



Supporting a Pathway for Inquiry, Restraint and Legitimate Future Choice: a “Middle Path” for Solar Radiation Modification (SRM) Research and Governance

A globally inclusive civil society effort to shape how SRM is studied, governed, and debated at a time of severe climate risk.

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Executive Summary

Climate impacts are worsening, and interest in Solar Radiation Modification (SRM) approaches is intensifying. SRM raises profound scientific, ethical, political, legal, and governance questions, yet discussion is often polarized and paralyzed between an emphasis on the risks of SRM versus the risks of climate change.

In reality, both raise important concerns.

The real question ahead of us is not whether SRM should be deployed or not, but rather how the conversation will unfold: who is at the table, what research is enabled, whose insights matter, and how the research and/or development of such technologies should be governed in a global reality defined by climate suffering and geopolitical tensions.

We believe the path forward is one built on inclusive inquiry, restraint, and legitimate future choice. We refer to this as a middle path: one that combines strong restraint on deployment with responsible research governance, meaningful participation by climate-vulnerable countries and communities, and prevention of unilateral or poorly governed action. Under current conditions of scientific uncertainty, insufficient governance capacity, and limited international legitimacy, deployment should not occur. However, suppressing inquiry is also not an adequate governance response.

This paper is the product of an initiative of civil society organizations working across environmental protection, climate change, public health, adaptation, and sustainable development, with members based in Africa, Latin America, South Asia, the Arctic, and North America. Grounded in the perspectives of regions already experiencing severe climate impacts, we articulate a rationale for a middle path approach and identify practical steps that governments, researchers, civil society organizations, and funders can take to support responsible, inclusive, transparent, and accountable SRM governance. This paper is intended to provide an intellectual foundation for a catalytic effort to build a broader constituency for responsible SRM research governance and more inclusive participation in SRM-related decision-making. We encourage others who share these values to join us in endorsing this approach and working with us to shape its ideas and build its constituency.

“We believe the path forward is one built on inclusive inquiry, restraint, and legitimate future choice.”

1. Introduction

The risks of severe climate change are no longer theoretical for many communities, especially across the Least Developed Countries (LDCs), mountain ecosystems, the Arctic, and Small Island Developing States (SIDS).

These regions are already experiencing severe consequences associated with rising temperatures, altered precipitation patterns, glacier retreat, incidents of Glacial Lake Outburst Floods (GLOFs) in the Himalayas, sea-level rise, and increasingly frequent extreme weather events. The partial glacier collapse near Langtang National Park in Nepal on August 26th provided a grim example of the human cost of climate-related disasters, including over 1,400 deaths and over 5,000 people missing.¹ For billions of people, climate change is already an immediate reality rather than a future risk.

Meanwhile, ongoing efforts to reduce greenhouse gas emissions and strengthen adaptation are insufficient. The United Nations Environment Programme recently concluded that exceedance of the 1.5°C long-term warming level is now widely assessed as unavoidable, likely within the next few years. Even in its lowest possible 1.5°C overshoot scenario, warming would peak at 1.7–1.8°C around midcentury, while current policies point to 2.8°C by 2100 and full delivery of all nationally determined contributions (NDCs) to 2.6°C.^{2,3} Rapid decarbonization remains the greatest and most urgent priority for climate action and the only approach that directly addresses the root cause of climate change; however, worsening climate impacts have prompted growing attention to additional interventions, such as SRM.

1. Shirish B. Pradhan. Press Trust of India. “Nepal moves to amend laws to facilitate death registration of 5,285 still missing after the Aug 26 floods.” Oct 7, 2026. Accessed at: <https://www.msn.com/en-in/news/other/nepal-moves-to-amend-laws-to-facilitate-death-registration-of-5-285-still-missing-after-the-aug-26-floods/ar-AA2dJZEj?ocid=BingNewsVerp>

2. United Nations Environment Programme (2026). “UNEP : World set to cross 1.5C global warming, but can still limit, adapt to and return from higher temperatures.” <https://www.unep.org/news-and-stories/press-release/unep-world-set-cross-15degc-global-warming-can-still-limit-adapt-and>

