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Withdrawal from International Agreements: Legal Framework and the Paris Agreement

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Renewed attention to the role of Congress in the termination of treaties and other international agreements has arisen following statements by President Donald Trump that he may consider withdrawing the United States from certain high profile agreements.[1]

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This article examines the legal framework for withdrawal from international agreements, and it provides a specific focus on the Paris Agreement on climate change.[2]

Although the Constitution sets forth a definite procedure whereby the President has the power to make treaties with the advice and consent of the Senate,[3] it is silent as to how treaties may be terminated. Moreover, not all agreements between the United States and foreign nations are made through Senate-approved, ratified treaties. The President commonly enters into binding executive agreements, which do not receive the Senate's advice and consent, and "political commitments," which are not legally binding, but may carry significant political weight.[4] Executive agreements and political commitments are not mentioned in the Constitution, and the legal procedure for withdrawal may differ depending on the precise nature of the agreement.

Treaties and other international agreements also operate in dual international and domestic contexts.[5] In the international context, international agreements constitute binding compacts between nations, and they create rights and obligations that sovereign states owe to one another under international law.[6] In this regard, international law creates a distinct set of rules governing the way in which sovereign states enter

[1] See Donald J. Trump, An America First Energy Plan (May 26, 2016), https://www.donaldjtrump.com/press-releases/an-america-first-energy-plan (statement of then candidate Donald Trump) ("We're going to cancel the Paris Climate Agreement and stop all payments of U.S. tax dollars to U.N. global warming programs.").

[2] Conference of Parties No. 21, United Nations Framework Convention on Climate Change, Decision 1/CP.21, U.N. Doc. FCCC/CP/2015/10/Add.1 (Jan. 29, 2016), annex 1, *available at* http://unfccc.int/resource/docs/2015/cop21/eng/10a01.pdf [hereinafter, "Paris Agreement"].

[3] U.S. CONST., art. II, §2, cl. 2 ("The President ... shall have Power, by and with the Advice and Consent of the Senate, to make Treaties, provided two thirds of the Senators present concur.... ").

[4] *See infra* § Forms of International Agreements and Commitments.

[5] *See, e.g.*, Medellin v. Texas, 552 U.S. 491, 504-06 (2008) (discussing the distinction between the binding effect of treaties under international law versus domestic law); PETER MALANCZUK, ALKHURT'S MODERN INTRODUCTION TO INTERNATIONAL LAW 64-71 (7th ed. 1997) (analyzing the interplay between international law and domestic or "municipal" legal systems).

[6] *See Medellin*, 552 U.S. at 505 ("A treaty is, of course, 'primarily a compact between independent nations.'") (quoting Head Money Case, 112 U.S. 580, 598 (1884)); JEFFREY L. DUNOFF, ET AL., INTERNATIONAL LAW, NORMS, ACTORS, PROCESS: A PROBLEM ORIENTED-APPROACH 37-38 (4th ed. 2015) ("States must enter into treaties ... to obtain legally binding commitments from other states.... "); RESTATEMENT (THIRD) OF FOREIGN RELATIONS, §301(1) [hereinafter, "RESTATEMENT"] (defining "international agreement" as any agreement between two or more states or international organizations that is "intended to be legally binding and is governed by international law"). The Restatement is not binding law, but is considered by many to be persuasive authority. See WINER ET AL., INTERNATIONAL LAW LEGAL RESEARCH 242-43 (2013).

into—and withdraw from—international agreements.[7]

Those procedures are intended to apply to all nations, but they may not account for the distinct constitutional and statutory requirements of the domestic law of the United States.[8] Consequently, the legal regime governing withdrawal under domestic law may differ in meaningful ways from the procedure for withdrawal under international law. And the domestic withdrawal process may be further complicated if Congress has enacted legislation implementing an international agreement into the domestic law of the United States.[9]

In sum, the legal procedure for termination of or withdrawal from[10] treaties and other international agreements depends on three main features: (1) the type of agreement at issue; (2) whether withdrawal is analyzed under international law or domestic law; and (3) whether Congress has enacted implementing legislation. These procedures and considerations are explored below and applied to the Paris Agreement.

Forms of International Agreements and Commitments

For purposes of U.S. law and practice, agreements between the United States and foreign nations may take the form of treaties, executive agreements, or non-legal agreements, which involve the making of so-called "political commitments."[11] Under the domestic law of the United States,[12] a *treaty* is an agreement between the United States and another state that does not enter into force until it receives the advice and consent of a

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[7] *See* Vienna Convention on the Law of Treaties, arts. 7-17, entered into force Jan. 27, 1980, 1155 U.N.T.S. 331 [hereinafter "Vienna Convention"] (defining the rules under international law in which a state may consent to be bound by a treaty). The United States has not ratified the Vienna Convention, but it is considered in many respects to reflect customary international law. *See* U.S. Dep't of State, Vienna Convention on the Law of Treaties, http://www.state.gov/s/l/treaty/faqs/70139.htm. *See also* De Los Santos Mora v. New York, 524 F.3d 183, 196 n.19 (2d Cir. 2008) ("Although the United States has not ratified the Vienna Convention on the Law of Treaties, our Court relies upon it 'as an authoritative guide to the customary international law of treaties,' insofar as it reflects actual state practices.") (quoting Avero Belg. Ins. v. Am. Airlines, Inc., 423 F.3d 73, 80 n.8 (2d Cir. 2005)); Fujitsu Ltd. v. Federal Exp. Corp., 247 F.3d 423 (2d Cir. 2001) ("[W]e rely upon the Vienna Convention here as an authoritative guide to the customary international law of treaties.... ") (internal citations omitted). *But see* RESTATEMENT, *supra* note 5, §208 reporters' n. 4 ("[T]he [Vienna] Convention has not been ratified by the United States and, while purporting to be a codification of preexisting customary law, it is not in all respects in accord with the understanding and the practice of the United States and of some other states.").

[8] *See* CONGRESSIONAL RESEARCH SERVICE, TREATIES AND OTHER INTERNATIONAL AGREEMENTS: THE ROLE OF THE UNITED STATES SENATE, S.Rept. 192-206 (2001) [hereinafter "TREATIES AND OTHER INTERNATIONAL AGREEMENTS"] (surveying the principles related to withdrawal from international agreements under international law and the domestic law of the United States); Int'l Law Comm'n, Draft Articles on the Law of Treaties with Commentaries, 1966, arts. 2 cmt. (9) & 11 cmt. (1), in II YEARBOOK OF THE INT'L L. COMM'N, 1966, at 187, *available at* http://legal.un.org/ilc/texts/instruments/english/commentaries/1_1_1966.pdf [hereinafter, "Commentary on the Law of Treaties"] (discussing differences between international and domestic law of treaty ratification and noting that "the international and constitutional ratifications of a treaty are entirely separate procedural acts carried out on two different planes."). For a brief discussion on the history and development of the Commentary on the Law of Treaties, *see* MALANCZUK, *supra* note 6, at 130.

[9] *See infra* § The Effect of Implementing Legislation.

[10] This report addresses both *withdrawal from* and *termination of* international agreements. Withdrawal generally occurs in the context of a multilateral agreement in which one party may withdraw from the agreement, but the agreement remains in place for the remaining parties. Termination generally occurs in the context of a bilateral agreement in which the withdrawal of a single party effectively terminates the agreement. For purposes of this report, the underlying legal framework is generally the same for both events, and the terms may be used interchangeably.

[11] For further detail of various types of international commitments and their relationship with U.S. law, see CRS Report RL32528, *International Law and Agreements: Their Effect upon U.S. Law*, by Michael John Garcia.

[12] The term "treaty" has a broader meaning under international law than under domestic law. Under international law, "treaty" refers to any binding international agreement. Vienna Convention, art. 1(a). Under domestic law, "treaty" signifies only those binding international agreements that have received the advice and consent of the Senate. See RESTATEMENT, supra note 5, §303(1).

two-thirds majority of the Senate and is subsequently ratified by the President.[13] The great majority of international agreements that the United States enters into, however, fall into the distinct and much larger category of executive agreements.[14] Although they are intended to be binding, executive agreements do not receive the advice and consent of the Senate, but rather are entered into by the President based upon a source of authority other than the Treaty Clause in Article II, Section 2 of the Constitution.[15] In the case of congressional-executive agreements, the domestic authority is derived from an existing or subsequently enacted statute.[16] The President also enters into executive agreements made pursuant to a treaty based upon authority created in prior

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[13] *See* RESTATEMENT, supra note 5, §303(1).

[14] Although not mentioned expressly in the Constitution, the executive branch has entered into executive agreements on a variety of subjects without the advice and consent of the Senate since the early years of the Republic. *See* Am. Ins. Ass'n v. Garamendi, 539 U.S. 396, 415 (2003) (discussing "executive agreements to settle claims of American nationals against foreign governments" dating back to "as early as 1799"); L. HENKIN, FOREIGN AFFAIRS AND THE UNITED STATES CONSTITUTION 219 (2d ed. 1996) ("Presidents ... have made many thousands of [executive] agreements, differing in formality and importance, on matters running the gamut of U.S. foreign relations."). Over the history of the Republic, it appears that well over 90% of international legal agreements concluded by the United States have taken a form other than a treaty. *See* CRS Report RL32528, *International Law and Agreements: Their Effect upon U.S. Law, supra* note 12, at 4-5.

[15] U.S. CONST., art. II, §2, cl. 2 ("The President ... shall have Power, by and with the Advice and Consent of the Senate, to make Treaties, provided two thirds of the Senators present concur.... ").

[16] *See, e.g.*, Foreign Assistance Act of 1961, P.L. 87-195 (codified as amended, 22 U.S.C. §2151 et seq.) (authorizing the President to furnish assistance to foreign nations "on such terms and conditions as he may determine, to any friendly country.... "). In some cases, the President enters into congressional-executive agreements based on existing statutes that do not contain an explicit legislative authorization to allow an international agreement, but in which the authorization is implied. See TREATIES AND OTHER INTERNATIONAL AGREEMENTS, supra note 9, at 78-86 (discussing examples congressional-executive agreements).

