CLIMATE CHANGE IN LEGAL SCHOLARSHIP: THE FIRST GENERATION (1958–1980)

BY

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Climate change has come to dominate contemporary environmental law scholarship, with an established set of themes, debates, and problematics that pervade the academic literature. But this was not always the case: when the prospects of climate change first emerged into the public discourse, it was a new issue that fit in uncertainly with existing research programmes. Was greenhouse gas emission a pollution problem, an energy issue, a potential tort, or something altogether different? What, if anything, was the academic and policy relevancy of a phenomenon that was, at the time, widely considered to be uncertain in effect and long-term in nature? How, in short, should climate change be framed? In this Article, I examine the responses of scholars through a systematic analysis of the legal academic literature engaging with climate change prior to 1980. My research shows a budding awareness of climate change in the period of 1958–1980, emerging from academics and practitioners alike, which tends to position climate change in three distinct frames: as a type of inadvertent weather/climate modification; as a form of environmental pollution or degradation; and (in particular during the late 1970s) as an energy policy factor. However, during this period, climate change was never the focal point of legal scholarship, was rarely positioned as a problem to be solved, and was largely ignored by environmental law professors.

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I. INTRODUCTION

Climate change has come to dominate contemporary environmental law scholarship.[1] Yet when the issue first emerged on the radar of legal scholars, it fit in uneasily with existing research programmes. Was greenhouse gas emission a pollution problem, an energy issue, a potential tort, or something altogether different? What, if anything, was the academic and policy relevancy of a phenomenon that was, at the time, widely considered to be uncertain in effect and long-term in nature? How, in short, should climate change be framed? These were the questions set before early legal scholars as they engaged with climate change, during a period when the study of environmental law itself was still in its infancy.[2] In this Article, I examine their responses through a systematic analysis of the legal academic literature engaging with climate change prior to 1980.[3] In doing so, I will also address the related questions of who was writing about climate change—and how they understood it.

Surprisingly, this first generation of scholarly engagement with climate change has gone almost entirely unexamined.[4] Indeed, climate change is often imagined to be a recent entrant into the world of legal scholarship.[5] This, however, is only partly true. While intensive legal study with a specific focus on climate change is indeed a post-1980 phenomenon, awareness of carbon dioxide-induced climate change in legal scholarship, and engagement with its implications, dates back to at

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[1] *See* Ole W. Pedersen, *The Evolution and Emergence of Environmental Law Scholarship—A Perspective from Three Journals*, 34 J. ENV'T L. 457, 469 (2022) (finding a "crowding out" trend within environmental legal scholarship, wherein "environmental law has become 'all about' climate law"); Eric Biber, *Climate Change and Backlash*, 17 N.Y.U. ENV'T L. J. 1295, 1296 (2009) ("[C]limate change is *the* issue in environmental law in the United States and indeed the world today.").

[2] *See generally,* RICHARD J. LAZARUS, THE MAKING OF ENVIRONMENTAL LAW 47–67 (2004) (discussing roots of environmental law scholarship in the 1960s and 70s); Daniel A. Farber, *The Unifying Force of Climate Change Scholarship*, *in* PERSPECTIVES ON ENVIRONMENTAL LAW SCHOLARSHIP 162, 164 (Ole W. Pedersen ed., 2018) (showing growth in law scholarship about the environment from 1965–75).

[3] The year 1980 was chosen as an end point for this research because it marks the beginning of a period of more significant and focused scholarly interest in climate change in legal scholarship. *See* discussion *infra* Part V.

[4] To date, the only inquiry into early awareness of climate change in the law review literature comes in a 2021 blog post by Daniel Farber. He dates the first clear law review references to anthropogenic climate change to 1978 and finds only a handful of references to climate change prior to 1985. Daniel Farber, *The Origins of Climate Awareness in the Legal Academy*, LEGAL PLANET (Sept. 30, 2021), https://legal-planet.org/2021/09/30/the-origins-of-climate-awareness-in-the-legal-academy. However, Farber's journal search significantly understates the level of climate change awareness in early scholarship, as it is limited to Westlaw, which does not maintain access to most journals from the period, rather than HeinOnline, which has far greater coverage of pre-1980 law journals.

[5] *Id.*; *see also* Kati Kulovesi, *Exploring the Landscape of Climate Law and Scholarship: Two Emerging Trends, in* CLIMATE CHANGE AND THE LAW 31, 32 (Erkki J. Hollo et al. eds., 2013) (discussing the "infancy" of climate law and the emergence of legal frameworks to address the climate crisis).

least 1958.[6] Climate change references became more common in the legal academic literature from 1968, at the very start of the modern era of environmental policy-making.[7]

In this Article, I examine the early scholarly engagement with climate change. In order to do so, I searched for all pre-1980 law journal articles in the HeinOnline and JSTOR databases which mention any of the following terms: "carbon dioxide"; "CO2"; "greenhouse effect"; "climate change"; and "climate modification."[8] I then reviewed each article to ensure that it is in fact dealing with climate change. In so doing, I located a total of 77 law journal articles that clearly discuss carbon dioxide induced climate change.[9] As the table below displays, references to climate change peaked during the 1970–1972 period, a time of intense public engagement with environmental policy, and again in 1978, reflecting a spurt of academic interest in energy policy.

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[6] *See* Robert W. Ginnane, *The Future of Administrative Law*, 19 OHIO STATE L. J. 432, 434 (1958) (discussing the potential of future government regulation of carbon dioxide). Scientific awareness of the threat of climate change dates back considerably earlier. *See* Stephen H. Schneider, *CO_2, Climate and Society: A Brief Overview*, *in* SOCIAL SCIENCE RESEARCH AND CLIMATE CHANGE 9, 9 (Robert S. Chen et al. eds., 1983) ("For about a century the academic community—or at least a segment of it—has been aware of the possibility that increasing carbon dioxide from fossil fuel burning and other human activities could significantly alter global climate . . . .").

[7] *See, e.g.*, Pete Domenici, *Clean Air Act Amendments of 1977*, 19 NAT. RES. J. 475, 475 (1979) (pointing to 1969 and 1970 as the turning point in environmental policymaking); Edith Brown Weiss, *The Evolution of International Environmental Law*, 54 JAPANESE Y.B. INTL. L. 1, 26 (2011) (noting that the first major piece of federal environmental legislation in the United States was adopted only in 1969).

[8] The term 'global warming' was popularized somewhat later and did not show up in searches from this period.

[9] This list includes articles (and student notes) that substantively discuss climate change, even if briefly, but not those that merely include carbon dioxide in a list of potential pollutants or mention climate change in passing without substantive comment. It excludes book reviews but includes articles in interdisciplinary journals published by law schools, such as the Natural Resources Journal, published at the University of New Mexico School of Law.

Year	Number of law journal articles mentioning climate change
1958	1[i]
1968	4[ii]
1969	3[iii]
1970	11[iv]
1971	8[v]
1972	13[vi]
1973	4[vii]
1974	4[viii]
1975	3[ix]
1976	4[x]
1977	5[xi]
1978	12[xii]
1979	5[xiii]
Total	77

[i] Ginnane, *supra* note 6, at 434.

[ii] Joseph D. Coons, *Air Pollution & Government Structure*, 10 ARIZ. L. REV. 48, 52 (1968); John A. Carver, Jr., *Pollution Control and the Federal Power Commission*, NAT. RES. L., Jan. 1968, at 32, 32; Note, *Air Pollution: Causes, Sources and Abatement*, 1968 WASH. U. L.Q. 205, 208 (1968); Allen V. Kneese, *Pollution and a Better Environment*, 10 ARIZ. L. REV. 10, 13–14 (1968).

[iii] Robert U. Ayres, *Air Pollution in Cities*, 9 NAT. RES. J. 1, 3 n.4 (1969); Earl Finbar Murphy, *A Law for Life*, 1969 WIS. L. REV. 773, 777 (1969); Note, *The Cost-Internalization Case for Class Actions*, 21 STAN. L. REV. 383, 390 n.32 (1969).

[iv] E.F. Roberts, *The Right to a Decent Environment; E=MC²: Environment Equals Man Times Courts Redoubling Their Efforts*, 55 CORNELL L. REV. 674, 686 (1970) [hereinafter Roberts, *The Right to a Decent Environment*]; Charles Maechling, *The Emergent Right to a Decent Environment*, 1 HUM. RTS., no. 1, 1970, at 59, 64; John R. Montgomery, *The Age of the Supersonic Jet Transport: Its Environmental and Legal Impact*, 36 J. AIR L. & COM. 577, 594 n.90 (1970); Donald F. Anthrop, *The Noise Crisis*, 20 U. TORONTO L. J. 1, 11 (1970); Edmund S. Muskie, *Environmental Jurisdiction in the Congress and the Executive*, 22 ME. L. REV. 171, 172 (1970) [hereinafter Muskie, *Environmental Jurisdiction in the Congress and the Executive*]; Robert D. Maack, Note, E*nvironmental Contamination: A Foul and Pestilent Congregation of Vapors*, 1970 UTAH L. REV. 414, 417 n.23 (1970); Robert L. Bliss, *The Designed Environment and the Law*, 1970 UTAH L. REV. 383, 383 (1970); Blair T. Bower & Walter O. Spofford, Jr., *Environmental Quality Management*, 10 NAT. RES. J. 655, 665–66 (1970); Comment, *Thermal Electric Power and Water Pollution: A Siting Approach*, 46 IND. L. J. 61, 66 n.14 (1970); Jean B. Kosinski, Comment, *Legal Methods for Control of Air*

Pollution in New York State: An Evaluation, 34 ALB. L. REV. 563, 565 (1970); Note, *The Effluent Fee Approach for Controlling Air Pollution*, 1970 DUKE L. J. 943, 944 (1970).