3. United Nations Environment Programme (2026). “Emissions Gap Report 2026: The point of return – Urgent emissions cuts needed to come back from overshoot of 1.5°C.” Nairobi. <https://doi.org/10.59117/20.500.11822/50038>

SRM technologies encompass a range of proposed climate interventions that seek to temporarily avoid some warming effects by increasing the reflection of sunlight or otherwise altering Earth's radiation balance, reducing global temperatures.⁴ It is important to recognize that, at its best, SRM would not be a “solution” to address the root cause of global warming, but a method to counter such warming temporarily while global mitigation and carbon dioxide removal action proceeds, while forestalling drastic and irreversible climate impacts.⁵ There is general agreement, based on a substantial body of research, that SRM could reduce global mean temperatures. The SRM strategy known as Stratospheric Aerosol Injection (SAI), specifically, is expected to deliver relatively fast cooling at a relatively low cost on a global scale⁶— a combination of features that is unique among climate approaches and a key reason for the increasing interest in these strategies.^{7,8}

However, these same features also make SRM uniquely challenging. Its potential to affect the climate is accompanied by substantial uncertainties and unresolved questions spanning physical impacts, governance, ethics, accountability, and consent. Increasingly, SRM is also raising questions related to international security and strategic stability, including concerns about unilateral action, geopolitical tensions, attribution of climate impacts, and the potential for disputes among nations with differing interests and vulnerabilities. The effects would cross national borders and potentially generations, while intersecting with today's inequitable global political realities. Countries and communities most vulnerable to climate change and potentially most affected by future SRM activities remain underrepresented in many governance discussions and have more restricted research capacity, funding, and policy influence. Meanwhile, much of the existing discourse on SRM has been shaped by a small number of Global North individuals and institutions,



4. Proposed approaches include Stratospheric Aerosol Injection (SAI), Marine Cloud Brightening (MCB), Surface Albedo Modification (SAM), space-based approaches, and related radiation-modification approaches sometimes discussed alongside SRM, such as Cirrus Cloud Thinning (CCT). For additional detail, see the Solar Radiation Modification Primer, American Academy of Arts and Sciences: <https://www.amacad.org/publication/solar-radiation-modification-srm-primer/section/1>; or “Solar radiation modification: NOAA State of the Science factsheet” (2024) <https://www.climate.gov/news-features/understanding-climate/solar-radiation-modification-noaa-state-science-factsheet>
5. UN Environment Programme (UNEP). Solar Radiation Modification: Scientific evidence does not support SRM as a viable climate solution – Working Paper. (2026) <https://wedocs.unep.org/handle/20.500.11822/49509>
6. Royal Society. Solar Radiation Modification: Policy Briefing. (2025) London.
7. UNEP. One Atmosphere: An Independent Expert Review on Solar Radiation Modification Research and Deployment. (2023) <https://www.unep.org/news-and-stories/story/new-report-explores-issues-around-solar-radiation-modification>
8. Royal Society. Solar Radiation Modification (2025).

“It is important to recognize that, at its best, SRM would not be a complete “solution” to address the root cause of global warming, but a method to counter such warming temporarily to buy time for mitigation and carbon dioxide removal while forestalling drastic and irreversible climate impacts



while perspectives from developing countries, Indigenous Peoples, local communities, and climate-vulnerable populations remain limited.

We have reached the undesirable place where there are no neutral options: both action and inaction carry risks. The severity of climate change does not make SRM safe, nor guarantee that its best-case outcomes will materialize. However, it does suggest that the search for ways to reduce climate suffering and damage will intensify, and that restraint has to be argued against the strongest case for engagement, not the weakest. As interest grows, so too does the possibility that future decisions could be driven by a narrow set of actors acting under conditions of urgency, uncertainty, or inadequate oversight. Thus, the challenge is not whether society will confront the questions relating to SRM deployment, but whether it will do so through inclusive, accountable, and well-governed processes. Regardless of what the future holds, the best preparation is governance that is sufficient to the task.