Senate-approved, ratified treaties.[17] In other cases, the President enters into sole executive agreements based upon a claim of independent presidential power in the Constitution.[18]

In addition to treaties and executive agreements, the United States makes non-legal agreements that often involve the making of so-called political commitments.[19] While political commitments are not intended to be binding under domestic or international law,[20] they may nonetheless carry moral and political weight and other significant incentives for compliance.[21]

Withdrawal Under International Law

Under international law, a nation may withdraw from any binding international agreement either in conformity with the provisions of the agreement—if the agreement permits withdrawal—or

Key Terminology

International Agreement: A blanket term used to refer to any agreement between the United States and a foreign state that is legally binding under international law.[22]

Treaty: An international agreement that receives the advice and consent of the Senate and is ratified by the President.[23]

Executive Agreement: An international agreement that is binding, but which the President enters into without receiving advice and consent of the Senate.[24]

Congressional-Executive Agreement: An executive agreement for which domestic legal authority derives from a preexisting or subsequently enacted statute.[25]

Executive Agreement Made Pursuant to a Treaty: An executive agreement based on the President's authority in a treaty that was previously approved by the Senate.[26]

Sole Executive Agreement: An executive agreement based on the President's constitutional powers.[27]

Nonlegal Agreements and Political Commitments: An agreement or a provision in an agreement between the United States and a foreign entity that is not intended to be binding under international law, but may carry nonlegal incentives for compliance.[28]

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[17] *See* TREATIES AND OTHER INTERNATIONAL AGREEMENTS, *supra* note 9, at 86.
[18] Examples of sole executive agreements include the Litvinov Assignment, under which the Soviet Union purported to assign to the United States claims to American assets in Russia that had previously been nationalized by the Soviet Union, and the 1973 Vietnam Peace Agreement ending the United States' participation in the war in Vietnam. *See* TREATIES AND OTHER INTERNATIONAL AGREEMENTS, *supra* note 9, at 88.
[19] *See id.* at 58-64 (discussing various types of nonlegal agreements and their status under domestic and international law). *See generally* Duncan B. Hollis and Joshua J. Newcomer, *"Political" Commitments and the Constitution,* 49 VA. J. INT'L L. 507 (2009) (discussing the origins and constitutional implications of the practice of making political commitments).
[20] See Jack Goldsmith, The Contributions of the Obama Administration to the Practice and Theory of International Law, 57 HARV. INT'L L.J. 1, 11 (2016) ("[P]olitical commitments carry no international law obligation[.]").
[21] *See* RESTATEMENT, *supra* note 5, §301 reporters n. 2 ("[T]he political inducements to comply with such [nonbinding] agreements may be strong and the consequences of noncompliance serious.").
[22] RESTATEMENT, supra note 5, §301(1).
[23] For more on variations of the definition of the term "treaty," see *supra* note 13.
[24] *See* TREATIES AND OTHER INTERNATIONAL AGREEMENTS, *supra* note 9, at 76.
[25] *See supra* note 17.
[26] See TREATIES AND OTHER INTERNATIONAL AGREEMENTS, supra note 9, at 86; see CRS Report RL32528, *International Law and Agreements: Their Effect upon U.S. Law*, supra note 12, at 5.
[27] *See supra* note 19.
[28] *See supra* notes 20-22.

with the consent of all parties.[29] Most modern international agreements contain provisions allowing and specifying the conditions of withdrawal, and many require a period of advance notice before withdrawal becomes effective.[30] Even when an agreement does not contain an express withdrawal clause, international law still permits withdrawal if the parties intended to allow a right of withdrawal or if there is an implied right to do so in the text of the agreement.[31] In those cases, under the Vienna Convention on the Law of Treaties (Vienna Convention),[32] the withdrawing party must give 12 months' notice of its intent to depart from the agreement.[33] In addition, certain superseding events, such as a material breach by one party or a fundamental change in circumstances, may give rise to a right to withdraw.[34]

Under the Vienna Convention, treaties and other binding international agreements may be terminated through

> [a]ny act declaring invalid, terminating, withdrawing from or suspending the operation of a treaty pursuant to the provisions of the treaty ... through an instrument communicated to the other parties. If the instrument is not signed by the Head of State, Head of Government or Minister for Foreign Affairs, the representative of the State communicating it may be called upon to produce full powers.[35]

Under this rule, a notice of withdrawal issued by the President (i.e., the "Head of State" for the United States) would effectively withdraw the United States from the international agreement as a matter of international law, providing such notice complied with applicable treaty withdrawal provisions.[36] In this regard, the withdrawal process under international law may not account for the unique constitutional and separation of powers principles related to withdrawal under U.S. domestic law, discussed below.[37]

Political commitments are not legally binding between nations, and thus a party can withdraw at any time without violating international law[38] regardless of whether the commitment contains a withdrawal clause.[39] Although such withdrawal may not constitute a legal infraction, the withdrawing party still may face the possibility of political con-

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[29] Vienna Convention, art. 54; TREATIES AND OTHER INTERNATIONAL AGREEMENTS, *supra* note 9, at 192. Some rules of international law known as *jus cogens* are recognized by the international community as peremptory, permitting no derogation. RESTATEMENT, *supra* note 5, §102 cmt. k. These rules generally prevail regardless of the content or status of international agreements, *id*., and thus would not be affected by withdrawal.

[30] *See, e.g.*, Paris Agreement, art. 28; United Nations Framework Convention on Climate Change, art. 25, May 9, 1992, S. Treaty Doc. No. 102-38, 1771 U.N.T.S. 107 (entered into force 21 March 1994) [hereinafter "UNFCCC"]. *See also* Laurence R. Helfer, Exiting Treaties, 91 VA. L. REV. 1579, 1597-98 (2005) (analyzing denunciation and withdrawal clauses in existing treaties).

[31] TREATIES AND OTHER INTERNATIONAL AGREEMENTS, *supra* note 9, at 192.

[32] Although the United States has not ratified the Vienna Convention, it has been described as the "most widely recognized international law source on current treaty law practice." *See id*. at 63. As described in note 8, *supra*, the Vienna Convention is also understood to reflect customary international law in certain respects.

[33] Vienna Convention, art. 56.

[34] *See id.*, arts. 60-64; MALANCZUK, *supra* note 6, at 142-46 (outlining the events which may give rise to a right to terminate a treaty under international law).

[35] Vienna Convention, art. 67.

[36] *See id.*

[37] *See infra* § Withdrawal Under Domestic Law.

[38] TREATIES AND OTHER INTERNATIONAL AGREEMENTS, *supra* note 9, at 59 (stating that a "'political' undertaking is not governed by international law and there are no applicable rules pertaining to compliance, modification, or withdrawal [,]" and therefore a party may "extricate[] itself from its 'political' undertaking ... without legal penalty[.]") (quoting DEP'T OF STATE, ARTICLE-BY-ARTICLE ANALYSIS OF START DOCUMENTS 352 (1991), reprinted in S. Treaty Doc. No. 20, 102d Cong., 1086 (1991)); Oscar Schachter, *The Twilight Existence of Nonbinding International Agreements*, 71 AM. J. INT'L L. 296, 300 (1977) ("[A] nonbinding agreement, however seriously taken by the parties, does not engage their legal responsibility."). But see Nuclear Test Case (N.Z. v. Fr.), 174 I.C.J. 457 (Dec. 20) (holding that a series of unilateral declarations by France concerning its intention to refrain from certain nuclear tests in the South Pacific were legally binding).

[39] Political commitments may have, but often lack, express withdrawal provisions. *See* Duncan B. Hollis, *Unpacking the Compact Clause*, 88 TEX. L. REV. 741, 791 (2010) (discussing exit provisions in certain political commitments).

sequences and responsive actions from its international counterparts.[40]

Withdrawal Under Domestic Law

Under domestic law, it is generally accepted among scholars that the Executive, by virtue of its role as the "sole organ" of the government charged with making official communications with foreign states, is responsible for communicating the United States' intention to withdraw from international agreements and political commitments.[41] The degree to which the Constitution requires Congress or the Senate to participate in the decision to withdraw, however, has been the source of historical debate and differs significantly depending on the type of agreement or commitment.

Withdrawal from Executive Agreements and Political Commitments Under Domestic Law

In the case of executive agreements, the President's authority to terminate such agreements unilaterally "has not been seriously questioned in the past."[42] Based on past practices, it appears to be generally accepted that, when the President has independent authority to enter into an executive agreement, the President may also independently terminate the agreement without congressional or senatorial approval.[43] Thus, observers appear to agree that, when the Constitution affords the President authority to enter into sole executive agreements, the President may also unilaterally terminate those agreements.[44] This same principle may also apply to political commitments: to the extent the President has the authority to make nonbinding commitments without the assent of the Senate or Congress,[45] the President may also unilaterally withdraw from those commitments.[46]

For congressional-executive agreements and executive agreements made pursuant to treaties, the mode of termination may be dictated by the underly-

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[40] *See* TREATIES AND OTHER INTERNATIONAL AGREEMENTS, *supra* note 9, at 59.

[41] *See id.* at 199 (citing United States v. Curtiss-Wright Export Corp., 299 U.S. 304, 319 (1936); WESTEL WOODBURY WILLOUGHBY, 1 CONSTITUTIONAL LAW OF THE UNITED STATES 587 (1929)) (stating that it is a "noncontroversial observation that, "as the official spokesperson with other governments, the President is the person who communicates the notice of impending termination" of international agreements); HENKIN, *supra* note 17, at 42 ("That the President is the sole organ of official communication by and to the United States has not been questioned and is not a source of significant controversy."); Saikrishna B. Prakash and Michael D. Ramsey, *The Executive Power over Foreign Affairs*, 111 YALE L.J. 231, 243 (2001) ("Even the most committed advocate of congressional primacy usually admits that the President is "sole organ of official communication in foreign affairs."); Curtis A. Bradley, Treaty Termination and Historical Gloss, 92 TEX. L. REV. 773, 782 n.39 (2014) (citing historical sources of the "sole organ" role of the Executive from the founding era through the U.S. Supreme Court decision in Curtiss-Wright). For the Supreme Court's latest description of the President's role in communicating with foreign governments and the contours of presidential power in the field of foreign affairs in general, see Zivotofsky v. Kerry, 135 S. Ct. 2076, 2090 (2015) ("The President does have a unique role in communicating with foreign governments.... But whether the realm is foreign or domestic, it is still the Legislative Branch, not the Executive Branch, that makes the law.").