[v] William D. Ruckelshaus, *The Role of the Environmental Protection Agency*, 1 ENV'T AFFS. 528, 532 (1971); Michael Hardy, *International Control of Marine Pollution*, 11 NAT. RES. J. 296, 301 n.7 (1971); Michael McCloskey, *The Energy Crisis: The Issues and a Proposed Response*, 1 ENV'T AFFS. 587, 589 (1971); Wolfgang Friedmann, *The Reality of International Law—A Reappraisal*, 10 COLUM. J. TRANSNAT'L L. 46, 57 (1971); Charles M. Hassett, *Weather Modification and Control: International Organizational Prospects*, 7 TEX. INT'L L. J. 89, 94 (1971); Wilmer R. Ticer, Comment, *Legal Methods of Eliminating Certain Undesirable By-Products of the Air Transportation Industry*, 11 NAT. RES. J. 177, 178 n.2 (1971); Daniel Wilkes, *Constitutional Dilemmas Posed by State Policies Against Marine Pollution—The Maine Example*, 23 ME. L. REV. 143, 164 (1971); William O. Douglas, *Environmental Problems of the Oceans: The Need for International Controls*, 1 ENV'T L. 149, 151 (1971).

[vi] Jamie Harris, Note, *Law and Technological Change: The Case of Weather Modification*, 3 YALE REV. L. & SOC. ACTION 27, 28 (1972); Edmund S. Muskie, *The Global Environmental Crisis*, 2 ENV'T AFFS. 172, 173 (1972) [hereinafter Muskie, *The Global Environmental Crisis*]; Miguel A. Ozorio de Almeida, *The Confrontation Between Problems of Development and Environment*, INT'L CONCILIATION, Jan. 1972, at 37, 46–47; Frederick L. Kirgis, Jr., *Technological Challenge to the Shared Environment: United States Practice*, 66 AM. J. INT'L L. 290, 311 (1972); Christopher D. Stone, *Should Trees Have Standing?—Toward Legal Rights for Natural Objects*, 45 S. CAL. L. REV. 450, 492 (1972); F. H. Bormann, *Urgently Needed: A Nationwide Appraisal of the Growth Problem*, 2 ENV'T AFFS. 271, 275 (1972); Lawrence David Levien, *A Structural Model for a World Environmental Organization: The ILO Experience*, 40 GEO. WASH. L. REV. 464, 465 (1972); E. Thomas Sullivan, Note, *The Stockholm Conference: A Step Toward Global Environmental Cooperation and Involvement*, 6 IND. L. REV. 267, 276 n.28 (1972); Mason Willrich, *The Energy-Environment Conflict: Siting Electric Power Facilities*, 58 VA. L. REV. 257, 266 (1972); Joseph W. Dellapenna, *Canadian Claims in Arctic Waters*, 7 LAND & WATER L. REV. 383, 386 n.16 (1972); Robert Michael Dombroff & Harris T. Lifshitz, *Overpopulation: No Strength in Numbers*, FAM. L.Q. 93, 99 n.28 (1972); Walker B. Lowman, Comment, *Legislative Responses to Air and Water Pollution*, 33 OHIO ST. L. J. 860, 866 (1972); Samuel A. Bleicher, *An Overview of International Environmental Regulation*, 2 ECOLOGY L. Q. 1, 65 (1972).

[vii] Eugene Brooks, *Technological and Legal Aspects of Environmental Monitoring*, 1 J. SPACE L. 6, 20–21 (1973); Morris Neiburger, *International Aspects of Air Pollution*, 8 STAN. J. INT'L STUD. 16, 21–22 (1973); S. Bhatt, *Some Reflections on International Law and Relations Involving Weather Modification Activities, Including Some Special Features Relating to India*, 15 J. INDIAN L. INST. 253, 255 (1973); Howard J. Taubenfeld, *International Environmental Law: Air and Outer Space*, 13 NAT. RES. J. 315, 315–16 (1973).

[viii] Lawrence A. Weiss, Note, *Weather Modification: A Modest Proposal*, 4 GA. J. INT'L & COMPAR. L. 159, 170 n.82 (1974) [hereinafter Weiss, *Weather Modification: A Modest Proposal*]; Linda P. Shields & Marvin C. Ott, *Environmental Decay and International Politics: The Uses of Sovereignty*, 3 ENV'T AFFS. 743, 750 (1974); Christopher C. Joyner & Nancy D. Joyner, *Global Eco-Management and International Organizations: The Stockholm Conference and Problems of Cooperation*, 14 NAT. RES. J. 533, 535 (1974); Myres S. McDougal & Jan Schneider, *The Protection of the Environment and World Public Order: Some Recent Developments*, 45 MISS. L. J. 1085, 1093 (1974).

[ix] Thomas M. Disselhorst, Comment, Sierra Club v. Ruckelshaus*: "On A Clear Day . . ."*, 4 ECOLOGY L.Q. 739, 756 n.86 (1975); John H. Barton, *Behind the Legal Explosion*, 27 STAN. L. REV. 567, 579 (1975); Note, *The Extraterritorial Scope of NEPA's Environmental Impact Statement Requirement*, 74 MICH. L. REV. 349, 369, 379 (1975).

[x] A. Gregory McKenzie, *Weather Modification: A Review of the Science and the Law*, 6 ENV'T L. 387, 401 (1976); David S. Zalob, *The UN Environment Programme: Four Years After Stockholm*, 2 ENV'T POL'Y & L. 50, 55 (1976); Bruce Davies, *Will the Circle Be Unbroken?*, AM. INDIAN J., May 1976, at 11, 11; Andrew W. Anderson, *National and*

International Efforts to Prevent Traumatic Vessel Source Oil Pollution, 30 U. MIA. L. REV. 985, 992 n.26 (1976).

[xi] Peter L. Strauss, *The NRC Role and Plant Siting*, 4 J. CONTEMP. L. 96, 101 (1977); John W. Ragsdale, Jr., *Ecology and the Role of the Federal Courts*, 46 UMKC L. REV. 221, 231–32 (1977); Robert E. Harris et al., *Alternative Energy Resources: An International Approach*, 16 COLUM. J. TRANSNAT'L L. 386, 389 (1977); Eldon V.C. Greenberg et al., *Peaceful Uses of Nuclear Energy: Environmental, Security, and Safety Considerations*, 16 COLUM. J. TRANSNAT'L L. 416, 427, 434 (1977); Amory B. Lovins, *Cost-Risk-Benefit Assessments in Energy Policy*, 45 GEO. WASH. L. REV. 911, 932 (1977).

[xii] Talbot Page, *A Generic View of Toxic Chemicals and Similar Risks*, 7 ECOLOGY L.Q. 207, 215 (1978); Daniel W. Meek, Note, *Nuclear Power and the Price-Anderson Act: Promotion Over Public Protection*, 30 STAN. L. REV. 393, 466 n.327 (1978); Stephen F. Williams, *Running Out: The Problem of Exhaustible Resources*, 7 J. LEGAL STUD. 165, 198 (1978); Jack McNamara, *Integrating Energy Development and Land Management Goals in the National Forests; or How Geothermal Resources Got Lost in the Woods*, 11 NAT. RES. L. 325, 326 (1978); David Helscher, Note, *Public Law 48, American Agriculture and World Food Demand*, 10 CASE W. RSRV. J. INT'L L. 739, 757 (1978); Robert C. Seamans, Jr. et al., *National Energy Planning and Environmental Responsibility*, 6 ENV'T AFFS. 283, 291 (1978); David T. Cox, *Deterioration of Southern Arizona's Grasslands: Effects of New Federal Legislation Concerning Public Grazing Lands*, 20 ARIZ. L. REV. 697, 708–09 (1978); John P. Holdren, *Coal in Context: Its Role in the National Energy Future*, 15 HOUS. L. REV. 1089, 1101–02 (1978); Reed Moyer, *The Role of Coal: Problems and Policies*, 18 NAT. RES. J. 761, 768 (1978); Donald P. Butler, *The Impact of the Clean Air Act Amendments of 1977 on Planned Increases in Coal Use*, 15 HOUS. L. REV. 1111, 1111 (1978); Stephen Breyer, Vermont Yankee *and the Courts' Role in the Nuclear Energy Controversy*, 91 HARV. L. REV. 1833, 1836–37 (1978); James H. Pannabecker, *International Regulation of Air Pollution*, 3 N.C. J. INT'L L. & COM. REGUL. 234, 236 (1978).

[xiii] Domenici, *supra* note 7, at 485; G.N. Heilbronn, *Some Legal Consequences of Weather Modification: An Uncertain Forecast*, 6 MONASH U. L. REV. 122, 124–25 (1979); David Bodansky & Fred H. Schmidt, *The Nuclear Alternative*, 30 MERCER L. REV. 395, 398–99 (1979); Daryl Robertson, *The Powerplant and Industrial Fuel Use of 1978: Fuel Replacement*, 3 HARV. ENV'T L. REV. 214, 217 & n.21 (1979); Comment, *The President's Energy Proposals: Dramatic Initiatives Plagued by Environmental, Constitutional Difficulties*, 9 ENV'T L. REP. 10148, 10150 (1979).

This compilation of journal articles discussing climate change is undoubtedly incomplete: some law journals from this period are not included in HeinOnline or JSTOR, and it is possible that some articles addressed climate change without using my search terms. I additionally discuss six books[10] and one legal article[11] in a non-law journal that engaged with climate change in a legal context during this same pre-1980 period. While the resulting database may not be comprehensive (and is clearly focused on English-language sources published in the United States), it can nevertheless provide considerable insight into how early legal scholarship engaged with the prospect of climate change.

Overall, the surveyed articles and books illustrate a budding awareness of climate change in the period of 1958–80, emerging from practitioners and academics alike, which tends to position climate change in three distinct frames: as a type of inadvertent weather/climate modification; as a form of environmental pollution or degradation; and (in particular during the late 1970s) as an energy policy factor. Each of these will be discussed in more detail below. These frames matter because they influence the substance of the climate change discussion, avenues for further research, and the potential policies to address the issue.[12]

Despite the awareness of climate change in the pre-1980 literature, my research also shows that this awareness does not translate into a research programme of lasting significance.[13] During this period, climate change was never the focal point of legal scholarship, was hardly ever positioned as a problem to be solved, and (most surprisingly) was largely ignored by environmental law professors of the period.