Yet within today's community of highly engaged stakeholders on SRM, a polarized political dynamic often dominates and crowds out constructive engagement. Some primarily emphasize the risks of SRM, arguing that scientific uncertainty, governance gaps, unequal capacities, and moral hazard warrant strong precautionary measures, including significant limits on research activities and policy engagement. Others emphasize the severe risks and uncertainties of accelerating climate change and potential tipping points, arguing that climate risk creates greater urgency for exploring additional response options. Yet many stakeholders fall between these poles, recognizing both the need for precaution and the severity of current projected climate impacts. The question is not simply whether SRM should be studied, but who gets to participate in deciding how it is studied, governed, constrained, or potentially rejected. Rather than responding to governance deficits by narrowing participation, we believe they should be addressed by expanding it.

The Need for a Middle Path

We have formed the Middle Path Initiative in response to this governance challenge. We are an emerging group of civil society representatives from environmental and climate NGOs from Africa, the Arctic, Latin America, North America, and South Asia. We work across diverse areas of climate action, including mitigation and adaptation, and on a wide variety of topics that include adaptation to extreme heat, Arctic resilience, air pollution and public health, rainforest and mountain ecosystems preservation, climate policies,

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biodiversity, water security, community resilience, and sustainable livelihoods. Many of us live on the front lines of severe climate change. We bring different perspectives and lived experience to our approach to SRM, as well as a mixture of interest and skepticism regarding whether SRM deployment would ever be in the public interest.

Yet we are aligned on key points: we do not support deployment under current conditions of scientific uncertainty, insufficient governance capacity, and limited international legitimacy. At the same time, we do not view the suppression of inquiry as an adequate governance response. Instead, we call for a middle path: strong restraint on deployment under current conditions, responsible research governance, meaningful participation by climate-vulnerable countries and communities, and informed public engagement. This will require governance that enables responsible research while recognizing concerns regarding moral hazard, path dependency, unequal capacities, and the risks of premature deployment.

Governance is needed now. While there exists some basis for SRM governance at international and national levels, institutional arrangements remain fragmented and uneven, and SRM is already entering scientific, policy, security, and civil society debates. Funding, expertise, and agenda-setting influence remain concentrated among relatively few actors, and many of the communities most exposed to climate risks remain underrepresented in governance discussions. Early governance can help ensure that these efforts are transparent, accountable, inclusive, and oriented toward the public interest before expectations, investments, or geopolitical incentives harden.

The Middle Path Initiative aims to build a broader and more inclusive constituency for SRM research governance — supporting inquiry, maintaining strong restraint on deployment under current conditions, and strengthening the knowledge, participation, and governance capacity needed for legitimate future choices. This paper is intended as an initial intellectual foundation for that effort: a starting point for coalition-building, civic engagement, and practical governance development across regions and sectors. It seeks to complement rather than replace existing efforts by connecting actors, broadening participation, identifying gaps, and helping translate shared principles into practical action.

This paper explains the rationale for this approach and offers principles and practical recommendations for governments, researchers, civil society organizations, and funders.

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2. Key Risks and Tensions

SRM should be evaluated through a risk-risk framework that considers the consequences of both intervention and non-intervention.

Yet the fact that climate change poses serious risks does not relieve SRM of scrutiny. Deliberate interventions create responsibilities that slowly evolving risks do not, raising acute questions of accountability, legitimacy, and consent. Further, any decision to deploy SRM would likely be made by a relatively small number of actors (even in the best case of inclusive, coordinated international decisionmaking) while its consequences would be unequal and widely experienced. This tension between concentrated agency and distributed impacts lies at the heart of the governance challenge.

This section focuses on the risks and tensions presented by SRM research, governance, and potential deployment, and provides an illustration of how this challenge manifests across scientific, governance, security, justice, and political domains. While SRM encompasses a range of proposed approaches, this section focuses primarily on SAI, not because all SRM approaches raise identical concerns, but because SAI most clearly illustrates the central tensions of the field.