[42] *See* TREATIES AND OTHER INTERNATIONAL AGREEMENTS, *supra* note 9, at 208.

[43] *See id*. at 172; RESTATEMENT, *supra* note 5, §339 reporter's note 2.

[44] *See* TREATIES AND OTHER INTERNATIONAL AGREEMENTS, *supra* note 9, at 173-74 (stating that the conclusion that the President has the authority to terminate executive agreements unilaterally "seems invariably true in the case of executive agreements concluded by virtue of exclusive Presidential authority"); RESTATEMENT, supra note 5, §339 reporter's note 2 ("No one has questioned the President's authority to terminate sole executive agreements.").

[45] For a discussion of competing positions related to the Executive's constitutional authority to enter into political commitments, see CRS Report RL32528, *International Law and Agreements: Their Effect upon U.S. Law, supra* note 12, at 9-12.

[46] *See, e.g.*, Ryan Harrington, *A Remedy for Congressional Exclusion from Contemporary International Agreement Making*, 118 W. VA. L. REV. 1211, 1226 (2016) ("A political commitment also provides the executive branch with the ability to terminate the agreement unilaterally or to deviate from it without consequences."); Julian Ku, *President Rubio/Walker/Trump/Whomever Can Indeed Terminate the Iran Deal on "Day One,"* OPINIO JURIS (Sep. 10, 2015), http://opiniojuris.org/2015/09/10/president-rubiowalkertrumpwhomever-can-indeed-terminate-the-iran-deal-on-day-one/.

ing treaty or statute on which the agreement is based.[47] For example, in the case of executive agreements made pursuant to a treaty, the Senate may condition its consent to the underlying treaty on a requirement that the President not enter into or terminate executive agreements under the authority of the treaty without senatorial or congressional approval.[48] In the case of congressional-executive agreements, Congress may dictate how termination occurs or how it affects U.S. domestic law.[49] At least one court has held that, to the extent Congress has enumerated constitutional powers to legislate on an issue, it may also enact legislation directing the executive branch to terminate an executive agreement that implicates its enumerated powers.[50] In most cases, however, the President has unilaterally terminated executive agreements, and the Executive's authority has not been questioned by Members of Congress or in judicial challenges, at least in circumstances where such termination is not in contravention of a legislative act.[51]

Withdrawal from Treaties Under Domestic Law

Unlike the process of terminating executive agreements, which has not generated significant opposition from Congress, the constitutional requirements for the termination of Senate approved, ratified treaties have been the subject of occasional debate between the legislative and executive branches. The Constitution sets forth a definite procedure for the President to make treaties with the advice and consent of the Senate,[52] but it does not describe how they should be terminated.[53]

Some commentators and executive branch attorneys have argued that the President possesses broad powers to withdraw unilaterally from treaties based on Supreme Court case law describing the President as the "sole organ" of the nation in matters related to

[47] *See* RESTATEMENT, *supra* note 5, §339 cmt. a; TREATIES AND OTHER INTERNATIONAL AGREEMENTS, *supra* note 9, at 174, 208; Michael J. Glennon, *Can the President Do No Wrong?*, 80 AM. J. INT'L L. 923, 926 (1986). *See also* Oona A. Hathaway, *Treaties' End: The Past, Present, and Future of International Law Making in the United States,* 117 YALE L.J. 1236, 1362 n. 268 (2008) ("The President may withdraw from ... a congressional-executive agreement unilaterally unless Congress has expressly limited the President's power to withdraw through ... authorizing legislation[.]").

[48] *See* RESTATEMENT, *supra* note 5, §339 cmt. a.

[49] For example, Section 125 of the Free Trade Act of 1974 applies to a number of international trade agreements and states: "Duties or other import restrictions required or appropriate to carry out any trade agreement entered into pursuant to this chapter ... shall not be affected by any termination, in whole or in part, of such agreement or by the withdrawal of the United States from such agreement and shall remain in effect after the date of such termination or withdrawal for 1 year, unless" certain exceptions apply. 19 U.S.C. §2135(e). For answers to frequently asked questions on withdrawal from the North American Free Trade Agreement and other international trade agreements, see CRS Report R44630, *U.S. Withdrawal from Free Trade Agreements: Frequently Asked Legal Questions*, by Brandon J. Murrill.

[50] In the Comprehensive Anti-Apartheid Act of 1986 (Anti-Apartheid Act), which was passed over President Reagan's veto, Congress directed the Secretary of State to terminate an air services agreement with South Africa. P.L. 99-440, §306(b)(1), 313, 100 Stat. 1086, 1100 ("The Secretary of State shall terminate the Agreement Between the Government of the United States of America and the Government of the Union of South Africa Relating to Air Services Between their Respective Territories.... "). In a subsequent legal challenge, the U.S. Court of Appeals for the D.C. Circuit held that Congress had the power to enact this provision by virtue of its constitutional powers to "regulate Commerce with foreign Nations" and to "make all Laws [that] shall be necessary and proper for carrying into Execution [such] Powers."). *See* South African Airways v. Dole, 817 F.2d 118, 126 (1987) (quoting U.S. CONST., art. I, §8), *cert denied*, 484 U.S. 896 (1987).

[51] TREATIES AND OTHER INTERNATIONAL AGREEMENTS, *supra* note 9, at 173-74 & 208.

[52] *See* U.S. CONST., art. II, §2, cl. 2.

[53] Scholars have also noted that the Framers never directly addressed the power to terminate treaties in the Federalist Papers, the Constitutional Convention, or the state ratifying conventions. *See, e.g.* James J. Moriarty, *Congressional Claims for Treaty Termination Powers in the Age of the Diminished Presidency*, 14 CONN. J. INT'L L. 123, 132 (1999).

foreign affairs[54] and pursuant to the "executive Power" conveyed to the President in Article II, Section 1 of the Constitution.[55] Other proponents of executive authority have likened the power to withdraw from treaties to the President's power to remove executive officers.[56] Although appointment of certain executive officers requires senatorial advice and consent, courts have held that the President has some unilateral authority to remove those officers.[57] In the same vein, some argue that the President may unilaterally terminate treaties even though those treaties were formed with the consent of the Senate.[58] Since the turn of the 20th century, officials in the executive branch have adopted variations of these arguments and consistently taken the position that domestic law permits the President to terminate or withdraw from treaties without receiving express approval from the legislative branch,[59] and some in the executive

[54] *See, e.g.*, RESTATEMENT, *supra* note 5, §339 cmt. a (stating that the President has the authority to terminate treaties pursuant to the presidential powers related to foreign affairs as described in United States v. Curtiss-Wright Export Corp., 299 U.S. 304 (1936)); John C. Yoo, *Rejoinder: Treaties and Public Lawmaking: A Textual and Structural Defense of Non-Self-Execution*, 99 COLUM. L. REV. 2218, 2242 (1999) ("[W]ith treaty formation, the President retains this authority "due to his preeminent position in foreign affairs and his structural superiority in managing international relations."); Bradley, *supra* note 42, at 782 (discussing the application of the President's role as the "sole organ" of communications to the concept of treaty termination); Memorandum from John C. Yoo, Deputy Assistant Att'y Gen. & Robert J. Delahunty, Special Counsel, Office of Legal Counsel, U.S. Dep't of Justice, to John Bellinger, III, Senior Assoc. Counsel to the President & Legal Adviser to the Nat'l Sec. Council, Authority of the President to Suspend Certain Provisions of the ABM Treaty 7 (Nov. 15, 2001) [hereinafter "Yoo & Delahunty Memorandum"], *available at* https://www.justice.gov/sites/default/files/olc/legacy/2009/08/24/memoabmtreaty11152001.pdf ("The President's power to terminate treaties must reside in the President as a necessary corollary to the exercise of the President's other plenary foreign affairs powers."). The Office of Legal Counsel (OLC) in the Department of Justice later disavowed unrelated portions of the Yoo & Delahunty Memorandum, but it continued to maintain that the President may unilaterally suspend a treaty where suspension is permitted "by the terms of the treaty or under recognized principles of international law." *See* Memorandum of Steven G. Bradbury, Principal Deputy Assistant Att'y Gen., Status of Certain OLC Opinions Issued in the Aftermath of the Terrorist Attacks of September 11, 2001, at 8-9 (Jan. 15, 2009), *available at* https://www.justice.gov/sites/default/files/opa/legacy/2009/03/09/memostatusolcopinions01152009.pdf.

[55] *See, e.g.*, MICHAEL D. RAMSEY, THE CONSTITUTION'S TEXT IN FOREIGN AFFAIRS 158 (2007) ("[I]n eighteenth-century terms 'executive' power included general power over treaties—including, of course, the decision whether or not to withdraw."); Bradley, *supra* note 42, at 780 (analyzing the so-called "Vesting Clause Thesis" and its application to treaty withdrawal); Yoo & Delhunty Memorandum, supra note 56, at 3-13 (stating that the "treaty power is fundamentally executive in nature").

[56] *See, e.g.*, DAVID GRAY ADLER, THE CONSTITUTION AND THE TERMINATION OF TREATIES 94 (1986); Yoo & Delhunty Memorandum, *supra* note 56, at 6; Bradley, *supra* note 42, at 781-82.

[57] *See, e.g.*, Free Enter. Fund v. Pub. Co. Accounting Oversight Bd., 130 S. Ct. 3138, 3146 (2010) ("Since 1789, the Constitution has been understood to empower the President to keep [executive] officers accountable—by removing them from office, if necessary.").

[58] *See* sources cited *supra* note 57.

