
- Survivalism as eschatology. The bunker mentality of Silicon Valley — New Zealand estates, private security, off-grid compounds — is often treated as an eccentricity of the super-rich. Read through Thiel's Girard, it is an eschatological posture: the elect prepare to outlast the catastrophe that the masses, locked in mimetic rivalry, will bring upon themselves. The "battling to the end" that Girard feared becomes, for this milieu, a plan.
- J.D. Vance and the political vehicle. Vance's biographical trajectory — Yale Law, conversion to Catholicism under intellectual influences close to Thiel's circle, financial backing by Thiel for his Senate run, and now the vice presidency — illustrates how this worldview has migrated from venture capital into executive power. Vance's public theology, with its emphasis on ordo amoris, civilizational hierarchy, and the duty to

defend "our own" first, is the political-electoral surface of the same apocalyptic substructure.

- Pete Hegseth and the crusading state. Hegseth's American Crusade and his Easter analogy between a rescued pilot and the resurrected Christ are not rhetorical excess; they are the militarized expression of the same script. If history is heading toward a final confrontation, then the armed forces are no longer an instrument of policy in Clausewitz's sense but the sword arm of a sacred order. This is precisely the inversion of Clausewitz that Girard's reductionist reading enables.

The Shared Apocalyptic Premise

The decisive point is that Girard and his far-right appropriators agree on the diagnosis and differ only on the prescription. Both assume that mimetic escalation has reached or is reaching the point of no return; both treat Clausewitz's tendency toward the extreme as an iron law rather than as one pole of a dialectic; both read history eschatologically. Girard's response is absolute nonviolence in imitation of Christ. Thiel's, Vance's, and Hegseth's response is absolute combat in the name of Christ. These are mirror-image conclusions drawn from the same flawed premise. This is why the standard liberal rejoinder — "they are misreading Girard" — is insufficient. It is true, but it leaves the apocalyptic frame intact and merely contests its ownership. The more important move is to dispute the premise itself: to recover the Clausewitz whom Girard truncates. Clausewitz's war stands within the chains of reason precisely because the political purpose, the friction of reality, and the moderating dynamics on both sides prevent the slide into the absolute. War is neither a sacred drama of redemption nor a final reckoning between elect and damned; it is a political instrument that retains its meaning only as long as it remains subordinate to a survivable post-war order. Religiously motivated war has historically produced a particular escalation, internally and externally, because it dissolves precisely this subordination. Girard's tendency toward absolute peacefulness is unrealistic; the religiously legitimized far right's drive toward a final battle is catastrophic. Both rest on the same assumption of an impending apocalypse. That assumption is the core of the problem.

ABOUT THE AUTHOR



*Dr. Andreas Herberg-Rothe is an internationally recognised scholar of Carl von Clausewitz, specialising in political theory, war studies, violence, and peace research. He taught at the University of Applied Sciences Fulda until his retirement in 2025 and previously lectured at Humboldt University of Berlin. His research explores the changing nature of war, drawing on Clausewitz's concept of a "floating balance" and adapting Zygmunt Bauman's idea of "liquid modernity." He was associated with the University of Oxford's "Changing Character of War" programme and served as a visiting fellow at the London School of Economics and Political Science. He is best known for his book Clausewitz's Puzzle: The Political Theory of War and for co-editing Clausewitz in the Twenty-First Century with Hew Strachan.

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Tackling the Manipur Conundrum

Brigadier Deepak Sinha*

One could say that the Central Government is presently in the midst of a perfect storm—the Hormuz crude oil dilemma, the impact of a free-falling Rupee on the economy and of systemic corruption on the exam system. If that were not enough, the government now finds itself combating an insidious social media phenomenon, the rise of the satirical Cockroach Janta Party. It has taken the internet by storm, channelling the angst and frustration of the youth against burgeoning unemployment, rampant corruption and the blatant hypocrisy of those feeding off the establishment. It is gaining immense traction thanks to the Government's short-sighted and rather inept efforts to defame and ban them. Clearly, politicians of all hues are running scared, uncertain of their fate if this phenomenon metamorphoses into a robust political movement. As it has in Nepal, Sri Lanka, and Bangladesh.

In all of this drama, we seem to have completely blanked out Manipur from our collective consciousness. That is truly a pity, because the already volatile situation there, the ongoing prolonged ethnic strife between the Meitei and Kuki/Zo communities from 2023, which shows no signs of ending, just got even more convoluted. The murder, on 13th May, of three prominent Thadou Baptist pastors and their driver, by suspected armed militants in the Kangpokpi district, has only exacerbated the divide between the Nagas, who make up around 25% of Manipur's population, and the Kuki/Zo community in the hill districts of Kangpokpi, Ukhrul and Tamenglong.

Further complicating tribal dynamics in the hill regions, already riven by intra-factional violence within the Hmar, Kuki and Zo communities in Churachandpur District. It must be added that this ambush occurred in a Naga-dominated area, which has led the Kuki Inpi Manipur and the Kuki Organisation for Human Rights Trust to explicitly accuse the NSCN(IM), the Zeliangrong United Front (ZUF), and Meitei groups of colluding in carrying out this ambush. The possibility of a rival Kuki faction, opposed to the peace talks, undertaking a false-flag operation, also cannot be ruled out. The killing of the three Kuki pastors, intimately involved in the peace negotiations, has effectively derailed the peace process itself and led to further clashes and hostage taking by both sides. Clearly, the State Government, which has really not made much progress in resolving the ethno-religious conflicts between the communities, now finds itself in an even more difficult spot. Its ability to control the

deterioration of the prevailing law-and-order situation seems increasingly doubtful, despite the strengthening of the police and security machinery.

The Central Government appears to have failed to recognise, or worse, has wilfully ignored, the possibility that if Manipur's descent into its self-created hellhole is not stopped and reversed quickly, it is only a matter of time before it becomes the first domino to fall in the North East. There is no getting away from the fact that such ethno-religious violence will spread in the region with disastrous consequences. If some see this as an excessively pessimistic diagnosis, they may like to read my earlier 2023 piece on the subject, 'Consequences of the Manipur Conflagration' in the Indian Defence Review (https://indiandefencereview.com/consequences-of-the-manipur-conflagration/).

In it, I had pointed out that the first casualty of the Manipur inferno would be the Government's moribund "Act East" initiative. Also, that there had already been calls emanating from Mizo factions for unity among the kindred tribes, the Chin, Kuki, Zo and Darlong, etc. These will not only get louder but also gain popularity, which could well lead to a demand for a 'Greater Mizoram', including areas in Manipur and Tripura. This is bound to have a knock-on effect, as the Naga tribes see this as an ideal opportunity to renew calls for a Greater Nagaland.

If any of this were to come about, Manipur, and especially the dominant Meitei community, would be adversely affected. Given the strategic importance of the region, an internally disturbed and volatile North East will greatly hamper and adversely impact our military preparedness, capabilities and posture in Arunachal Pradesh.

In fact, the only one to gain from this sordid episode would be China. Given the tenuous state of our relationship with them and their proclivity for using information warfare, one cannot help but wonder if we are victims of a malicious, well-organised and sophisticated information warfare campaign aimed at damaging our socio-economic cohesion, maligning our government, hurting us economically and degrading our military. It is imperative that we act with speed; dilly-dallying or living in denial is not policy.

ABOUT THE AUTHOR



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Research Articles

Advancing Climate Resilience: The Role of Policy Frameworks in Mitigating Environmental and Socioeconomic Impacts under a Narrowing Window of Action

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Abstract

Climate change has emerged as a defining challenge of the twenty-first century, with far-reaching implications for environmental stability, economic systems, social equity, and governance structures. Scientific evidence overwhelmingly attributes contemporary climate change to human activities, particularly fossil fuel dependence and unsustainable land-use practices, while recent assessments indicate that climate impacts are intensifying faster than previously anticipated. Despite growing international recognition and expanding policy frameworks, global responses remain fragmented and insufficient to achieve climate stabilization or equitable development outcomes. This paper examines climate change through an integrated analytical framework that connects scientific risk assessment, climate policy design, governance structures, political economy dynamics, and long-term sustainability pathways. It evaluates the evolution and effectiveness of global and national climate policies, highlights persistent gaps between commitments and implementation, and analyses the roles of governments, international institutions, private sector actors, civil society, and marginalised communities in shaping climate outcomes. Particular attention is given to structural lock-ins, unequal vulnerability, and the chronic underfunding of adaptation in climate-vulnerable regions. The paper argues that the next fifteen years represent a critical and narrowing window for effective climate action. Delayed mitigation and adaptation will significantly constrain future options, increase costs, and heighten the risk of irreversible environmental and socio-economic damage. The findings underscore the need for coordinated, science-based, and equity-oriented policy interventions to accelerate emissions reductions, strengthen resilience, and support a just and sustainable transition.

Keywords Climate Change; Global Climate Governance; Climate Policy Frameworks; Political Economy of Climate Action; Sustainability Pathways; Mitigation and Adaptation; Climate Finance; Just Transition; Climate Resilience

1. Introduction

Climate change has moved decisively beyond the margins of environmental discourse and now stands at the centre of public policy, economic planning, and international cooperation. Once framed as a distant or future concern, it is increasingly understood as a systemic risk capable of reshaping ecosystems, destabilizing economies, deepening social inequalities, and placing political systems under strain across the globe (**IPCC, 2023**). Rising global temperatures, intensifying extreme weather events, and widespread ecological degradation have reinforced the urgency of coordinated and transformative action across all levels of governance. At its core, contemporary climate change is the result of human decisions. Heavy reliance on fossil fuels, large-scale deforestation, rapid industrial expansion, and consumption-intensive development models have driven a sharp increase in atmospheric greenhouse gas concentrations over the past century (**IEA, 2024**). While industrialized nations remain responsible for the largest share of historical emissions, emerging and developing economies now face complex trade-offs between economic growth, poverty reduction, and climate responsibility. This uneven distribution of emissions and impacts has transformed climate change into not only an environmental problem but also a deeply political and ethical challenge. The consequences of a warming climate extend well beyond environmental degradation. Climate-related shocks increasingly intersect with poverty, weak infrastructure, and institutional vulnerabilities, producing cascading impacts across sectors and communities. Heatwaves place growing pressure on public health systems, droughts undermine food security, floods damage infrastructure and disrupt supply chains, and sea-level rise threatens the displacement of coastal populations (**UNDP, 2022; IPCC, 2023**). These risks disproportionately affect low-income populations and climate-vulnerable countries with limited adaptive capacity, reinforcing global inequalities and raising pressing questions of climate justice. In response, governments and international institutions have developed a wide array of policy initiatives aimed at limiting further warming while supporting more sustainable development pathways. The establishment of the United Nations Framework Convention on Climate Change (UNFCCC), the adoption of the Paris Agreement, and the expansion of national climate action plans reflect growing political acknowledgment of the climate crisis. More recently, climate considerations have been integrated into development finance, trade policy, and corporate governance frameworks, signalling a broader shift toward sustainability-oriented decision-making (**World Bank, 2024; OECD, 2023**).

Despite these advances, a significant gap persists between policy commitments and real-world outcomes. Current nationally determined contributions (NDCs) remain collectively insufficient to limit warming to 1.5°C or even well below 2°C (**IPCC, 2023**). Climate policies are frequently characterized by fragmentation, weak enforcement, and poor coordination across sectors and governance levels. Short-term political and economic priorities often continue to outweigh long-term climate objectives, undermining policy credibility and effectiveness. A further challenge lies in the imbalance between mitigation and adaptation efforts. While mitigation has dominated climate discourse and investment flows, adaptation particularly in developing countries remains chronically underfunded. Recent assessments indicate that international public adaptation finance covers only a small fraction of projected needs, leaving vulnerable communities increasingly exposed to climate risks **(UNEP, 2024**). This adaptation finance gap highlights broader structural weaknesses in global climate governance, including inadequate financial mechanisms, limited institutional capacity, and insufficient attention to equity and justice.

Within this context, the concept of global sustainability offers a unifying framework that links environmental protection with economic development and social well-being. Sustainability emphasizes the interdependence of human and natural systems and the need to balance present needs with long-term ecological limits. Addressing climate change through a sustainability lens requires not only technological innovation but also fundamental changes in governance structures, policy design, and societal values (**Rockström et al., 2017; IPCC, 2023**).

The objective of this paper is to provide a comprehensive examination of climate change and global sustainability by integrating scientific evidence, policy frameworks, institutional dynamics, and transition pathways. By synthesizing recent research and policy assessments, the study identifies key structural barriers to effective climate action and highlights opportunities for strengthening climate governance. The paper is organized into five domains. Domain I examines the scientific foundations of climate change and associated global risks. Domain II analyzes the evolution and effectiveness of climate policy frameworks. Domain III explores the roles of key actors and political economy dynamics shaping climate action. Domain IV assesses sustainability pathways and implementation challenges. Domain V focuses on the critical fifteen-year window for action and the limitations of post-2035 recovery. By situating climate change within a broader governance and sustainability framework, this study seeks to contribute to policy-relevant debates on building a more resilient and equitable global future.

Domain I: Scientific Basis of Climate Change and Global Risks

2.1 Anthropogenic Drivers of Climate Change

Over the past decade, advances in climate science have strengthened the conclusion that current climate change is overwhelmingly the result of human activity. The IPCC's Sixth Assessment Report states with very high confidence that anthropogenic greenhouse gas emissions are responsible for the observed rise in global temperatures since the mid-twentieth century (**IPCC, 2023**). This conclusion rests on a robust body of evidence drawn from observational records, climate modelling, and attribution studies that clearly distinguish human influence from natural climatic variability.

The dominant source of human-induced warming remains the combustion of fossil fuels coal, oil, and natural gas to meet global energy demand. These fuels continue to underpin electricity generation, transportation systems, industrial activity, and residential energy use. According to the International Energy Agency **(IEA, 2024**), energy-related carbon dioxide emissions reached record levels in recent years, reflecting both persistent fossil fuel dependence and rising global energy consumption. Although renewable energy deployment has accelerated in many regions, particularly in the power sector, it has not yet expanded rapidly enough to displace fossil fuels at the scale required for absolute emissions reductions.

Land-use change represents another major contributor to climate change. Deforestation, forest degradation, and the conversion of natural ecosystems into agricultural or urban land release significant amounts of stored carbon while simultaneously reducing the capacity of ecosystems to absorb future emissions. The agriculture, forestry, and other land use (AFOLU) sector also emits substantial quantities of methane and nitrous oxide through livestock production, rice cultivation, fertilizer use, and soil management practices. These gases have a much higher global warming potential than carbon dioxide over shorter time horizons, intensifying near-term warming and complicating mitigation efforts (IPCC, 2023).

Industrial activity further exacerbates climate change through both energy consumption and process-related emissions. Sectors such as cement, steel, chemicals, and refrigeration produce emissions that are difficult to abate using existing technologies. In many cases, emissions arise directly from chemical reactions inherent to production processes rather than from fuel use alone. The persistence of carbon-intensive industrial infrastructure highlights the structural nature of the climate challenge and underscores the limitations of incremental efficiency gains in the absence of transformative technological and regulatory change. At a deeper level, these

sectoral drivers reflect a broader development model characterized by resource-intensive growth, rising consumption, and increasingly complex global supply chains. A growing body of research argues that climate change is not simply a technological failure but a systemic outcome of economic trajectories that prioritize short-term growth over long-term ecological stability (**Rockström et al., 2017; IPCC, 2023**). Addressing climate change therefore requires rethinking how societies produce, consume, and govern resources, rather than relying solely on end-of-pipe technical solutions.

2.2 Sectoral Emissions Patterns and Structural Lock-In

Analysing emissions by sector is critical for identifying mitigation priorities and assessing the feasibility of global climate targets. Available emissions data indicate that energy-related sectors power generation, transport, industry, and buildings account for approximately three-quarters of total global greenhouse gas emissions (**Our World in Data, 2024; IPCC, 2023**). Among these, electricity and heat generation remain the single largest source of emissions worldwide.

In many regions, power systems continue to rely heavily on coal and natural gas, particularly in rapidly growing economies where electricity demand is increasing sharply. While solar and wind capacity has expanded substantially, fossil fuels still supply a dominant share of global electricity. Power plants are typically designed to operate for several decades, meaning that once constructed, they lock in emissions unless retired early or retrofitted with low-carbon technologies. This infrastructure lock-in presents a major challenge for timely decarbonization. Transport is another significant emissions source, driven primarily by road transport dependent on petroleum-based fuels. Despite technological advances in electric vehicles and improvements in fuel efficiency, the global vehicle fleet remains overwhelmingly fossil fuel-based. Aviation and shipping pose additional difficulties due to limited availability of scalable low-carbon alternatives. The rebound in transport emissions following the COVID-19 pandemic illustrates the deep structural dependence of mobility systems on carbon-intensive energy sources (**IEA, 2024**).

Industrial emissions arise from both energy use and process emissions linked to production chemistry, particularly in cement manufacturing. These emissions are among the most difficult to eliminate and often require either breakthrough technologies, such as carbon capture and storage, or fundamental changes in material use and construction practices. Emissions from

buildings, while lower in direct terms, become significant when indirect emissions from electricity consumption are considered.

The persistence of high emissions across sectors is reinforced by long-lived infrastructure, institutional inertia, and economic dependencies. Investments in fossil fuel extraction, pipelines, refineries, power plants, and transport networks create vested interests that resist rapid change. IPCC assessments warn that existing and planned fossil fuel infrastructure, if operated as intended, would emit enough carbon dioxide to exceed remaining carbon budgets compatible with limiting warming to 1.5°C (**IPCC, 2023**). This finding implies that climate policy must address not only future investments but also the managed decline of existing high-emissions assets.

2.3 Climate Impacts and Cascading Global Risks

The impacts of climate change are already being experienced across all regions and are intensifying as global temperatures continue to rise. These impacts manifest through both gradual processes such as sea-level rise and shifting precipitation patterns and acute events, including heatwaves, floods, cyclones, and wildfires. The IPCC (2023) notes that many observed impacts are occurring sooner and with greater intensity than projected in earlier assessments, suggesting that climate risks are materializing faster than anticipated.

Heatwaves have emerged as one of the deadliest climate-related hazards, affecting human health, labor productivity, and urban livability. Prolonged periods of extreme heat increase mortality rates, overwhelm health systems, and reduce agricultural yields, particularly in regions with limited access to cooling infrastructure. Changes in precipitation patterns have also intensified both droughts and floods, disrupting water availability, food production, and energy systems. Beyond direct physical impacts, climate change is driving widespread ecological disruption. Rising temperatures, ocean acidification, and habitat loss threaten biodiversity and weaken the ecosystem services on which human societies depend. Coral reef degradation, forest dieback, and declining pollinator populations have cascading consequences for fisheries, food security, and carbon sequestration capacity. These ecological losses further reduce the resilience of natural systems to future climate stressors.

Crucially, climate impacts do not occur in isolation. They interact with socio-economic conditions to produce compound and cascading risks. Climate-induced crop failures can amplify food price volatility, deepen poverty, and contribute to social instability. Flood damage to infrastructure can disrupt supply chains, financial systems, and access to essential services.

The United Nations Development Programme (**UNDP, 2022**) describes climate change as a "risk multiplier" that intensifies existing vulnerabilities and governance challenges. These dynamics highlight the interconnected nature of climate risks and the limitations of narrowly defined adaptation strategies. Effective responses must account for interactions across sectors, regions, and social groups rather than treating climate hazards as isolated events.

2.4 Unequal Vulnerability and Climate Justice

One of the defining characteristics of climate change is the mismatch between responsibility for emissions and exposure to impacts. High-income countries have historically contributed the majority of cumulative greenhouse gas emissions, while many low- and middle-income countries face the most severe climate risks. These countries are often located in climate-sensitive regions, depend heavily on agriculture and natural resources, and possess limited financial and institutional capacity to adapt. This imbalance raises fundamental questions of climate justice. Vulnerable communities frequently lack access to resources necessary for effective adaptation, including resilient infrastructure, early warning systems, and social protection mechanisms. Indigenous peoples and marginalized groups are particularly exposed due to historical exclusion from decision-making processes and insecure land tenure.

Climate justice has gained increasing prominence in international policy debates, emphasizing the ethical responsibility of wealthier nations to support mitigation and adaptation efforts in developing countries. The principle of common but differentiated responsibilities, enshrined in the UNFCCC, reflects this recognition. However, translating this principle into adequate and effective support remains a persistent challenge.