The main risks

Physical

SRM could temporarily reduce some warming but would not remove greenhouse gases or reverse ocean acidification, and its effects would vary by region and season, with regional impacts still poorly understood.⁹ While some elements of uncertainty have been assessed, there are a host of known-unknowns and likely unknown-unknowns that remain unexplored. Uncertainty is especially acute where precipitation changes intersect with food systems, ecosystems, and migration pressure. Shifts in precipitation and monsoons matter most where food and water depend on predictable rain; their disruption carries cascading consequences for nutrition, waterborne disease, and population displacement, compounding vulnerabilities in regions least equipped to absorb them.

These second-order impacts require anticipatory modelling alongside physical climate assessments, with careful consideration on a risk-risk basis. If sustained deployment stopped abruptly, termination shock could return warming to non-reduced levels at a dangerous rate, raising profound questions about intergenerational responsibility and the credibility of phase-out commitments.¹⁰

Governance, power, and security

The potentially lower direct operational cost and perceived technical feasibility of SAI could allow a state or small coalition to act without global agreement, the free-driver effect.¹¹ No dedicated regulatory regime exists, though several governance instruments are relevant, including the Convention on Biological Diversity (CBD) COP Decision X/33 calling for a precautionary approach and XIII/14 calling for transdisciplinary research and knowledge sharing, the 1977 ENMOD Convention, the ozone treaties, and the London Convention.^{12,13} A unilateral intervention could be read as a hostile act,¹⁴ alter weather in non-consenting states, and fuel interstate tension.¹⁵ Because effects are hard to separate from natural variability, attributing harm would be contested, and no international liability mechanism for SRM exists.

Beyond interstate contestation, the difficulty of attribution also undermines accountability to affected populations; communities experiencing altered rainfall or food insecurity cannot easily trace harm to a governing decision, let alone seek remedy. This accountability gap is a structural barrier to justice that existing legal frameworks were not designed to address. Moral hazard is also a cross-cutting concern: a cooling option can dull the urgency to cut emissions, a concern that crossed blocs when an SRM resolution collapsed at the 2024 UN Environment Assembly.¹⁶

Justice and consent

Those most exposed to climate impacts usually have least influence over SRM, while expertise and funding concentrate among wealthy states and private actors, risking a model in which less-resourced regions become test sites or inherit an agenda set elsewhere. Where modelled benefits tend toward global aggregates, the actual impacts would fall locally – and felt especially acutely by climate-vulnerable regions and populations are already managing intersecting pressures on their environments, economies, health, livelihoods, and social conditions. An intervention that centers global averages without disaggregating subnational and population-level impacts risks reproducing patterns of exclusion and under-recognition that climate governance should seek to overcome.

What is deemed acceptable risk by those with robust adaptive capacity looks fundamentally different from the perspective of communities with fewer resources to buffer against shocks. This asymmetry is not only about representation in governance rooms. It runs deeper, into whose knowledge counts in technical assessments, who shapes funding priorities, and who has the capacity to contest framings that misread or undervalue their vulnerabilities.

Time, reversibility, and institutional fragility

SRM postpones the problem rather than ending it. A stratospheric program implies deploying for as long as greenhouse gas concentrations stay high, plausibly a century, binding generations who never chose it and assuming an institutional continuity no government can promise.¹⁷ Effective SRM governance would require sustained international cooperation, transparency, monitoring, and dispute resolution over long time horizons. Yet institutions operate in contexts of changing political priorities, economic shocks, conflict, and leadership transitions. Governance arrangements that appear robust today may weaken over time, creating risk of inconsistent implementation, loss of public legitimacy, or failure to manage disputes. With likely even higher complexity than for transformational mitigation, adaptation, and removal governance, the feasibility of maintaining effective governance across generations remains one of the least understood dimensions of SRM.