[59] *See* Memorandum from James Brown Scott, Solicitor, U.S. Dep't of State 1-2 (June 12, 1909) (on file with author)("A third method of terminating a treaty is by notice given by the President upon his own initiative without a resolution of the Senate or the joint resolution of the Congress"); Memorandum from R. Walton Moore, Acting U.S. Sec'y of State, to President Roosevelt 5 (Nov. 9, 1936) (on file with author) ("I have no doubt that you may authorize the giving of notice to Italy of the intention to terminate the treaty of 1871 without seeking the advice and consent of the Senate or the approval of Congress to such action."); Memorandum from William Whittington, Termination of Treaties: International Rules and Internal United States Procedure 5 (Feb. 10, 1958) (on file with author) ("While the practice has varied in the past, it is now generally considered that, as to a self-executing treaty ... it is proper for the Executive acting alone to take the action necessary to terminate or denounce the treaty."); Memorandum from Herbert J. Hansell, Legal Adviser, U.S. Dep't of State, to Cyrus R. Vance, U.S. Sec'y of State, President's Power to Give Notice of Termination of U.S.-ROC Mutual Defense Treaty (Dec. 15, 1978) [hereinafter, "Hansell Memorandum"], *reprinted in* S. Comm. on Foreign Relations, 95th Cong., Termination of Treaties: The Constitutional Allocation of Power 395 (Comm. Print 1978) ("This memorandum confirms my advice to you that the President has the authority under the Constitution to decide whether the United States (continued)

branch have described treaty termination as a plenary power of the President that is not shared with the legislative branch.[60] Not all courts and commentators, however, agree that the President possesses this power, or at least contend that the power is shared between the political branches and that the President cannot terminate a treaty in contravention of the will of Congress or the Senate.[61] Some have argued that the termination of treaties is analogous to the termination of federal statutes.[62] Because domestic statutes may be terminated only through the same process in which they were enacted[63]—i.e., through a majority vote in both houses and with the signature of the President or veto override—these commentators contend that treaties must be terminated through a procedure that is symmetrical to their making and that includes, at a minimum, the Senate's consent.[64] Proponents of congressional or senatorial participation further assert the Founders could not have intended the President to be the "sole organ" in the broader context of treaty powers because the Treaty Clause expressly provides a role for the Senate in the formation of treaties.[65]

Historical Domestic Practices Related to Treaty Termination and Withdrawal

While proponents on both sides of the debate over the Executive's power of unilateral treaty termination cite historical practices in favor of their respective branches,[66] past practices related to treaty termination vary considerably.[67] These historical practices can generally be organized into five categories:[68]

(continued) shall give the notice of termination ... without Congressional or Senate action."); Yoo & Delhunty Memorandum, *supra* note 56, at 3-13 (concluding that the Constitution vests the President with authority to terminate or suspend treaties unilaterally).

[60] *See, e.g.*, Yoo & Delhunty Memorandum, *supra* note 56, at 7; *Treaty Termination*: Hearings Before the S. Comm. On Foreign Relations, 96th Cong. 50 (1979) (testimony of State Dep't Legal Adviser Herbert Hansell); id. at 220 (letter from Larry A. Hammond, Deputy Assistant Attorney General to Senator Frank Church, Chairman of the Senate Foreign Relations Committee).

[61] *See, e.g.*, Barry M. Goldwater, *Treaty Termination is a Shared Power*, 65 A.B.A. J. 198 (1979); David "Dj" Wolff, *Reasserting its Constitutional Role: Congress' Power to Independently Terminate a Treaty*, 46 U.S.F. L. Rev. 953 (2012); Michael J. Glennon, *The Constitutional Power of the United States to Condition its Consent to Treaties*, 67 CHI.-KENT. L. REV. 533, 554-66 (1991); ADLER, supra note 54, at 98-110. The courts' differing interpretations of the power of treaty termination is discussed below. See infra § Domestic Legal Challenges to Unilateral Treaty Termination by the Executive .

[62] *See, e.g.*, Goldwater, *supra* note 62, at 199-200; Bradley, *supra* note 42, at 781.

[63] *See, e.g.*, Clinton v. City of New York, 524 U.S. 417, 438 (1998) ("There is no provision in the Constitution that authorizes the President to enact, to amend, or to repeal statutes."); INS v. Chadha, 462 U.S. 919, 954 (1983) (continued) statutes, no less than enactment, must conform with Art. I.").

[64] *See, e.g.*, Wolff, *supra* note 62, at 966. Stefan A. Riesenfeld, *Tribute: The Power of Congress and the President in International Relations: Three Recent Supreme Court Decisions*, 87 CALIF. L. REV. 786, 802 (1999).

[65] *See, e.g.*, ADLER, *supra* note 54, at 93. For more arguments regarding the role of the legislative branch in treaty termination, see the sources cited *supra* note 62.

[66] *Compare, e.g.*, Hansell Memorandum, *supra* note 60 (discussing "previous Presidential treaty terminations undertaken without action by Congress" in support of the conclusion that "[w]hile treaty termination may be and sometimes has been, undertaken by the President following Congressional or Senate action, such action is not legally necessary"); *with* Goldwater, *supra* note 62, at 198 ("[T]he weight of historical evidence proves that treaties are normally only terminated with legislative approval.").

[67] *See, e.g.*, ADLER, *supra* note 54, at 190 ("There has been no predominant method of termination, or even a discernible trend. Indeed, the record is checkered."); 5 GREEN HAYWOOD HACKWORTH, DIGEST OF INTERNATIONAL LAW 330 (1943) ("The question as to the authority of the Executive to terminate treaties independently of the Congress or of the Senate is in a somewhat confused state.... No settled rule or procedure has been followed.").

[68] For more detailed investigation of historical practices, see Bradley, *supra* note 42, at 788-816 and TREATIES AND OTHER INTERNATIONAL AGREEMENTS, *supra* note 9, at 202-208.

1. executive withdrawal or termination pursuant to prior authorization or direction from Congress;[69]
2. executive withdrawal or termination pursuant to prior authorization or direction from the Senate;[70]
3. executive withdrawal or termination without prior authorization, but with subsequent approval by Congress;[71]
4. executive withdrawal or termination without prior authorization, but with subsequent approval by the Senate;[72] and
5. unilateral executive withdrawal or termination without authorization or direction by Congress or the Senate.[73]

Although historical accounts vary,[74] most observers are in general agreement that the practice of unilateral withdrawal or termination by the President without authorization or direction by the legislative branch (category 5) increased markedly during the 20th century.[75] In most cases, this unilateral presidential action has not generated significant opposition in either chamber of Congress, but there have been occasions in which Members filed suit in an effort to block the President from terminating a treaty without first receiving congressional or senatorial approval.

Domestic Legal Challenges to Unilateral Treaty Termination by the Executive

Goldwater v. Carter

The most prominent attempt by Members of Congress to prevent the President from terminating a treaty through litigation occurred during the 1970s as the United States began to pursue closer relations with the government of the People's Republic of China (PRC).[76] Anticipating that, as part of its efforts to normalize relations with the PRC, the

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[69] *See, e.g.*, Comprehensive Anti-Apartheid Act of 1986, *See* P.L. 99-440, §313, 100 Stat. 1086, 1104 (mandating that "[t]he Secretary of State shall terminate immediately" a tax treaty and protocol with South Africa); Joint Resolution Concerning the Oregon Territory, 9 Stat. 109 (1846) (providing that the President "is hereby authorized, at his discretion, to give to the government of Great Britain the notice required by" a convention allowing for joint occupancy of parts of the Oregon Territory). Although the Anti-Apartheid Act was enacted over his veto, *see supra* note 47, President Reagan terminated the treaty at issue. *See* Bradley, *supra* note 42, at 814-15 n. 244 (discussing history of the Anti-Apartheid Act). Likewise, after Congress enacted the Joint Resolution Concerning the Oregon Territory (Oregon Territory Treaty) in 1846, the Secretary of State informed the U.S. Ambassador to Great Britain that "Congress have spoken their will upon the subject, in their joint resolution; and to this it is his (the President's) and your duty to conform." S. Doc. No. 29-489, at 15 (1846). The Oregon Territory Treaty was ultimately renegotiated. *See* Bradley, *supra* note 42, at 790.

[70] In 1855, the Senate authorized President Franklin Pierce to terminate a Friendship, Commerce, and Navigation Treaty with Denmark, and the President subsequently relied on the Senate's action in carrying out the termination. Franklin Pierce, Third Annual Message (Dec. 31, 1855) ("In pursuance of the authority conferred by a resolution of the Senate of the United States passed on the 3d of March last, notice was given to Denmark" that the United States would "terminate the [treaty] at the expiration of one year from the date of notice for that purpose.").

[71] *See, e.g.*, Joint Resolution to Terminate the Treaty of 1817 Regulating the Naval Force on the Lakes, 13 Stat. 568 (1865) ("Be it resolved ... That the notice given by the President of the United States to [the] government of Great Britain and Ireland to terminate the treaty ... is hereby adopted and ratified as if the same had been authorized by Congress.").

[72] *See* TREATIES AND OTHER INTERNATIONAL AGREEMENTS, *supra* note 9, at 205-06.

[73] *See*, *e.g.*, Telegram from the U.S. Department of State to the Embassy of the Republic of China (Dec. 23, 1978), *text available at* https://history.state.gov/historicaldocuments/frus1977-80v13/d180 [hereinafter, Taiwan Treaty Termination Telegram] (providing notice of termination of the Mutual Defense Treaty with the government of Taiwan).

[74] *See, e.g.*, Shalev Roisman, *Constitutional Acquiescence*, 84 GEO. WASH. L. REV. 668, 733-40 (2016) (challenging the conclusions of recent studies related to past practices in treaty termination).

[75] *See, e.g.*, Bradley, *supra* note 42, at 801-20; HENKIN, *supra* note 15, at 213-14; Adler Jean Galbraith, *Treaty Termination as Foreign Affairs Exceptionalism*, 92 TEX. L. REV. 121, 121-26 (2014).