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[10] Walter Orr Roberts, *The State of the Art in Weather Modification*, *in* WEATHER MODIFICATION AND THE LAW 1, 17–18 (Howard J. Taubenfeld ed., 1968) [hereinafter Roberts, *The State of the Art in Weather Modification*]; George W. Rathjens, *National Environmental Policy: Goals and Priorities*, *in* ENVIRONMENTAL CONTROL: PRIORITIES, POLICIES, AND THE LAW 11, 17 (Frank P. Grad et al. eds., 1971); JAMES E. KRIER, ENVIRONMENTAL LAW AND POLICY 7–8, 15 (1971); Howard J. Taubenfeld & Rita F. Taubenfeld, *Modification of the Human Environment*, *in* THE FUTURE OF THE INTERNATIONAL LEGAL ORDER, VOLUME IV: THE STRUCTURE OF THE INTERNATIONAL ENVIRONMENT 124, 143 (Cyril E. Black & Richard A. Falk eds., 1972); Donat Pharand, *The Arctic Waters in Relation to Canada*, *in* CANADIAN PERSPECTIVES ON INTERNATIONAL LAW AND ORGANIZATION 434, 445 (J. Macdonald et al. eds., 1974); Richard B. Bilder, *The Settlement of Disputes in the Field of the International Law of the Environment*, *in* 144 RECUEIL DES COURS 139, 212 (Hague Acad. of Int'l L. ed., 1975).

[11] Edward A. Morris, *The Law and Weather Modification*, 46 BULL. AM. METEOROLOGICAL SOC'Y 618, 621 (1965).

[12] *See* Sally A. Weller, *Just Transition? Strategic Framing and the Challenges Facing Coal Dependent Communities*, 37 ENV'T & PLAN. C: POL. & SPACE 298, 300 (2019) ("[A] dominant issue framing has a normative and agenda-setting effect, determining how policy problems are defined, how they are positioned conceptually relative to other problems, what evidence is gathered to inform responses, and how that evidence is evaluated."); SHEILA JASANOFF, SCIENCE AND PUBLIC REASON 179 (2012).

[13] This is consistent with Farber's broad conclusion that "legal scholarship seems in retrospect to have been a bit slow to focus on the issue of climate change." Farber, *supra* note 4.

II. CLIMATE CHANGE AS INADVERTENT CLIMATE MODIFICATION

In the years following World War II, weather modification emerged as a field of considerable interest for scientists and policy-makers.[14] Developments in cloud seeding, fog dispersal and hail suppression raised hopes that these new technologies could have economically productive uses, especially in the agricultural sector.[15] Over time, this led to a sizable collection of legal scholarship, largely focused on questions of property rights and tortious responsibility.[16] If, to give an example from the period, an airport engaged in artificial fog dispersal in order to assist landings, would it be liable to the neighbouring farm which relied on high fog levels to increase artichoke yield?[17] By the late 1960s, military weather modification activities also began to attract the interest of both scholars and the general public—in large part due to the use of cloud-seeding by U.S. forces during the Vietnam War.[18] Concerns about such activities led to policy discussions and legal scholarship on the use of international law as a means to prohibit such activities,[19] eventually culminating in the establishment of the Environmental Modification Convention in 1977.[20]

These existing research strands provide background context for the emergence of serious scientific concerns about anthropogenic climate change in the late-1960s, due in part to evidence of rising carbon dioxide concentrations from observations at the Mauna Loa observatory.[21] For many scholars, this "greenhouse effect" was a form of inadvertent climate

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[14] *See* Ralph E. Huschke, *A Brief History of Weather Modification Since 1946*, 44 BULL. AM. METEOROLOGICAL SOC'Y 425, 427–28 (1963) (detailing advancements in weather modification).

[15] James Rodger Fleming, *The Pathological History of Weather and Climate Modification: Three Cycles of Promise and Hype*, 37 HIST. STUD. PHYSICAL & BIOLOGICAL SCIS. 3, 10, 12 (2006).

[16] For early literature on the law of weather and climate modification, see, e.g., Vaughn C. Ball, *Shaping the Law of Weather Control*, 58 YALE L. J. 213 (1949); Derek H. Hene, *The Legal Aspects of Rainmaking*, 19 MOD. L. REV. 285 (1956); Allan L. Grauer & Bob Erickson, Comment, *The Weathermaker and the Law*, 1 S.D. L. REV. 105 (1956); Ralph M. Wade, Note, *Are There Individual Property Rights in Clouds?*, 15 WYO. L. J. 92 (1960); Donald D. Stark, *Weather Modification: Water—Three Cents per Acre-Foot?*, 45 CALIF. L. REV. 698 (1957); Jack C. Oppenheimer, *The Legal Aspects of Weather Modification*, 1958 INS. L. J. 314.

[17] Morris, *supra* note 11, at 620.

[18] Ed Darack, *Weaponizing Weather: The Top Secret History of Weather Modification*, WEATHERWISE, Mar. 2019, at 24, 25–26.

[19] *See, e.g.*, Ray Jay Davis, *Weather Warfare: Law and Policy*, 14 ARIZ. L. REV. 659, 688 (1972); Peter Caplan, *Weather Modification and War*, BULL. CONCERNED ASIAN SCHOLARS, Jan.–Mar. 1974, at 28, 29–30; Bhupendra M. Jasani, *Environmental Modifications: New Weapons of War?*, 4 AMBIO 191, 198 (1975).

[20] Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, art. 1, *adopted* Dec. 10, 1976, 31 U.S.T. 333, 1108 U.N.T.S. 151 (prohibiting the "hostile use of environmental modification techniques having widespread, long-lasting or severe effects").

[21] John W. Zillman, *A History of Climate Activities*, 58 WMO BULL. 141, 143 (2009) ("[B]y the late 1960s . . . scientific concern was beginning to mount, reinforced by the increasing carbon dioxide concentrations evident from the early observations at Mauna Loa . . . .").

modification, akin to other types of modification studied by climate/weather modification researchers. This broad view was embraced in a 1966 National Academy of Sciences report, which stated that "[t]he subject of weather and climate modification is concerned with any artificially produced changes in the composition, behavior, or dynamics of the atmosphere."[22]

While this inadvertent modification framing for climate change first emerged in scientific and policy-related discourses, it soon also found its way into legal scholarship, where it was discussed using the vocabulary and legal categories characteristic of this field of study. The earliest legal article I have found to frame climate change as a form of "inadvertent climate modification" was published in 1965 by Edward Morris, a practicing attorney from San Francisco.[23] Morris noted the prospect of global warming and goes on to suggest—in a techno-optimist vein characteristic of the era—that purposeful climate modification will be needed to return the climate to how it was in the past.[24] Morris added that those who are the most outspoken opponents of climate modification (environmentalists, presumably) "may . . . be the very ones most strongly advocating it so as to return to 'the good old days.'"[25] This article was followed in 1968 by the first scholarly law book (to the best of my knowledge) to discuss climate change: an edited volume entitled *Weather Modification and the Law*.[26] In a chapter entitled "The State of the Art in Weather Modification," Walter Orr Roberts—who was not a legal scholar—cited atmospheric warming as one type of inadvertent climate modification, which most scientists believed was happening, that was "far less speculative" than other forms of purposive weather modification being discussed, and which merited further research.[27]

These early contributions were followed in the 1970s by a range of other legal books and articles that framed climate change as a form of weather/climate modification, although in some cases climate change is

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[22] PANEL ON WEATHER & CLIMATE MODIFICATION, NAT'L ACAD. OF SCIS., PUB. NO. 1350, WEATHER AND CLIMATE MODIFICATION: PROBLEMS AND PROSPECTS, VOL. I, at 1 (1966). Other scholars, however, found little in common between global anthropogenic climate change and a small-scale cloud-seeding project, and thought that they should be viewed as categorically separate issues. David M. Hart & David G. Victor, *Scientific Elites and the Making of US Policy for Climate Change Research, 1957–74*, 23 SOC. STUD. SCI. 643, 657. This question was contentious and political: in their study, Hart & Victor show how scientific researchers at coastal universities attempted to frame the greenhouse effect as a form of 'climate modification' in order to access government funds for basic climate research that had previously been going to applied weather modification studies in the Midwest. *Id.* at 657–60.

[23] Morris, *supra* note 11, at 621.

[24] *Id.* For more on the techno-optimism of mid-Sixties climate modification researchers, *see* Hart & Victor, *supra* note 22, at 656.

[25] Morris, *supra* note 11, at 621.

[26] Roberts, *The State of the Art in Weather Modification*, *supra* note 10.

[27] *Id.* at 17. Roberts noted presciently that climate change may affect the ecological balance, and "consequences . . . may be most severe for the least advanced nations . . . ." *Id.* at 18.

mentioned only briefly, as one (among other) forms of inadvertent modification.[28] Perhaps surprisingly, the 'inadvertent climate modification' framing was embraced by early international law experts.[29] For example, Frederic Kirgis mentioned the "greenhouse effect" as a typical form of inadvertent weather modification,[30] while in Richard Bilder's 1975 *Recueil des Cours* on environmental law dispute settlement for the Hague Academy of International Law, the greenhouse effect is included in the "weather and climate modification" section rather than the separate section on "air pollution."[31]

The framing of climate change as climate/weather modification had certain implications. Arguably, it impeded serious thinking about regulatory responses, because climate/weather modification scholars had traditionally endorsed regulation as a solution to purposive modification only, and not inadvertent modification.[32] This tendency to focus solely on solving the problem of purposeful modification could lead to a rather dismissive attitude to solving 'inadvertent' climate change.[33] A few authors did, however, use climate change as a reason to argue for further study of mankind's effect on Earth's climate,[34] or to call for cooperation on inadvertent climate change at the international level.[35]

Perhaps most importantly, because weather/climate modification policy had always been something of a niche subject (of interest mainly to farmers), this framing did little to raise climate change awareness amongst either policy-makers or other legal academics. This limitation was remarked upon at the time, as Charles Hassett suggested in 1971:

> Perhaps the way to advance is to attempt to link weather modification and control problems, which constitute a slumbering

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[28] *See, e.g.*, Hassett, *supra* note v, at 94; Kirgis, Jr., *supra* note vi, at 311; Taubenfeld & Taubenfeld, *supra* note 10, at 143; Harris, *supra* note vi, at 28; Bhatt, *supra* note vii, at 255; Weiss, *Weather Modification: A Modest Proposal*, *supra* note viii, at 170–71; McDougal & Schneider, *supra* note viii, at 1093; McKenzie *supra* note x, at 401; Heilbronn, *supra* note xiii, at 124–25.