9. IPCC (2021). Climate Change 2021: The Physical Science Basis. Working Group I, Sixth Assessment Report. Cambridge University Press.
10. Parker, A., and Irvine, P. J. (2018). The risk of termination shock from solar geoengineering. *Earth's Future*, 6(3), 456–467.
11. Wagner, G., Weitzman M. (2012) Playing God. *Foreign Policy*, Washington DC.
12. Convention on Biological Diversity. Decision X/33: Biodiversity and Climate Change. Tenth Conference of the Parties, Nagoya, Japan, 2010. Reaffirmed in Decision XI/20 (2012) and subsequent COP decisions.
13. ENMOD (1977). Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques. United Nations.
14. Sovacool BK, Baum C, Low S (2023). “The next climate war? Statecraft, security, and weaponization in the geopolitics of a low-carbon future.” *Energy Strategy Reviews*, Volume 45.
15. Carnegie Endowment for International Peace (2025). *Geoengineering: Assessing Risks in the Era of Planetary Security*.
16. Carnegie Endowment, 2025.

17. Royal Society. *Solar Radiation Modification*, 2025

How society responds to these risks can introduce additional tensions and tradeoffs between competing governance goals. These should be considered in detail and named clearly:

Research and
legitimation

Studying SRM can normalize it and make deployment likelier, the core argument of the non-use case that largely opposes SRM research.¹⁸ Yet refusing to study it leaves exposed regions dependent on others’ models and blind to decisions that affect them. Researchers from climate-vulnerable countries argue the real risk is ignorance, and that halting research to protect the vulnerable can reproduce the exclusion it claims to resist.¹⁹ What matters is who controls research and to what end, and whether governance frameworks are designed to evaluate not only direct experimental risks but also how research can shape expectations about future policy choices and deployment.

Restraint and exclusion

A mechanism to prevent deployment has wide support, from the Overshoot Commission to the CBD to AMCEN.^{20,21,22} Strong restraint on deployment is warranted under current conditions, but non-use of deployment and non-participation in knowledge are different commitments, and conflating them shuts much of the world out of rule-making.

Precaution and agency

Precaution should govern deployment given the regional uncertainties, but it should not be a reason to exclude affected parties from the science and governance of a shared atmosphere. Caution and a seat at the table can hold together.

18. Biermann, F., et al. (2022). Solar geoengineering: The case for an international non-use agreement. WIREs Climate Change, 13(3), e754. <https://doi.org/10.1002/wcc.754>

19. Quagraine, K. A., Abiodun, B. J., and Essien-Baidoo, S. (2025). Africa must lead the governance of solar radiation management. Nature Climate Change, 15, 1017-1018.

20. Climate Overshoot Commission (2023). Reducing the Risks of Climate Overshoot. Paris: Climate Overshoot Commission.

21. Convention on Biological Diversity. Decision X/33, 2010.

22. African Ministerial Conference on the Environment (AMCEN) (2023). Decision 19/5: Call for a global governance mechanism for the non-use of solar radiation modification.

3. Principles

In setting the foundation for an approach that combines inquiry, restraint and future choice, the Middle Path Initiative affirms the following Principles.

They have been informed by existing governance initiatives, including the Oxford Principles for Geoengineering Governance,²³ the Ethical Framework Principles of the American Geophysical Union (AGU),²⁴ the Proposal for a Solar Geoengineering Non-Use Agreement, the “Call for Balance”²⁵ and recommendations contained in the United Nations Environment Programme’s (UNEP) assessment of SRM research and deployment.²⁶

Initiative participants recognize that different readers — and indeed members of the current group — may place different emphasis on different principles, as would those who choose to join. Yet we are united by the belief that these principles provide a constructive foundation for broader engagement.

23. Rayner, S., Heyward, C., Kruger, T. et al. The Oxford Principles. Climatic Change 121, 499–512 (2013). <https://doi.org/10.1007/s10584-012-0675-2>

24. AGU. “Ethical Framework Principles for Climate Intervention Research” (2024). Accessed at <https://www.agu.org/ethicalframeworkprinciples>

25. “We call for balance in research and assessment of solar radiation modification.” (2023) <https://www.call-for-balance.com/>

26. UNEP, 2023 and 2026.

Foundational Principles

1. Human rights and justice at the core

Justice considerations are critical, not supplemental. Decisions about SRM research and governance must be centered on the overall impact on human rights, including the right to life, health, food, water, participation, and access to science and information. These include recognition of asymmetries between those responsible for emissions and those experiencing climate impacts across LDCs and the Arctic, as well as concerns related to intergenerational equity and global power imbalances.