[76] For additional background on *Goldwater v. Carter*, *see* ADLER, *supra* note 54, at 248-306 and VICTORIA MARIE KRAFT, THE U.S. CONSTITUTION AND FOREIGN POLICY: TERMINATING THE TAIWAN TREATY 1-52 (1991).

executive branch might terminate a 1954 mutual defense treaty with the government of Taiwan,[77] Congress enacted (and President Carter signed) the International Security Assistance Act, which, among other things, expressed "the sense of the Congress that there should be prior consultation between the Congress and the executive branch on any proposed policy changes affecting the continuation in force of the Mutual Defense Treaty of 1954."[78] When the Carter Administration announced that the United States would provide the required notice to terminate the treaty without having first obtained the consent of Congress,[79] a group of 16 Members of the House of Representatives and nine Senators, led by Senator Barry Goldwater, filed suit seeking to block the President's action on the ground that the Executive lacks the constitutional authority for unilateral treaty termination.[80]

In the early stages of the litigation, the district court agreed with the Members and entered an order enjoining the State Department from "taking any action to implement the President's notice of termination unless and until that notice is so approved [by the Senate or Congress]."[81] The district court reasoned as follows:

> [T]reaty termination generally is a shared power, which cannot be exercised by the President acting alone. Neither the executive nor legislative branch has exclusive power to terminate treaties. At least under the circumstances of this case involving a significant mutual defense treaty ... any decision of the United States to terminate that treaty must be made with the advice and consent of the Senate or the approval of both houses of Congress.[82]

Notably, the district court relied, in part, on historical practice, and stated that, although no definitive procedure exists, "the predominate United States' practice in terminating treaties ... has involved mutual action by the executive and legislative branches."[83]

On appeal, the U.S. Court of Appeals for the District of Columbia Circuit, sitting en banc, disagreed both with the district court's interpretation of past practice and the ultimate decision on the constitutionality of President Carter's action.[84] In addition to relying on case law emphasizing the President's role as the "sole organ" in foreign relations,[85] the D.C. Circuit reasoned that past practices were varied, and that there was no instance in which a treaty continued in force over the opposition of the President.[86] Of "central significance" to the appellate court's decision was the fact that the Mutual Defense Treaty of 1954 contained a termination clause.[87] Because there was "[n]o specific restriction or condition" on withdrawal specified in the termination clause, and because the Constitution does not expressly forbid the Executive from terminating treaties, the D.C. Circuit reasoned that the termination power, for that particular treaty, "devolves upon the President[.]"[88]

In an expedited decision issued two weeks later, the Supreme Court vacated the appellate court's decision and remanded with instructions to dismiss the complaint, but it did so without reaching the merits of the constitutional question

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[77] Mutual Defense Treaty Between the United States of America and the Republic of China, Dec. 2, 1954, 6 U.S.T. 433 [hereinafter, "Taiwan Mutual Defense Treaty"].
[78] International Security Assistance Act of 1978, P.L. 95-384, §26(b), 92 Stat. 730, 746.
[79] *See* Taiwan Treaty Termination Telegram, *supra* note 74; President Jimmy Carter, Address to the Nation: Diplomatic Relations Between the United States and the People's Republic of China (Dec. 15, 1978), *available at* http://www.presidency.ucsb.edu/ws/?pid=30308.
[80] In addition, three days of hearings were held in the Senate Foreign Relations Committee on a resolution expressing the sense of the Senate that "approval of the U.S. Senate is required to terminate any mutual defense treaty between the United States and another nation." S.Res. 15, 96th Cong. (1979); Treaty Termination: Hearings Before the S. Comm. On Foreign Relations, 96th Cong. (1979). The resolution never passed.
[81] Goldwater v. Carter, 481 F. Supp. 949, 964 (D.D.C. 1979), *rev'd*, 617 F.2d 697 (D.C. Cir. 1979) (en banc) (per curiam), *vacated and remanded with instructions to dismiss*, Goldwater v. Carter, 444 U.S. 996 (1979) (plurality op.).
[82] *Goldwater*, 481 F. Supp. at 964.
[83] *Id*. at 960.
[84] *See* Goldwater v. Carter, 617 F.2d 697, 699 (D.C. Cir. 1979) (en banc) (per curiam).
[85] *Id.* at 707 (discussing and quoting United States v. Curtiss-Wright Export Corp., 299 U.S. 304, 320 (1936)
[86] *Id.* at 706-07. Judge MacKinnon issued a lengthy dissent which focused on past termination practices and concluded that "congressional participation in termination has been the overwhelming historical practice." Id. at 723 (MacKinnon, J., dissenting).
[87] *See id.* at 709.
[88] *Id.* at 708.

and with no majority opinion.[89] Writing for a four-Justice plurality, Justice Rehnquist concluded that the case should be dismissed because it presented a nonjusticiable political question[90] —meaning that the dispute was more properly resolved in the politically accountable legislative and executive branches than in the court system.[91] One member of the Court, Justice Powell, also voted for dismissal, but did so based on the ground that the case was not ripe for judicial review until the Senate passed a resolution disapproving of the President's termination.[92] Only one Justice reached a decision on the constitutionality of President Carter's action: Justice Brennan would have affirmed the D.C. Circuit, but his opinion was premised on the conclusion that termination of the Mutual Defense Treaty implicated the Executive's power to recognize the PRC as the official government of China,[93] and not because the President possesses a general, constitutional power over treaty termination.[94] Accordingly, it is not clear that Justice Brennan's reasoning would apply to all treaties, particularly those that do not address matters where the President does not have preeminent constitutional authority.

District Court Dismissals Following Goldwater

In the years after the litigation over the Mutual Defense Treaty with Taiwan, the Executive continued the practice of unilateral treaty termination in many,[95] but not all,[96] cases. In 1986, a group of private plaintiffs filed suit seeking to prevent President Reagan from unilaterally terminating a Treaty of Friendship, Commerce, and Navigation with Nicaragua,[97] but the district court dismissed the suit as a nonjusticiable political question following the reasoning of the four Justice plurality in *Goldwater*.[98]

Six years later, Members of Congress again instituted litigation in opposition to the President's unilateral termination, this time in response to George W. Bush's 2001 announcement that he was terminating the Anti-Ballistic Missile (ABM) Treaty with Russia.[99] Thirty-two Members of the House of Representatives challenged the constitutionality of that termination in Kucinich v.Bush,[100] but the district court dismissed the suit on jurisdictional grounds without reaching the merits for two rea-

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[89] Goldwater v. Carter, 444 U.S. 996 (1979) (plurality op.).
[90] *Id.* at 1002 (Rehnquist, J, concurring) (opinion joined by Justices Stewart and Stevens and Chief Justice Burger).
[91] For further analysis of the political question doctrine, see CRS Report R43834, *The Political Question Doctrine: Justiciability and the Separation of Powers*, by Jared P. Cole.
[92] *See* Goldwater, 444 U.S. at 998 (Powell, J.) ("If the Congress chooses not to confront the President, it is not our task to do so."). Justice Marshall also concurred in the result without a written opinion.
[93] For the Court's most recent holding on the President's power to recognize foreign governments, see Zivotofsky v. Kerry, 135 S. Ct. 2076 (2015).
[94] *See Goldwater*, 444 U.S. at 1006-07 (Brennan, J., dissenting) ("Abrogation of the defense treaty with Taiwan was a necessary incident to Executive recognition of the Peking Government, because the defense treaty was predicated upon the now-abandoned view that the Taiwan Government was the only legitimate political authority in China."). Justices Blackmun and White also dissented, but on the grounds that they felt the case should have been set for oral argument and to allow time for "plenary consideration" of the issues. *Id*. at 1006 (Blackmun & White, JJ., dissenting in part).
[95] *See* OFFICE OF LEGAL ADVISER, U.S. DEP'T OF STATE, DIGEST OF UNITED STATES PRACTICE IN INTERNATIONAL LAW 2002, at 202-06 (Sally J. Cummins & David P. Stewart eds., 2002) (identifying 23 treaties terminated by the President between 1980 and 2002); Bradley, supra note 42, at 815 (identifying unilateral treaty terminations since the State Department's compilation in 2002).
[96] For example, the Comprehensive Anti-Apartheid Act of 1986, which was enacted over President's Reagan's veto, directed the President to terminate a tax treaty and an air service treaty with South Africa. See P.L. 99-440, §§306, 313, 100 Stat. 1086, 1100, 1104. (1986)
[97] Treaty of Friendship, Commerce and Navigation, Jan. 21, 1956, United States Nicaragua, 9 U.S.T. 449, T.I.A.S. No. 4024.
[98] *See* Beacon Products Corp. v. Reagan, 633 F. Supp. 1191, 1198-99 (D. Mass. 1986) ("[A] challenge to the President's power vis-a-vis treaty termination raise[s] a nonjusticiable political question"), *aff'd on other grounds*, 814 F.2d 1 (1st Cir. 1987).
[99] President George W. Bush, Remarks on National Missile Defense (Dec. 13, 2001), https://2001-2009.state.gov/t/ac/rls/rm/2001/6847.htm.
[100] 236 F. Supp. 2d 1 (D.D.C. 2002).

sons.[101] First, the court held that the Member-Plaintiffs failed to meet the standards for Members of Congress to have standing to assert claims for institutional injuries to the legislative branch[102] as set by the Supreme Court in Raines v. Byrd.[103] Second, the district court held that the interbranch dispute over the proper procedure for treaty termination was a nonjusticiable political question better resolved in the political branches.[104] The district court did not opine on the underlying constitutional question, and no appeal was filed.

Limits on Applicability of Past Cases in Separation of Powers Disputes

In addition to courts' reluctance to reach the merits of separation of powers disputes over treaty termination, past cases have not addressed a circumstance in which the Executive's decision to terminate a treaty was in direct opposition to the stated will of the Senate or Congress. While the International Security Assistance Act, passed in 1978, expressed the sense of the Congress that there should be consultation between the Congress and the executive branch related to termination of the Mutual Defense Treaty with Taiwan, it did not direct the President to obtain the Senate's consent before terminating the treaty.[105] The following year, the Senate introduced a resolution expressing the "sense of the Senate that approval of the United States Senate is required to terminate any mutual defense treaty between the United States and another nation."[106] But that resolution was never passed,[107] and it does not appear that Congress has enacted a provision purporting to block the President from terminating a treaty or expressing the sense of the Senate or Congress that unilateral termination by the President is wrongful unless approved by Congress.