[29] *See* Bilder, *supra* note 10, at 212–13; McDougal & Schneider, *supra* note viii, at 1093; Kirgis, Jr., *supra* note vi, at 311.

[30] Kirgis, Jr., *supra* note vi, at 311.

[31] *See* Bilder, *supra* note 10, at 212–13.

[32] *See* McKenzie, *supra* note x, at 398 ("[I]nadvertent weather modification[] . . . has been largely ignored by those actively participating in shaping weather modification law.").

[33] *See, e.g.*, Taubenfeld, *supra* note vii, at 315–16 ("In a sense, some inadvertent environmental modification is the norm. . . . To the extent that [climate] changes are the inevitable byproducts of national development it is unlikely that nations will substantially change their ways in the near future.").

[34] Harris, *supra* note vi, at 28, 30.

[35] Bhatt, *supra* note vii, at 255 (arguing that effective steps to stop climate change is "in the general interest of people all over the world"); McDougal & Schneider, *supra* note viii, at 1116 (advocating for "a comprehensive international treaty concerning control of weather and climate modifications, both inadvertent and deliberate, which have effects or potential effects across national boundaries" and suggesting that the World Meteorological Organization "be explicitly charged with undertaking inquiry and recommendation in this area").

> issue, to the dramatically alive and compelling issue of environmental pollution and quality. By stressing the inadvertent effects of pollution on the weather and the reciprocal effect of the weather on man and his environment, it may be possible to create the necessary interest for constructive action. In other words, concern for the world's environmental crisis may suffice to get the camel's nose of weather modification under the international organization tent.[36]

By around 1980, one sees significantly less climate change research using a weather/climate modification frame. The National Academy of Science's influential 1979 study on the effect of carbon dioxide on the climate consistently uses the terms "climate change" or "global warming" in place of "inadvertent climate modification."[37] While no doubt partly the result of the growing political attention to climate change as an environmental issue, this also coincided with (and probably resulted from) a general reduction of interest in the law of climate/weather modification.[38] Prominent researchers in climate modification law such as Edith Brown Weiss and Howard Taubenfeld began to specialise more in international environmental law.[39] Ironically, legal scholars' interest in climate modification has only revived in recent years due to worries about the lack of regulation of geoengineering solutions to climate change.[40] Thus, while climate change used to be—in the eyes of some scholars—a (minor) part of weather/climate modification law, now the reverse is true: the regulation of weather/climate modification is in large part a (minor) subarea of climate change law.

III. CLIMATE CHANGE AS AN ENVIRONMENTAL THREAT

The first article to embrace an environmental frame for climate change was Robert Ginnane's 1958 paper on the future of administrative law, where he wrote (prophetically) that in the future "there will be increasing regulation of water and air pollution."[41] Ginnane went on to predict that "[i]f there is confirmation of the suspicion that carbon dioxide resulting from combustion may create profound climate changes, control of emission of carbon dioxide from combustion would represent a new and

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[36] Hassett, *supra* note v, at 115.

[37] *What's the Difference Between Global Warming and Climate Change?*, CLIMATE REALITY PROJECT (Oct. 26, 2016), https://www.climaterealityproject.org/blog/difference-between-global-warming-and-climate-change.

[38] Fleming, *supra* note 15, at 14–15 ("Since 1979 federal funding for applied weather modification has literally dried up.").

[39] *See generally* Edith Brown Weiss, *A Resource Management Approach to Carbon Dioxide During the Century of Transition*, 10 DENV. J. INT'L L. & POL'Y 487, 491–92 (1981) [hereinafter Weiss, *A Resource Management Approach to Carbon Dioxide*]; Howard Taubenfeld, *Environment and Development*, 77 AM. SOC'Y INT'L L. PROC. 423, 425 (1983).

[40] Fleming, *supra* note 15, at 21–24.

[41] Ginnane, *supra* note 6, at 434.

unwelcome form of government regulation."[42] It should be noted that Ginnane was a practitioner rather than academic—at the time he was general counsel of the Interstate Commerce Commission.[43] In this respect he was typical of those early writers framing climate change as an environmental threat, who tended to come from outside the legal academy.

Ginnane's article was an early outlier, in an explicitly future-oriented study. The next law journal articles to discuss climate change through an explicitly environmentalist frame emerged during the burst of scholarly and public interest in environmental protection from 1968 to 1972.[44] This was a period in which the groundwork for a federal statutory framework of environmental regulation was laid out, during which time law schools began to develop environmental law curricula and establish new environmental law journals.[45] Many authors at the time framed climate change as a pollution problem, a framing that of course is still common.[46] Thus, Robert Bliss in 1971 cited the "possible greenhouse effect" as a form of "resource pollution," while Miguel Ozorio de Almeida listed carbon dioxide as the first of the major air, land, and water pollutants to have "international significance."[47] In 1972, Joseph Dellapena discussed the "'greenhouse effect' of pollution."[48] Other scholars during this early period wrote about greenhouse gases and/or climate change in the context of broader research on the regulation of air pollution, implicitly signalling that they considered climate change to be a pollution issue.[49] The existence of this early pollution framing is potentially significant from a legal as well as a purely historical perspective, as there has long been debate about whether the terms "air pollutants" and "air pollution" in the Clean Air Act of 1970 should be

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[42] *Id.*

[43] *Id.* at 432.

[44] *See, e.g.*, Maack, *supra* note iv, at 417 n.23 (noting meteorological theory of a "greenhouse effect created by concentrations of pollution in the higher strata"); Bliss, *supra* note iv, at 383; Ticer, *supra* note v, at 178 n.2 (mentioning the "'greenhouse' effect of polluting the earth's upper atmosphere"); Dellapenna, *supra* note vi, at 386 n.16; Davies, *supra* note x, at 11 ("Some scientists fear that atmospheric pollution may have the opposite effect of warming the earth . . . .").

[45] Frances Irwin, *The Law School and the Environment*, 12 NAT. RES. J. 278, 278 (1972). Environmental Law (Lewis & Clark) was first published in 1970; Ecology Law Quarterly (University of California) was first published in 1971, and Environmental Affairs (Boston College) was first published in 1972. Bill L. Williamson, Tribute, *The First Years of* Environmental Law, 20 ENV'T L. 1, 2 (1990).

[46] *E.g.*, TED NORDHAUS & MICHAEL SHELLENBERGER, BREAK THROUGH: FROM THE DEATH OF ENVIRONMENTALISM TO THE POLITICS OF POSSIBILITY 8 (2007) (describing predominant view of "global warming as a problem of pollution, whose solution would be found in pollution limits").

[47] Bliss, *supra* note iv, at 383; Ozorio de Almeida, *supra* note vi, at 46.

[48] Dellapenna, *supra* note vi, at 386 n.16.

[49] Coons, *supra* note ii, at 52; Kneese, *supra* note ii, at 14; Ayres, *supra* note iii, at 3; Kosinski, *supra* note iv, at 563.

interpreted to include greenhouse gases.[50] However, the framing of greenhouse gases as a form of air pollution, while common, was not universal. A few authors in this period stated that carbon dioxide is not normally considered a pollutant.[51]

A. Academic Context

In some of these early books and articles, the environmental framing of climate change was employed in a fundamentally descriptive context, with the intention of raising awareness about the issue and potential risks involved.[52] Climate change concerns also appeared in more advocacy-oriented articles, although interestingly not in the context of arguments that climate change itself should be mitigated or addressed in some way—the problem-solving approach to climate change only enters the law review literature after 1980.[53] Rather, early authors tended to refer to climate change in three specific advocacy contexts.

First, climate change was sometimes cited as one reason (among many) why society should enact robust general environmental protections. This broad pro-environmentalist argument can especially be seen in articles from 1968–1972, the formative period of modern environmental policy, during which time the nature and direction of environmental action was being robustly debated. Examples include Bormann's call for fundamental social change in the face of ecological crisis[54] and Murphy's *cri de coeur* for (generalized) environmental action, which highlighted that carbon dioxide-induced climate change "of only a few degrees could melt the polar icecaps and flood most of the land surfaces on this planet."[55] Similarly, both Roberts and Maechling described the threat of climate change while writing independently to set forth their arguments for a legal right to a decent environment.[56] To be clear, there is no discussion in any of these pieces of regulating

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[50] *See* Richard L. Revesz, Bostock *and the End of the Climate Change Double Standard*, 46 COLUM. J. ENV'T L. 1, 3–4 (2020).

[51] Note, *Air Pollution: Causes, Sources and Abatement*, *supra* note ii, at 208 ("Carbon dioxide, a compound essential to plant life, is not normally considered a pollutant . . . ."); Murphy, *supra* note iii, at 777 ("[I]ncrease of carbon dioxide in the air . . . [is] a matter not regarded by most as even constituting pollution.").

[52] *See, e.g.*, Ginnane, *supra* note 6, at 434; Carver, Jr., *supra* note ii, at 32; Note, *Air Pollution: Causes, Sources and Abatement*, *supra* note ii, at 208; Ayres, *supra* note iii, at 3 n.4. This is unsurprising: while climate change may have been widely discussed in certain scientific and policy circles, it was clearly a new topic for legal scholars, and early scholarship on any new phenomenon can be expected to lean towards the descriptive.

[53] Gus Speth, *Global Energy Futures and the Carbon Dioxide Problem*, 9 B.C. ENV'T AFFS. L. REV. 1, 6 (1980).

[54] Bormann, *supra* note vi, at 275.

[55] Murphy, *supra* note iii, at 777; *see also* Lowman, *supra* note vi, at 889 ("We must demand, through our representatives and through our ballots, a mobilization of research, technical and political facilities to forestall the impending environmental crisis.").

[56] Roberts, *The Right to a Decent Environment*, *supra* note iv, at 686; Maechling, *supra* note iv, at 64.

greenhouse gas emissions or addressing climate change in particular; rather, the prospect of climate change (along with water pollution, species loss, and other evils) is used to emphasize the point that mankind is having a significant detrimental impact on the natural environment, and therefore politicians must establish the laws and institutions to address that impact with the seriousness it deserves.