2.5 The Adaptation Finance Gap and Systemic Constraints

Adaptation is an essential component of climate response, given that some degree of warming is now unavoidable. Measures such as climate-resilient infrastructure, improved water management, climate-smart agriculture, and disaster risk reduction are critical for reducing vulnerability and safeguarding livelihoods. Despite this importance, adaptation remains significantly underfunded compared to mitigation.

Recent estimates by the United Nations Environment Programme (**UNEP, 2024**) suggest that adaptation needs in developing countries could reach between USD 310 and 365 billion annually by 2035. By contrast, tracked international public adaptation finance amounted to approximately USD 26 billion in 2023. This stark gap highlights the scale of underinvestment and its implications for vulnerable regions.

Several factors contribute to this shortfall. Adaptation projects often produce public goods and non-market benefits that attract limited private investment. Measuring adaptation outcomes is complex, complicating project evaluation and accountability. Additionally, many vulnerable countries face high borrowing costs and constrained fiscal space, limiting their ability to finance adaptation domestically.

The adaptation finance gap reflects not only a funding deficit but also deeper governance failures. Weak international financial mechanisms, insufficient prioritization of adaptation, and limited integration of climate risk into development planning continue to undermine resilience-building efforts. If left unaddressed, these constraints will exacerbate vulnerability and threaten broader sustainability goals.

2.6 Implications of Scientific Evidence for Policy and Sustainability

The scientific evidence reviewed in this domain carries clear implications for climate policy and global sustainability. **First**, the dominance of energy-related emissions underscores the need for rapid and comprehensive transformation of energy systems. Incremental improvements are unlikely to be sufficient without structural change.

Second, infrastructure lock-in highlights the importance of timing. Delayed action increases the risk of stranded assets, higher transition costs, and irreversible climate impacts. Policy frameworks must therefore address both future investments and the managed phase-out of existing high-emissions infrastructure.

Third, the scale and complexity of climate impacts demand integrated and forward-looking adaptation strategies. Effective responses require coordination across sectors and governance levels, informed by scientific evidence and local knowledge.

Finally, the adaptation finance gap exposes deep inequities within global climate governance. Achieving sustainability will require not only technological innovation but also reforms to financial systems, institutional capacity, and international cooperation. The challenge lies not in the absence of knowledge but in translating that knowledge into effective and equitable policy action.

Domain II: Climate Policies and Global Governance Frameworks

3.1 Evolution of Global Climate Governance

Global efforts to govern climate change have evolved gradually in response to growing scientific certainty, rising political awareness, and the recognition that climate change is a shared global challenge that cannot be addressed by individual states acting alone. Initial

international responses focused largely on acknowledging the problem and establishing guiding principles, which culminated in the adoption of the United Nations Framework Convention on Climate Change (UNFCCC) in 1992. The UNFCCC marked a critical turning point by framing climate change as a common concern of humanity and introducing the principle of common but differentiated responsibilities, which acknowledged differences in historical emissions and national capacities.

Over time, the global climate governance system expanded in both scope and complexity. Early attempts to impose binding emission limits, most notably through the Kyoto Protocol, faced limitations due to narrow participation and uneven compliance. These shortcomings revealed the difficulty of enforcing rigid obligations in a highly diverse international system. In response, subsequent governance arrangements sought to balance ambition with flexibility, leading to the adoption of the Paris Agreement in 2015. Unlike earlier approaches, the Paris framework emphasized broad participation and national ownership over uniform, top-down targets. In recent years, global climate governance has shifted from a phase dominated by negotiations to one increasingly focused on implementation. International discussions now place greater emphasis on aligning policies, tracking progress, and translating commitments into tangible outcomes at national and subnational levels. This transition reflects a growing understanding that governance effectiveness depends not only on formal agreements but also on domestic institutions, political incentives, and administrative capacity (**Falkner, 2023**).

3.2 The Paris Agreement and Nationally Determined Contributions

The Paris Agreement remains the cornerstone of the contemporary international climate regime. Its defining feature is the use of Nationally Determined Contributions (NDCs), through which countries voluntarily outline their mitigation and adaptation goals. This bottom-up structure was designed to encourage near-universal participation while respecting national circumstances and development priorities. Rather than imposing uniform obligations, the agreement relies on iterative cycles of commitment, review, and enhancement.

Since 2020, many countries have revised or strengthened their NDCs, expanded coverage across sectors, and articulated long-term strategies aimed at achieving net-zero emissions. As of 2024, more than 140 countries have announced net-zero targets, collectively representing the vast majority of global emissions (**UNFCCC, 2024**). These developments indicate increasing political recognition of climate risks and the need for structural change. Despite these advances, a significant gap persists between stated commitments and the level of ambition required to meet the Paris temperature goals. Aggregated NDCs remain inconsistent

with limiting warming to 1.5°C and are projected to result in substantially higher levels of warming by the end of the century. This shortfall highlights the limitations of voluntary pledges when they are not supported by robust accountability mechanisms. At the domestic level, implementation is often constrained by policy inconsistencies, regulatory fragmentation, and political resistance. In many cases, climate pledges coexist with continued support for fossil fuel production and consumption, undermining credibility and slowing progress.

3.3 National Climate Policy Instruments

At the national level, governments employ a range of policy instruments to reduce emissions, enhance resilience, and steer investment toward sustainable activities. These instruments typically include regulatory measures, market-based mechanisms, fiscal tools, and information-based approaches. Regulatory policies such as emissions standards, renewable energy mandates, and efficiency requirements provide clear rules that can shape behavior when effectively enforced. In several countries, such measures have played a decisive role in accelerating renewable energy deployment and improving energy performance.

Market-based instruments, particularly carbon pricing, have gained increasing attention. Carbon taxes and emissions trading systems aim to incorporate the social cost of emissions into economic decision-making. By 2024, carbon pricing initiatives had been implemented in over 70 jurisdictions, covering a significant share of global emissions (**World Bank, 2024**). Evidence suggests that well-designed pricing mechanisms can reduce emissions while generating revenue that can be redirected toward climate action or social protection. Fiscal policies also exert substantial influence on climate outcomes. Public investment, tax incentives, and subsidies have helped lower the cost of clean technologies and encourage innovation. However, continued fossil fuel subsidies remain a major obstacle. These subsidies distort markets, discourage low-carbon alternatives, and weaken policy coherence. Information-based instruments, including climate risk disclosures and sustainability reporting, seek to improve transparency and influence decision-making by consumers, investors, and firms. Increasingly, such measures are viewed as essential for aligning financial systems with climate objectives.

3.4 International Climate Finance Architecture

Climate finance is a critical component of global climate governance, particularly in addressing disparities between developed and developing countries. International financial mechanisms aim to support mitigation and adaptation efforts while advancing sustainable development goals. Key channels include multilateral funds such as the Green Climate Fund and Global

Environment Facility, as well as multilateral development banks and bilateral assistance programs.

Despite repeated commitments by developed countries to mobilize substantial climate finance, actual flows remain inadequate relative to assessed needs. Moreover, a large share of available finance has been directed toward mitigation rather than adaptation, reflecting investor preferences and challenges in measuring adaptation outcomes (**OECD, 2023**). This imbalance leaves vulnerable countries exposed to escalating climate risks. Recent policy debates have emphasized the need for systemic reform of the international financial architecture. Proposals include expanding concessional lending, lowering borrowing costs for vulnerable countries, and better leveraging private capital through risk-sharing instruments. Aligning all financial flows with climate objectives, as articulated in the Paris Agreement, has emerged as an important guiding principle. However, fragmentation among funding channels and limited institutional capacity continue to constrain effectiveness.

3.5 Accountability, Transparency, and Governance Effectiveness

Transparency and accountability are central to the effectiveness of climate governance. The Paris Agreement's Enhanced Transparency Framework requires countries to regularly report emissions data, policy actions, and progress toward their commitments. These reporting mechanisms are intended to foster trust, encourage peer learning, and enable collective assessment through global stocktakes. While transparency has improved, significant challenges remain. Data quality and comparability vary widely across countries, and many developing states face technical and institutional constraints in reporting. Moreover, transparency alone does not guarantee compliance, particularly in the absence of enforcement mechanisms. At the national level, governance effectiveness depends heavily on institutional coordination, stakeholder participation, and political leadership. Policies that are integrated across ministries and aligned with development priorities tend to be more durable and effective than fragmented initiatives.

3.6 Structural Limitations of Current Frameworks

Despite notable progress, existing climate governance arrangements face persistent structural limitations. The voluntary nature of international commitments restricts enforceability and allows governments to prioritize short-term political or economic objectives. Fragmentation across sectors and governance levels undermines coherence, while unequal access to finance and technology constrains implementation in lower-income countries.

Geopolitical tensions further complicate collective action. Concerns related to energy security, strategic competition, and economic resilience can conflict with cooperative climate objectives. These dynamics highlight that climate governance is not purely technical but deeply political, shaped by power relations and competing interests.

3.7 Implications for Global Sustainability

The analysis of climate policies and governance frameworks underscores that achieving global sustainability requires more than incremental reform. It demands coordinated, multi-level governance capable of aligning scientific evidence, political incentives, and economic structures. Strengthening climate governance involves raising ambition, improving policy coherence, reforming financial systems, and embedding equity considerations throughout decision-making processes.

As subsequent sections explore, the effectiveness of climate policies ultimately depends on the actors and institutions responsible for their design and implementation. Understanding the political economy shaping climate action is therefore essential for identifying realistic and durable pathways toward a sustainable and resilient future.

Domain III: Parties, Institutions, and the Political Economy of Climate Action

4.1 Climate Action as a Political Economy Challenge

Although climate change is firmly grounded in scientific evidence and addressed through policy frameworks, the pace and effectiveness of climate action are ultimately shaped by political and economic realities. Climate policies inevitably redistribute costs and benefits across sectors, regions, and social groups, making them deeply political in nature. Decisions regarding emissions reductions, adaptation priorities, and climate finance allocation are influenced not only by environmental considerations but also by power relations, institutional capacity, and competing economic interests.

Political economy perspectives emphasise that climate policies do not operate in a neutral environment. Instead, they interact with existing development models, labour markets, industrial structures, and governance systems. As a result, even technically sound and scientifically justified policies may face resistance, dilution, or delay during implementation. Understanding climate action therefore requires examining the roles and interactions of key actors, including national governments, international institutions, private sector entities, civil society organisations, and communities most affected by climate impacts (**Newell, 2021**).

4.2 National Governments and Domestic Political Constraints

National governments play a central role in translating international climate commitments into domestic policies, laws, and investments. Their capacity to do so, however, is shaped by political systems, economic dependencies, and social priorities. In many countries, climate objectives compete with short-term concerns such as employment, economic growth, energy affordability, and electoral pressures.

In economies that rely heavily on fossil fuels, climate mitigation policies often pose direct challenges to powerful industries and associated labor groups. Measures such as carbon pricing, subsidy reform, or coal phase-outs can provoke political opposition if they are perceived to threaten livelihoods or increase living costs. These tensions have been evident in public resistance to fuel price reforms and emissions regulations in several regions (**IEA, 2024**). Even where governments express strong climate ambition, policy coherence remains a persistent challenge. Ministries responsible for energy, industry, transport, and finance may pursue objectives that conflict with climate goals, resulting in fragmented governance. Limited administrative capacity, weak enforcement mechanisms, and regulatory uncertainty further undermine implementation, particularly in developing countries. Sustained political leadership and institutional continuity are therefore critical for maintaining momentum. Conversely, policy reversals following changes in government can erode credibility and delay progress, highlighting the vulnerability of climate action to domestic political cycles.

4.3 International Institutions and Multilateral Governance

International institutions play a vital role in shaping climate norms, coordinating collective action, and mobilizing financial and technical support. The United Nations Framework Convention on Climate Change (UNFCCC) remains the primary forum for global climate negotiations, while the Intergovernmental Panel on Climate Change (IPCC) provides authoritative scientific assessments that inform policy decisions.

Beyond the UN system, multilateral development banks and international financial institutions exert significant influence through lending practices, investment priorities, and policy guidance. In recent years, many of these institutions have pledged to increase climate-related finance and align their portfolios with the goals of the Paris Agreement. However, progress has been uneven, and continued support for fossil fuel-related projects has raised concerns about credibility and policy consistency (**Oxfam, 2023**).

Questions of legitimacy and representation also persist. Developing countries often argue that decision-making power within global financial institutions is disproportionately concentrated in advanced economies, limiting responsiveness to the needs of climate-vulnerable states. Calls

for institutional reform and greater inclusivity reflect broader debates about equity, justice, and fairness in global climate governance.

4.4 The Role of the Private Sector and Financial Actors

The private sector plays a dual role in the climate transition. On one hand, businesses are major contributors to greenhouse gas emissions; on the other, they control capital, technology, and innovation pathways that are essential for decarbonization. Corporate investment decisions, supply chain practices, and political lobbying significantly influence climate outcomes.

In recent years, many companies have announced net-zero targets, adopted sustainability reporting practices, and begun assessing climate-related financial risks. Financial institutions such as banks, insurers, and asset managers have also emerged as powerful actors by determining where capital flows across the economy. Initiatives like the Glasgow Financial Alliance for Net Zero aim to align private finance with climate goals by encouraging voluntary commitments. However, concerns persist regarding the credibility of these commitments. Voluntary pledges are often criticized for weak accountability, inconsistent methodologies, and the risk of greenwashing (**UNEP FI, 2023**). Market forces alone are unlikely to drive the rapid and equitable transitions required. Clear regulatory frameworks, mandatory disclosure requirements, and supportive public policies are necessary to steer private investment toward genuine emissions reductions. Without appropriate safeguards, private-sector-led transitions may also reinforce existing inequalities, particularly if climate finance bypasses high-risk regions or marginalized communities.

4.5 Civil Society, Social Movements, and Knowledge Actors

Civil society organisations, research institutions, and social movements play an essential role in shaping climate discourse and holding decision-makers accountable. Environmental NGOs have long contributed to agenda-setting, policy advocacy, and monitoring of government and corporate behaviour.

In recent years, grassroots movements and youth-led climate activism have gained prominence, reframing climate change as an issue of intergenerational justice and human rights. These movements have broadened public engagement and increased political pressure for stronger climate action. Climate litigation has also expanded, with courts increasingly recognizing government obligations to protect citizens from climate-related risks (Setzer & Higham, 2022).

Scientific and policy research institutions contribute by generating evidence, evaluating policy effectiveness, and countering misinformation. Their credibility and independence are critical for informed decision-making. However, in some contexts, the politicization of climate science

has undermined public trust and delayed policy responses, illustrating the challenges of translating knowledge into action.

4.6 Indigenous Peoples and Marginalised Communities

Indigenous peoples and marginalised communities are often among the most exposed to climate impacts while contributing the least to global emissions. Many of these groups depend directly on climate-sensitive ecosystems and face structural barriers such as insecure land tenure, limited access to finance, and exclusion from formal decision-making processes.

At the same time, indigenous knowledge systems and traditional land management practices offer valuable insights for sustainable resource use and climate adaptation. Recognising this, recent policy frameworks increasingly emphasize inclusive governance and the protection of indigenous rights. However, meaningful participation requires more than formal recognition. It depends on addressing historical inequalities, ensuring access to resources, and granting genuine decision-making authority. Climate action that fails to integrate justice considerations risks exacerbating social tensions and undermining long-term sustainability. Inclusive approaches not only enhance equity but also improve the effectiveness and legitimacy of climate interventions.

4.7 Power Asymmetries and Structural Barriers

A defining feature of the political economy of climate action is the persistence of power imbalances across countries and sectors. Wealthier nations possess greater financial, technological, and institutional capacity to respond to climate change, while poorer countries face disproportionate risks with limited resources. These asymmetries shape negotiation outcomes, access to finance, and implementation capacity. Within countries, concentrated economic interests particularly in fossil fuel industries often exert significant influence over policy processes. Lobbying, media influence, and political financing can delay or weaken climate legislation. Addressing these barriers requires transparency, accountability, and governance reforms that prioritise long-term public interests over short-term economic gains.

4.8 Implications for Advancing Climate Action

The analysis of political economy dynamics reveals that the primary obstacles to climate action are not technological limitations but governance and power-related constraints. Overcoming these challenges requires aligning economic incentives with climate objectives, strengthening institutional capacity, and promoting inclusive and participatory decision-making.

Durable climate action depends on political leadership, social consensus, and institutional reform. Recognizing and addressing political economy barriers is therefore essential for translating scientific knowledge and policy frameworks into effective, equitable, and lasting climate outcomes.

Domain IV: Sustainability Pathways and Implementation Challenges

5.1 Conceptualising Sustainability Pathways in Climate Action

Sustainability pathways describe the long-term trajectories through which societies can transition toward low-carbon, climate-resilient, and socially inclusive development. Rather than representing a single or uniform route, these pathways encompass diverse combinations of technological change, institutional reform, economic restructuring, and social transformation shaped by national contexts and global constraints. In the context of climate change, sustainability pathways must address two parallel objectives: the rapid reduction of greenhouse gas emissions and the strengthening of adaptive capacity to manage unavoidable climate impacts.

Recent climate research underscores that pathways compatible with limiting global warming to 1.5°C or well below 2°C require immediate and sustained action across all major sectors **(IPCC, 2023**). Delays significantly reduce the number of feasible options and increase reliance on uncertain or controversial future technologies. Consequently, sustainability pathways must be assessed not only by their long-term climate outcomes but also by their near-term feasibility, equity implications, and governance requirements. The effectiveness of these pathways depends on whether they can be implemented within existing political, economic, and institutional constraints.

5.2 Mitigation Pathways Across Key Economic Sectors

Mitigation pathways focus on reducing emissions through structural changes in energy systems, industrial production, land use, and consumption patterns. The energy sector occupies a central position in these pathways, as decarbonizing electricity generation enables emissions reductions across transport, buildings, and industry. Core strategies include the rapid expansion of renewable energy, the phase-out of unabated coal, improvements in energy efficiency, and modernisation of electricity grids to support variable renewable supply.

Electrification plays a key role in mitigation strategies, particularly in transport and buildings. The adoption of electric vehicles, heat pumps, and smart energy systems offers substantial emissions reduction potential, provided that electricity supply is increasingly low-carbon.

However, large-scale deployment depends on infrastructure development, regulatory support, affordability, and consumer acceptance. In heavy industry, mitigation pathways are more complex. Options such as material efficiency, fuel switching, process innovation, and carbon capture technologies are essential for addressing emissions that are difficult to eliminate using conventional approaches.

Land-use-based mitigation pathways emphasise ecosystem protection, forest restoration, and improved agricultural practices. Nature-based solutions can deliver multiple benefits, including carbon sequestration, biodiversity conservation, and livelihood support. Their success, however, depends on strong governance, secure land tenure, and safeguards to prevent social displacement or ecological harm.

5.3 Adaptation Pathways and Building Climate Resilience

Adaptation pathways aim to reduce vulnerability and enhance resilience to climate impacts that are already occurring or are unavoidable. Unlike mitigation, adaptation is inherently context-specific and closely linked to local development priorities. Effective adaptation involves integrating climate risk considerations into infrastructure planning, water management, agriculture, health systems, and urban development. Climate-resilient infrastructure forms a cornerstone of adaptation strategies. Investments in flood protection, resilient transport systems, and climate-proofed energy infrastructure can significantly reduce long-term economic losses and protect essential services. In agriculture, climate-smart practices such as drought-resistant crops, improved irrigation, and diversified livelihoods help maintain food security under changing climatic conditions. Urban adaptation is increasingly critical as cities concentrate populations, assets, and climate risks. Measures to manage heat stress, improve drainage, and enhance inclusive urban planning are essential, particularly for low-income communities. Successful adaptation pathways require participatory approaches that incorporate local knowledge and address social inequalities. Adaptation efforts that overlook community needs or power imbalances risk being ineffective or socially contested.

5.4 Finance, Technology, and Institutional Capacity as Enablers

The feasibility of sustainability pathways is strongly influenced by access to finance, technology, and institutional capacity. Transformational change demands substantial upfront investment, especially in developing countries where fiscal constraints and competing

development priorities limit public spending. Aligning public and private financial flows with climate objectives is therefore a central challenge.

Innovative financial instruments such as green bonds, blended finance, and concessional lending can help mobilize resources and reduce investment risks. At the international level, reforming development finance institutions to better support adaptation and just transitions remains essential. Technology transfer and capacity-building initiatives also play a critical role by enabling countries to adopt and maintain low-carbon and climate-resilient solutions. However, technology alone cannot deliver sustainability. Governance quality, human capital, and institutional effectiveness are equally important. Strengthening planning systems, regulatory frameworks, and monitoring mechanisms enhances policy implementation and reduces the likelihood of failure or unintended consequences.