If such an act or resolution were passed and the Executive still terminated without approval from the legislative branch, the legal paradigm governing the separation of powers analysis might shift. When faced with certain separation of powers conflicts, the Supreme Court has frequently adopted the reasoning of Justice Jackson's well-known concurring opinion in Youngstown Sheet & Tube Co. v. Sawyer,[108] which stated that the President's constitutional powers often "are not fixed but fluctuate, depending on their disjunction or conjunction with those of Congress."[109] Justice Jackson's opinion sets forth a tripartite framework for evaluating the constitutional powers of the President. The President's authority is (1) at a maximum when acting pursuant to authorization by Congress; (2) in a "zone of twilight" when Congress and the President "may have concurrent authority, or in which its distribution is uncertain," and Congress has not spoken on an issue; and (3) at its "lowest ebb" when taking measures incompatible with the will of Congress.[110]

Because Congress, in Goldwater and the district court cases discussed above, had not passed legislation disapproving the President's terminations, presidential authority in those cases likely fell into the "zone of twilight." But a future resolution or legislation disapproving of unilateral treaty termination could place the President's authority at the "lowest ebb." In that scenario, the President only may act in contravention of the will of Congress in matters involving exclusive presidential prerogatives that are "at once so conclusive and preclusive" that they "disabl[e] the Congress from acting upon the subject."[111] Members of the executive branch have contended that treaty termination is one such plenary power that is exclusively reserved to the President,[112] but a counterargument could be made that the legislative branch plays at least a shared role in the

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[101] *See Kucinich*, 236 F. Supp. 2d at 18.
[102] See id. at 9-12. For more background on standing requirements in lawsuits by Members of Congress, see CRS Legal Sidebar WSLG783, *Legislator Lawsuits: Checking Executive Action Through the Courts*, by Todd Garvey and Alissa M. Dolan.
[103] 521 U.S. 811 (1997).
[104] *See Kucinich*, 236 F. Supp. 2d at 12-18.
[105] International Security Assistance Act of 1978, P.L. 95-384, §26(b), 92 Stat. 730, 746 (emphasis added).
[106] S.Res. 15, 96th Cong. (1979).
[107] For further background on this resolution, *Goldwater v. Carter*, 481 F. Supp. 949, 954 (1979).
[108] 343 U.S. 579 (1952).
[109] *Id.* at 635 (Jackson, J., concurring).
[110] *Id*. at 635-38.
[111] *Id*. at 637-40 (Jackson, J., concurring). Accord Zivotofsky v. Kerry, 135 S. Ct. 2076, 2095 (2015).
[112] *See* sources cited, *supra* note 61.

termination process, especially in matters that implicate Congress's enumerated powers.[113]

The Effect of Implementing Legislation

The legal framework for withdrawal from an international agreement may also depend on whether Congress has enacted legislation implementing its provisions into the domestic law of the United States. Some provisions of international agreements are considered self-executing, meaning they have the force of domestic law without the need for subsequent congressional action.[114] But for non-self-executing provisions or agreements,[115] implementing legislation from Congress may be required to provide U.S. agencies with legal authority to carry out functions contemplated by the agreement or to make them enforceable by private parties.[116] Certain political commitments have also been incorporated into domestic law through implementing legislation.[117]

Under Supreme Court precedent, the repealing of statutes must conform with the same bicameral process set forth in Article I that is used to enact new legislation.[118] Accordingly, when Congress has passed legislation implementing an international agreement into domestic law, the President would appear to lack the authority to terminate the domestic effect of that legislation without going through the full legislative process for repeal.[119] Even when the President may have the power under international law to withdraw the United States from an international agreement and suspend its obligations to its counterparts,[120] that withdrawal likely would not, on its own

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[113] *Cf.* South African Airways v. Dole, 817 F.2d 118, 126 (1987) (quoting U.S. CONST., art. I, §8), *cert denied*, 484 U.S. 896 (1987) (holding that Congress had the power to enact legislation mandating the Secretary of State terminate an executive agreement related to airline services with South Africa pursuant to Congress's constitutional authority to "regulate Commerce with foreign Nations" and to "make all Laws shall be necessary and proper for carrying into Execution [such] Powers.").

[114] *See, e.g.*, Medellin v. Texas, 552 U.S. 491, 505 n.2 (2008) ("What we mean by 'self-executing' is that the treaty has automatic domestic effect as federal law upon ratification."); Cook v. United States, 288 U.S. 102, 119 (1933) ("For in a strict sense the [t]reaty was self-executing, in that no legislation was necessary to authorize executive action pursuant to its provisions.").

[115] For analysis of the differences between self-executing versus non-self-executing agreements, see CRS Report RL32528, *International Law and Agreements: Their Effect upon U.S. Law, supra* note 12, at 12-14.

[116] *See Medellin*, 552 U.S. at 505 ("In sum, while treaties may comprise international commitments ... they are not domestic law unless Congress has either enacted implementing statutes or the treaty itself conveys an intention that it be 'self-executing' and is ratified on these terms.") (internal citations and quotations omitted); Whitney v. Robertson, 124 U.S. 190, 194 (1888) ("When the [treaty] stipulations are not self-executing, they can only be enforced pursuant to legislation to carry them into effect, and such legislation is as much subject to modification and repeal by congress as legislation upon any other subject."). *See generally* RESTATEMENT, *supra* note 5, §111(4)(a) & cmt. h.

[117] *See, e.g.*, Clean Diamond Trade Act, 19 U.S.C. §§3901-3913 (implementing a multilateral nonbinding commitment to adopt the "Kimberley Process" designed to decrease the trade in conflict diamonds).

[118] *See* sources cited, *supra* note 64.

[119] *See* Hathaway, *supra* note 49, at 1362 n. 268 ("To the extent the legislation creates domestic law that operates even in the absence of an international agreement, that law will survive withdrawal from the international agreement by the President."); Julian Ku & John Yoo, *The Treaty Power, and the Overlooked Value of Non-Self-Executing Treaties*, 90 NOTRE DAME L. REV. 1607, 1628 (2015) ("A President's termination of a treaty will dissolve the formal legal obligation, but the policy of the United States will still continue because he cannot repeal the implementing legislation."); John Setear, *The President's Rational Choice of a Treaty's Preratification Pathway: Article II, Congressional-Executive Agreement, or Executive Agreement?*, 31 J. LEGAL STUD. S5, S15 n.20 (2002) ("If only legislation can repeal legislation, then the formal status of implementing legislation does not change merely because the president takes some action, namely, terminating the treaty that the legislation implements.")

[120] *See supra* § Withdrawal Under International Law.

accord, repeal the domestic effect of implementing legislation.[121]

In some cases, implementing legislation may dictate the extent to which termination of an underlying international agreement affects domestic law.[122] Analysis of the terms of the implementing statutes may be necessary, therefore, to understand the precise legal effect that termination of an international agreement has on U.S. law.

Withdrawal from the Paris Agreement

Some media outlets have reported[123] that President Donald Trump may be considering options to withdraw the United States from the Paris Agreement —a multilateral, international agreement intended to reduce the effects of climate change by maintaining global temperatures "well below 2°C above pre-industrial levels[.]"[124] President Obama signed an instrument of acceptance of the Paris Agreement on August 29, 2016, which was deposited with U.N. Secretary General Ban-Ki Moon on September 3, 2016.[125] The Agreement entered into force on November 4, 2016, and has been ratified or accepted by 121 parties, including the United States and the European Union, as of January 1, 2017.[126]

The Paris Agreement is a subsidiary to the 1992 United Nations Framework Convention on Climate Change (UNFCCC), a broader, framework treaty entered into during the George H. W. Bush Administration.[127] Unlike the UNFCCC, which received the Senate's advice and consent in 1992,[128] the Paris Agreement was not submitted to the Senate for approval. Instead, the Obama Administration took the position that the Paris Agreement is an executive agreement,[129] but it did not publicly articulate the precise sources of executive

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[121] *See* sources cited *supra* note 120; Peter J. Spiro, *Treaties, Executive Agreements, and Constitutional Method*, 79 TEX. L. REV. 961, 1005 (2001) ("[T]he president could unilaterally terminate the treaty, but not the implementing legislation[.]"); Kristen E. Eichensehr, 53 VA. J. INT'L L. 247, 308 n. 245 (2013) ("If ... the treaty was ... incorporated into U.S. law with implementing legislation, then the President's termination ends only U.S. obligations to treaty partners; it does not alter the implementing legislation, which was adopted as a statute under domestic law.").

[122] *E.g.*, U.S.-Australia Free Trade Agreement Implementation Act §106(c) ("On the date on which the Agreement terminates, the provisions of this Act (other than this subsection) and the amendments made by this Act shall cease to be effective.").

[123] See, e.g., Trump Looking for Fast Ways to Quit Global Climate Deal: Source, REUTERS (Nov. 14, 2016), http://www.reuters.com/article/us-usa-electionclimatechange-accord-idUSKBN1370JX; Trump Seeking Quickest Way to Quit Paris Climate Agreement, Says Report, GUARDIAN (Nov. 13, 2016), https://www.theguardian.com/us-news/2016/nov/13/trump-looking-at-quickest-way-to-quit-paris-climate-agreement-says-report.

[124] Paris Agreement, *supra* note 2, art. 1(a). For further analysis of the Paris Agreement, see CRS Report R44609, *Climate Change: Frequently Asked Questions about the 2015 Paris Agreement*, by Jane A. Leggett and Richard K. Lattanzio.

[125] *See* Tanya Somanader, *President Obama: The United States Formally Enters the Paris Agreement*, WHITE HOUSE BLOG (Sep. 3, 2016), https://obamawhitehouse.archives.gov/blog/2016/09/03/president-obama-united-states-formally-enters-paris-agreement.

[126] *Paris Agreement – Status of Ratification*, UNFCCC (last visited Jan. 1, 2017), http://unfccc.int/paris_agreement/items/9485.php.

[127] *See supra* note 31.

[128] *See* 138 CONG. REC. S17150 (daily ed. Oct. 7, 1992).