Second, the prospect of climate change was cited by a number of scholars as an environmental danger that helps make the case for attention to (and regulation of) a specific environmental or social issue such as marine pollution, deforestation, or overpopulation. These authors were not generally worried that climate change would exacerbate the problems that they were addressing.[57] Rather, they feared that the environmental problem being addressed would (absent regulatory action) eventually lead to more climate change,[58] or they felt that a proposed solution to the issue that they were concerned with would have the ancillary benefit of reducing greenhouse gas emissions.[59] Again, these authors did not call for greenhouse gas regulation or other climate change solutions; rather they argued that the potentially detrimental effects on the earth's climate makes it all the more important that society engage urgently with the separate and distinct issues of marine pollution, overpopulation, and the like.

Third, the prospect of climate change was used to show the potentially global nature of environmental harms. The threat of climate change therefore supported the argument that environmental regulation should be undertaken at the international level, through the establishment of relevant institutions and treaties.[60] These arguments peaked during 1971–75, the period immediately preceding and following the 1972 UN Conference on the Human Environment, in Stockholm.[61] In a typical example from 1972, Levien wrote that climate change, along with maritime pesticide pollution, shows that "world environmental safety is feasible only through international cooperation."[62] The same year, Muskie cited climate change while arguing that "the world must respond to the global environmental crisis not only by national programs

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[57] Justice Douglas is the exception, citing the effects of global warming in his plea for international regulation of the marine environment. Douglas, *supra* note v, at 151.

[58] Helscher, *supra* note xii, at 757 (arguing that agricultural deforestation will exacerbate climate change); Dombroff & Lifshitz, *supra* note vi, at 99 (speculating that overpopulation could eventually poison the entire atmosphere); Anderson, *supra* note x, at 992 (noting that oil spills could worsen climate change by killing oxygen producing plankton); Wilkes, *supra* note v, at 164 (same).

[59] Anthrop, *supra* note iv, at 11 (noting that electric cars would, in addition to reducing noise levels, have the ancillary benefit of reducing greenhouse gas emissions).

[60] *See* Levien, *supra* note vi, at 465; Shields & Ott, *supra* note viii, at 749–50; Sullivan, *supra* note vi, at 276; Neiburger, *supra* note vii, at 30; Joyner & Joyner, *supra* note viii, at 536; Pannabecker, *supra* note xii, at 236.

[61] *See* U.N. Conference on the Human Environment, *Action Plan for the Human Environment*, Recommendation 79, A/CONF.48/14/Rev.1, ch. I (June 16, 1972) (calling for international community to monitor air pollution and to study climate change).

[62] Levien, *supra* note vi, at 465.

but also by commitments to global cooperative action."[63] By the mid-1970s, this framing became less common: After the establishment of the United Nations Environmental Programme and the success of the Stockholm Conference, the globalized nature of environmental protection had become increasingly well accepted by the international community.[64]

B. Substantive Understanding

Although some of the aforementioned environmental articles discussed the issue only briefly, most engaged with three fundamental substantive questions related to climate change. First, there is the question of certainty. In general, authors at this time emphasized the speculative nature of climate change, characterizing it as a "possibility" or a "potential" issue, whose eventual emergence is uncertain.[65] Indeed, global warming was often discussed in the same breath as a possible cooling trend or "new ice age," naturally emphasizing a lack of scientific consensus.[66] That said, a few of the authors at this time did write about climate change as a presently occurring phenomenon or emphasized the high level of certainty among scientists that it would eventually occur.[67]

The second (related) question is one of timing. While, as mentioned, a few authors considered that climate change was already occurring, most anticipated it to be an issue that would manifest at some point in the future. The exact time horizon varies: a few scholars vaguely referred to climate change as a "long-term" or "long range" problem.[68] Others cited expectations of harmful effects by the year 2000, by which time they anticipated a 25% increase in atmospheric carbon dioxide levels.[69]

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63 Muskie, *The Global Environmental Crisis*, *supra* note vi, at 179.

64 Joyner & Joyner, *supra* note viii, at 554.

65 *See, e.g.*, Kneese, *supra* note ii, at 14; Ayres, *supra* note iii, at 3 n.4 ("The climatic effects of a temperature rise (or fall) are matters of speculation at present."); Bower & Spofford, *supra* note iv, at 665–66 (querying effect of greenhouse gases on the climate); Maack, *supra* note iv, at 417; Roberts, *The Right to a Decent Environment*, *supra* note 13, at 686.

66 *See, e.g.*, Ayres, *supra* note iii, at 3 n.4; Ruckelshaus, *supra* note v, at 532; Lowman, *supra* note vi, at 867; Bleicher, *supra* note vi, at 65 n.273; Shields & Ott, *supra* note viii, at 750; Joyner & Joyner, *supra* note viii, at 535.

67 *See, e.g.*, Douglas, *supra* note v, at 151 ("[Global warming] is already beginning to alter the distribution of marine fauna."); Lowman, *supra* note vi, at 866 ("Since 1880, the amount of atmospheric carbon dioxide has increased by 12 per cent with an accompanying increase in average world temperatures."); Dellapenna, *supra* note vi, at 386 n.16 ("[T]he North Polar pack is thinning and shrinking, the Arctic Ocean temperature is rising, and fish are migrating to higher latitudes.").

68 Coons, *supra* note ii, at 52; Note, *Air Pollution: Causes, Sources and Abatement*, *supra* note ii, at 208.

69 Maechling, *supra* note iv, at 64 (citing possibility of cataclysmic rise in ocean levels by 2000); Roberts, *The Right to a Decent Environment*, *supra* note iv, at 686 (warning that increased combustion by the year 2000 will lead to possibly catastrophic consequences); Neiburger, *supra* note vii, at 21 (noting that atmospheric CO_2 will likely exceed 380 ppm by

Finally, there is the question of what consequences can be expected if global warming does occur. In short, the seriousness of climate change's possible effects was widely acknowledged, even at this early point. Authors often cited melting ice caps as a potential risk from unchecked climate change.[70] Many went on to warn of the flooding which might result due to sea level rise, sometimes in quite alarming terms.[71] A few observers also anticipated the possibility of changing weather patterns.[72] The potential effects of climate change are described as "catastrophic,"[73] and a few observers even questioned the viability of continued human life on Earth if climate change continued unchecked.[74] There was hardly any denialism.[75] Even authors who highlighted the uncertainty of whether the Earth was warming or cooling did not use that uncertainty to dismiss the gravity of potential danger: rather they stressed that either global heating or cooling would lead to extraordinary negative consequences.[76]

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the year 2000); *c.f.* Bleicher, *supra* note vi, at 65 (noting more favourable research suggesting more limited harms with a longer time horizon).

70 *See, e.g.*, Murphy, *supra* note iii, at 777; Maechling, *supra* note iv, at 64; Stone, *supra* note 15, at 492; Lowman, *supra* note vi, at 867; Maack, *supra* note iv, at 417 n.23; Neiburger, *supra* note vii, at 22.

71 *See, e.g.*, Stone, *supra* note vi, at 492 (effects include polar ice caps melting and coastal city destruction); Lowman, *supra* note vi, at 867 ("[T]he melting of the polar ice sheets once started could become a rapidly accelerating phenomenon, raising the seas 60 to 200 feet and inundating vast areas of the world's most populous and fertile land."); Murphy, *supra* note iii, at 777 ("[Climate change] of only a few degrees could melt the polar icecaps and flood most of the land surfaces on this planet."). One also sees the serious effects of climate change approached through (one hopes) gallows humour. *See* Dombroff & Lifshitz, *supra* note vi, at 99 n.28 ("Fortunately, carbon dioxide is not toxic to humans. Its only possible deleterious effect is minor: it allows the atmosphere to better hold radiant energy from the sun, creating a slight warming trend (the greenhouse effect) which could melt the polar ice caps and flood all of the world's coastal regions.")

72 Kneese, *supra* note ii, at 14; Note, *The Extraterritorial Scope of NEPA's Environmental Impact Statement Requirement*, *supra* note ix, at 379.

73 Roberts, *The Right to a Decent Environment*, *supra* note iv, at 686.

74 Hardy, *supra* note v, at 301 n.7 ("[M]ajor climatic or other environmental changes . . . might threaten human existence . . . ."); Wilkes, *supra* note v, at 164 ("The air is gaining carbon dioxide at a rate which will make it incapable of sustaining life within a century . . . ."); Lowman, *supra* note vi, at 867 (citing UNESCO opinion that "man has only about another 20 years before the planet begins to become uninhabitable").

75 The nearest exception being a 1971 law journal book review of a climate change denialist's book. Jerome Muys, Book Note, 2 ECOLOGY L. Q. 867, 870–78 (1972) (reviewing JOHN MADDOX, THE DOOMSDAY SYNDROME (1972)). There are also a number of articles from this period which characterize carbon dioxide emissions as harmless (or relatively harmless), without mentioning the issue of climate change at all. *See, e.g.*, Harris T. Lifshitz, Comment, *Air Pollution: The Problem of Motor Vehicle Emissions*, 3 CONN. L. REV. 178, 182 n.23 (1970); Joseph T. O'Connor, Note, *The Automobile Controversy—Federal Control of Vehicular Emissions*, 4 ECOLOGY L. Q. 661, 671 n.62 (1975).