2. Commitment to mitigation, adaptation, and broader climate response

Emissions reductions remain the only approach that directly addresses the root causes of climate change. Any discussion of SRM research should therefore be grounded within a broader climate strategy that prioritizes mitigation, adaptation, and the protection of life in a warming world. Accountable research governance and policy design should be implemented to minimize the risk of moral hazard.

Building Legitimacy and Trust in SRM Research

3. SRM research as a public good under responsible governance

SRM research should be conducted in the public interest, funded transparently through public-interest mechanisms, and governed to advance human and ecological well-being, rather than proprietary, commercial, or geopolitical advantage.

4. Inclusion, participation, and the right to shape scientific agendas

Communities — especially in climate-vulnerable regions, including LDCs and Arctic communities — must have meaningful opportunities not only to participate in SRM discussions, but to shape research agendas, define risks, and influence governance frameworks. This requires investment in accessible, two-way communication and the institutional and funding infrastructure that makes sustained agenda-setting possible. It also requires mutual respect for diverse knowledge systems.

5. Transparency, accountability, and responsible knowledge generation

Communities — especially in climate-vulnerable regions, including LDCs and Arctic communities — must have meaningful opportunities not only to participate in SRM discussions, but to shape research agendas, define risks, and influence governance frameworks. This requires investment in accessible, two-way communication and the institutional and funding infrastructure that makes sustained agenda-setting possible. It also requires mutual respect for diverse knowledge systems.



Research and Deployment Governance



6. Governance should be proportionate to risk

SRM research and SRM deployment are fundamentally different activities with different ethical, legal, and human consequences, and research itself encompasses a wide variety of approaches and objectives ranging from desk research and modeling to field experiments. Well-designed governance approaches should be proportionate to the specific risks presented by SRM research or deployment activities, rather than treating all research activities as equivalent or as a single continuum.

7. Restraint on deployment and prevention of unilateral action

Responsible engagement with SRM requires strong norms of restraint regarding deployment. Under current conditions of scientific uncertainty, insufficient governance capacity, and limited international legitimacy, SRM should not be deployed. Preventing unilateral or poorly governed action is essential to protecting human rights, maintaining global stability, and preserving public trust. Achieving this will require more than voluntary restraint alone, including legitimate governance arrangements capable of providing oversight, review, monitoring, and meaningful mechanisms for accountability.

4. Recommendations

The recommendations below identify practical actions that governments, researchers, civil society organizations, and funders can take now to advance a Middle Path approach.

These are intended as a focal point around which a broader community of stakeholders can organize, collaborate, and develop governance ideas and capacity. This will be a collective effort: many other initiatives exist to advance aspects of this agenda. This Initiative does not seek to replace or duplicate this work, but to support and strengthen it by building broader support, encouraging greater participation by climate-vulnerable communities and regions, identifying gaps, and helping translate governance principles into sustained action.

Recommendations for Policymakers

Consider SRM strategies through a “risk/risk” framework.

The ultimate goal is to alleviate damage and suffering, and this requires a systems view across choices and tradeoffs.

Differentiate among SRM approaches.

Develop governance frameworks that recognize the substantial differences among SRM techniques, rather than treating all interventions as a single category.

Identify mechanisms for deployment restraint while strengthening governance.

Maintain strong restraint on deployment and on large-scale outdoor experiments with significant environmental, transboundary, or deployment-relevant effects unless and until inclusive, legitimate, transparent, and enforceable governance arrangements are in place.²⁷ Develop governance thresholds and review processes before considering deployment or large-scale experimentation.

Proactively address moral hazard concerns.