[129] *See* Press Briefing by White House Press Secretary Josh Earnest, Deputy Nat'l Security Advisor for Strategic Communications, Ben Rhodes, Senior Advisor, Brian Deese and Deputy Nat'l Security Advisor Int'l Economic, Wally Adeyemo (Aug. 29, 2016) [hereinafter, "Press Briefing"], https://www.whitehouse.gov/the-press-office/2016/08/29/press-briefing-press-secretary-josh-earnest-deputy-nsa-strategic (statement of Brian Deese) ("[T]he Paris agreement is an executive agreement. And so the President will use his authority that has been used in dozens of executive agreements in the past to join and ... put our country as a party to the Paris agreement."). Senior State Department Official on the Paris Agreement Signing Ceremony (Apr. 20, 2016), http://www.state.gov/r/pa/prs/ps/2016/04/256415.htm (continued) "Senior State Department Official") ("With respect to the Paris agreement, we have our own procedures, we have a standard State Department exercise that we are currently going through for authorizing an executive agreement, which this is[.]").

authority on which the President relied.[130] Possible sources of authority include the UNFCCC,[131] existing statutes such as the Clean Air Act and Energy Policy Act,[132] the President's sole constitutional powers,[133] or a combination of these authorities.[134] Regardless, there does not appear to be an underlying restriction on unilateral Presidential withdrawal (i.e., a treaty reservation,[135] statutory restriction, or other form of limitation) in any of the potential sources of executive authority. Consequently, the Paris Agreement would likely fall into the category of executive agreements that the Executive has traditionally terminated without seeking consent from the Senate or Congress.[136]

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[130] Whether the Paris Agreement should have been treated as a treaty which required the advice and consent of the Senate has been the subject of disagreement among observers. *Compare e.g.*, STEVEN GROVES, THE PARIS AGREEMENT IS A TREATY AND SHOULD BE SUBMITTED TO THE SENATE, BACKGROUNDER NO. 3103 (Heritage Foundation, Mar. 15, 2016), *available at* http://thfreports.s3.amazonaws.com/2016/BG3103.pdf (arguing that the Paris Agreement requires the Senate's advice and consent) *with* David A. Wirth, *The International and Domestic Law of Climate Change: A Binding International Agreement Without the Senate or Congress?*, 39 HARV. ENVTL. L. REV. 515 (2015) (asserting that neither Senate advice and consent nor new congressional legislation are necessarily conditions precedent to the United States becoming a party to an international agreement related to emissions reduction and climate change).

[131] *See* Written Testimony of Andrew M. Gross, *Pitfalls of Unilateral Negotiations at the Paris Climate Change Conference*, Hearing before the H. Comm. on Science, Space & Technology, 104th Cong. (2015), *available at* https://www.cato.org/publications/testimony/pitfalls-unilateral-negotiations-paris-climate-change-conference (concluding that certain procedural and reporting requirements of the Paris Agreement could be viewed as implementing the UNFCCC).

[132] *See* UNITED STATES, U.S. COVER NOTE, INDC AND ACCOMPANYING INFORMATION (2015) *available at* http://www4.unfccc.int/submissions/INDC/Published%20Documents/United%20States%20of%20America/1/U.S.%20Cover%20Note%20INDC%20and%20Accompanying%20Information.pdf [hereinafter, "U.S. INDC"] (citing the Clean Air Act, 42 U.S.C. §7401 *et seq.*, the Energy Policy Act, 42 U.S.C. §13201 *et seq.*, and the Energy Independence and Security Act, 42 U.S.C. §17001 et seq., as existing statutes through which the United States will implement the Paris Agreement). The statutes that the Obama Administration identified as allowing the United States to implement the Paris Agreement do not expressly authorize the President to enter into agreements with foreign nations. However, the executive branch has stated in the past that existing domestic laws which allow executive agreements to be implemented without subsequent action by Congress may bolster the Executive's authority to enter into the agreement. *See* Letter from Harold Koh to Sen. Ron Wyden (Mar. 6, 2016), *in* DIGEST OF U.S. PRACTICE IN INTERNATIONAL LAW 2012, at 95 (CarrieLyn D. Guymon, ed. 2012) (asserting that the Obama Administration is "currently in a position to accept the [Anti-Counterfeiting Trade Agreement] for the United States[,]" in part, based on "existing U.S. intellectual property law for implementation of the [Agreement], including the Copyright Act of 1976, the Lanham Act" and other statutes); *see also* Daniel Bodansky & Peter Spiro, *Executive Agreements+*, 49 VANDERBILT J. TRANSAT'L L. 885, 909-16 (2016) (discussing the executive branch's reliance on existing domestic statutes as a basis of authority to enter into certain executive agreements).

[133] ELIZA NORTHROP & CHAD SMITH, DOMESTIC PROCESSES FOR JOINING THE PARIS AGREEMENT, TECHNICAL NOTE 4 (2015), *available at* http://www.wri.org/sites/default/files/Domestic_Processes_for_Joining_the_Paris_Agreement.pdf (stating that the U.S. joined the Paris Agreement as a sole-executive agreement).

[134] *See* David A. Wirth, *Is the Paris Agreement on Climate Change a Legitimate Exercise of the Executive Agreement Power?* LAWFARE (Aug. 29, 2016), https://www.lawfareblog.com/paris-agreement-climate-change-legitimate-exerciseexecutive-agreement-power (citing multiple sources of executive authority for the Paris Agreement); Borandsky & Spiro, *supra* note 133, at 886 (stating that that Paris Agreement would "fall somewhere in between" a sole executive agreement and a congressional-executive agreement)

[135] For more on reservations, understandings, and declarations issued by the Senate in the course of providing its advice and consent to a treaty, see CRS Report RL32528, *International Law and Agreements: Their Effect upon U.S. Law*, *supra* note 12, at 3.

[136] *See supra* § Withdrawal from Executive Agreements and Political Commitments Under Domestic Law.

Timeline and Procedure for Withdrawal from the Paris Agreement

Article 28 of the Paris Agreement allows any party to withdraw voluntarily by providing written notice to the U.N. depository, and that withdrawal becomes effective one year after notice is received.[137] Article 28's right to withdraw, however, is not available until three years after the Paris Agreement became effective.[138] Because the agreement entered into force in November 2016,[139] the right of withdrawal would not be available until November 2019. Article 28 also provides that any party that withdraws from the UNFCCC shall be considered to have also withdrawn from the Paris Agreement. The UNFCCC has nearly identical withdrawal requirements to the Paris Agreement,[140] but because the UNFCCC entered into force in 1994,[141] the three-year withdrawal prohibition expired in 1997. Thus, the option of withdrawing from the Paris Agreement via withdrawal from the UNFCCC may be an available option to the executive branch. If the Executive sought to pursue such a course of action and effectuate such a withdrawal, it would need to provide written notice to the U.N. pursuant to the terms of the UNFCCC.[142] Withdrawal from both the UNFCCC and the Paris Agreement would become effective one year later.[143]

The fact that the UNFCCC was approved by the Senate, however, makes the domestic withdrawal procedure for that treaty less straightforward, and an effort by the President to withdraw unilaterally from that treaty might invoke the long-standing debate over the proper role of the legislative branch in treaty termination.[144] Given the diverse nature of past practice and the unsettled state of the law relating to the legislative branch's role in this process, it is unclear whether the Executive would be required to receive congressional or senatorial approval should it decide to withdraw from the UNFCCC.

It is also unclear whether the courts would resolve a dispute between the legislative and executive branches over termination of the UNFCCC should a disagreement arise. While past efforts to challenge the President's assertion of unilateral withdrawal authority in Goldwater and Kucinich proved unsuccessful, those cases addressed the President's termination of treaties that implicated the President's power to recognize foreign governments.[145] In the case of the UNFCCC, it is possible that a court could reason that environmental treaties related to climate change implicate core congressional interests, such as Congress' enumerated powers over interstate and foreign commerce in Article I, Section 8, clause 3,[146] and therefore Congress may be given a role in reviewing the propriety of withdrawing from the treaty. On the other hand, in light of the Goldwater Court's decision not to reach the merits of the constitutional challenge[147] and lower courts' subsequent dismissals of similar cases on jurisdictional grounds,[148] it appears unlikely that the judicial branch would resolve this constitutional debate.

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[137] Paris Agreement, art. 28.
[138] *Id.*
[139] *See Paris Agreement – Status of Ratification*, UNFCCC (last visited Dec. 7, 2016), http://unfccc.int/paris_agreement/items/9485.php.
[140] *Compare id. with* UNFCCC, art. 25.
[141] *United Nations Framework Convention on Climate Change, Status of Ratification of the Convention* (last visited Dec. 8, 2016), http://unfccc.int/essential_background/convention/status_of_ratification/items/2631.php.
[142] *See* UNFCCC, art. 25(1) ("At any time after three years from the date on which the Convention has entered into force for a Party, that Party may withdraw from the Convention by giving written notification to the Depositary.").
[143] *Id.*, art. 25(2); Paris Agreement, art. 28.
[144] *See supra* § Withdrawal from Treaties Under Domestic Law.
[145] *See* Goldwater v. Carter, 444 U.S. 996, 1006-07 (1979) (Brennan, J., dissenting) (discussing the implications of the "Executive['s] recognition of the Peking Government" on the termination of the Mutual Defense Treaty with Taiwan). The ABM Treaty at issue in *Kucinich* implicated issues related to the dissolution of the Soviet Union and the fact that, what was formerly a bilateral treaty, now involved four "successor" states: Belarus, Kazakhstan, Russia, and the Ukraine. *See* Yoo & Delhunty Memorandum, *supra* note 56, at 2.
[146] U.S. CONST., art. I, §8, cl. 3 ("The Congress shall have the power to ... regulate commerce with foreign nations, and among the several states, and with the Indian tribes[.]").
[147] Goldwater v. Carter, 444 U.S. 996 (1979) (plurality op.).
[148] *See* Beacon Products Corp. v. Reagan, 633 F. Supp. 1191 (D. Mass. 1986), *aff'd on other grounds*, 814 F.2d 1 (1st Cir. 1987); Kucinich v. Bush, 236 F. Supp. 2d 1 (D.D.C. 2002).