76 *See, e.g.*, Ragsdale, Jr., *supra* note xi, at 232 ("That the eventual results are unclear is not a reason for rejoicing or relaxing; the critical factor is that man's capacity and propensity for environmental dislocation have reached a point where a dramatic change in the climate—and life patterns—is very possible."); *see also* Montgomery, *supra* note iv, at 594 n.90 ("[A]ny temperature change in the atmosphere will manifest itself through climatic

C. Author Background

What was written about climate change in these early environmental articles is in some ways less interesting than who was writing it. While the climate modification frame was often used by legal academics, very few of the authors of articles and book chapters that framed climate change as an environmental problem (rather than as a form of involuntary climate modification or energy policy factor) were law school faculty.[77] Many were academics from other disciplines, including meteorology,[78] forest ecology,[79] and geography.[80] Economists demonstrated a particularly early awareness of climate change in the law review literature, with notable contributions from researchers affiliated with the think-tank Resources for the Future.[81] This diversity of disciplinary background is perhaps unsurprising: environmental law scholarship has often been seen as interdisciplinary (or at least multidisciplinary), with important contributions from experts in other fields.[82]

Several other early authors were law students discussing climate change in journal notes and comments.[83] Still others were legal practitioners, from government and civil society, taking part in a quite vigorous debate about the future of environmental policy in the pages of law reviews.[84] Industry voices took part in these debates, but, with few

changes. The problem, therefore, cannot be underestimated because the effects may be extremely far reaching."); Ruckelshaus, *supra* note v, at 532 ("Neither of the prospects has much appeal, and I do not think we should wait passively on the sidelines, fascinated by the question of which form doom will take.").

77 The short list of law professors would include Earl Finbar Murphy (Temple); E.F. Roberts (Cornell); Christopher Stone (University of Southern California); Samuel Bleicher (University of Toledo), and John Barton (Stanford). Murphy, *supra* note iii, at 773; Roberts, *The Right to a Decent Environment*, *supra* note iv, at 674; Stone, *supra* note vi, at 450; Bleicher, *supra* note vi, at 1; Barton, *supra* note ix, at 567.

78 Neiburger, *supra* note vii, at 16.

79 Bormann, *supra* note vi, at 279.

80 Anthrop, *supra* note iv, at 1.

81 *See* Kneese, *supra* note ii, at 10; Ayres, *supra* note iii, at 1; Bower & Spofford, *supra* note iv, at 655. Kneese and Ayres are remembered today as among the founders of the discipline of environmental economics. Inge Røpke, *The Early History of Modern Ecological Economics*, 50 ECOLOGICAL ECON. 293, 300–01 (2004).

82 *See* Ole W. Pederson, *The Culture of Environmental Law and the Practices of Environmental Law Scholarship*, *in* PERSPECTIVES ON ENVIRONMENTAL LAW SCHOLARSHIP 227, 228 (Ole W. Pedersen ed., 2018) ("[E]nvironmental law scholarship is by its very nature interdisciplinary."); John McEldowney & Sharron McEldowney, *Science and Environmental Law: Collaboration Across the Double Helix*, 13 ENV'T L. REV. 169, 176 (2011) ("There has long been a bond between environmental law and science that distinguishes it from other areas of law.").

83 *See, e.g.*, Note, *Air Pollution: Causes, Sources and Abatement*, *supra* note ii, at 208; Maack, *supra* note iv, at 417 n.23; Note, *The Effluent Fee Approach for Controlling Air Pollution*, *supra* note iv, at 944; Kosinski, *supra* note iv, at 564–65.

84 *See, e.g.,* Ginnane, *supra* note 6, at 432; Maechling, *supra* note iv, at 59; Ruckelshaus, *supra* note v, at 533; Hardy, *supra* note v, at 296; McCloskey, *supra* note v, at 605; Levien, *supra* note vi, at 464.

exceptions, they unsurprisingly ignored climate change concerns in their contributions.[85]

The list of practitioners framing climate change as an environmental issue during this period includes a number of public officers.[86] In fact, the most important environmental thinkers from each of the three branches of federal government—Senator Edmund Muskie, Supreme Court Justice William O. Douglas, and EPA Administrator William Ruckelshaus—engaged with climate change in the pages of law reviews during 1970–71.[87] Senator Muskie wrote in 1970 that the greenhouse effect and rising temperatures were among the consequences of increased fossil fuel usage and characterised the effects as potentially "disastrous."[88] A year later, Justice Douglas, while laying out the range of environmental threats to the world's oceans, acknowledged that "[c]arbon dioxide is accumulating in the air which results in a gradual warming up of the oceans, which is already beginning to alter the distribution of marine fauna."[89] This contribution is impressively lacking in the hedge words that characterise so much of the early writing on climate change, but is perhaps unsurprising coming from Douglas, an icon of early environmentalism.[90] Also in 1971, Ruckelshaus joined in with a plea for us—as a society—to seek answers to long-range environmental questions, including the issue of increasing carbon dioxide emissions, which, he claimed, may hasten the melting of the polar ice caps

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[85] *See, e.g.*, Henry Ford II, *The Auto Industry and the Environment*, 59 KY. L. J. 629, 629–30 (1971); Charles F. Luce, *Power Generation and the Environment*, 1971 PUB. UTIL. L. 13, 13–14 (1971); Arne E. Gubrud, *The Clean Air Act and Mobile-Source Pollution Control*, 4 ECOLOGY L.Q. 523, 523, 529 (1975). One early timber industry source alluded to climate change and concluded (self-servingly) that "an average acre of vigorously growing trees gives off four tons of fresh oxygen a year while producing four tons of new wood and consuming five to six tons of carbon dioxide. That makes the growing commercial forest a better anti-pollution device than any man-made mechanism." Vern L. Gurnsey, *Race Riots and Eco-Activism*, 2 ENV'T L. 368, 374 (1972).

[86] *See, e.g.*, Ginnane, *supra* note 6, at 432 (Interstate Commerce Commission); Carver, Jr., *supra* note ii, at 33 (Federal Power Commission); Maechling, *supra* note iv, at 59 (National Science Foundation); Hardy, *supra* note v, at 296 (Office of Legal Affairs, United Nations).

[87] Muskie, *Environmental Jurisdiction in the Congress and the Executive*, *supra* note iv, at 171–72; Ruckelshaus, *supra* note v, at 532–33; Douglas, *supra* note v, at 149, 151.

[88] Muskie, *Environmental Jurisdiction in the Congress and the Executive*, *supra* note iv, at 172. Muskie was a towering figure in early environmental law and a major contributor to the Clean Air Act of 1970 and Clean Water Act of 1972. Joel K. Goldstein, *Edmund S. Muskie: The Environmental Leader and Champion*, 67 ME. L. REV. 226, 227–28 (2015). This reference can be added to the evidence compiled by Richard Revesz showing Muskie's awareness and concern about climate change at the time the Clean Air Act of 1970 was being drafted, and that the law's coverage should be interpreted in that light. *See* Revesz, *supra* note 50, at 33 (arguing that Congress was "both aware of and concerned about" climate change when drafting the Clean Air Act of 1970).

[89] Douglas, *supra* note v.

[90] *See* M. MARGARET MCKEOWN, CITIZEN JUSTICE: THE ENVIRONMENTAL LEGACY OF WILLIAM O. DOUGLAS—PUBLIC ADVOCATE AND CONSERVATION CHAMPION 107 (2022).

and cause sea levels to rise.[91] Later in the decade, this illustrious group was joined by another prominent politician, the anti-environmentalist New Mexico Senator Pete Domenici, who warned presciently about the danger of global warming, noting that other pollution issues "may be small potatoes compared to the impact of the carbon dioxide in the earth's atmosphere."[92]

Environmental law professors, on the other hand, were surprisingly late to engage with issues of climate change. During the 1970s, climate change was not written about by most of the leading environmental law academics of the era—scholars such as Joseph Sax, Dan Tarlock, Nicholas Robinson, Ved Nanda, Arnold Reitze, Ludwik Teclaff, and Andrew Thompson—at least not in the databases surveyed for this research.[93] Even among those environmental law scholars who broached the issue, there was sometimes a degree of complacency. In 1972, for example, environmental law professor Samuel Bleicher was one of a few scholars to downplay the threat of climate change,[94] and Reitze, the leading voice in U.S. air pollution law scholarship, would in 1977 characterize carbon dioxide emissions as "harmless."[95] As late as 1981, Findley and Farber's 738-page casebook on environmental law would contain only a few paragraphs on climate change.[96]

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91 Ruckelshaus, *supra* note v, at 532. Ruckelshaus is better known today for his resignation as Deputy Attorney General instead of obeying Nixon's orders to fire Special Prosecutor Archibold Cox in the so-called Saturday Night Massacre. Gene Johnson, *Ruckelshaus, Who Defied Nixon in Watergate Firing, Dies*, AP NEWS (Nov. 27, 2019), https://apnews.com/general-news-5d26f3374ef942d3be96f90d2dfc9488.

92 Domenici, *supra* note 7, at 485. Senator Domenici may have had a very poor voting record on environmental issues, but he was (perhaps significantly) known as a particularly strong proponent of nuclear energy. *See* Brian Beutler, *What Will Sen. Pete Domenici's Retirement Mean for the Environment?*, GRIST (Oct. 5, 2007), https://grist.org/politics/for-petes-sake-or-petes-seat.

93 Many of these scholars turned their attention to climate change in the 1980s, with Ved Nanda leading the way by convening the 1980 University of Denver symposia on the topic. *See* Ved P. Nanda, *Introduction*, 10 DENV. J. INT'L L. & POL'Y 463, 463–65 (1981).

94 Bleicher, *supra* note vi, at 65 ("[E]ven an order of magnitude increase in CO_2 in the atmosphere by human activities, which at the present rate of input is not expected within the next several thousand years, may not be sufficient to produce a runaway greenhouse effect on Earth.").

95 Arnold W. Reitze, Jr., *An Otto for the Automobile*, ENV'T: SCI. & POL'Y FOR SUSTAINABLE DEV., May 1977, at 32, 36.

96 ROGER W. FINDLEY & DANIEL A. FARBER, ENVIRONMENTAL LAW: CASES AND MATERIALS 23 (1981); *see also* Daniel Farber, *Then and Now*, LEGALPLANET (Nov. 21, 2018), https://legal-planet.org/2018/11/21/then-and-now ("We also included [in the casebook] a couple of paragraphs about climate change, but that's about it.").