5.5 Governance and Implementation Bottlenecks

Despite the availability of viable sustainability pathways, implementation is frequently constrained by governance bottlenecks. Policy fragmentation across sectors and levels of government undermines coherence and weakens outcomes. Short political time horizons often discourage long-term investments, while limited stakeholder engagement can reduce social acceptance and legitimacy.

In many contexts, climate policies coexist with continued support for carbon-intensive activities, reflecting unresolved political economy tensions. These contradictions dilute policy signals and slow progress. Addressing them requires integrated policy frameworks that align climate objectives with economic development and social priorities. Just transition strategies, which aim to protect workers and communities affected by structural change, are increasingly recognized as essential for maintaining public support and minimizing social disruption. Monitoring and evaluation systems are also critical. Transparent tracking of progress enables learning, accountability, and course correction. Without reliable data and feedback mechanisms, sustainability pathways risk remaining aspirational rather than operational.

5.6 Integrating Equity and Just Transition Principles

Equity considerations are central to the legitimacy and durability of sustainability pathways. Climate action that disproportionately burdens vulnerable groups or excludes marginalised communities, risks generating resistance and political backlash. Just transition principles emphasize fairness in the distribution of costs and benefits, inclusive decision-making processes, and the protection of livelihoods.

Policies that combine climate objectives with social protection such as targeted subsidies, retraining programs, and community investment can enhance public acceptance and reduce transition risks. At the international level, equity considerations reinforce the importance of financial and technological support for developing countries, consistent with climate justice principles. Integrating equity into pathway design is not only an ethical requirement but also a practical necessity for sustaining momentum and achieving long-term outcomes.

5.7 Translating Pathways into Action

The analysis of sustainability pathways demonstrates that viable solutions to climate change already exist across sectors and contexts. The central challenge lies in translating these pathways into coordinated, scalable action. Achieving this requires political leadership, institutional reform, and sustained investment, supported by scientific evidence and societal engagement.

Effective sustainability pathways must remain adaptive, inclusive, and grounded in local realities while aligned with global climate objectives. As the next domain argues, the narrowing window for action heightens the importance of immediate implementation. Decisions taken in the present decade will determine whether sustainability pathways remain achievable or become increasingly constrained by delay.

Domain V: The Critical Window of the Next Fifteen Years and the Limits of Post-2035 Recovery

6.1 Understanding the Narrowing Window for Climate Action

Recent climate science and policy analysis increasingly converge on a shared conclusion: the coming fifteen years represent a decisive and rapidly narrowing window for meaningful global climate action. This period, extending roughly until the mid-2030s, is defined by shrinking carbon budgets, accelerating physical impacts, and rising risks of irreversible environmental change. According to the IPCC's Sixth Assessment Report, global greenhouse gas emissions must peak almost immediately and decline steeply thereafter to retain a realistic chance of limiting warming to 1.5°C (IPCC, 2023).

The idea of a "closing window" reflects more than urgency; it captures a structural reality. Climate outcomes are shaped by cumulative emissions, meaning that delays in action cannot simply be offset by faster reductions later. From a socio-economic perspective, decisions made today regarding infrastructure, energy systems, and land use will lock in emissions trajectories

for decades. As a result, the next fifteen years constitute not just another policy phase, but a turning point that will determine whether climate stabilization remains achievable.

6.2 Carbon Budgets, Tipping Points, and Irreversible Change

Scientific evidence indicates that continued emissions growth significantly increases the risk of crossing climate tipping points thresholds beyond which changes in Earth systems become self-reinforcing and extremely difficult to reverse. These include the destabilization of polar ice sheets, large-scale forest dieback, permafrost thaw, and disruptions to ocean circulation. While uncertainties remain regarding the precise timing of these thresholds, research suggests that risks rise sharply as global temperatures exceed the 1.5–2°C range (**Armstrong McKay et al., 2022**).

Once such tipping points are crossed, subsequent mitigation efforts may be unable to restore previous climate conditions. This challenges the assumption that delayed action can be compensated through future technological advances or accelerated emissions reductions later in the century. Instead, climate risk exhibits a strong asymmetry: the consequences of delay are disproportionately larger than the costs of early action. Recovery from overshoot scenarios, if possible at all, is likely to be partial, prolonged, and socially disruptive.

6.3 Infrastructure Lock-In and Development Path Dependency

The coming fifteen years will also shape the long-term structure of global energy, transport, and urban systems. Infrastructure investments made during this period such as power plants, transport networks, industrial facilities, and buildings typically operate for several decades. If these investments continue to favour carbon-intensive technologies, they will embed high emissions pathways well beyond 2040.

IPCC assessments warn that emissions from existing and planned fossil fuel infrastructure alone could exceed the remaining carbon budget compatible with limiting warming to 1.5°C **(IPCC, 2023**). Retrofitting or retiring such assets prematurely would impose significant economic and political costs, particularly in developing economies. This path dependency underscores why near-term decisions carry disproportionate weight. Once carbon-intensive systems are established, reversing them becomes increasingly expensive, politically contested, and socially disruptive.

6.4 Limits to Adaptation and Rising Loss and Damage

Delayed mitigation also constrains the effectiveness of adaptation. While adaptation measures can reduce vulnerability, they are subject to both physical and social limits. Extreme heat, sea-level rise, and ecosystem degradation may exceed adaptive capacity in many regions, particularly in small island states, low-lying coastal zones, and arid areas.

As warming intensifies, adaptation costs rise while effectiveness declines. Infrastructure designed for present-day climate conditions may fail under future extremes, and repeated climate shocks can erode community resilience over time **(UNEP, 2024**). In such contexts, adaptation shifts from risk prevention to damage management. The concept of loss and damage climate impacts that cannot be avoided through mitigation or adaptation has gained prominence as these limits become more apparent. Economic losses, cultural displacement, and irreversible ecological harm are expected to increase substantially if emissions reductions are delayed. These realities reinforce the conclusion that reliance on future recovery strategies cannot substitute for immediate action.

6.5 Technological Optimism and Its Constraints

Some climate pathways assume that future technologies such as large-scale carbon dioxide removal or geoengineering will enable recovery from delayed mitigation. While technological innovation is essential, excessive reliance on unproven solutions introduces significant uncertainty and risk. At present, carbon removal technologies operate at a scale far below what would be required to offset continued high emissions.

Rapid scaling would demand substantial land, energy, and financial resources, potentially creating new environmental and social trade-offs. Moreover, governance frameworks for such technologies remain underdeveloped, raising ethical, political, and geopolitical concerns. The IPCC cautions against treating future carbon removal as a justification for near-term inaction, emphasizing that early emissions reductions are more reliable, cost-effective, and equitable (**IPCC, 2023**).

6.6 Policy Urgency and Strategic Priorities

The evidence reviewed in this domain leads to a clear conclusion: the next fifteen years constitute a make-or-break period for global climate action. During this window, governments and institutions must prioritise policies with immediate and lasting impact. Key measures include phasing out unabated coal, accelerating renewable energy deployment, improving energy efficiency, and protecting critical ecosystems. Equally important is scaling up

adaptation in vulnerable regions to prevent irreversible losses and humanitarian crises. Policy strategies should focus on actions that deliver near-term emissions reductions while building long-term resilience. Delaying action in anticipation of future recovery undermines both scientific evidence and policy realism. Beyond the mid-2030s, options narrow, costs escalate, and risks multiply.

6.7 The Present Decade as a Historical Turning Point

Viewed from a long-term perspective, the coming fifteen years are likely to be remembered as a defining chapter in humanity's response to climate change. Choices made during this period will determine whether societies stabilise the climate system or commit future generations to escalating disruption and constrained recovery options.

Recognizing this temporal urgency strengthens the case for immediate, coordinated, and equitable action. Aligning policies, institutions, and societal priorities within this narrowing window is essential for achieving global sustainability and avoiding irreversible climate outcomes. The challenge ahead is not a lack of knowledge, but the willingness and capacity to act decisively while meaningful options still remain

7. Conclusion and Policy Implications

Climate change stands as one of the most far-reaching and complex challenges confronting the global community in the twenty-first century. As this paper has demonstrated, it is not solely an environmental problem but a multidimensional crisis with deep implications for economic stability, social equity, institutional governance, and long-term sustainability. Scientific evidence leaves little ambiguity regarding the anthropogenic drivers of climate change or the accelerating pace of its impacts. At the same time, existing policy responses and governance arrangements remain insufficient to match the scale and urgency of the challenge.

The analysis of scientific risks and emissions patterns highlights that the central obstacle is no longer a lack of knowledge, but a persistent gap between understanding and action. Structural lock-ins across energy, transport, industry, and land-use systems continue to delay emissions reductions, while climate impacts increasingly test the limits of adaptation, particularly in vulnerable regions. The uneven distribution of both responsibility and harm reinforces climate change as an issue of global justice, demanding responses that go beyond efficiency and incorporate equity at their core.

An examination of global and national climate governance frameworks reveals a mixed picture. The Paris Agreement has succeeded in mobilizing near-universal participation and embedding climate considerations within national planning processes. However, the reliance on voluntary commitments, weak enforcement mechanisms, and fragmented domestic implementation has produced a persistent ambition gap. Climate finance commitments have fallen short of assessed needs, and adaptation remains significantly underfunded relative to mitigation. These shortcomings underscore the limits of incremental reform within existing governance structures.

The political economy analysis further demonstrates that climate action is shaped as much by power relations, vested interests, and institutional capacity as by technological feasibility. Fossil fuel dependence, policy incoherence, and unequal access to finance continue to constrain progress. At the same time, the growing role of civil society, indigenous communities, and knowledge actors highlights the importance of inclusive governance and social legitimacy in sustaining long-term climate action. The exploration of sustainability pathways confirms that viable solutions already exist across sectors. Clean energy transitions, resilient infrastructure, nature-based solutions, and inclusive adaptation strategies offer credible routes toward low-carbon and climate-resilient development. Yet the feasibility of these pathways is increasingly constrained by time. As argued in the preceding domain, the next fifteen years represent a critical window during which delayed action would sharply limit future options and increase reliance on uncertain recovery strategies. The notion that future technological breakthroughs can compensate for present inaction is neither scientifically robust nor politically realistic.

Taken together, these findings suggest that the defining challenge of climate governance lies not in designing new goals, but in accelerating implementation, strengthening institutions, and aligning political and economic incentives with long-term sustainability objectives.

Policy Implications

Several key policy implications emerge from this analysis.

First, policy urgency must be substantially elevated. Governments should move beyond incrementalism and prioritize measures with immediate and durable emissions-reduction impacts. These include the rapid phase-out of unabated coal, the removal of fossil fuel subsidies, accelerated deployment of renewable energy, and large-scale investments in energy efficiency. Delayed action will only increase transition costs and heighten climate risks.

Second, climate policy coherence must be strengthened. Climate objectives should be embedded across economic, industrial, and development planning processes rather than treated as a separate policy domain. Aligning short-term economic incentives with long-term climate goals requires stronger inter-ministerial coordination, regulatory consistency, and institutional accountability.

Third, international climate finance architecture requires reform. Scaling up adaptation finance, improving access for climate-vulnerable countries, and reducing borrowing costs are essential to addressing equity concerns and preventing irreversible losses. International financial institutions must align lending practices fully with climate goals and prioritize resilience alongside mitigation.

Fourth, just transition principles should guide implementation. Climate policies must explicitly address social impacts by protecting livelihoods, supporting affected workers and communities, and promoting inclusive decision-making. Equity is not an auxiliary concern but a prerequisite for political durability and social acceptance.

Finally, the present decade must be treated as a strategic inflection point. Decisions taken now will shape emissions trajectories, infrastructure systems, and adaptive capacity for generations. Effective climate governance therefore requires decisive leadership, institutional reform, and sustained societal engagement to act within this narrowing window of opportunity.

Closing Reflection

In conclusion, climate change is no longer a distant or abstract threat but a present reality with escalating consequences. The pathway to global sustainability remains open, but it is increasingly constrained by delay and inaction. Whether the international community succeeds in stabilising the climate system will depend on its ability to translate scientific knowledge into policy, commitments into implementation, and urgency into lasting institutional change.

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Dual-Use and Emerging Space Technologies: Drivers of Militarization and the Governance Deficit

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Abstract

The rapid diffusion of space technologies, both established dual-use systems (e.g., GNSS, Earth observation, and launch vehicles) and emerging technologies (e.g., autonomous on-orbit servicing, robotic satellites, and AI-enabled space systems), is reshaping strategic competition in outer space and exposing fundamental weaknesses in extant governance regimes. This paper investigates how the technical affordances of dual-use and emerging space technologies facilitate militarization, and why existing legal and normative instruments are ill-equipped to prevent their progressive weaponization. The analysis identifies three mechanisms linking technology to militarization: functional convergence (civilian systems repurposed for military ends), capability diffusion (commercial innovations lowering thresholds for military use), and operational opacity (limited transparency and verification enabling strategic ambiguity). It further maps governance gaps, exploring the arenas for cooperative space governance. The study adapts methodological foundations from secondary sources and theoretical ground from neorealism, neoliberalism, and security studies.

Keywords Dual-use, emerging technologies, space militarization, governance, verification, space policy.

Introduction

States have historically exploited the domain of outer space to pursue their interests, both civilian and military, and the Cold War period witnessed the dramatic use of outer space as a competitive domain. Even so, scientific advancements and space innovations drove the competition. American celestial accomplishments are considered to have outpaced those of the Soviets during the period, primarily due to the development of more sophisticated space technology, with private entities contributing to the innovation and development of space technology (Brown, 2011). By the 21st century, more states have ventured into outer space to explore the vast cosmos, and competition has taken a different dimension. Commercial entities have increased in number and contribution level. The state-centric model of exploring and exploiting outer space has now evolved into a mixed model involving private entities, primarily to stay ahead in technological innovation. This mixed model has led to the emergence of new

technologies apart from the existing dual-use systems and has accelerated the utility of the outer space domain. The rapid advancement in technological progress in outer space, while accelerating progress on one hand, also surpasses existing governance mechanisms by militarizing the domain. This paper is built to address two major questions: how do dual-use and emerging space technologies facilitate the militarization and potential weaponization of outer space? And why are current governance frameworks failing to address this challenge?

The paper argues that functional convergence, capability diffusion, and operational opacity link militarization and technology and are systematically lowering the barriers to and increasing the incentives for space militarization, thereby exposing critical vulnerabilities in a governance regime designed for a bygone era.

The paper proceeds by first reviewing the discourse on militarization and weaponization before looking at the theoretical perspectives. It then develops an analytical framework centered on three mechanisms linking technology to militarization, and subsequently maps the corresponding governance deficits before conclusion.

1. Discourse on Space Militarization and Weaponization

Even before the launch of the Sputnik satellite by the Soviet Union, which marked the beginning of the space age, the United States had plans to build a world-circling spaceship with potential military applications (Hays, 2011).The development of photo-reconnaissance and intelligence-gathering satellites by the US was a way to monitor the Soviet Union and their developments (Hays, 2011, p. 3). Later, the heightened tensions of the Cold War were not limited to the Earth alone; they extended far up into space. Similar to the arms race on Earth, the space race was initiated by the Cold War powers. It was never limited to scientific advancements but to military applications as well. They developed and deployed satellites to be used for meteorology, communication, and early warning, among others (Mowthorpe, 2004). Assets based in space could provide information regarding activities of national concern, including military communications, position-navigation-timing, missile early warning systems, missile targeting, movement of military troops and fleets, and intercept signals from adversaries, apart from civilian necessities. Satellite deployments and exploration activities have contributed to the military power of respective countries, particularly in intelligence gathering, reconnaissance, and understanding capabilities of the adversary, and thus need a focus. In this way, space assets could ensure overhead surveillance over a state's territory as well as over that of an adversary. It can be seen that the Cold War, through the deployment of

military-spy satellites, had a significant role in assigning space as a military domain (Muszyński-Sulima, 2023).

The Cold War and early post-Cold War years could demonstrate the military uses of space assets as in the Gulf War of 1991, the Kosovo War of 1999, the Afghanistan intervention in 2001 and Iraq intervention of 2003 which demonstrated the space-enabled warfare abilities including GPS-enabled precision strikes, weather calculations for attack, battlefield coordination and target acquisition through intelligence, surveillance and reconnaissance (ISR) (Cheng, 2012). It also demonstrated the changing nature of warfare, which demanded information domination over the adversary to have a complete battlefield picture and situational awareness (Cheng, 2012, p. 58). Thus, space militarization was necessary to ensure battlefield intelligence and to secure a win in warfare. That said, there are diverse arguments regarding the militarization of space, with some scholars asserting that its initial phases were predominantly defensive, whereas contemporary developments indicate a shift toward more offensive capabilities, while others argue that space has always been militarized. Others argue that space was not just militarized but has been weaponized. The source of these diverse arguments stems from the ambiguity in defining what space militarization is and how it is different from space weaponization. Matthew Mowthorpe defines space militarization as "the use of assets based in space to enhance the military effectiveness of conventional forces or the use of space assets for military purposes" (Mowthorpe, 2004, p. 3) and space weaponization as "weapons based in space or weapons based on the ground with their intended targets being located in space" (Mowthorpe, 2004, p. 3). However, the principles of the OST are not complementary to Mowthorpe's definition. It limits certain activities in space, predominantly weaponization. It calls upon "states to refrain from placing in orbit around the earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction or from installing such weapons on celestial bodies" and "the establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military maneuvers on celestial bodies shall be forbidden" (UNOOSA, 1967).

It can be seen that the 1967 Outer Space Treaty (OST) categorizes only weapons of mass destruction (WMD) and nuclear weapons in orbit as weaponization, leaving loopholes for states to exploit the same (UNOOSA, 1967). All these would have adequately captured the military uses of space, except for the changes in warfare, technology, and the military potential of space. Over the past two decades, warfare has evolved significantly. The objective is no longer just physical dominance, but information superiority through space assets as well as denying the

adversary's access (Berge, 2024). Achieving this increasingly depends on space-based systems such as satellites, as well as the ground infrastructure that supports them. Thus, the scope of what constitutes a 'space asset' has broadened. Today, space assets can be space-based (satellites, spaceships, space stations, etc) and ground-based (control and tracking centers, ground stations, launching facilities, etc). The military use of these assets, whether for surveillance, navigation, communication, or coordination, clearly falls under the realm of militarization. These are tools that support military effectiveness without necessarily being weapons themselves. However, as rivalries intensify and states seek to deny adversaries access to space, a new set of technologies has emerged - counterspace weapons. These are specifically designed to disrupt, disable, or destroy an opponent's space systems (Moltz, 2024, p. 138). These can be hard-kills, causing physical destruction to assets, and soft-kills, where it does not physically damage assets but can disable, disrupt, and damage satellite functioning, causing reversible damage (Bowen B. E., 2022, p. 250). In the soft-kill case, technology is used as a military tool, essentially militarizing technology. Bowen categorizes space weapons into three operational domains: earth-to-space, space-to-space, and space-to-earth.

Earth-to-space weapons: These are ground-based systems, such as kinetic kill vehicles, anti-satellite (ASAT) missiles, and directed energy weapons, which target satellites or other objects in space (Bowen B. E., 2022, p. 246). While these weapons are launched from Earth, their intended targets are in orbit, which technically makes them part of space weaponization under Mowthorpe's definition. However, the OST does not explicitly prohibit such ground-based systems, allowing states to exploit this legal gap.

Space-to-space weapons: These include soft-kill technologies like lasers, microwave weapons, jammers, robotic arms, and cyber tools installed on orbiting platforms (co-orbital) (Bowen B. E., 2022, p. 258). Though they are capable of disabling or disrupting other satellites, they are often embedded within dual-use systems and can be framed as part of a satellite's defensive or operational functions. Because the OST only bans nuclear weapons or weapons of mass destruction in space, soft-kill weapons remain in a legal grey area. Their presence blurs the line between military support and actual weaponization.

Space-to-earth: This is the most speculative category and refers to hypothetical systems capable of launching attacks from orbit toward targets on Earth. Examples 4 include kinetic orbital strike systems like orbital bombardment (Bowen B. E., 2022, p. 277). No state has deployed such systems, and they would almost certainly violate OST provisions if developed.