SRM can, at most, supplement deep emissions cuts and adaptation, never replace them, and governance should resist its use to justify slower decarbonization.²⁸ SRM should not be placed into competition with other strategies, including through emissions offsets, credits, or compliance instruments that can be used in place of emissions reductions. SRM budgets and mitigation should be tracked separately, and mechanisms are needed to ensure that any future consideration of deployment or large-scale experimentation is not used to weaken mitigation or adaptation commitments.

Establish public-interest research assessment capacity within and across ministries.

Governments – including in climate-vulnerable regions – should directly fund and support their own independent, interdisciplinary assessment of SRM research and governance questions, including physical science, social science, ethics, law, security, human rights, development, and regional impact analysis. This should not be concentrated solely within a single ministry.

Establish robust research governance.

Research governance should include transparency, accountability, independent oversight, community engagement, capacity-building, and consideration of how research may influence future policy and governance choices. Practical mechanisms may include public registries, disclosure of funding and interests, open publication of methods and results where appropriate, agreed limits on research scale where appropriate, and independent ethical and scientific review. Research frameworks should also require attention to population-level and subnational impacts, not only global or regional averages. Inclusive and collaborative efforts to develop and build such governance – for example, the Solar Geoengineering Research Governance Platform²⁹ – should be strengthened.

Strengthen multilateral engagement.

Identify complementary institutional pathways across relevant environmental, scientific, human rights, development, climate-policy, and security-related forums, recognizing that no single institution currently has a comprehensive mandate for SRM governance. Multilateral engagement should reduce fragmentation, secrecy, securitization, and forum-shopping.

Prepare for future governance challenges.

Consider both use and non-use contexts and scenarios, and develop monitoring, attribution, liability, compensation, review, and dispute-resolution mechanisms capable of addressing potential deployment-related decisions, restraint arrangements, non-use commitments, unequal impacts, and contested claims of harm.

Put affected parties at the table from the start and use free, prior, and informed consent (FPIC) for Indigenous Peoples and resourcing so climate-vulnerable countries take part on equal terms.

Decisions about a shared atmosphere should not be made without meaningful participation by those who would live with the consequences. Inclusion must extend beyond formal representation in governance bodies to meaningful participation in defining research questions, risk thresholds, and acceptable outcomes.



27. Consistent with the Climate Overshoot Commission, 2023.

28. IPCC, 2021; Royal Society, 2025

29. Solar Geoengineering Research Governance Platform (SGRG). <https://www.sgrg.org/>

Recommendations for Policymakers

Anticipate the security dimension.	Clarify how instruments like ENMOD apply, build independent monitoring and attribution, and create liability and dispute channels before an actor moves unilaterally. ³⁰
Build distributed research capacity and protect against capture.	Increase and spread research funding and expertise beyond wealthy states and private interests, including Global South-led research of the kind the Degrees Initiative supports, with limits on private patents and commercial control. ^{31,32} Governance arrangements should be informed not only by advances in global scientific understanding, but also by new evidence generated locally, particularly from regions that may experience SRM impacts differently. Governance arrangements should also be subject to periodic review as scientific understanding, technological capabilities, and societal perspectives evolve, ensuring decisions remain responsive to emerging evidence rather than locked into frameworks designed under conditions of greater uncertainty.

Recommendations for Researchers

Improve transparency and research standards.	Establish common definitions, reporting standards, public registries, and governance expectations for SRM research, including disclosure of funding sources, institutional affiliations, conflicts of interest, methods, assumptions, uncertainties, and intended uses of research outputs.
Avoid overstating readiness or controllability.	Researchers should clearly distinguish modelling, laboratory research, observational studies, small-scale field studies, deployment-relevant experiments, and operational deployment, and should avoid claims that imply technical readiness, governance sufficiency, or predictable control beyond the evidence.
Develop standards for outdoor experimentation.	Create clear frameworks governing field testing, including transparency, ethical review, community engagement, and appropriate limits on scale.
Prioritize decision-relevant knowledge gaps.	Focus research on key uncertainties relating to impacts, effectiveness, reversibility, governance, and societal consequences, while advancing broader understanding of Earth systems.
Respect Indigenous Peoples’ rights and local communities.	Research conducted on Indigenous Peoples’ lands should follow FPIC principles and relevant Indigenous Peoples’ governance frameworks.