IV. Energy Policy Factor

The 1970s has been called the "energy crisis decade."[97] Domestic oil and gas production stagnated at a time of rising demand, leading to higher energy prices.[98] In some cases, power companies had difficulty meeting this demand.[99] Gas stations, too, saw notoriously long lines, especially around the time of the 1973–74 OPEC oil embargo.[100] By the mid-seventies, public pressure was building on politicians and policy-makers to resolve the crisis.[101] This pressure reached a peak when President Carter took office in January 1977: According to Carter, with the exception of preventing war, energy shortages were "the greatest challenge our country will face during our lifetimes."[102]

As well as being at the top of the national policy agenda, energy policy was also a subject of considerable public debate, including in the pages of law reviews. A major part of Carter's proposed solution was to shift the United States away from a reliance on oil and gas and towards the increased use of coal—a fossil fuel that was more readily available domestically, but one which also possesses a greater greenhouse gas footprint.[103] While references to climate change in an "environmental frame" declined as public attention turned away from environmental policy-making, legal researchers increasingly approached climate change from a new perspective—as a factor to be taken into consideration when developing the new energy policy that everyone seemed to agree was necessary.[104]

Within this law review scholarship, discussions of energy policy took into account climate change considerations in two distinct contexts. First, authors noted climate change as a negative factor to consider when

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97 Daniel Yergin, *The 1973 Oil Crisis: Three Crises in One—and the Lessons for Today*, CTR. ON GLOB. ENERGY POL'Y (Oct. 16, 2023), https://www.energypolicy.columbia.edu/publications/the-1973-oil-crisis-three-crises-in-one-and-the-lessons-for-today.

98 Robert S. Pindyck, *The Natural Gas Industry*, 74 CURRENT HIST. 215, 215 (1978); Yergin, *supra* note 97; Robert D. Lifset, *A New Understanding of the American Energy Crisis of the 1970s*, HIST. SOC. RSCH., no. 4, 2014, at 22, 32.

99 Lifset, *supra* note 98, at 36–37.

100 Yergin, *supra* note 97.

101 *Id.*

102 *Carter: 'Oil and Natural Gas . . . Are Running Out*', WASH. POST (Apr. 18, 1977, 7:00 PM), https://www.washingtonpost.com/archive/politics/1977/04/19/carter-oil-and-natural-gas-are-running-out/de4c4a51-4418-4224-b388-3fcc5d63e631.

103 *See* Michael Camp, *Carter's Energy Insecurity: The Political Economy of Coal in the 1970s*, 26 J. POL'Y HIST. 459, 459 (2014).

104 Thus, during the period 1977–79, a total of 22 law review articles engaged with the issue of climate change. 15 of these did so in the context of debating energy policy. *See* sources cited *supra* notes xi–xiii. This shift in attention away from environmental concerns was recognized at the time. *See* Richard A. Falk, *The Global Environment and International Law: Challenge and Response*, 23 KAN. L. REV. 385, 385 (1975) ("As with so many other subjects of public enthusiasm, the concern with ecological problems surged rapidly, peaked quickly in about 1970–71, and then subsided as the public became distracted by new concerns ranging from the energy shortage through inflationary pressures and corruption in government.").

analysing the future role of coal in U.S. energy generation.[105] In some of these cases, the climate effect of coal power was included as something of an afterthought, as compared to the more immediately perceptible disadvantages, such as acid rain and mining accidents.[106] However, other scholars did focus more intently on climate change as a primary concern, detailing at length the scientific explanations for climate change and the potential threat it posed.[107] In some cases, climate change was characterized as the principal hazard of coal consumption.[108] While the prospect of climate change was unsurprisingly stressed by opponents of coal power, even some of the advocates of an expanded role for coal felt the need to take climate change arguments into account in their analyses.[109]

Second, scholars cited climate change concerns in articles promoting (or discussing) the suitability of alternative energy sources.[110] These articles engaged in particular with the prospect of geothermal stations,[111] solar energy,[112] or (most commonly) nuclear reactors.[113] Authors writing about nuclear energy clearly struggled with the implications of trade-offs, as have environmentalists ever since. Nuclear power seemed desirable from the perspective of greenhouse gas emissions while posing a risk of catastrophic accident and a potential threat of nuclear weapon proliferation.[114] After Three Mile Island, however, the climate suitability of nuclear energy was, at least temporarily, a moot question in the face of public safety fears—a development anticipated by

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105 *See, e.g.*, Lovins, *supra* note xi, at 932; Robertson, *supra* note xiii, at 217 & n.21; Comment, *The President's Energy Proposals*, *supra* note xiii, at 10148. By 1980–81, similar discussions were taking climate change into account when evaluating the prospects for coal gasification. Ann Sherman, Development, *The Development of Synthetic Fuels*, 8 ECOLOGY L.Q. 781, 782–83 (1980); Gloria Bates, Note, *Energy: Coal Gasification—A Source of Energy*, 34 OKLA. L. REV. 128, 148–49 (1981).

106 *See* Moyer, *supra* note xii, at 768; Seamans, Jr. et al., *supra* note xii, at 291; Butler, *supra* note xii, at 1111.

107 Holdren, *supra* note xii, at 1102.

108 *See* Comment, *The President's Energy Proposals*, *supra* note xiii, at 10149–50 ("The most significant hazard, though one not fully understood at this point, is the atmospheric buildup of carbon dioxide . . . ."); Editorial, 6 ENV'T POL'Y & L. 109, 109 (1980) ("Coal's greatest threat is thought to be the 'greenhouse effect' . . . .").

109 *See, e.g.*, Holdren, *supra* note xii, at 1102.

110 Harris et al., *supra* note xi, at 389.

111 McNamara, *supra* note xii, at 326.

112 Williams, *supra* note xii, at 198 ("[Solar energy] subsidies may be justifiable because of concern over . . . the risk that use of fossil fuels will raise the earth's temperature by increasing atmospheric carbon dioxide.").

113 Greenberg et al., *supra* note xi, at 427 ("I come to the very provocative conclusion that coal is not an acceptable long-range alternative to nuclear energy for producing a large fraction of the world's energy in 50 years."); Meek, *supra* note xii at 466; Breyer, *supra* note xii, at 1836 (writing of the potential climate impact of coal when criticising the application of a strict standard of review for nuclear power plant licensing); Bodansky & Schmidt, *supra* note xiii, at 398–99.

114 Meek, *supra* note xii, at 466; Holdren, *supra* note xii, at 1108.

Bodansky & Schmidt when writing in the immediate aftermath of the accident.[115]

Substantively, understandings of climate change in the energy policy debate differed very little from those in earlier pieces written explicitly in an environmental frame. Authors continued to acknowledge the scientific uncertainty surrounding the topic.[116] Nevertheless, climate change was normally seen as potentially leading to serious consequences, including the melting of polar ice caps,[117] decreased agricultural productivity,[118] and significant ecosystem changes.[119] In addition, there was a growing understanding in this era that the true scale of the danger from climate change would not be clear until it was too late to prevent serious adverse effects, turning the continued large-scale emission of greenhouse gases into an experiment of global proportions.[120]

Like those writing within the 'environmental frame,' the authors framing climate change as an energy policy factor came from diverse backgrounds in academia, industry (to a greater extent), and public service. Contributions also came from the non-profit sector: One of the earliest articles to address climate change as part of the 'energy crisis' was published in 1971 by Michael McCloskey, then-executive director of the Sierra Club.[121] A few other well-known names also appeared in these debates. One of those was Amory Lovins, a leading thinker on energy efficiency and renewable energy, who noted the transformative threat of climate change in an early law review piece.[122] Another was future Supreme Court Justice (and then-Harvard law professor) Stephen Breyer, who asserted that the potential climate change effects of coal were a disadvantage of the energy source, albeit without showing great conviction—he cited a litany of what he considered to be "more realistic" ill effects of coal power, such as respiratory illnesses, cancer, and train accidents.[123]

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115 Bodansky & Schmidt, *supra* note xiii, at 441–44. *See generally* ROBERT NORDHAUS & SAM KALEN, ENERGY FOLLIES: MISSTEPS, FIASCOS, AND SUCCESSES OF AMERICA'S ENERGY POLICY 141 (2018) ("The public's reaction made it clear that there would be little support for the massive expansion of nuclear capacity necessary if nuclear power were to displace oil- and gas-fired electric power production.").

116 Holdren, *supra* note xii, at 1102; Bodansky & Schmidt, *supra* note xiii, at 398.

117 Breyer, *supra* note xii, at 1836; Holdren, *supra* note xii, at 1102.

118 Holdren, *supra* note xii, at 1102.

119 Moyer, *supra* note xii, at 768.

120 *See* Holdren, *supra* note xii, at 1102 ("[T]he only way to avoid finding out by experiment how much CO_2 the climatic system will tolerate is to stop the growth of fossil fuel use in time."); Bodansky & Schmidt, *supra* note xiii, at 399 ("The amounts of carbon dioxide produced are enormous (fifteen billion tons per year at present) and there is essentially nothing that can be done with such masses of a gas other than to let it escape to the atmosphere and see what happens.").

121 McCloskey, *supra* note v, at 587–89, 605.

122 Lovins, *supra* note xi, at 932–33.

123 Breyer, *supra* note xii, at 1836–37.

V. CONCLUSION

As the preceding discussion makes clear, climate change was far from unknown in the pre-1980 legal literature. Dozens of legal articles and books engaged with the prospect of climate change, which was generally treated as a real and serious threat, despite the scientific uncertainties surrounding it. Climate change was framed in ways that are both familiar: as an environmental threat or energy policy consideration, and less so: as a form of inadvertent climate/weather modification. While the inadvertent modification frame has faded from academic view, the environmental threat and energy policy frames endure, although legal academic research on climate change has evidently since moved in numerous different and highly specialized directions.

Within the early legal literature, three absences stand out. First, climate change was not the focal point of a legal book or article at this stage. Rather, it was a topic that was addressed only in the context of academic discussion of separate and distinct issues. In these contexts, climate change was in many cases referred to relatively briefly, as an exemplar of the destructive potential of industrialized society or an environmental problem that was global in nature.[124] Occasionally it was discussed in somewhat more depth, especially as an energy policy factor.[125] Climate change was never, however, given the detailed attention that (in retrospect) it clearly deserved.

Second, the question of climate change was hardly ever addressed through a problem-solving frame, which is characteristic of modern environmental law scholarship.[126] Rather, consideration of how to 'address' or 'solve' the climate change problem was largely absent in the pre-1980 legal literature. A few authors recommended that scientists research and monitor carbon emissions and climate change in order to learn more about the issue.[127] A few others suggested institutional frameworks that could begin to tackle the issue.[128] The question of the role of the law (whether domestic or international) in mitigating greenhouse gas emissions is, however, almost entirely absent. Even

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124 *Supra* notes 57–63 and accompanying text.