The OST, while foundational, is limited in its scope. It prohibits the placement of nuclear weapons or other weapons of mass destruction in orbit and bans military activities on celestial bodies, but it says little about non-nuclear, dual-use, or ground-based systems (Ferreira-Snyman, 2015). As a result, many states have continued to develop and test counter-space capabilities without breaching the treaty's letter, if not its spirit. This loophole enables nations to field advanced technologies designed for hostile purposes while technically maintaining a non-weaponized stance in space. For example, a satellite carrying a laser jammer can be described as a communications or navigation satellite, depending on its mission profile, even if it holds the potential to disable adversary assets. Given the complexity of the current space environment, the definitions of militarization and weaponization require updating. Militarization today encompasses the integration of both space-based and ground-based assets for military advantage as well as denying the adversary's access. Weaponization, by contrast, implies the active deployment of weapons of hard-kill nature in space against space-based assets or against ground-based assets. Here, direct-ascent ASAT weapons, although offensive and hard-kill in nature, would not fall under weaponization since OST implicitly provides a gray area. Also, ASAT tests by countries have only been employed against their assets, but with the potential to do the same against other assets. Thus, they can be considered as part of space militarization, aimed at strategic deterrence, because the lines between space militarization and weaponization are increasingly becoming blurred. While we have not yet reached a fully weaponized space environment (since no space-to-Earth or space-to-space hard kill systems have been deployed), we are witnessing a strategic and technological convergence, a blend of militarization with latent weaponization capabilities.

While scholars agree on the blurring of militarization and weaponization of outer space and acknowledge the role of dual-use space technology in facilitating the same, this paper offers a systematic analysis of the causal mechanisms through which dual-use and emerging technologies accelerate the militarization of space. Additionally, the paper explores the governance deficit as a causal factor, as well as a stage for enhanced governance.

2. Theoretical Lenses

2.1. Neorealism

The neorealist argument of space militarization is grounded in the structural anarchy of the international system. Since outer space is also a domain governed by anarchy, i.e., the absence of a hierarchy to bring order, states are primarily concerned with survival and will seek to

maximize their relative power and security. In an anarchic world where no central authority exists to enforce rules and bring order, states cannot be certain about one another's intentions (Mearsheimer, 2014). As a result, they are compelled to act in ways that maximize their power and security, even if it means taking assertive actions. This logic fits well within the space domain, where dual-use technologies, such as satellites capable of both civilian and military applications (Cannon, 2023), further complicate understanding of the actual motive. Since no state can be fully confident about the purpose of another's space capabilities, mistrust and competition naturally follow. The ambiguity surrounding space systems reinforces the basic tenets of offensive realism: the pursuit of power, the centrality of survival, and the impossibility of fully knowing others' objectives (Hudson, 2022). Hence, in space, states would seek to maximize their capabilities, leading to the militarization of space. For defensive realists, security-seeking motives gain an upper hand over power maximization that leads to security. For this reason, the logic of the security dilemma from Security Studies applies with defensive realism, whereby a state's efforts to enhance its own security unintentionally generate a sense of threat in other states, prompting them to strengthen their own security measures. These responses then feed back into the original state's threat perceptions, resulting in a cycle of mutual insecurity. In outer space, where the intent and motive of other states are unknown, and where dual-use and emerging technologies have an upper hand, the security dilemma can be traced.

3.2 Neoliberalism

Neoliberalism, while accepting the condition of anarchy, offers a more optimistic view regarding the potential for cooperation. Neoliberals argue that institutions, regimes, and norms can mitigate the security dilemma by reducing transaction costs, increasing transparency, and facilitating repeated interactions that build trust. Neoliberal institutionalism argues for the establishment of institutions to increase cooperation (Jervis, 1999). However, for institutions to be established, actors would need to have cooperation as the desired outcome. Neoliberal approaches assume that by lowering transaction costs and increasing transparency, states and other actors will naturally move toward cooperation. In practice, however, the rapid commercialization of space has made this more difficult. As private and state-linked actors gain uneven access to information and advanced capabilities, mistrust grows rather than diminishes, weakening confidence-building efforts instead of reinforcing them. Governance deficits, therefore, emerge because existing institutions, largely inherited from Cold-War-era treaties, cannot monitor or verify the proliferating constellation of dual-use technologies, leaving the

domain susceptible to militarization (Burke-White & Williams, 2025). Hence, the challenge of governance deficit can be met with transparency and confidence-building measures that align the interests of the actors with cooperative outcomes. Neorealism predicts that rising dependence on space assets and ambiguous intent will produce security-seeking or power-seeking countermeasures, and neoliberal institutionalism predicts that where credible transparency and verification exist, cooperative restraint is possible. While existing literature capably describes the symptoms of space competition and critiques governance shortfalls, there is a need for a more systematic, mechanism-driven analysis of the causal links between modern technology and militarization. This paper seeks to fill that gap. It moves beyond stating that dual-use technologies are problematic to explain how and why they drive militarization through specific, identifiable mechanisms. By grounding these mechanisms in current technological case studies, this paper attempts to analyse a core challenge in space security.

3. Methodology

This paper uses a qualitative, theory-guided process-tracing approach to link technological affordances to observed patterns of militarization. The method is used to assess whether the cases follow a sequence, beginning with uncertainty about intent and ending with observable militarization-oriented responses. Three purposively selected cases are analyzed, including Global Navigation Satellite Systems (GNSS), commercial Earth observation, and autonomous on-orbit servicing, chosen to capture possible variations in technological maturity, actor type, and publicly available evidence. Sources include peer-reviewed articles, books, official government statements, strategy documents, and technical reports. Limitations include reliance on open sources and the focus on illustrative cases.

4. Mechanisms Of Space Militarization

4.1. Functional Convergence

Functional convergence refers to the inherent ability of a system designed and operated for civilian or commercial purposes to perform military functions with minimal to no physical modification. Outer space systems are designed with respect to functional convergence properties to repurpose them for military effect. In an anarchic space environment marked by uncertainty over intentions, functional convergence blurs the civilian–military boundary in ways that intensify security dilemmas, as states increasingly view civilian space assets or non-military capabilities as potential threats, thereby encouraging defensive protection, denial strategies, and countermeasures. Navigation satellite systems, earth observation systems, and

potential multi-functional systems are all examples of the same. Systems like GPS (USA), Galileo (EU), GLONASS (Russia), and BeiDou (China) are public goods providing critical timing and positioning data for global transportation, finance, and communication. Militarily, however, GNSS is a force multiplier. Its civilian signals also enable military precision, synchronization, and situational awareness (Larsen, 2001). It is fundamental for the navigation of troops, the guidance of precision munitions, and the synchronization of military operations. The 2022 conflict in Ukraine has starkly illustrated this, with both sides heavily reliant on GNSS for drone operations and artillery targeting, while simultaneously engaging in jamming and spoofing attacks (Jhanjhi, et al., 2025). The civilian infrastructure is, de facto, a core military infrastructure. Similarly, earth observation systems, particularly those employed for commercial applications, resonate with the mechanism. The revolution in high-resolution, high-revisit-rate satellite imagery, led by companies like Maxar Technologies, Planet Labs, and Airbus, has democratized access to strategic intelligence. During the Ukraine conflict, commercial EO from entities like Maxar, Starlink, etc., provided near-real-time imagery of Russian troop buildups, battlefield damage assessments, and evidence of alleged war crimes, which were used by Ukrainian forces and publicized by governments (Kostenko & Manzhula, 2025). This represents a direct, functional convergence where a commercial commodity becomes a pivotal tool for strategic intelligence, surveillance, and reconnaissance (ISR), erasing the line between commercial remote sensing and military spy satellites.

5.2 Capability Diffusion

Capability diffusion describes the process by which commercial innovation, economies of scale, and market competition dramatically lower the cost and technical barriers to acquiring advanced space capabilities. Innovations favouring small satellites, mega constellations, commercial launches, and reusable rockets are contributions to capability diffusion. While capability diffusion has contributed to the democratization of space-access with more and more actors engaging in the frontier, it also raises the question of who genuinely has this expanded access.

Commercial innovation, market competition, and reduced technical barriers have allowed a greater number of states and private entities to participate in space activities, especially through small satellite deployment and new launch options, suggesting a trend toward broader inclusion and equity in space access. Such trends underlie the narrative that space is becoming more accessible to emerging space nations and non-traditional players beyond the historic space

powers (Peeters, 2025). The problem is not simply that more actors are present in orbit, but that capabilities once associated with high-end military systems are now embedded in commercial platforms with ambiguous intent and dual-use functionality. The CubeSat standard and advances in miniaturization have reduced the cost and time for the development of satellites. This shift has enabled commercial actors to operate constellations consisting of hundreds of small satellites, providing continuous Earth-observation capabilities that were previously associated with government-run programs (Hallex & Cottom, 2020). Reduction in launch costs driven by reusability and modest investment, even for the deployment of dedicated ISR constellations, has made space faring affordable and reliable, but it has also increased the complexity of the space environment. They make it easier to put military systems into orbit as well. Capabilities such as direct-ascent anti-satellite weapons, on-orbit inspection spacecraft, or coordinated satellite swarms become simpler to deploy when access to space is cheaper, more frequent, and less technically demanding. The same technological advances that underpin a thriving commercial space sector can also, unintentionally, intensify military competition by reducing the practical and economic barriers to escalation in space (Bowen, 2020). Capability diffusion complicates neoliberal institutionalist assumptions, as expanded access through markets increases the salience of governance and verification while simultaneously producing asymmetries that undermine transparency and erode the cooperative dynamics institutions are meant to foster. At the same time, it creates and reinforces security dilemmas since it deepens uncertainty about intentions, prompting actors to take reciprocal measures, which fuel militarization. The increased number of actors tends to create insecurity and multiply threat perception. The lowered costs of launches and development of space systems equally lowered the cost of competition. This could make ASAT weaponry cheaper and therefore preferable.

5.3 Operational Opacity

Operational opacity stems from the technical characteristics of emerging technologies that create ambiguity in intent. It becomes difficult or impossible for an external observer to distinguish between peaceful and hostile activities, thereby complicating attribution, eroding trust, and enabling ‘grey zone’ aggression below the threshold of armed conflict. On-orbit servicing, assembly, and manufacturing (OSAM) technologies illustrate one of the most striking dual-use dilemmas in space security today. A servicer equipped with a robotic arm, grappler, or refueling nozzle may be designed for benign purposes such as life-extension, debris removal, or in-space assembly, like the rendezvous and proximity operations, but the same physical capabilities can enable close approaches, inspection, grappling, or even interference

with another satellite's operations (Porras, 2019). Capabilities developed for servicing or active debris removal could, if misused or repurposed, degrade or disable space assets and thus blur the line between peaceful and threatening activity. The inherent ambiguity of such systems is evident in contemporary orbital behavior. For example, Russia's so-called 'nesting doll' satellites, Cosmos-2542 and its deployed sub-satellite Cosmos-2543, have performed extended close approaches near a U.S. reconnaissance satellite (Jenkins, 2024). Also, Shijian-21(SJ-21), launched in 2021, successfully exhibited rendezvous and proximity operations (RPO) by docking with an out-of-service BeiDou-2 G2 navigation satellite, flying it to a temporary disposal graveyard orbit, and 40 returning to GEO. A similar robot grappling feature was reportedly exhibited by SJ-17 as well (US Department of Defense, 2024). Similarly, the digitization of satellite command and control and the use of internet-protocol-based links create vulnerabilities and opacity, resulting in fields for cyber and electronic warfare. Soft-kill weapons such as lasers, jammers, and cyber-attacks are employed in this dynamic. These are as lethal as kinetic-kill weapons but are usually non-collidable in nature and can be used to destroy and disable space systems, with the advantage of deniability in cases of accusations. This opacity provides a permissive environment for constant, low-level testing of an adversary's defenses and resilience without triggering overt retaliation. Operational opacity deepens insecurity in space by obscuring intent and making even routine actions appear threatening. When states cannot reliably verify what others are doing, they are more likely to assume worst-case scenarios and take precautionary measures to protect themselves. This uncertainty strengthens the security dilemma, as actors respond not to confirmed threats but to perceived vulnerabilities. At the same time, opacity erodes the very conditions that neoliberal cooperation depends upon, like transparency, information sharing, and trust. Without credible insight into others' behavior, institutions lose their ability to reassure, and cooperative frameworks struggle to function as intended.

5. The Governance Deficit

The 1967 OST remains the cornerstone of space law. While its principles, such as the non-appropriation of celestial bodies and the freedom of exploration, are enduring, its utility for managing contemporary security threats is severely limited. Key terms like 'peaceful purposes' are subject to weaker interpretations, permitting militarization to an extent, while neither distinguishing nor banning weaponization (M.Cervino & Davolio, 2003). Its narrow focus on weapons of mass destruction does not properly define that space weapons, ASATs, and soft-

kill weapons are undefined (Ferreira-Snyman, 2015). The treaty is crafted for states as actors, leaving the regulatory status of private entities ambiguous.

The three mechanisms listed above adequately map the governance gaps in international laws concerning outer space. The governance deficit in outer space cannot be understood simply as a gap in law or an absence of institutions. Rather, it reflects the deeper structural pressures created by security dilemma dynamics that are intensified by dual-use and emerging technologies. International law struggles to regulate a technology based on its potential use. Export control regimes like the Missile Technology Control Regime (MTCR) are slow to update, can be circumvented via globalization, and often fail to capture commercial components. There is no legal instrument to prevent a nation from using globally available, high-resolution commercial imagery for military targeting, as it is a passive use of a commercial product. Also, there are no international limits on the number of satellites launched, the size of constellations, or the frequency of launches. While the UN Committee on the Peaceful Uses of Outer Space (COPUOS) focuses on long-term sustainability guidelines, these are non-binding (Ancona, 2025). The commercialization of key technologies means they are sold on the open market, effectively diffusing potential military capabilities to any entity with the capital to purchase them. Similarly, there is currently no comprehensive international agreement that defines safe and responsible behavior in orbit, particularly for rendezvous and proximity operations (RPO). While RPOs have become more common due to on-orbit servicing, inspection, and debris-removal technologies, there is no universally accepted set of keep-out zones, mandatory notifications for close approaches, or clear rules distinguishing passive from active inspections in Earth orbit (Johnson, 2020). The vulnerability exposed by cyber and electronic warfare does not possess any regulatory mechanisms, alarming the heightened deficit in space governance. Although new initiatives like Artemis Accords, EU-led International Code of Conduct, etc. emerges, the geopolitics rooted in specific national interests brings in question the authenticity of viewing space as a global common. Hence, the current landscape is fragmented and has the potential to exacerbate terrestrial geopolitical divides.

6. Conclusion

This paper has argued that the ongoing militarization of space is being driven systematically by the intrinsic affordances of dual-use and emerging technologies. Through functional convergence, capability diffusion, and operational opacity, these technologies are lowering the barriers to entry, increasing the incentives for military use, and creating a strategically

ambiguous environment ripe for miscalculation and conflict. The existing governance regime, anchored in the outdated Outer Space Treaty, is fundamentally ill-equipped to manage these challenges, resulting in a dangerous governance deficit that lags far behind the pace of innovation. The findings strongly support a neorealist interpretation of space security dynamics across all three mechanisms - functional convergence, capability diffusion, and operational opacity. States respond to technological ambiguity by engaging in security-seeking behavior consistent with the security dilemma. Dual-use and emerging technologies intensify uncertainty regarding intent, increase insecurity with an increased number of players, and blur standards of ambiguity, causing escalation to a security dilemma. To address these challenges, a pragmatic approach to governance is needed. This does not imply that cooperation via neoliberal institutionalism is impossible; rather, it suggests institutionalism as the solution. Governance efforts must be mechanism-specific, technologically informed, and capable of reducing uncertainty at the operational level. Apart from building norms and transparency through confidence-building measures, diplomatic engagements like sanctions and moratoriums by governance institutions are necessary on kinetic-kill tests. The role of non-state actors has to be managed along with the management of commercial space situational awareness. Ultimately, progress will likely require a combination of binding measures that are politically feasible and incorporated through a structured international regime.

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From Deserts to Diversification: Climate Resilient Strategy of the Gulf

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Abstract

The Gulf countries have long been recognised around the world as the 'oil power houses.' But now they are beginning to take centre stage on the international climate change agenda with projects like the UAE's Al Maktoum Solar Park, Be Solar in Qatar and many more. Internationally, Gulf participation in the ISO-GHG Protocol collaboration and the Voluntary Carbon Market Integrity (VCMI) initiative indicates an increasing interest from the region in global carbon governance. It looks like serious attempts at mitigating the hold of an oil-past.

This research article presents a comparative analysis of the Gulf countries' position in climate governance. It is framed using the Multi-Criteria Decision-Making (MCDM) approach. It examines the tendencies in climate policies from the year 2000 to the present. It uses the Sustainability Index dataset from 2019 to 2022. The main methodical instrument used is the normalised TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution). The statistical results hint that climate resilience is a factor of not just expenses made but of the overall ratio between different contributing factors. This explains why Bahrain and Oman are placed above Qatar.

In an effort to provide a complete picture, analysis combines a quantitative scoring of results with a qualitative interpretation of policy based on ecological modernisation theory and post-rentier approaches.

Keywords Gulf policy, MCDM approach, TOPSIS model, energy transition, ecological modernisation, post-rentierism

Introduction:

It's hard to imagine oil-rich Gulf states as the classroom for studying a green transition. Yet the truth is that the Gulf region is rapidly changing. Once famed for their oil wealth, these countries are now pouring money into renewable energy, green finance, and green technology. The six GCC members, Saudi Arabia, the United Arab Emirates, Qatar, Kuwait, Bahrain, and Oman, are trying to break free from the hydrocarbons-focused future. And the shift isn't only about money or emerging markets. Climate change is real for the Gulf. It's among the hottest, driest

places on Earth, facing rising temperatures, water shortages, and desertification. So it's become quite important for these oil exporters to sit at the big tables and push toward carbon neutrality. Closer observation of Saudi Arabia's Vision 2030, the UAE's Net Zero 2050, or Qatar's National Climate Change Action Plan, reveals that climate policy has become interwoven into core state planning. These plans are supported by serious investments, think Dubai's Mohammed bin Rashid Al Maktoum Solar Park or Oman's green hydrogen ventures. They show that efforts beyond mere talk, must go down to concrete ones.

Still, questions linger about the depth and sincerity of such transitions. Much of the conversation emphasis focuses on the success stories or broad national visions. But direct, apples-to-apples comparisons between the Gulf states are rarer. We know they're pouring money into renewables and green finance, but how far have they actually come toward climate resilience? Which countries are pulling ahead, which lag-and why? How do these various national strategies stack up against global standards of sustainability and carbon governance frameworks? This paper explores using a regional, data-driven approach to answer these questions. It assesses the GCC states based on selected sustainability indicators through the multi-criteria decision-making method called TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution). The method integrates hard data with policy interpretation. In return it identifies which country comes closest to the 'ideal' model of climate-resilient governance.

However, beyond the technical aspects, the research explores how the Gulf is also creating a new identity for itself. For this, the research uses the post-rentier and Ecological Modernisation Theory (EMT). The post-rentier paradigm explores how resource-wealthy countries change their logic when the original rentier structures do not always ensure stability. On the other hand, EMT helps identify how patterns of growth are balanced today through a proper blend of protecting the environment and providing for growth. This research article tries to highlight some of the trends, successes, and gaps within these transitions. But overall it seeks to enrich the discourse on how developing resource-dependent regions can balance growth with sustainability. There are six sections in this article. Section one gives an overview of literature on diversification in Gulf states, governance of climate, green finance, and multi-criteria decision-making in environmental research. Section two introduces the research methodology and analytical framework. Section three focuses on data tabulations and interpretations. Section four deals with the discussion, developing the theoretical argument arising from quantifiable

findings. Section five offers policy implications and lessons. While the last section concludes, with reflections on future research directions within the context of its limitations.

Literature Review

Like it is impossible to understand the entirety of an art piece just by a brush stroke, so is climate governance. Climate resilience emerges at the intersection of state, the role of capital, and deployment of international best practices. Hence, the following literature review connects dots in the areas of politics, finance, governance, and its measurement in the Gulf paradigm.

Rentier State Seated Transition: Political Economy

A grasp of transformation in the Gulf demands that one assess the degree to which the Rentier system influences its political economy. Beblawi (1987), who saw a rentier state as one that sustains itself mainly on external rents gives a classic definition of the rentier state. Within this region, this rent is based on oil exports. This influences the relationship between work and reward, with only 2-3 per cent of its workforce being productively active. However, a large proportion, estimated around 85-90 per cent, is involved in the rent consumption chain. The implication is that in such a system, the government becomes the central distributor of resources, employment, and advantages. Beblawi referred to this as the 'rentier mentality'.