30. Carnegie Endowment for International Peace (2025). Geoengineering: Assessing Risks in the Era of Planetary Security.

31. African Academy of Sciences and Solar Radiation Management Governance Initiative (SRMGI) (2013). Governance of Research on Solar Geoengineering: African Perspectives.

32. Degrees Initiative (2024). Degrees Modeling Fund and Socio-Political Fund. Cambridge, UK: Degrees Initiative.



Recommendations for Civil Society

Shape the agenda, rather than abstain from it.	Recognize that SRM research and governance questions are already being discussed, including by some civil society actors. The wide spectrum of civil society has an important role in shaping research priorities, defining governance questions, scrutinizing power and funding, and ensuring that climate-vulnerable communities are not excluded from decision-making.
Guard against capture and polarization.	Civil society organizations should monitor whether SRM research and governance discussions are being shaped by narrow technical, commercial, philanthropic, or geopolitical interests, while also resisting polarization that would suppress responsible inquiry or exclude affected communities from knowledge and rule-making.
Serve as connective tissue across stakeholders.	Facilitate dialogue among governments, researchers, communities, and international institutions to improve transparency, coordination, and accountability.
Expand participation and public understanding.	Support capacity-building, public engagement, and grassroots initiatives that enable broader participation in governance discussions, particularly among climate-vulnerable communities.

Recommendations for Funders and Philanthropies

Require transparency of funding sources, objectives, methods, assumptions, intended uses, and conflicts of interest.	Transparency helps build public trust, allows independent scrutiny, and reduces the risk that research agendas are shaped by undisclosed interests or expectations.
Prioritize Global South-led research capacity, agenda-setting, and long-term institutional strengthening.	Support institutions and researchers in climate-vulnerable regions so they can contribute to knowledge generation, governance discussions, and policy development on equal terms.
Avoid funding structures that create proprietary control, deployment momentum, or dependence on narrow technical pathways.	Funding should encourage independent assessment and open scientific inquiry rather than creating incentives that predetermine policy outcomes or concentrate influence among a small number of actors.
Support independent governance, public engagement, interdisciplinary assessment, and social science research alongside physical science research.	Understanding SRM requires attention not only to climate impacts, but also to governance, ethics, public perceptions, security implications, and questions of justice and legitimacy.

5. Closure

This paper does not seek to determine whether SRM should ever be used or resolve every disagreement, nor does it represent uniform consensus among its contributors.

But we are united by a shared conviction that decisions about a technology with potentially global implications should not be shaped by a narrow set of actors, nor be allowed to disappear into a black box of technical expertise, geopolitical competition, or institutional inertia.

People have a right to access information and participate in discussions about matters that may affect their lives and futures. We believe that responsible inquiry, inclusive governance, and open dialogue are essential to honoring that principle.

The climate harms hitting our communities are real. The action to mitigate and adapt are not moving quickly enough. The risks and tensions of SRM are also real. Navigating a world shaped by worsening climate change will require us to grapple with these realities. The principles and recommendations presented here reflect our belief that a Middle Path that enables inquiry, restraint, and legitimate future choice is possible: one that is grounded in responsibility, humility, and inclusion. The challenge before us is not simply to evaluate the use or non-use of a technology, but to strengthen the conditions for legitimate, informed decision-making under uncertainty.

This paper is a first step. Through it, we hope to establish a starting point for catalysing broader civil-society engagement and practical collaboration on SRM research governance, centered on a broader engagement of civil society organizations from climate-vulnerable regions and grounded in human rights. We invite others to engage with these ideas and join with us to build a broader constituency for responsible, inclusive, and accountable SRM governance. The future of SRM should not be determined by those with the greatest resources or loudest voices alone. It should be shaped through processes worthy of the people who will live with the consequences.