125 *E.g.,* Holdren, *supra* note xii, at 1102.

126 *See* DANIEL BODANSKY, THE ART AND CRAFT OF INTERNATIONAL ENVIRONMENTAL LAW 37 (2010) ("[U]nderstanding the causes of an environmental problem can help to identify the most appropriate policy responses."); Andreas Kotsakis, *On the Relation Between Scholarship and Action in Environmental Law: Method, Theory, Change*, *in* RESEARCH METHODS IN ENVIRONMENTAL LAW 338, 355 (Andreas Philippopoulos-Mihalopoulos & Victoria Brooks eds., 2017) ("Scholars increasingly do cast themselves in the role of the 'problem-solving doctors' . . . .").

127 *See, e.g.*, Brooks, *supra* note vii, at 20–21; Roberts, *The State of the Art in Weather Modification*, *supra* note 10, at 17–18.

128 *See, e.g.*, Levien, *supra* note vi, at 465–66 (suggesting creation of an international environmental agency of the United Nations based upon the International Labor Organization); Bhatt *supra* note vii, at 269–71 (discussing importance of international cooperation regarding weather modification activities).

energy policy articles framed climate change fears as a reason to favour nuclear energy or disfavour coal—but they did not frame nuclear power or renewable energy as a means of reducing greenhouse gas emissions.

Third, there were hardly any environmental law scholars engaging with climate change. Those that did mention climate change tended to do so in passing and without the level of concern and urgency that one might expect.[129] Perhaps there were so many other environmental law developments—international and domestic—to address that scholars at this time found little incentive to engage speculatively with issues that had yet to attract legislative attention.[130] Alternatively, the lack of attention could reflect a reluctance to move outside the subject-matter silos that characterized early environmental policy-making.[131] The late arrival of legal scholars is not, it should be noted, a phenomenon that is necessarily confined to climate change. As Andreas Kotsakis has noted, there seems to be a pattern whereby environmental law scholars only arrive in the later stages of environmental debates, as technical experts to solve very complex and dynamic problems.[132]

Around 1980, all three of these absences in the literature began to be filled. Anthropogenic climate change was taking on a higher profile in international fora, most notably through the 1979 World Climate Conference in Geneva.[133] Domestic actors began to take notice,[134] and scientific research into climate change expanded accordingly.[135] In 1980, the Boston College Environmental Law Review published an edited version of a report on climate change and energy planning by the President's Council on Environmental Quality, the first time a law journal published a paper with a focus exclusively on climate change.[136] The report recommended that climate change considerations be taken into account in energy policy planning, renewable energy sources and

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129 *See, e.g.,* Murphy, *supra* note iii, at 777; Bleicher, *supra* note vi, at 65.

130 *See* David Driesen, *Thirty Years of International Environmental Law: A Retrospective and Plea for Reinvigoration*, 30 SYRACUSE J. INT'L L. & COM. 353, 354–58 (2003) (discussing the many environmental treaties of the 1970s and 1980s).

131 Louis Kotzé, *Reflections on the Future of Environmental Law Scholarship and Methodology in the Anthropocene*, *in* PERSPECTIVES ON ENVIRONMENTAL LAW SCHOLARSHIP 140, 142 (Ole W. Pedersen ed., 2018).

132 Kotsakis, *supra* note 126, at 359.

133 *See* Editorial, 5 ENV'T POL'Y & L. 65, 65 (1979). This conference led to the establishment of the World Climate Programme in January 1980 by the World Meteorological Organization, International Council of Scientific Unions and the United Nations Environment Programme. Speth, *supra* note 53, at 10.

134 The National Academy of Sciences issued a report in 1979 emphasising both the likelihood and gravity of climate change at current emission trajectories. NAT'L RSCH. COUNCIL, CARBON DIOXIDE AND CLIMATE: A SCIENTIFIC ASSESSMENT (1979).

135 Gupta places 1979 as the year that climate change "hit the global scientific and political agenda." Joyeeta Gupta, *A History of International Climate Change Policy*, 1 WIRES CLIMATE CHANGE 636, 636 (2010).

136 Speth, *supra* note 53, at 1.

conservation be prioritised, and that the United States should expand international cooperation to address climate change issues.[137]

Also in 1980, the University of Denver College of Law hosted a two-day multi-disciplinary conference on "world climate change" which stands as a landmark in legal attention to the topic.[138] The conference framed climate change as a topic in itself worthy of investigation by legal scholars, rather than as a relatively minor point of interest within the broader context of weather/climate modification law or energy planning.[139] Several of the resulting papers appeared in a 1981 special edition of the Denver Journal of International Law and Policy, and, a few years later, in an edited book.[140] In retrospect, the most interesting of these was the contribution by Edith Brown Weiss, positioning climate change as a problem to be solved—her proposal being a transition to a non-fossil fuel economy over the course of the following 50–100 years, with a strategy of "control[ling] of CO2 emissions, use of those renewable energy resources that are environmentally sound, energy conservation, and management of forests and soils for sustained yields."[141] Others soon followed suit, including Allene Zanger, who attacked head-on the question of how legal tools can be used to solve the problem of climate change in a 1981 student note.[142] In 1983, Weiss continued along these lines by setting forth a research agenda in climate change and the law with a firmly problem-solving outlook.[143]

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137 *Id.* at 6–10.

138 Ved P. Nanda, *The Challenge of World Climate Change*, *in* WORLD CLIMATE CHANGE: THE ROLE OF INTERNATIONAL LAW AND INSTITUTIONS 4, 4 (Ved P. Nanda ed., 1983).

139 This framing did not go unnoticed (or uncontested). Mirfendereski criticized the symposium's lack of coverage of deliberate weather modification issues. Guive Mirfendereski, Book Note, 8 B.C. INT'L & COMPAR. L. REV. 267, 267–68 (1985) (reviewing WORLD CLIMATE CHANGE: THE ROLE OF INTERNATIONAL LAW AND INSTITUTIONS (Ved P. Nanda ed., 1983)).

140 Nanda, *supra* note 138, at 4–5. The symposium and resulting book were widely reviewed in major journals, suggesting a role in raising awareness within the academy of the legal implications of climate change. *See, e.g.,* Arthur John Keeffe, *Hot Air and Hot Topics*, 68 AM. BAR. ASS'N J. 869, 869 (1982); James N. Corbridge, Jr., Book Note, 23 NAT. RES. J. 943, 943–45 (1983) (reviewing WORLD CLIMATE CHANGE: THE ROLE OF INTERNATIONAL LAW AND INSTITUTIONS (Ved P. Nanda ed., 1983)); N.D. Bankes, Book Note, 78 AM. J. INT'L L. 552, 552–53 (1984); Mirfendereski, *supra* note 139.

141 Weiss, *A Resource Management Approach to Carbon Dioxide*, *supra* note 39, at 508–09.

142 Allene Zanger, Note, *Carbon Dioxide's Threat to Global Climate: An International Solution*, 17 STAN. J. INT'L L. 389, 389 (1981). Even Captain Cousteau was contributing his problem-solving thoughts in (of all places) the house journal of the ABA Section of Insurance, Negligence and Compensation Law. Jacques-Yves Cousteau, *Ocean Policy and Reasonable Utopias*, 16 FORUM 897, 905 (1981) ("The real problem is carbon dioxide, which is building up in the atmosphere. What is the remedy? To plant, because plants turn carbon dioxide into oxygen.").

143 Edith Brown Weiss, *International Legal and Institutional Implications of an Increase in Carbon Dioxide: A Proposed Research Strategy*, *in* SOCIAL SCIENCE RESEARCH AND CLIMATE CHANGE: AN INTERDISCIPLINARY APPRAISAL 147, 162–65 (Robert Chen et al. eds., 1983).

Throughout the 1980s, legal academic interest gradually increased, but the decade can still be seen as a transition period, with climate change addressed in a mainly *ad hoc* manner and without great urgency. In 1990 negotiations began on the United Nations Framework Convention on climate change,[144] and academic interest exploded. A new generation of environmental law experts began to focus their attention on climate change, including scholars who would continue to steer research agendas in the field during the ensuing decades.[145] By 1991, Sir Robert Jennings, then-president of the International Court of Justice, was announcing a new volume compiling academic views on international law and climate change, essays which "in an expert way, tackle the legal problems that are at the very heart of the matter."[146] In contrast to the pre-1980 scholarship, a new period of legal research on climate change had emerged. This period was internationally oriented and is recognizably relevant to current scholars, focusing on elucidating—and solving—the problem of global warming.

144 Philippe Sands, *The United Nations Framework Convention on Climate Change*, 1 REV. EUR., COMPAR. & INT'L ENV'T L. 270, 270 (1992).

145 *See, e.g.*, Durwood Zaelke & James Cameron, *Global Warming and Climate Change—An Overview of the International Legal Process*, 5 AM. U. J. INT'L L. & POL'Y 249, 249–50 (1990); David A. Wirth & Daniel A. Lashof, *Beyond Vienna and Montreal—Multilateral Agreements on Greenhouse Gases*, 19 AMBIO 305, 305 (1990); David D. Caron, *When Law Makes Climate Change Worse: Rethinking the Law of Baselines in Light of a Rising Sea Level*, 17 ECOLOGY L.Q. 621, 621–22 (1990); Lakshman D. Guruswamy, *Global Warming: Integrating United States and International Law*, 32 ARIZ. L. REV. 221, 222–24 (1990); Daniel Bodansky, *Managing Climate Change*, 3 Y.B. INT'L ENV'T. L 60, 60 (1992); Richard B. Stewart & Jonathan B. Wiener, *The Comprehensive Approach to Global Climate Policy: Issues of Design and Practicality*, 9 ARIZ. J. INT'L & COMPAR. L. 83, 83–85 (1992); Sands, *supra* note 144.

146 Robert Jennings, *Preface*, *in* INTERNATIONAL LAW AND GLOBAL CLIMATE CHANGE (Robin Churchill & David Freestone, eds., 1991).