Some scholars have challenged the definitiveness of such a path. A case in point is by Luciani (2017) in his work Oil rent and regional economic development in MENA. He argued that resources and rent are not inherently a blessing or a curse: when appropriately invested in the long run. Resource wealth can be the source of many advantages. Oil rents can be an engine of industrialisation instead of industrial stagnation.

Luciani's assertions, which are supported by evidence from energy-demanding industries, indicate a paradigm shift. Today, the GCC is a major supplier of aluminum worldwide. They account for approximately 9 to 10 per cent of global aluminium production (Bank of Bahrain and Kuwait, 2012). Such indicators illustrate the practicality of diversification based on its relative advantage in energy. And all this was achievable by effectively reinvesting the respective rent. Diversification is less a function of hydrocarbons, as it is a reuse of hydrocarbon rent.

However, political imperatives remain. As pointed out by Hvidt (2013), any event of sociological or geopolitical tension leads back to the ideology of redistribution of rent, making it challenging for any kind of reform. Not too long ago, during the Arab Spring of 2011, this was witnessed again. For instance, following the Arab Spring, Saudi Arabia pledged two

financial packages worth a total of US$130 billion to its population, encompassing cash hand-outs, public sector pay raises, and job creation. Similarly, Kuwait increased governmental spending by 3 per cent of GDP by distributing cash grants and free food, while Oman created 41,000 jobs in the public sector. These expenditures, often costing 3-19% of the respective country's GDP, were not planned and directly undermined the diversification goal of transferring employment creation to the private sector. It demonstrates political priority to maintain a rentier state model rather than fiscal responsibility. Developing on this further, recently, Malik (2017) widened the notion of rentier states from oil rents to include regulatory rents, state-created privileges, and even money flows of regions. Thus, any switch to the condition of climate resiliency has to be embedded in such a rentier setup.

Green Issuance Framework in the Gulf: Finance

Green finance in a rentier economy, as it is in the Gulf, is one of the key drivers in this green transition. Green investments worth $2 trillion (approx.) have been identified in the Gulf region as per Green and Sustainability Sukuk Report 2022. However, on an international level, it amounts to just 2 per cent of total green foreign direct investment, reflecting the gap between what is financially and politically aspirated and what is possible given the constraints of the domestic policies.

One of the most innovative developments in this field is the emergence of Green Sukuk. According to Alam et al. (2016), Green Sukuk is a hybrid instrument that combines the tenets of Islamic finance with sustainable goals to direct faith-based financing towards supportive climatic projects. There appears to be robust enthusiasm among investors in such initiatives, indicating that Islamic Green Finance has the potential to significantly influence the mobilisation of low-carbon developmental financing (Nour, 2025). Some studies suggest that it is still a shallow market in terms of depth because of regulatory variations in the region.

Although the Gulf's rigidity and flexibility of governance structure is a major challenge. The unequal success of PPPs and the absence of clear regulations in the GCC are significant hindrances to a standardised development of markets (Damayanti, 2025). Scholars are increasingly calling for international structuring of taxonomies and integrity frameworks to overcome these hurdles. This will improve the integration of the Gulf green financial market into international sustainable financial markets.

Climate Administration and International Cooperation: Governance

The Gulf states climate governance is located at the nexus of several influences relating to both political economy, diversification, and green investments. However, this relationship is asymmetrical. You can see layers of agreements, markets, and non-binding practices intersecting within this nexus. The 'regime complex' illustrated by Keohane and Victor (2010) captures this dynamic, demonstrating that Gulf states instead choose to couple multiple levels of governance with more lenient approaches rather than subscribing to one rigid call.

In such an environment, there has been an increase in hybrid governance mechanisms that have been embraced (Bäckstrand et al., 2017). Non-state actors and voluntary processes have largely facilitated these occurrences. Carbon markets have been considered flexible governance instruments that have been used as an experiment, without having rigid commitments. During the post-Kyoto era, prior to Copenhagen, (Newell et al., 2013) observed that there were limitations in the centrally organised carbon markets, resulting in voluntary processes, which have been very pertinent in Gulf regions as well. A voluntary process would be fitting, considering the differential capacity in Gulf countries themselves.

But again at the domestic level, the underlying structure of climate governance in the Gulf is directed by a centralised state development pattern. Instead of dealing in a redistributive or participatory climate policy, the Gulf states place importance on the deployment of heavyweight infrastructures. This is a display of the Gulf's regulatory ambition, led by the state. Knowing these is important as it is under this framework the Gulf's climate change transformation is placed.

Quantitative Approaches to Sustainability Assessment: Measurement

To understand the complex and multi-levelled climate approaches of the Gulf states, quantitative methods and figures are essential. They have the ability to combine different variables of an environmental and financial kind in a way that cannot easily be reproduced through mere qualitative comparisons. For that reason, multi-criteria decision-making (MCDM) approaches are so valuable. Among these approaches, the TOPSIS tool is distinguished by its transparency and ease of interpretation.

From an application standpoint, TOPSIS has proven suitable for comparing energy transitions. However, much of the former research is not conceptualised within a theoretical framework. It is often driven by large cross-national datasets that ignore the specific characteristics of hydrocarbon-based economies. It is an aim of this research to address this gap, by bringing theory and fact closer.

Research methodology and analytical framework

This research employs a mixed-method and comparative research design to study the following six Gulf countries: the Kingdom of Saudi Arabia, the United Arab Emirates, the State of Qatar, the State of Kuwait, the Kingdom of Bahrain, and the Sultanate of Oman. It combines MCDM numerical analysis results with interpretation based on political economy theories. Simply put, the results give a rank to each of the countries analysed. The theory explains the results of the ranks obtained by the numbers.

For the MCDM aspect, the methodological approach that is applied extensively is that of Technique for Order Preference by Similarity to the Ideal Solution, or TOPSIS. This method allows decisions to be made by ordering alternatives based on their similarity. Then the final score is compared to the ideal alternative. The method is often applied in sustainability research because it allows each indicator to be expressed using different units. The procedure takes four steps. First, the decision matrix is normalised, ensuring that there are no unit differences between the indicators. Second, equal weightings are imposed on the values obtained from normalisation. This eliminates the injection of personal values or biases. Third, the maximum positive solution, or the best solution, and the negative solution, or the worst solution, are identified. This depends on the sign of the indicators, which hinges on whether the indicators are maximised or minimised. Last, the Euclidean distance from each country towards both solutions is calculated.

Higher values mean it is closer to the ideal sustainability profile, while lower values depict the opposite, which makes it easy to rank accordingly. This way, TOPSIS ensures that no single criterion tends to overshadow the entire performance in sustainability assessment. The study culls data from averages of 2019-2022. This was chosen deliberately as it captures the post-Paris implementation phase, when climate commitments in the Gulf translated into concrete policies, financial instruments, and institutions. Moreso, this period also stimulated external stress from Covid to start of the Russia-Ukraine war, creating conditions for Gulf states resilience under global shocks.This study employs six indicators, which ranges from environmental performance to innovation, financial mobilisation, to the level of commitment. These indicators were picked based on the availability of data, their relevance to the study of climate transition, and their ability to be compared across countries. They are listed below:

(1) renewable electricity share,

(2) carbon dioxide emissions per capita (excluding land-use change and forestry),

(3) energy intensity of GDP,

(4) research and development expenditure as a percentage of GDP,

(5) cumulative green bond and green sukuk issuance, and

(6) a composite climate policy index capturing the presence of core governance instruments.

Data for indicators 1-4 has been taken from the World Bank's World Development Indicators. Multi-year averages have been selected for the years spanning 2019-2022. Each indicator represents benefits or costs. Benefit indicators signal better performance by showing higher values. While, the cost indicators signal better performance by showing lower values. This study treats CO_2 per capita and energy intensity as costs, and all other indicators as benefits.

Cumulative data of green bond and sukuk issuance were acquired from various sources, including national issuance summaries and official announcements on public debt. To maintain comparability over time, the dataset in this study considers issuances till 2022 only. One important differentiation to be denoted is that the 'green issuance' in this study includes only sustainable debt instruments, namely, green bonds and Sukuk. The concept of green investment flows is exclusive and hence has been kept out of the ambit of this study.

The climate policy index, the sixth indicator, was constructed by using a binary scoring system. Each country receives 0 for no and 1 for yes across five governance components.

(1) net-zero pledge,

(2) updated Nationally Determined Contribution (NDC) up to 2022,

(3) renewable energy targets,

(4) carbon market or offset mechanisms, and

(5) the presence of a dedicated climate strategy or governing body.

Note: This index captures institutional readiness rather than policy ambition or effectiveness.

For any methodology section to be worthwhile, the selection criteria also need to be explained. So, for this, TOPSIS was selected for three reasons. First, it allows the study to be compared across diverse dimensions. Second, unlike single-index or regression-based methods, TOPSIS provides an intuitive and comprehensible ranking that is accessible to scholars and policy analysts alike. Third, the method has been broadly used in the fields of sustainability, energy

policy, and environmental governance studies, which provides a high degree of methodological validity and makes it particularly suitable for exploratory comparative analysis.

As a part of its analytical framework, to ground these floating numbers and rankings, the study draws on the theoretical bases of post-rentier political economy and Ecological Modernisation Theory (EMT). It views climate transition as an institutional and political-economic process shaped by state capacities, innovation strategies, and inherited energy structures.

EMT studies the attempt of states to find a balance to ensure development and environmental protection simultaneously on a higher level. It means that protecting the climate and boosting economic development aren't opposing factors. Rather, they support and enhance each other in their development. However, EMT's application to the Gulf region is conditioned by the persistence of rentier political systems. This is where bringing in the frame of post-rentier theory becomes essential.

Post-rentier theory, therefore, adds to EMT by arguing how resource-states adjust their governance structures based upon rent. This is why the GCC's climate policies are instead, state-controlled because the legacy of rentiers is not shaken out of its roots. Hence the transition of energy unfolds in a centralised, state-controlled manner.

Drawing on these theories, the framework links abstract concepts to measurable indicators. To measure the factors of EMT, this paper examines variables including the share of renewable electricity, R&D expenditure, issuance of green finance, and use of climate policy instruments. Conversely, indicators such as carbon emissions per capita and energy intensity are used in the statistical test as proxies for structural dependence on the oil-based rentier legacies.

Note that the analytical framework does not presuppose linear or causal associations between indicators and outcomes. Instead, the framework is configurational in nature. It implies that higher TOPSIS scores indicate economically modernised development. While lower scores reflect closer alignment with traditional rentier structures and carbon-heavy growth paths.

Scores in between suggest hybrid trajectories whereby ecological modernisation coexists with ongoing rentier constraints.

Results Tabulation and Interpretation

Below are the key tabulations presented to the reader by organising them into three core tables. Table 1 has the definition of each indicator and its orientation. Table 2 is the raw decision matrix displaying the averages or final values culled from data collected from 2019 to 2022.

Table 3 presents the final TOPSIS score and the ranking of the states in descending order, with an ensuing corresponding bar graph, Figure 1, of the same data.

There are more tables in the appendix for detailed follow-through calculations. The normalised decision matrix is shown in Appendix Table A1. The weighted decision matrix is in Appendix Table A2. Whereas, Appendix Table A3 maps each state's distance from the Ideal/Negative, which leads to the final TOPSIS score.

Table 1 - Indicator Definitions and Data Sources

Indicator	Description	Source	Direction
Renewable Energy Share	% of renewable electricity output	World Bank	Benefit
Carbon dioxide emissions per capita	tCO_2 per capita excl. LULUCF)	World Bank	Cost
Energy intensity	Energy/GDP	World Bank	Cost
R&D expenditure	% of GDP	World Bank/Imputed	Benefit
Green issuance	Cumulative green bonds and Sukuk (USD)	National Policy Documents	Benefit
Climate Policy Index	Composite (0-5)	Benefit	Author's compilation

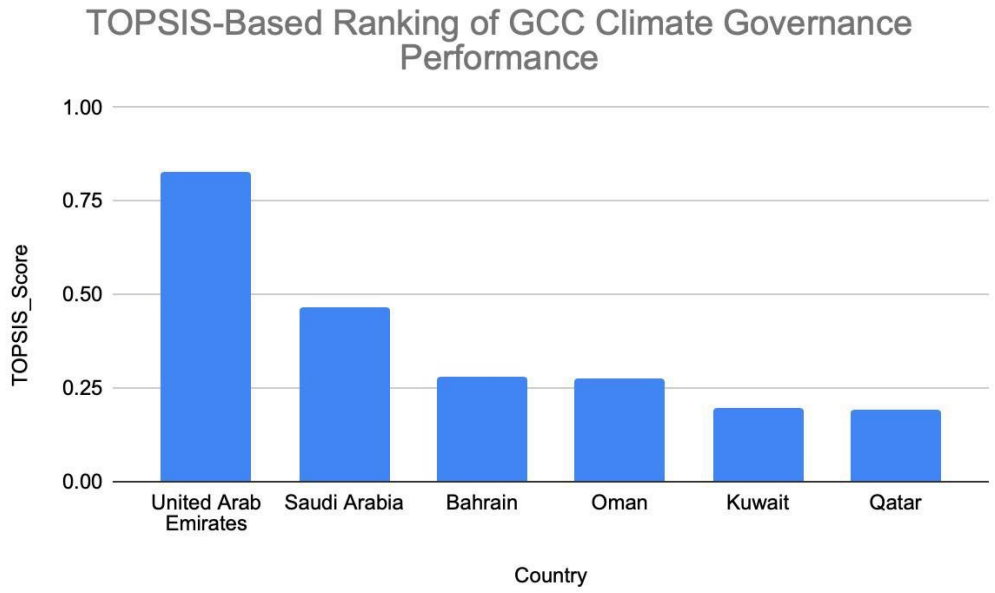
Table 2 - Raw Decision Matrix (Averages/Final Values)

Country	Ren. Share	CO_2 pc	Energy Int.	R&D GDP	Green Issuance	Policy Index
UAE	3.543	20.489	5.33	1.431	USD $1.8	5
Saudi Arabia	0.067	19.008	5.84	0.467	USD $2.8	5
Bahrain	0.035	25.039	9.11	0.603	USD $0.9	4
Oman	0.837	18.987	6.9	0.288	0	4
Kuwait	0.142	22.046	7.58	0.150	0	3
Qatar	0.272	44.587	7.03	0.680	0	3

Table 3 - Final TOPSIS Scores and Ranking

Rank	Country	TOPSIS SCORE
1	UAE	0.826
2	Saudi Arabia	0.467
3	Bahrain	0.282
4	Oman	0.274
5	Kuwait	0.198
6	Qatar	0.193

Figure 1 - Bar Chart based on the TOPSIS Scores



These results show important variation in climate governance and sustainability performance across the Gulf (Table 3). The United Arab Emirates stands as the clear leader. It obtained the highest TOPSIS score, 0.82, reflecting consistently strong performance in almost all of the indicators. In particular, the UAE stands out regarding renewable energy deployment, climate policy architecture, and green finance activity. In factm it was as early as in Nov 2017, UAE adopted the National Climate Change Action Plan (2017-2050). The same year, the National bank of Abu Dabi became the first issuer of green bond worth USD $5 Billion. UAE's early adoption of net-zero targets (in Oct 2021 for 2050) and updated NDC commitments made its mark. This active participation in global climate governance gave the UAE an edge. Clearly, such commitments can also be seen in the UAE hosting COP28 in 2023. All these cumulatively translate into its position very close to the ideal solution. This high score clearly positions the UAE as the most advanced case of ecological modernisation within the GCC.

Saudi Arabia is second with a score of 0.46. It indicates a moderate but uneven sustainability profile. The Kingdom of Saudi Arabia (KSA) performs well in green finance issuance and climate policy initiatives, including participating in the voluntary carbon markets. For instance, KSA in October 2022 raised around $3 Billion in their green bond debut. They launched a Saudi Green Initiaitve in 2021 which supports KSA's ambition to reach net zero emissions by 2060 through the Cicrcular Carbon Economy approach and is also accelerating the country's

transition to a green economy. On part of Voluntary Carbon Market, in Oct 2022, KSA held the largest auction, selling more than 1.4 million tonnes of carbon credits. These developments, however, are offset by KSA's persistently high carbon emissions per capita. And the high energy intensities also disrupt the green balance. Thus, though Saudi Arabia has made substantial institutional and financial commitments to climate transition, the structural legacy is a matter of concern. KSA's hydrocarbon-based economy continues to weigh heavily on its overall performance.

Bahrain is in the middle position, with a TOPSIS score of 0.28. Bahrain has strong alignment with climate policy. They also have a committed net-zero pledge and updated NDC. What sets them apart from richer states is their green finance activity. They took this head start in 2022 by creating a comprehensive Sustainability Finance Framework under the aegis of the National Bank of Bahrain in 2022. This was followed by the first issuance of Bahrain's Green Sukuk, by Infracorp, valued at USD $900 million, in March 2022.

Oman ranks fourth with a TOPSIS score of 0.27. This ranking reflects moderate outcomes across most indicators. Oman flaunts particular strengths in climate policy commitments and renewable energy planning. They adopted a National Strategy for an orderly transition to net zero by 2050, in Nov 2022. This position benefits from early institutional alignment provided by Vision 2040 and its commitment to net zero. However, it is held back by very limited green finance activity and relatively low R&D expenditure. Such results made indicate that Oman is a classic case of reform-oriented late mover. They possess much-needed growing institutional readiness but have limited financial scale.

The lowest places have been closely occupied by Kuwait and Qatar, with a score of 0.198 and 0.193, respectively. Both stand very close to the negative ideal. The dependence on crude oil and natural gas is very high respectively. On one hand, where Kuwait remains heavily dependent on oil, with the sector accounting for almost 50% of their GDP, and roughly around 90-94% of export revenues leading up to major portion of government income. On the other hand, in Qatar, hydrocarbon revenues accounted for roughly 87% of government revenues between 2017-2021. Contrary to diversifying away from gas, Qatar is 'doubling down' by expanding its north Field production, which will further increase LNG production capacity from current 77 Million to 142 Million per annum (mtpa) by 2030. Both of them represent a case study of high energy intensity and delayed climate governance reforms. Both have

minimal green finance activity during the study period. While renewable energy targets and updated NDCs exist, what lacks is the carbon market instruments. What further makes

Qatar drop one rank lower, is the absence of a net-zero pledge. Interestingly even till today in 2026, Qatar has not made commitments towards selecting a net-zero target. This weakens their overall policy index score. They represent the persistence of traditional rentier dynamics and slower adaptation to emerging governance norms.

In sum, the TOPSIS results show a clear hierarchy in the GCC: the UAE and Saudi Arabia are leading the transition, while a middle group of reform-oriented but constrained states like Bahrain and Oman are trying to catch up slowly, and the last ones - Kuwait and Qatar - are still trying to push through their comfort zone. This quantitative study clearly suggests that climate-resilient transformation is uneven in the Gulf. Moreover, the numbers confirm that the outcome depends on an interaction of policy ambition, financial capability, and structural economic legacies, rather than being one-dimensional.

Discussion: theoretical grounding to quantitative results

As mentioned in former sections, EMT postulates that environmental improvement can be achieved along with economic growth. They do not stand juxtaposed to each other. The need is to further systematic eco-innovation, regulatory reform, and market-based instruments within existing economic systems (Jänicke, 2008; Julkovski et al., 2021). The GCC is a critical test case for this proposition. Being rentier state structures, the Gulf states have always given priority to distributive capacity over extractive or regulatory authority. It makes these states stand at the intersection of change and traditional rentier bargain. This bargain is nothing but what Beblawi (1987) described as a social contract where hydrocarbon revenues (oil rent) were exchanged for political acquiescence. According to Ulrichsen (2017) & Reiche (2010), the above-described rentier logic has restricted the government's will to impose redistributive climate policies. They face friction and resistance when it comes to the question of taxation, subsidy removal, or demand-side regulation. This creates a functional wedge in their reality and aspirations.

The metadata hints are somewhat suggestive of this commitment. The high per capita and energy intensity in several GCC nations continues to weigh in the balance. It even jeopardises the existing climate commitment. The mid-range TOPSIS result of 0.46 in the case of Saudi Arabia aptly depicts this contradiction. It aligns with Bakari's (2014) notion of ecological modernisation being a form of sustainability resting on a 'weak' foundation. He pointed to this

contradiction where technological upgrades coexist with growth-driven economic pressures, making it difficult to reach climate commitments. Despite this, the focus on transforming underlying consumption and production systems is the bare minimum. Thus, rather than breaking through the rentier logic, it creates a base for neo-rentierism.

Neo-rentierism represents an environment in which even innovation becomes a statecraft-controlled field. Tsai's (2018) theory on 'neo-rentierism' covers this complexity effectively. He called this an additional complication. He argued that rather than reform, state control gets further extended from hydrocarbons into new renewable energy and green industries as well. In other words, instead of reducing state control, state authorities manage climate projects through state oil companies, sovereign wealth funds, or state-owned enterprises. This confirms Sim's (2020) argument that low-carbon projects in Gulf countries have reinforced state control rather than liberalising markets or encouraging state-society engagement. Such environments limit innovation. The TOPSIS rankings clearly reflect this logic.

The UAE's leadership position (0.82) represents the most advanced expression of this model. High scores across variables indicate a consolidated form of top-down ecological modernisation. Based on EMT terminology, the UAE is very close to the 'ideal' state. But what makes the UAE have scores much higher than others? There must be more underlying? This is driven by an underlying logic of technopolitics, prestige and 'extrinsic' drivers. Al-Saidi (2020) argues that the nuclear and renewable energy megaprojects of the region are not only driven by economic logic but represent a 'prestige project'. The most prominent ones in the lineup includes the Mohammed bin Rashid Al Maktoum Solar Park (Dubai) and the Barakah Nuclear Energy Plant (Abu Dhabi). The UAE's dominant TOPSIS score is mirroring the success of this strategy. They carefully laid their cards through large-scale solar projects, climate finance initiatives, and international norm-setting. This thereby enhances both domestic legitimacy and global standing.

However, this technopolitical approach explains why the process of ecological modernisation does not occur evenly. Bahrain (0.28) and Oman (0.27) lag, despite policy commitments and technological capacity, due to limited green finance activity and narrower governance frameworks during the study period. Their results suggest that prestige-driven infrastructure alone is insufficient without sustained institutional and financial integration. Thus, it must balance the 'external' and 'internal' aspects.

One of the more revealing findings is Bahrain and Oman's position above wealthier states such as Qatar and Kuwait. This distinctly shows how the sequencing of institutions may be more significant than the level of the GDP. Their early ambition in the field of climate change allowed Oman and Bahrain to comfortably surpass its more financially wealthy counterparts in the Gulf, who are trapped in a rigid rentier state structure. This is in line with Tsai's notion from 2018. He argued that fiscal constraints, instead of hindering the state, may trigger governance reforms, leading to a renegotiation of the rentier bargain with sincerity. That's exactly what Oman and Bahrain also highlight.

The ranking of TOPSIS score hits hard at the reality of structural limits and the boundaries of ecological modernisation, amid visible progress. The paradox of the N-curve formulated by Jänicke (2008) is evident in the same, where the ecological optimisation on one level can be nullified by the emission rise on another level. The country of Saudi Arabia represents this paradox. In KSA, modernisation advances without proportional environmental relief. Similarly, Kuwait and Qatar's low score reflects entrenched rentier inertia. They reinforce Sim's (2020) claim that energy democracy and decentralisation remain actively constrained in the region.

Combined, GCC climate strategies continue to focus more on 'hardware' than on 'software' (Minić & Filipović, 2024). In other words, they focus on large infrastructure and megaprojects rather than on behaviour-altering measures, deepening regulation, or involving broad societal participation. Such a course of action enables rapid implementation and smooth regime operation but renders sustainability performance dependent on centralised capacity and continuous fiscal might. Ecological modernisation in the Gulf, therefore, reads best as a state-led and selective process framed within a shifting rentier political economy.

Policy Implications: Lessons from the Gulf

Even though the GCC states operate under different political and fiscal conditions, the lessons from this study are fairly transferable. They are of particular importance for countries that seek to balance growth, commitments, and climate resilience. One takeaway is rather clear: economic heft alone does not dictate climate performance. In addition to resource wealth, there have to be some must-have essentials. A coherent climate governance framework, alignment between energy policy and financial tools, and transparent long-term targets take the success a long way. These reduce policy uncertainty and attract investment. Building on this, India should push for strong cross-ministerial coordination to deliver streamlined results. For example, it might require the establishment of joint climate task forces that involve energy, finance, and

environment ministries. Where resources are scattered, and redundant efforts are made, they might end up being wasted. They scale down efficiency and dilute the outcome even when ambitious targets exist.

This study also points that financial instruments alone cannot overcome the deeply rooted issue of emissions intensity. With investments, simultaneous demand-side reform and emission management are required. Early alignment of institutions does make a difference. It would be helpful to sequence the process of change and give priority to the governance structure before attempting to tap the power of large-scale capital flows.

Examples such as the case of Bahrain, which performs better than Kuwait and Qatar, can be seen as illustrating this. For India, which has deepened its green bond market rapidly, the takeaway can be very significant. While green finance can be expanded, this needs to be achieved in a manner that complements system-wide decarbonization and not just focus on showcase projects. The focus must also be on system upgrade and industrial sector efficiency. Ultimately, financial innovations need to support structural transformation instead of just covering up emissions growth.

The tale from the Gulf states is pretty clear. One cannot achieve big infrastructure projects without investing in smarter rules, deeper regulation, and broad societal buy-in to sustain real progress. Attention-grabbing mega-projects signal intent; often, they do not drive lasting cuts unless they are combined with the ‘software’ reforms. And these include reforming prices, tightening efficiency standards, and shaping people's incentives. A lesson India must also heed.

Gulf states also illustrate how robust state capacity can accelerate climate action, particularly in the early years of any transition. A firm, focused nudge from the state can get the entire endeavour off to a running start. But too much centralisation can trample innovation and discourage private sector involvement emerging from the crowding out effect. The key is to capture the benefits of state leadership while gradually opening doors to market-driven solutions. For India's mixed economy, that balance comes relatively naturally and fits the context.

Finally, climate resilience isn't only about economics or the environment. It has a geopolitical upside, too. The UAE's track record demonstrates that climate action can align with border and strategic interests, boosting international credibility, attracting foreign investment, and strengthening a country's geopolitical standing. Climate governance, when part of a nation's development story, can reverberate outward with positive global influence. It projects one as a

responsible power. Hence, for India, which seeks to position itself as a global leader on climate change, climate diplomacy becomes crucial.

The Gulf experience, when taken together, reveals that climate-resilient growth and development are neither technical tasks alone nor mere ideological pursuits. They are political-economic endeavours - an equal blend of capacity, finance, and intention. Climate change initiatives work when they are not seen as a condition, but beyond the canvas of larger growth policies.

Limitations and Scope for Future

Like every other research, this one too has its own share of limitations, which can be used to open the scope for similar future studies. Gaps in data from particular indices created obstacles. For example, renewable power generation figures from 2022 were not included in the World Bank Open Data. Hence, the multi-year mean until 2021 was used. Similarly, Bahrain's figures regarding research and development expenditures at the country level could not be retrieved. Therefore, the GCC-average as an imputational mean was used. It is a common practice in cross-national studies on sustainability, though in the process, fluctuations and particular idiosyncrasies in different countries may get overly-smoothed.

Another limiting factor is the short timeframe of the analysis, which primarily focuses on the last few years to retain validity and comparability of the data. Indeed, it does limit the way we are able to trace the longer-term trends. It can miss those transitional inflection points, especially for late-emerging indicators, such as green finance. For example, in 2024, Kuwait and Qatar, while in 2025 Oman made their debut in the sovereign green bond market. Thus, the meta data which results up to 2022 and has been set to zero, would now be different.

Third, indicator selection inevitably reduces the complexity of policy reality. Even with several indicators in use, there is room to add more variables-particularly ones that capture the areas of regulatory enforcement, social acceptance, and subnational differences. They remain hard to quantify, which is why they were excluded from this model. Fourth, giving all indicators equal weight may not be reflective of how different dimensions actually matter. This is a chosen trade-off for clarity and avoidance of subjective bias. If one uses alternative weighting, one may end up with very different rankings, which opens up a path for robust testing in future work.

Fifth, this study theoretically opens a discussion where the Ecological Modernisation theories need to evolve more syncretically. They need to recognize countries with heavy oil rentierism.

Because here, otherwise the conventional EMT may not stand the ground. This can be another area of further development.

Ultimately, TOPSIS is a diagnostic approach rather than a causal one. It identifies relative performance, but it does not verify how definite policies produce specified results. The next step may involve enhancing the current approach through econometric studies, dynamic panel data models, or case-study methods, exploring causal processes further. The current research presents a straightforward way to examine cases, but future research can take the approach further by increasing the scope, depth, or temporal focus.

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Appendix

Appendix Table A1 - Normalised Decision Matrix Used in TOPSIS Analysis

Country	R_Renewable	R_CO_2	R_Energy	R_RnD	R_Green	R_Polic y
UAE	0.9695351137	0.3145688623	0.3080273218	0.7999538605	0.5220133115	0.5
Saudi Arabia	0.01840979474	0.2918287446	0.3370792429	0.2615525781	0.8120207068	0.5
Bahrain	0.009594836491	0.3844163812	0.5258205313	0.3374685004	0.2610066558	0.4
Oman	0.2290579836	0.291505026	0.3982614342	0.1611654624	0	0.4
Kuwait	0.03907997128	0.3384679036	0.4378951808	0.08427215311	0	0.3
Qatar	0.07467180147	0.684522285	0.4057649105	0.3803984478	0	0.3

Appendix Table A2 - Weighted Normalised Decision Matrix

Country	W_Renewable	W_CO_2	W_Energy	W_RnD	W_Green	W_Policy
UAE	0.1615891856	0.05242814372	0.05133788697	0.1333256434	0.08700221858	0.08333333333
Saudi Arabia	0.003068299123	0.04863812411	0.05617987381	0.04359209636	0.1353367845	0.08333333333
Bahrain	0.001599139415	0.06406939686	0.08763675521	0.05624475007	0.04350110929	0.06666666667
Oman	0.0381763306	0.048584171	0.0663769057	0.0268609104	0	0.06666666667
Kuwait	0.006513328547	0.05641131726	0.07298253013	0.01404535885	0	0.05

Qatar	0.01244530025	0.1140870475	0.06762748508	0.06339974129	0	0.05

Appendix Table A3 - Distance to Ideal/Negative

Country	Distance to Ideal (D+)	Distance to Negative Ideal (D-)	TOPSIS Score
UAE	0.04848717753	0.2315697013	0.8268666789
Saudi Arabia	0.1822208239	0.1599231735	0.4674148157
Bahrain	0.204468208	0.08032856454	0.2820557404
Oman	0.213038652	0.0807620894	0.2748872893
Kuwait	0.2413156001	0.05971084848	0.1983574824
Qatar	0.2260899478	0.05434947251	0.1938011156

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Beyond Climate Finance Dependency: Local Innovation and Self-Reliant Pathways to Climate Resilience in Rwanda and Mozambique

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Abstract

Net-zero transitions are commonly framed through national pledges, technological pathways, and climate finance commitments, yet less attention has been given to locally grounded strategies emerging in resource-constrained settings. This paper examines how climate resilience can be advanced through self-reliant and community-embedded approaches in two African case studies: Rwanda and Mozambique. It compares Rwanda's forest and wetland restoration policies and urban nature-based adaptation initiatives with Mozambique's mangrove restoration, community carbon projects, and agroforestry-based regeneration efforts. Drawing on secondary literature, policy documents, and climate project evaluations, the paper argues that these cases reveal under-recognised forms of mitigation and adaptation rooted in indigenous knowledge, institutional innovation, and collective organisation.

At the same time, the paper analyses the dependency paradox that structures these transitions. Although the international climate regime is formally guided by the principle of Common But Differentiated Responsibilities (CBDR), support from developed countries has frequently been delayed, insufficient, or delivered through mechanisms that generate new forms of vulnerability. The comparison identifies key enabling conditions for self-reliant climate action, including customary tenure arrangements, decentralised governance, community trusts, local finance, and nature-based solutions, while also highlighting persistent constraints related to scaling, monitoring and verification, benefit-sharing, and external dependence on donor finance and carbon markets.

The paper contends that climate justice should be understood not only in distributive terms, as a matter of financial transfer, but also in relation al and institutional terms, as recognition of local agency, indigenous innovation, and the right to self-determined development. In doing so, it advances a more grounded account of net-zero transition in the Global South: one that values context-specific resilience-building while remaining attentive to the limits of replication and scale.

Keywords climate resilience, climate justice, self-reliance, indigenous innovation, Rwanda, Mozambique, Global South.

Introduction

As climate change has become a defining policy challenge, countries across the world have made net-zero commitments with varying levels of ambition and implementation. Bhutan is frequently presented as a prominent example of carbon negativity (Tzung, 2022), with international recognition for sequestering approximately nine million tonnes of carbon annually while emitting only two million tonnes. Its constitutional requirement to maintain 60 per cent forest cover reinforces this position (GVI, 2022). By contrast, less attention has been given to emerging models across Africa, where countries facing severe financial and technological constraints are developing localised, resource-efficient strategies that move them toward lower-emission and more climate-resilient pathways. Examining these experiences is especially important in light of persistent gaps in international climate support.

This paper examines these under-researched models through case studies of Rwanda and Mozambique. From Rwanda's urban nature-based adaptation initiatives to Mozambique's community carbon projects, the analysis shows how communities draw on indigenous knowledge, institutional innovation, and collective organisation to pursue climate resilience under constrained conditions. At the same time, the paper acknowledges the fragility of these models, as many communities continue to rely on the CBDR framework while confronting support that is often delayed, partial, or insufficient.

The paper therefore adopts a pragmatic approach that gives climate justice conceptual space to incorporate indigenous innovation and local agency. In doing so, it argues for a more sustainable pathway through which the Global South can pursue climate resilience and net-zero transitions.

Legal Framework

The legal principles guiding this discussion are drawn from Sands (2003). The "Principle 21/2 paradigm," reflected in Stockholm Principle 21 (1972) and Rio Principle 2 (1992), sets out the tension between sovereignty and responsibility. On the one hand, states retain the sovereign right to exploit their own resources in accordance with their environmental and developmental policies. On the other hand, they are responsible for ensuring that activities within their jurisdiction do not cause transboundary environmental harm.

A central pillar of this paper is the uneven implementation of the CBDR (Common But Differentiated Responsibilities) principle, crystallised in Rio Principle 7, which recognises the shared responsibility of all states to protect global environmental resources while accounting for historical contributions, differing capabilities, and the special circumstances of developing countries (Hey, n.d.). In practice, this differentiation has been reflected in measures such as longer implementation timelines, technology-transfer provisions, and financial mechanisms including the Global Environment Facility. Yet the principle becomes more complex in application. As Sands (2003) notes, the 2011 ITLOS Advisory Opinion warned against "sponsoring states of convenience" and sought to prevent developing countries from becoming regulatory havens. This concern connects the discussion to sustainable development, which the Brundtland Commission framed around intergenerational equity, sustainable use, intragenerational equity, and integration. Within this broader legal framework, the precautionary approach under Rio Principle 15 supports proactive climate action even when global consensus or support remains incomplete. The UNFCCC-Kyoto-Paris pathway has institutionalised this framework, but it has also contributed to a structural dependency in which climate action in developing countries is often tied to external finance.

Case Study: Rwanda

Rwanda presents a compelling case of state-driven environmental recovery in contemporary Africa. It is not discussed here as a net-zero country, but as an example of how top-down policy and bottom-up participation can interact in climate governance. Three areas are especially relevant: forests as a national strategy, wetland conservation, and adaptation through nature-based solutions (Collaborative Action For Nature and People and Albertine Rift Conservation Society, 2019). Despite pressures on forest cover linked to population growth and historical instability, Rwanda has developed a notable National Forest Policy (Wfcadmin, 2024). Forest cover increased from 18% in 2010 to 30.4% in 2022 (Wfcadmin, 2024). The policy's distinctiveness lies in its implementation, which has earned international recognition, including a Gold Future Policy Award. Rwanda is also among the first countries to align with the 30 x 30 biodiversity target under the Kunming-Montreal Global Biodiversity Framework. Agroforestry is especially important within this model because it links tree planting with agricultural production, thereby addressing food security and carbon sequestration together.

Rwanda currently has 708,629 hectares of forest under restoration and has committed under the Bonn Challenge to restore 2 million hectares by 2030. This has contributed to a significant increase in the forest sector's budget, from $1.36 million in 2004 to $4 million in 2019. Within

this broader effort, the Bugesera region has undergone extensive greening, the Umutara afforestation plan has expanded, and 600 hectares in the Gishwati area have been restored with indigenous species, leading to the declaration of Gishwati-Mukura as a National Park. Yet these important gains should be assessed alongside larger structural pressures. As Arakwiye, Rogan, and Eastman (2021) show in their study of forest cover in western Rwanda from 1987 to 2019, periods of conflict and policy change underscore the need for sustained and robust implementation to protect globally important biodiversity hotspots.

The robust wetland ecosystem of Rwanda, covering 165,000 hectares, provides critical ecosystem services. The long-standing and well-established importance of wetlands is reflected in the National Policy on Environment (2003), which mandates the rehabilitation of degraded wetland ecosystems while also preserving the endangered species therein. The Rugezi wetland restoration effort, initiated in 2005, is a case in point. It achieved Ramsar site status and earned Rwanda the Green Globe Award, introducing an effective ecosystem rehabilitation methodology that produced the desired outcome.

Despite sustained efforts to mainstream wetlands into national policy, ecological integrity[1] and effective implementation remain ongoing challenges.

The SUNCASA model is another important dimension of the Rwanda case, highlighting the value of urban nature-based solutions (International Institute for Sustainable Development,

n.d.). SUNCASA, which stands for Scaling Urban Nature-Based Solutions, responds to Kigali's climate challenges, including flash floods, landslides, and soil erosion. It is a three-year, $7 million project running through 2026 and is intended to strengthen resilience for 975,000 residents. Working with local partners including ARCOS Network, AVEGA-Agahozo, and Rwanda Water Professionals, SUNCASA seeks to implement gender-responsive nature-based solutions across the Kicukiro, Nyarugenge, and Gasabo districts. Its concrete targets also indicate potential for replication. One of its most notable features is the network of women-led cooperatives operating eleven nurseries across the city, preparing hundreds of indigenous seedlings while creating green jobs and supporting skills development. The model demonstrates how nature-based solutions can provide cost-effective climate adaptation while also generating employment and restoring urban ecosystems.

Rwanda has positioned itself as an important advocate for a greener development pathway in Africa (Republic of Rwanda, Ministry of Lands and Forestry, 2018). The government has announced an ambitious climate agenda that targets a 38% reduction in greenhouse gas

emissions by 2030. Rwanda's broader achievements in climate action and sustainability have also been notable. In March 2024, the country hosted the 38th Green Climate Fund (GCF) Board meeting, underscoring its leadership in climate finance as the first nation to accredit a government institution for direct GCF funding (International Institute for Sustainable Development, 2024).

Case Study: Mozambique

Mozambique contains East Africa's largest mangrove forest system along its nearly 2,000-kilometre coastline. These ecosystems have experienced severe degradation: estimates suggest that around 2,000 hectares disappear each year, and if current trends continue, more than 100,000 hectares of biodiversity-rich mangrove ecosystems could be lost by 2050 (Viridios Capital, 2023), the target year for Mozambique's net-zero goal. The MozBlue project (Removall and Blue Forest partner to finance the largest mangrove reforestation project in Africa, n.d.), developed over three years through collaboration with 300 local communities and 20 partner organisations, represents the largest mangrove restoration initiative in Africa. Phase 1 involves planting 10 million mangrove trees across 1,300 hectares, with the broader aim of restoring 30,000 hectares of tidal wetland habitat by 2030. Located in the Zambezi River Delta, the project has secured 60-year land-use agreements and established legal frameworks intended to support long-term carbon sequestration, with projected mitigation of more than 15 million tonnes of carbon dioxide equivalent over the life of the project.

Importantly, the MozBlue initiative shows that blue carbon projects can combine ecological restoration with community development. Although it was developed by a French company in collaboration with the Mozambican government, its implementation depends substantially on local participation, underscoring the central role of community engagement in the project's success.

The Sofala Community Carbon Project and its successor, Kukumuty, illustrate community-led approaches to forest regeneration and agricultural transformation (Johnson & Ryan, n.d.). Working with rural households in the Mangunde Regulado of Chibabava district, these initiatives aim to restore the Miombo woodlands, the most widespread vegetation type in Sofala province. Two-thirds of the project area is classified as High Conservation Value Forest, underscoring its ecological importance. The project has supported the rehabilitation and management of approximately 10,000 hectares of community forests and benefited nearly 1,700 farmers through improved land-use systems. These systems include homestead planting, dispersed interplanting of Faidherbia and Gliricidia, non-burning of agricultural residues,

boundary planting, mango and cashew orchard development, and woodlot creation (Johnson and Ryan, n.d.).

The project employs three ecosystem regeneration strategies built entirely on community knowledge: the Miombo Soil Strategy, utilizing indigenous knowledge of grasses and soil quality to create “soil fertility maps” combined with mulching and swaling; the Miombo Fire Strategy, leveraging community fire knowledge to establish strategic fire breaks; and the Miombo Enrichment Strategy, combining biomass and soil monitoring with targeted planting of native Miombo trees.

This community-led regeneration work has also supported agroforestry nurseries for horticultural and fuelwood species, reducing pressure on natural forests while diversifying household income. The governance structure of the project is especially significant. The Mozambique Carbon Livelihoods Trust (MCLT) manages carbon funds, with part of the revenue directed to community development initiatives such as sustainable sawmills, drip irrigation systems, beekeeping, and livestock rearing. The model also includes contracts between individual producers and the project for each adopted land-use system, creating clearer accountability and a more transparent framework for distributing benefits to participating households (Johnson and Ryan, n.d.; Anwar et al., 2022).

The need for locally tailored solutions, with precision applied at every level of implementation, enables such projects to achieve their desired outcomes.

The Energy Transition Strategy (ETE), approved in 2023, sets a long-term vision for Mozambique to achieve universal, affordable, and reliable access to modern energy by 2030. The International Energy Agency's (IEA) first-ever energy policy review of Mozambique states that the country’s significant energy resources can support government efforts to achieve universal access to electricity and clean cooking while charting a path to economic development (Mozambique 2024 – Analysis - IEA, 2025).

Lessons from the Case Studies: Optimising Self-Reliance

A central lesson from these case studies is that successful adaptation initiatives are more likely to emerge when governance is decentralised, and communities act as active stakeholders. Localised governance is particularly effective when institutions serve as brokers across both horizontal and vertical dimensions. Horizontally, governance institutions create linkages across villages, enabling collective problem-solving at a larger scale, drawing on traditions of shared decision-making, and opening formal channels for information exchange that support the

spread of new technologies and climate awareness. Vertically, communes connect with external actors at national and international levels, increasing the flow of resources and information while linking local strategies to broader climate networks. The SUNCASA model discussed above illustrates this dynamic well. These two dimensions are mutually reinforcing: as horizontal participation becomes stronger, external linkages become more effective, and vice versa.

Across rural Africa, land legislation is often unevenly implemented, and many resource users continue to access land through local tenure systems that combine statutory and customary entitlements, resulting in multiple and overlapping rights over the same resource. Earlier efforts to replace "customary" tenure with "modern" systems have increasingly given way to the recognition that land policies and laws must build on local practices. Several African countries have accordingly adopted legislation that offers greater protection for local land rights.

Indigenous and local knowledge (ILK) systems provide essential climate adaptation strategies across Africa (Dorji et al., 2024). In the agricultural sector, communities use climate-smart crop varieties, adjust planting and harvesting times, practise crop rotation and intercropping, refine cultivation methods, and rely on traditional storage techniques. The success of the MozBlue project similarly depended on community ILK and local initiative in restoring the ecosystem.

A major limitation of indigenous innovation is the difficulty of scaling it beyond its originating context. ILK-based adaptation practices are often hard to replicate because they evolve in response to specific ecological conditions, social structures, and cultural histories. What succeeds in Rwanda's volcanic highlands may not be effective in Ghana's savanna, and

Mozambique's coastal mangrove restoration offers only limited direct lessons for landlocked Sahelian states. Yet this limitation also points to a broader insight: climate adaptation should not be assessed solely through the lens of universal scalability, but rather by its capacity to support diverse, locally appropriate strategies. The Policy-to-Action (P2A) framework proposed for African decarbonisation emphasises relevance, scalability, and inclusivity by placing African contexts at the centre of policy design. It suggests that context-specific solutions should be developed while still recognising the broader value of principles such as community participation, recognition of customary tenure, decentralised governance, and the integration of indigenous and scientific knowledge.

Barriers to Transition: The Dependency Paradox

The Common But Differentiated Responsibilities (CBDR) principle, formalised in the 1992 UN Framework Convention on Climate Change, recognises that industrialised countries have contributed more to climate change and should therefore bear greater responsibility for mitigation (Hey, n.d.). This principle informed developed countries' commitment to mobilise $100 billion annually in climate finance for low- and middle-income countries. However, the record of delivery has been widely contested. Although donors reported mobilising $83.3 billion in 2020, Oxfam estimated the real value at $24.5 billion because reported figures often include projects with overstated climate objectives and count loans at face value rather than by grant equivalent (Oxfam International, 2024). A further concern is that some donor countries reclassify existing development assistance as climate finance rather than providing new and additional resources, while a large share of funding to poorer countries continues to take the form of repayable loans. Among bilateral providers, France channels 92% of its bilateral public climate finance through loans, Austria 71%, Japan 90%, and Spain 88%. Multilateral development banks show a similar pattern: in 2019-20, 90% of climate finance provided by institutions such as the World Bank was loan-based. This financing structure places additional pressure on countries with low historical responsibility for emissions while limiting their fiscal capacity to invest in resilience. The adaptation finance gap is especially acute. Of the $21-24.5 billion in estimated real value allocated in 2020, only $9.5-11.5 billion was allocated to adaptation. Expectations that private investors would meaningfully close this gap have also not been realised. Private finance amounted to roughly $14 billion annually and was directed primarily toward mitigation. OECD reporting showed a rise in mobilised private adaptation finance from $1.9 billion in 2018 to $4.4 billion in 2020, but this increase was driven largely by a liquefied natural gas project in Mozambique that did not clearly involve adaptation activities, raising questions about reporting practices.

Climate finance flows to Africa totalled $44 billion in 2021/22, representing only 23% of the estimated $277 billion needed annually to meet the continent’s 2030 climate goals. This implies that annual flows would need to increase several times over to close the gap. Distribution is also uneven: the top ten countries receive 50% of total climate finance, while the bottom 30 receive only 10%, and private finance is even more concentrated, with 76% flowing to just ten countries. The ten most climate-vulnerable African countries receive only 11% of total flows, illustrating a substantial mismatch between need and allocation. The financing structure compounds this imbalance. Around 80% of adaptation finance is delivered through debt instruments, despite widespread debt vulnerability across the continent, where 21 countries

currently face debt distress. This raises serious concerns about whether the present climate finance architecture alleviates vulnerability or reproduces new forms of financial dependence.

Carbon markets may offer a supplementary source of climate investment, and Africa has seen an 11% increase in demand for its credits, raising the continent's share of global project value from 10% in 2021 to 26% in 2023. However, declining prices and persistent concerns about transparency, additionality, verification, and benefit-sharing (Future Earth, 2025) point to significant limitations within current market structures. Mozambique's carbon projects, which direct 50% of revenues to local communities, suggest a potentially promising model, but ensuring transparent and equitable distribution across more than 50 communities and over 40,000 people requires substantial institutional capacity (Future Earth, 2025).

Towards a Practical Paradigm

The prevailing climate finance architecture tends to conceive justice primarily as the transfer of capital from developed to developing countries. Although this framework acknowledges historical responsibility, it can also reinforce dependency and undervalue local innovation. A more viable approach would recognise indigenous innovation, protect local agency, and support self-determined development pathways aligned with community values and ecological realities (Rajul, 2025). Sam Adelman argues that climate justice must provide criteria for determining who owes what to whom, and why (Adelman, 2021). This perspective encompasses environmental, distributive, gender, global, procedural, and reparative dimensions of justice.

Three criteria—historical responsibility, benefit, and ability to pay—provide a coherent basis for CBDR-RC. The wealth accumulated through carbon-based industrialisation creates an obligation for developed countries to transfer financial and other resources to less developed countries for adaptation, mitigation, and loss and damage. However, this framing also risks reducing complex ecological relationships and community knowledge systems to monetary values. The case studies examined here show that African communities are not passive recipients awaiting financial transfers, but active innovators developing context-specific solutions that are often more sustainable and socially embedded than externally imposed interventions. Rwanda's integration of agroforestry with forest restoration and Mozambique's community-governed carbon trusts illustrate how communities combine traditional knowledge with contemporary techniques to develop hybrid adaptation mechanisms. The SUNCASA model highlights an additional point: international organisations and wealthier states can play

a constructive role by supporting such initiatives in ways that help overcome structural constraints rather than deepen dependency.

Conclusion

This paper has shown that climate adaptation and mitigation models emerging from Rwanda and Mozambique offer important evidence of how resource-constrained countries can build resilience through locally grounded strategies. Rwanda's national forest agenda and Mozambique's large-scale wetland and community-based restoration initiatives illustrate that effective climate action can emerge from strong domestic institutions, community participation, and context-specific innovation, even where international support remains limited.

These achievements, however, unfold within a broader context of global inequity. Developed countries' failure to fully deliver the $100 billion climate finance commitment, together with the reliance on debt-based instruments rather than grants, has weakened trust in international climate cooperation. The current architecture often directs the smallest shares of finance to the most vulnerable countries while exposing them to higher capital costs and fiscal risk, thereby reinforcing rather than redressing historical injustice.

The dependency paradox, therefore, remains central: African countries demonstrate substantial capacity for self-reliant innovation while still requiring external support to expand and sustain these efforts. Climate justice should be reconceptualised not as charity, but as recognition of historical responsibility, ecological debt, indigenous innovation, and the right to self-determined development.

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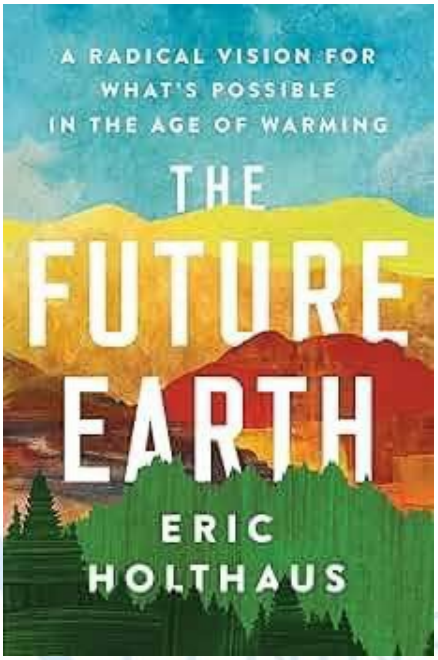
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Book Reviews

Future Earth: A Radical Vision for What's Possible in the Age of Warming

Tejaswini Sugumaran*



Eric Holthaus | Harper One | 2020

Climate change is often described in ways that leave people feeling scared, helpless or exhausted. News headlines focus on disaster, deadlines, and failures. While many books warn of collapse without offering a clear sense of what comes next, Eric Holthaus' Future Earth: A Radical Vision for What's Possible in the Age of Warming takes a different path. While it does not deny the seriousness of the climate crisis, it refuses to accept hopelessness as the final answer. Instead, the book argues that humanity still has the power to shape a livable, just and meaningful future. Published in 2021, Future Earth blends, climate science, journalism, political analysis, and imaginative storytelling. Holthaus is a meteorologist, and a long-time climate journalist, and his expertise shows throughout the book. But this is not a technical manual or narrow policy report. It's a vision driven work that asks readers to rethink how societies respond to climate change, and what kind of world they want to build. At its core, Future Earth challenges the idea that climate change automatically means disaster and decline. Holthaus acknowledges that damage has already been done and that the coming decade will be difficult. Still, he insists that focusing only on loss and failure limit our ability to act. By

offering a hopeful but realistic version of transformation, the book invites readers to move beyond despair and toward collective action.

Confronting the Climate Crisis Honestly

Holthaus begins the book by clearly laying out the scale of the climate crisis. He does not soften the facts or pretend that the situation is manageable with small changes. Rising global temperatures, stronger storms, extreme heat, wildfire, floods, and food shortages are presented as realities that are already shaping life around the world. Climate change is not a future problem, he argues. It is happening now. One of the strengths of the book is how firmly it connects climate change to the human system. Holthaus explains that these disasters are not random or natural in the traditional sense. They are tied directly to fossil fuel use, industrial agriculture, deforestation and economic systems that prioritize profits over long-term stability. He also makes it clear that climate impacts are not shared equally. Wealthier countries and communities often have more resources to adapt while poorer and marginalized groups face the greatest risks. This honesty is important. Holthaus does not try to comfort readers by suggesting that everything will work out on its own. He recognizes that some damage is irreversible and that many people will suffer no matter what actions are taken next. However, he also argues that acknowledging these truths does not require surrendering to hopelessness.

Rejecting the Culture of Climate Doom

A central theme in Future Earth is Holthaus' rejection of what he calls climate doomism. This is the belief that it is already too late to make a meaningful difference. So, efforts to address climate change are pointless. Holthaus argues that this mindset is dangerous because it discourages action and allows powerful interest to continue causing harm without resistance. Rather than asking whether it is “too late”, Holthaus reframes the question. He asks what kind of future is still possible, and who gets to decide that future. Even if warming cannot be fully stopped, he argues that there are still choices to be made about how societies adopt, who is protected, and how resources are shared. This shift in perspective is one of the book’s most important contributions. Instead of presenting climate change as a single pass-or-fail test, Holthaus treats it as a long-term struggle over values, priorities, and power. The goal is not perfection but improvement. Not avoidance of harm but reduction of suffering and expansion of justice.

A Call for Systematic Change

Holthaus is clear that individual lifestyle changes, while helpful, are not enough to address climate change at its roots. Recycling, driving less or eating differently cannot solve a crisis

created by global economic and political systems. Throughout the book. He argues the real solutions required deep structural change. This includes transforming the energy system by rapidly phasing out fossil fuels and expanding renewable energy. It also means rethinking agriculture, transportation, housing, and industry. Holthaus challenges the idea that endless economic growth is either realistic or desirable on a finite planet. Instead, he suggests that society should measure success by well-being, health, and environmental stability rather than by GDP alone. Importantly, Holthaus does not frame these changes as sacrifices that will make life worse. He argues that many climate solutions could improve quality of life by reducing pollution, creating meaningful jobs, strengthening communities and restoring ecosystems. In this sense, climate action is not just about preventing harm, but about creating better ways of living.

Climate Justice at the Center

Justice is not a side issue in Future Earth. It is central to Holthaus' vision. He repeatedly emphasizes that climate change is deeply tied to histories of colonialism, racism, and economic exploitation. Communities that contributed the least global emissions are often the most exposed to climate risk while those benefited most from fossil fuel are better protected. Holthaus argues that any serious climate response must address these inequalities directly. This includes supporting indigenous land rights, investing in frontline communities, and ensuring the transitions away from fossil fuels do not leave workers behind. He also calls for wealthier nations to take greater responsibility for funding, adaptation and efforts in poorer countries. By framing climate action as a justice issue, Holthaus challenges readers to think beyond technical fixes. Solutions are not just about cleaner energy or smarter technology. They are also about fairness, power, and who gets to shape the future.

Imagining Future, as if it Already Happened

One of the most distinctive features of Future Earth is its structure. The book is divided into three time periods: 2020-2330, 2030-2040 and 2040-2050. In these sections, Holthaus writes as if future climate success has already occurred. He describes them in the past tense blending reporting with imagined history. This approach may feel unusual, but it serves a clear purpose. By treating a hopeful future as something already lived, Holthaus helps readers imagine what success might look like in concrete terms. Instead of vague promises, readers see examples of cleaner cities, restored ecosystem, new forms of governance and stronger social bonds. The

storytelling technique also challenges the idea that the future is fixed. By presenting it as something shaped by choices, Holthaus reminds readers that today's decisions matter. While some readers may find it confusing or uneven, it adds emotional weight and accessibility to complex topics.

Beyond Technology: Cultural and Social change

Although Future Earth discusses renewable energy, infrastructure and policy, it does not treat technology as the sole solution. Holthaus argues the climate change is also a cultural and moral crisis. It reflects how societies related to nature to each other and future generations. The book explores the importance of rebuilding connections within a natural world and learning from, indigenous knowledge systems that emphasize balance, care, and long-term thinking. Holthaus critiques the idea that humans can dominate nature without consequences, suggesting instead that survival depends on cooperation and respect. He also highlights the need for stronger communities and social trust. Climate resilience, in this view, is not just about physical infrastructure. It's about relationships, mutual aid and shared responsibilities.

A Practical Vision, not Just Optimism

While Future Earth is hopeful, it's not vague or purely inspirational. Holthaus outlines specific actions that could take place over the coming decades. These include ending fossil fuel subsidies, investing in public transportation, redesigning cities for climate resilience, restoring degraded land, and strengthening international cooperation. He also acknowledges that adaptation will be necessary. Some climate impacts cannot be avoided and societies will need to prepare for heat waves, rising seasons and changing weather patterns. Holthaus openly discusses resistance from powerful industries, political polarization, and the difficulty of global coordination. His optimism comes from social movements, scientific progress, and the growing recognition that current systems are unsustainable.

Hope as an Active Choice

Perhaps the most powerful idea in Future Earth is Holthaus' definition of Hope. He does not treat hope as blind optimism or wishful thinking. Instead, he presents it as a deliberate choice and a form of resistance. Hope in this sense means refusing to accept that collapse is inevitable or acceptable. It means acting, even when success is uncertain. Holthaus argues that without hope there is no motivation to imagine alternatives or fight for change. Throughout the book, he shares examples of people and communities already working towards a better future. These stories ground the vision in reality and show that progress is already happening, even if it's uneven and fragile.

Strengths and Criticisms

Future Earth has been praised for his originality, moral clarity and emotional honesty. Many readers find its hopeful framing refreshing in a field often dominated by fear-based messaging. The integration of justice, science, and imagination gives the book a broad appeal. At the same time, it has limitations. Some readers may find the narrative structure confusing or the tone to be overly optimistic. Others may question whether the scale of change Holthaus imagined, is politically realistic within the timeframe he suggests. These critiques are reasonable, but they do not undermine the book's main purpose. Future Earth is not meant to be a detailed policy manual. It is a framework for thinking differently about climate change and for reclaiming agency in the face of uncertainty.

Conclusion, a Vision Worth Engaging With

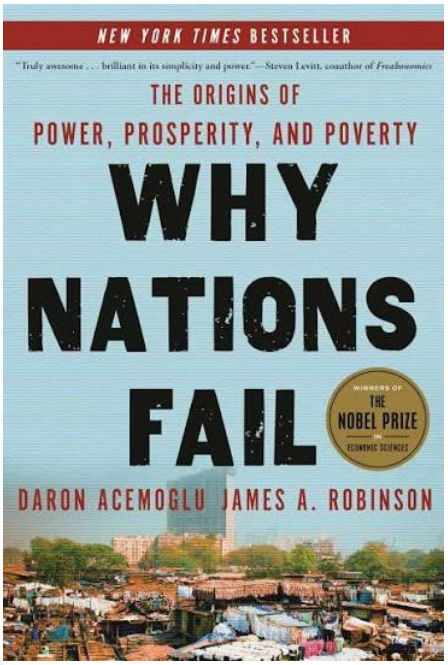
Future Earth: A Radical Vision for What's Possible in the Age of Warming, is an ambitious and deeply thoughtful book. Holthaus challenges readers to confront the climate crisis honestly, without giving into despair. He argues that the future is not predetermined and that collective action, imagination, and justice can still shape what comes next. By combining science with storytelling and ethics, Holthaus offers more than information. He offers a way of staying engaged in a difficult moment. For anyone overwhelmed the climate change, but still want to believe in meaningful action, Future Earth provides a grounded and motivating perspective. Ultimately, the book reminds the climate change is not just about temperature targets or emission charts. It is about how we choose to live together on a changing planet.

The future, Holthaus insists, it is still being written, and we all have a role in shaping it.

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Why Nations Fail

Joshita Sunnanthraj*



Daron Acemoglu & James A. Robinson | Crown Business | 2012

Acemoglu and Robinson introduce developmental economics in this book as a concept that does not require prior knowledge of the subject. By placing economics at the intersection of politics, they provide a holistic view of the wealth inequalities evident in the post-colonised world. They use a diverse range of case studies to illustrate their point that the key distinction between "poor" and "rich' countries is the inclusivity of their political and economic institutions. The more concentrated political power is, the more a small group in society (usually the elites) tries to extract wealth for itself; in their view, this is a world of 'extractive' institutions. By contrast, dispersed political power that exists in democracies is conducive to competition, which, in turn, creates the conditions for a broadly shared concept of 'prosperity'. In short, their simple explanation for the disparities in wealth across the world is political institutions.

Britain serves as their chief example. When European exploration began, Britain placed trade in the hands of privateers, leading to the creation of a new merchant elite. Its members secured pluralism and sowed the seeds of economic development. However, Spanish history reveals a contrasting story of development. While Britain entrusted trade to merchants, Spain adopted an alternative strategy of favouring state control of ocean commerce, thereby solidifying

Spanish Tyranny and empowering the elite. Similarly, in Central and South America, European explorers established exploitative states better suited to plundering, while the North American colonies witnessed political reforms and strong economic rights, spurring American industrial growth, in stark contrast to the economic stagnation of the South.

Beyond Britain and Spain, the authors present striking images of countries in close proximity that display stark differences in wealth and institutions. The examples used are Nogales,

Arizona, and Nogales, Mexico: one city split by a border fence, and North and South Korea. Same geography, same culture, same people – yet radically different institutions explain the economic divide that persists today. Post-colonial institutions are also assessed to explore how some countries emerge as success stories, while others continue to sink into hindered growth, eventually leading to a neo-colonial structure in the country. Congo, under Belgian colonisation, created institutional path dependencies that persisted even after independence, trapping the country in poverty.

The authors also examine how prosperous nations can undergo institutional reversal. Venice emerges as one such example. Once among the medieval world's most prosperous cities, Venice's elites eventually consolidated power, closed off the merchant class, and innovation collapsed. Similarly, the Roman Empire, which had a rich history of a powerful and prosperous civilisation, collapsed when political power became concentrated, and institutions slid back into their extractive nature.

The authors spend considerable time dismantling alternative theories. The geography hypothesis, advanced by Montesquieu and Jeffrey Sachs, holds that the geography of an area directly influences a country's capacity to increase its wealth. However, Acemoglu and Robinson use the case studies of Botswana and the Democratic Republic of the Congo (DRC) – both in the same tropical climate- to refute this argument; they indicate that while Botswana thrives, the resource-rich DRC does not. Other similar arguments by various authors, such as Max Weber and his culture hypothesis – Protestant work ethic vs Confucian values – seek to explain how different cultures yield varying results in a country's economic output. However, the authors challenge this theory by presenting North and South Korea as a formidable example that defies this hypothesis.

Central to the authors' argument is the concept of 'creative destruction': innovation that displaces old industries and power structures with new ones. The authors argue that this is the engine of sustained economic growth but also threatens those elites already at the top,

prompting active efforts to block new technologies to protect their position. The Ottoman Empire's resistance to the printing press and the European monarchs' suppression of labour-saving machinery are examples. The key insight is that economics and politics work hand in hand, and those who control politics will always shape economic institutions to protect themselves rather than maximise growth for society.

Another major concept discussed in the book is the 'critical juncture', which refers to a major historical disruption - a revolution, plague, colonisation or war - that destabilises existing institutions and opens a window for change. The Black Death is one of the book's most striking examples; by decimating Europe's labour force, it shifted bargaining power towards peasants in the West. In Eastern Europe, the same event produced opposite institutional outcomes, brought about by landlords' decisions to tighten serfdom. This leads to the concept of path dependency, the tendency of institutional trajectories to persist over time. Small differences at the moment of a critical juncture can produce enormous divergence centuries later, and the authors are clear that these critical junctures do not guarantee inclusive institutions, as the outcome depends on the balance of power at that moment.

While the authors' theories largely apply to most of the countries we see today, some countries contain many hybrid systems that don't fit neatly into 'inclusive' or 'extractive' boxes. The book views China through a critical lens, presenting it as a rare exception that has achieved extraordinary growth under deeply extractive political institutions. Its growth may be rooted in the removal of highly oppressive Maoist institutions, but its communist government remains fundamentally extractive. It may engineer growth by mobilising people and resources from low-productivity activities, such as subsistence agriculture, towards industry. But without political reform and the possibility of creative destruction, growth will grind to a halt.

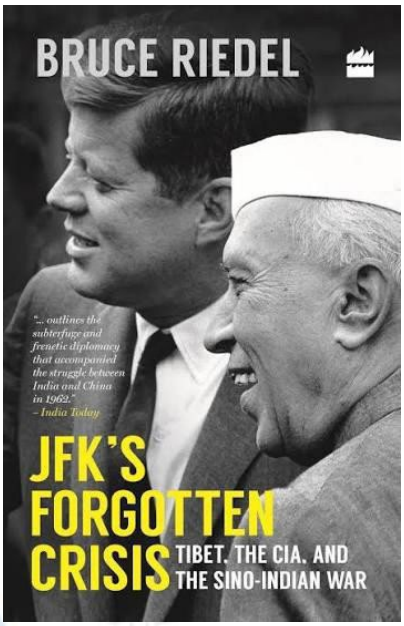
The book deserves credit for its accessibility and ambition, as it synthesises centuries of history into a coherent and readable argument that few academic works attempt. The authors are admirably honest about the limits of their optimism, acknowledging that changing institutions is slow, painful and frequently reversed, with no easy policy prescription. Overall, it is a genuinely important contribution to understanding how we think about development. In an era of rising authoritarianism and democratic backsliding globally, this book feels more urgent than ever, presenting itself as a timely reminder that political pluralism is not just a moral good but the very foundation of shared prosperity.

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THE PENINSULA FOUNDATION

JFK'S FORGOTTEN CRISIS - Tibet, the CIA and the Sino-Indian War

Gayathri Narayanan N*



Bruce Riedel | Brookings Institution Press and Harper Collins Publishers India | 2015

Authored by former CIA analyst Bruce Riedel, JFK's Forgotten Crisis offers a nuanced synthesis of pivotal geopolitical events. Bruce Riedel spent over three decades in the CIA and brings his experience to the fore in this analysis. The book examines the 1962 Sino-Indian War within the broader Cold War context of the Kennedy presidency, viewed from an American vantage point. The book's central contribution lies in foregrounding how the conflict was perceived in Washington—as a strategic episode intertwined with global concerns about Communist expansion and U.S. credibility.

This review argues that although the book offers valuable insight into American strategic thinking, it remains analytically uneven. Its reliance on a U.S. intelligence perspective leads it to reproduce contested interpretations, particularly on India's role in the escalation of the conflict.

Kennedy, the CIA and Strategic Perception

Riedel effectively traces the evolving relationship between President Kennedy and the CIA, highlighting how intelligence assessments shaped U.S. responses to global crises. The

establishment of institutional mechanisms such as the White House Situation Room reflected the growing importance of coordinated intelligence analysis during this period.

The book shows that India's appeal for assistance during the war was taken seriously in Washington, revealing a moment of potential strategic convergence between India and the United States. However, this convergence remained limited and contingent, shaped by broader Cold War priorities.

The author's narrative, however, explores how Kennedy and Nehru, despite their lack of personal rapport, were brought together by shared democratic principles to confront China's aggression. Riedel employs logic and evidence of Kennedy's 1962 support for India to argue that, if Beijing had not withdrawn its troops from Indian territory in December 1962, Kennedy would have agreed to Nehru's plea for the US Air Force to deploy fighter jets to protect Indian skies, enabling the Indian Air Force to target Chinese positions. Riedel offers an alternative explanation for the question: "Why did China retreat from occupied Indian territory in 1962?"

The author traces the relationship between the CIA and Kennedy during his presidency through a series of revealing incidents. Kennedy's effort to establish himself as a credible statesman and a world leader was centred on making foreign policy a major part of his 1960 presidential campaign. When Kennedy won the election with a 0.17% margin against Nixon, he signalled bipartisanship by retaining Allen Dulles (a Republican) as the Director of the CIA.

The book consistently underscores how the positions of the CIA and the US government diverged during the Kennedy era, particularly regarding the urgency and perceived threat, most notably during Operation Mongoose and the Cuban Missile Crisis, when Kennedy remained reluctant to deploy the US military in covert operations. Despite the Bay of Pigs failure and Dulles's termination, Kennedy continued to seek expertise to further his interests in Asia. Another indication of Kennedy's reliance on intelligence in his foreign policy was the establishment of the White House Situation Room (WHSR) in the basement of the West Wing of the White House. The irony, as the author notes, is that the CIA, which had already warned the White House about the Sino-Indian skirmishes in 1959 in its National Intelligence Estimate (NIE), was nevertheless too late to address the same when the outcome of the Bay of Pigs operation turned out to be disastrous. By highlighting Nehru's appeal to the White House for assistance during the war and Kennedy's openness to supporting India, the author illustrates the dynamics of India-US relations during the Kennedy era while pointing to the strain placed on the ideal of non-alignment.

Asia as a Strategic Theatre

A key strength of the book is its treatment of Asia as a central theatre of Cold War competition. The opening chapter foregrounds Kennedy's perception of Asia during the Cold War as a theatre that demanded more calibrated diplomacy rather than overt military engagement. Kennedy's determination to contain communism in Asia extended to Tibet, where the CIA supported the Khampa rebels against the Chinese occupation from bases in India and then East Pakistan. While Riedel situates this within Kennedy's broader Asian strategy, this reader finds it a telling exposure of the fragility of Nehru's 'Hindi-Chini Bhai-Bhai' aspirations, which were shattered by the Sino-Indian war that followed.

At the same time, this dimension raises important questions that the book does not fully address. Covert operations in Tibet may have contributed to China's threat perceptions, complicating India's position as a non-aligned actor. The implications of such covert engagement for regional stability remain underexplored.

Regional Fault Lines: India, Pakistan, and China

A recurring theme throughout the book is how Kennedy wanted to support India in the Indo-Sino war, despite the mounting dissatisfaction from Ayub Khan, even at the possible cost of jeopardising the US air base operation in Peshawar. The author highlighted that this, in turn, made Pakistan put India under pressure of a two-front war, in Kashmir with Pakistan and in NEFA with the Chinese, though it did not fully unfold. The author's observation precisely conveys India's precarious position amid two neighbouring countries aligned against it.

Nehru's Military Unpreparedness and the "Forward Policy"

One of the most debated aspects of the book is its implicit alignment with the argument that India's Forward Policy provoked the conflict, like earlier works such as Neville Maxwell's "India's China War" (1970). Like Maxwell, Riedel argues that India's Forward Policy and the establishment of outposts along and beyond the Line of Actual Control "pulled the trigger" and provoked China.

Riedel suggests that the swift reclamation of Goa from the Portuguese somewhat inflated confidence in Nehru and created a false impression of the Indian Army's capacity to fight a war with China (Pages 74-75). This was poor analysis. Riedel's assumptions and linkages were superficial and lacked analytical depth. The fact that the Indian Army was not in a position to implement the 'forward policy' was true, and this was due to a complex set of factors; Nehru's

defensive foreign policy and its impact on national security; the Indian Army's ill-equipped status, with WW II-vintage, obsolete weapons and a lack of winter clothing; and the fact that the PLA was not only well equipped but also battle-hardened, having emerged from a gruelling three-year war in Korea less than a decade ago.

Riedel's view that China was provoked is seriously debated. A counter-view holds that the Chinese were already consolidating their hold on the Aksai Chin and were prepared to strike India at a moment when the USA was preoccupied with the Cuban missile crisis. This perspective later finds resonance in Bertil Lintner's book, "China's India War: Collision Course on the Roof of the World", where he suggests that Mao had prepared for this war well in advance to assert China's dominance in international politics, particularly after his setback in the Great Leap Forward Movement. While Riedel acknowledges these perspectives, the book does not sufficiently evaluate their relative strength, leaving the analytical balance incomplete.

Riedel is critical of Jawaharlal Nehru, emphasising strategic miscalculation and military unpreparedness. While these critiques are significant, they risk oversimplifying a more complex reality.

India's challenges in 1962 were not solely the result of leadership decisions but were also shaped by:

- Institutional weaknesses in a newly independent state
- Limited military modernisation
- The constraints of non-alignment

A more nuanced analysis would integrate these structural factors alongside leadership choices.

The chapter on the Indo-Sino War concludes with reference to remarks in the Henderson Brooks-Bhagat Report, which noted that the Fourth Division was virtually destroyed during the war and that the Chinese had almost captured 30,000 sq. km of the North-East Frontier Agency (NEFA) region.

What remains strikingly consistent even today is the Chinese reluctance to provide an official accounting of casualties or injured PLA personnel, a pattern that reflects the opacity of its military conduct and was repeated in the Galwan Valley Clash of 2020.

Mao's unilateral ceasefire

The book's analysis of Mao Zedong's unilateral ceasefire is one of its strongest sections. Riedel convincingly argues that the ceasefire was politically calibrated, combining strategic signalling with practical considerations such as logistical constraints in the Himalayan theatre.

This interpretation moves beyond a purely military narrative and highlights the interplay between political objectives and battlefield decisions.

USA-India Strategic Relations

Riedel's assertion that Kennedy and US allies would have supported India against China is supported by plans from Harriman's 1963 visit for an air defence exercise in India, involving US, British, Canadian, and Australian pilots defending Indian airspace before Kennedy's death. Riedel notes how close Washington and New Delhi came to a military alliance, but circumstances halted this. A five-year, $500 million military aid programme was devised by Kennedy's administration, set for approval on November 26, 1963. Kennedy's assassination in Dallas four days earlier affected this. Lyndon B. Johnson faced Pakistani pressure against aiding India, with President Ayub Khan threatening to deny US access to the Peshawar air base. A White House meeting was scheduled for May 28, 1964, to approve the aid, but Nehru's unexpected death the day before delayed it. His successor, Lal Bahadur Shastri, continued negotiations but signed a larger agreement with the Soviet Union in August 1964.

US Ambassador Chester Bowles called this "a lost opportunity" in Indo-American relations.

Conclusion

JFK's Forgotten Crisis is a valuable contribution for readers seeking to understand how the 1962 war was perceived within the United States. It provides insight into intelligence assessments, strategic anxieties, and policy responses during the Kennedy era. Overall, the book offers an engaging and detailed account of the 1962 war and briefly beyond that, through an American lens. The author's sharp and wry observations on the personalities of Nehru and other leaders lighten the tone of an otherwise intense account of conflict and diplomacy.

Nonetheless, the book lacks a thorough analysis of the conflict. Its U.S.-centric view repeats disputed interpretations and limits other perspectives. Significant editorial mistakes detract from the book. The author lacks knowledge of the history of the Sino-Indian border conflict. He claims China's October 1962 attack "led to China occupying 14,500 square miles of territory claimed by India in Kashmir known as Aksai Chin..." However, China already controlled Aksai Chin before the conflict, having built a highway through it. Riedel fails to recognise that

Ladakh is separate from Kashmir, leading to inaccuracies like stating: "All of the territory that China gained in the Sino-Indian War in 1962 was part of Kashmir." More concerning is Riedel's assertion that the boundary between Tibet and Jammu & Kashmir — the Johnson Line — was established in 1914, along with the McMahon Line. In reality, the

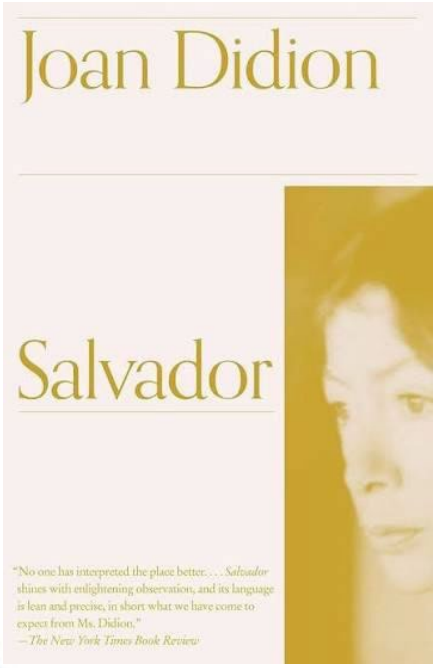
Johnson Line (never officially recognised) originated in 1865, nearly fifty years before the Simla Conference, where the McMahon Line was defined. These mistakes are embarrassing even for a novice. It is astonishing that a CIA veteran could make such errors and that editors could overlook them. For much of the American public, the Sino-Indian War was lost in the fog of the Cuban crisis. For Indian readers, the 1962 war was never a “forgotten crisis.” It remains a defining moment in the country’s strategic history—one that continues to shape its security thinking today.

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THE PENINSULA FOUNDATION

Salvador

Vanshika Ahuja*



Joan Didion | Simon & Schuster | 1983

"In El Salvador, one learns that the vultures go first for the soft tissue, for the eyes, the exposed genitalia, the open mouth. One learns that an open mouth can be used to make a specific point, can be stuffed with something emblematic; stuffed, say, with a penis, or, if the point has to do with land title, stuffed with some of the dirt in question."

Brief Overview

A haunting look at the Salvadoran civil war between the US-backed military Junta and Farabundo Martí National Libération Front (FMLN), a coalition of leftist opposition groups, Salvador by Joan Didion captures the chaos and brutality of a place where death and terror have become ordinary and truth evermore elusive. A piece of literary reportage that grew into a book from three essays that Didion wrote for the New York Review of Books, it is a scrupulous critique of the moral blindness and self-deceptions of US foreign policy.

Main Themes

The Banality of the Brutality during War

Perhaps the book's central theme, one that Didion explores with admirable skill, is the ordinariness of violence in the country and the ever-present sense of dread among its citizens.

“These are the details– the models and colours of armoured vehicles, the makes and calibres of weapons, the particular methods of dismemberment and decapitation used in particular instances– on which the visitor to Salvador learns immediately to concentrate, to the exclusion of past or future concerns, as in a prolonged amnesiac fugue”, she writes, describing the place’s pervasive terror.

Rhetoric as a Tool in Diplomacy and Foreign Policy

Furthermore, Didion masterfully critiques the manipulation of language as a means of justifying and normalising violence. “Language as it is now used in El Salvador is the language of advertising, of persuasion, the product being one or another of the soluciones crafted in Washington or Panama or Mexico,” writes Didion, as we witness government, military, and U.S. officials using bureaucratic phrases and euphemisms to obscure the reality of violence and repression.

Failures of the American Foreign Policy

Additionally, Didion offers a critique of American policy on intervention in El Salvador, at one point comparing it to “a dreamwork devised to obscure any intelligence that might trouble the dreamer.” We see disillusionment with American foreign policy due to its refusal to accept the realities of inequality and repression in the country, as well as its tendency to reduce the conflict to Cold War terms of communism versus democracy.

Limitations of Objectivity during Conflict

Further, Didion explores the lack of objectivity in reporting from a conflict zone, as she struggles to discern the truth in a place where chaos reigns and facts and figures become increasingly elusive. She describes “a great deal of what goes on is considered ineffable.”

Key figures

Roberto D’ Aubuisson

A Salvadoran military officer and a neo-fascist politician, he was the founder of the Alianza Republicana Nacionalista (ARENA) party. He is widely believed to have been involved in orchestrating the death squads as well as the assassination of the archbishop Óscar Arnulfo Romero, the Archbishop of San Salvador at the time. In Salvador, he increasingly comes to personify far-right terror in the country.

Ambassador Deane Hinton

From 1981 to 83, during the Reagan Administration, he served as the U.S. Ambassador to El Salvador. After his predecessor was relieved of his position, he was a key figure in American

diplomatic efforts to manage the Salvadoran crisis. In Salvador, he appears as an example of bureaucratic detachment, representing the inability of American foreign policy to reckon with moral collapse.

Writing Style

Didion deploys her signature cinematic prose to paint a vivid picture of the terror that pervades El Salvador. Her work is impressionistic, mirroring the confusion and disorientation of El Salvador during the civil war. Didion is detached yet observant as she tries to assemble facts that grow increasingly elusive.

However, her cool cynicism sometimes gives way to helplessness. We witness this in her writing, "As I waited to cross back over the Boulevard de los Heroes to the Camino Real, I noticed soldiers herding a young civilian into a van, their guns at the boy's back, and I walked straight ahead, not wanting to see anything at all."

Conclusion

Salvador may not be the sharp political analysis of the Salvadoran Civil War, limited both by the author's understanding of the place as well as the time she was there– two weeks only. However, it serves as a masterful critique of the repetitive self-delusions of American foreign policy. Further, it forces the reader to do something more crucial: to bear witness to the darkness in a nation consumed by fear and terror, and to the hollowness of the rhetoric governments use to justify such cruelty.

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