Non-implementation as an Alternative to Withdrawal from the Paris Agreement

The Paris Agreement contains a number of provisions that appear to create binding obligations under international law, including requirements that the parties "shall prepare, communicate and maintain ... nationally determined contributions [NDC]" to the "global response to climate change" in the form of domestic plans for reducing greenhouse gas emissions and otherwise attempting to address the effects of climate change.[149] But other provisions contain aspirational language and appear to take the form of nonbinding political commitments.[150] Most notably, Article 4.4 states that "[d]eveloped country parties should continue taking the lead by undertaking economy-wide absolute emission reduction targets."[151] This variation in language has been interpreted to mean that, while the Paris Agreement creates a legal obligation for states to communicate an NDC, it does not create a binding duty to carry out domestic implementing activities or to satisfy the emission reduction targets that may be stated in the NDC.[152] Because the emissions targets themselves are not binding under this interpretation, it may be possible to repeal or revise the domestic regulations that the Obama Administration sought to utilize to meet its emission reduction targets in the United States' NDC without withdrawing from or violating a legal obligation in the Paris Agreement.[153]

[149] *See* Paris Agreement arts. 3, 4.1. For discussion of which provisions may be binding and new obligations for the United States, see CRS Report R44609, *Climate Change: Frequently Asked Questions about the 2015 Paris Agreement*, *supra* note 125.

[150] *E.g.*, *id.* arts. 4.19 ("All parties strive to formulate and communicate long-term low greenhouse gas emission development strategies"); 5.2 ("Parties *are encouraged* to take action to implement and support ... the existing framework ... already agreed under the [UNFCCC]"); 7.7 ("Parties *should* strengthen their cooperation on enhancing action on adaptation, taking into account the Cancun Adaptation Framework") (emphasis added in all).

[151] *Id*. art. 4.4 (emphasis added). For other examples of international agreements that contain both binding obligations and political commitments, see Hollis & Newcomer, *supra* note 30, at 536-37.

[152] *See*, Letter from Julia Frifield, Assistant Secretary, Legislative Affairs, U.S. Dep't of State, to The Honorable Bob Corker, Chairman, Senate Committee on Foreign Relations (Oct. 19, 2015), ("[W]e are not seeking an agreement in which Parties take on legally binding emissions targets."); COP21 Press Availability with Special Envoy Todd Stern (Dec. 7, 2015), http://www.state.gov/s/climate/releases/2015/250425.htm (U.S. Special Envoy for Climate Change, Todd Stern, stating that the Paris Agreement creates an emission reduction target that is not legally binding, but that the reporting and "accountability system that circles around the target" is legally binding).

[153] The domestic laws and regulations that the Obama Administration intended to utilize to meet its emissions reduction targets are identified in the United States' Intended Nationally Determined Contributions (INDC). *See* U.S. INDC, *supra* note 133. For primers on the process for repealing existing rules and regulations, see CRS Legal Sidebar WSLG888, *How to Repeal a Rule*, by Jared P. Cole, and CRS Legal Sidebar WSLG1697, *With the Stroke of a Pen: What Executive Branch Actions Can President-elect Trump "Undo" on Day One?*, by Todd Garvey.

Restoring and Sustaining Great Lakes Ecosystems

Great Lakes Restoration Initiative

The Great Lakes are, from west to east: Superior, Michigan, Huron, Erie, and Ontario. They are a dominant part of the physical and cultural heritage of North America, and comprise the largest surface freshwater system on Earth.

Shared with Canada and spanning more than 750 miles (1,200 kilometers) these vast inland freshwater seas provide water for consumption, transportation, power, recreation and a host of other uses.

More than 30 million people live in the Great Lakes basin, and the impact of their daily activities, from the water consumed to the waste returned, directly affect the Great Lakes environment.

The Great Lakes Restoration Initiative (GLRI)[1] was launched in 2010 to accelerate efforts to protect and restore the Great Lakes by providing additional resources to make progress on the most critical long-term goals for this important ecosystem. The GLRI has been a catalyst for unprecedented federal agency coordination through the Interagency Task Force and the Regional Working Group, which are led by the U.S. Environmental Protection Agency (EPA). Collaborators include the U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, and National Oceanic and Atmospheric Administration. Grants are disseminated through collaborators to local NGOs and universities.

Action has been taken under the GLRI to address critical problem areas of the Great Lakes. GLRI resources have supplemented federal agency base budgets to fund the cleanup of critically altered areas of the Great Lakes that had not been previously addressed. Resources also have been applied to more than 2,000 projects to improve water quality, protect and restore native habitat and species, prevent and control invasive species, and solve or reduce other Great Lakes environmental problems.

The GLRI Action Plan II will guide collaborative activities through fiscal year 2019. Many of the goals will take decades to achieve.

Areas of Concern

Great Lakes clean up and restoration activities frequently focus on "Areas of Concern." These areas are defined under the 1987 Great Lakes Water Quality Agreement as geographic areas where significant impairment of beneficial uses has occurred as a result of human activities at the local level. At the time of the agreement, there were 43 areas of concern including contaminated or deformed fishes, eutrophication, toxic sediments, and habitat destruction. Areas of concern occur in all of the Great Lakes.

Impairments are defined by EPA as a change in the chemical, physical or biological integrity of the Great Lakes system sufficient to cause any of the following:[2]

1. Restrictions on fish and wildlife consumption
2. Tainting of fish and wildlife flavor
3. Degraded fish and wildlife populations
4. Fish tumors or other deformities
5. Bird or animal deformities or reproductive problems
6. Degradation of benthos (flora and fauna found at lake bottoms)
7. Restrictions on dredging activities
8. Eutrophication or undesirable algae
9. Restrictions on drinking water consumption or taste and odor problems
10. Beach closings
11. Degradation of aesthetics
12. Added costs to agriculture or industry
13. Degradation of phytoplankton and zooplankton populations
14. Loss of fish and wildlife habitat

Significant Environmental Challenges

Toxic Substances

Toxic substances enter the Great Lakes through multiple pathways including runoff and discharge, air, rivers and streams, groundwater, and sediment. Most toxins can be controlled at the source. However, the control of toxins stored in and released from sediments requires alternative means of management. Toxins in contaminated sediments persist for years after their initial discharge and leach into the environment over time. These persistent toxins are known as legacy contaminants.

This article is adapted from the Great Lakes Restoration Initiative Action Plan II, the second iteration to be implemented through FY 2019. The complete plan is available at https://www.glri.us/actionplan/pdfs/glri-action-plan-2.pdf.

[1] https://www.glri.us/index.html

[2] https://www.epa.gov/great-lakes-aocs/beneficial-use-impairments

Persistent concentrations of contaminants in the sediments of rivers and harbors cause risks to aquatic organisms, wildlife, and humans. Efforts to inform the public about persistent risks are ongoing. For example, advisories against fish consumption are in place in most locations around the Great Lakes. Outreach is focused on populations with the highest risk of contaminant exposure, including women who may become pregnant, children, urban anglers, tribal communities, and people who rely heavily on Great Lakes fish in their diets. Healthcare professionals are being advised to educate their patients about safe fish consumption choices, and to test blood contaminant levels as appropriate. Used in concert with pollution reduction and the targeted capping and dredging of problem sediments, exposure to Great Lakes contaminants can be limited.

Sea Lampreys feeding on a Lake Trout (Salvelinus namaycush)

Effects on Wildlife

Contaminants harm fish and wildlife. Research has informed our understanding of the presence and distribution of contaminants and routes of exposure. Negative impacts include increased feminization (vitellogenin) in male fish, decrease in overall size and ability to compete for mates; irregular courtship and nest guarding behavior; decreased reaction time and predator escape response; decreased population genetic diversity; declines in prey species populations, and declines in sportfish populations. Even with proper harvest management and habitat restoration, Great Lakes fish stocks can be optimized only if harmful toxins are effectively managed.

Scientists will continue to evaluate emerging contaminants that have the greatest potential to adversely impact Great Lakes fish and wildlife. Laboratory and field studies will be conducted to evaluate biological effects from chemical mixtures, evaluate long-term exposure of fish to contaminants, conduct additional field sampling where effects are being observed and sample other high priority wildlife such as migratory birds, mussels and amphibians. These projects are evaluated on an annual basis and the results are used to prioritize the design and implementation of future laboratory and field studies.

Invasive Species

Invasive species have significantly altered the Great Lakes ecosystem. Changes caused by invasive species have affected local economies, the national economy, fish and wildlife, and the health and well being of the people that rely on the Great Lakes for food, water, and recreation.

Invasive species enter the Great Lakes through canals and waterways, recreational boating, commercial shipping, illegal trade of banned species, release of aquarium species, release of live bait, and the spread of plant species purchased through nurseries, internet sales, and the water garden trade. Potential avenues of introduction are so numerous that extensive monitoring and control efforts must be employed.

Efforts to prevent the introduction of new invasive species are critical. Once an invasive species is established, it is difficult to control and eradication is frequently impossible. Though invasive species may be permanent once established, some invasive species can be managed. Management of invasive species proceeds with varying degrees of success.

A number of effective control technologies have been developed to manage invasive species in the Great Lakes. One of the longest-running and most effective invasive control technology programs has involved the selection of compounds to control sea lamprey populations.

Sea lampreys (Petromyzon marinus) are parasitic fish native to the Atlantic Ocean. They are unique from many other fishes in that they do not have jaws or other bony structures, and instead possess a skeleton made of cartilage. While sea lampreys resemble eels, they are not closely related and are set apart by their unique mouth: a large oral

sucking disk filled with sharp, horn-shaped teeth surrounding a razor-sharp rasping tongue. Sea lampreys attach to fish with their suction cup mouth then dig their teeth into flesh for grip. Once securely attached, sea lampreys rasp through the fish's scales and skin with their sharp tongue. Sea lampreys then feed on the fish's body fluids by secreting an enzyme that prevents blood from clotting, similar to how a leech feeds off its host.

In the Atlantic Ocean, co-evolutionary relationships have developed and sea lampreys typically do not kill their hosts. In the Great Lakes, where no such co-evolutionary link exists, sea lampreys act as predators, with each individual capable of killing up to 40 pounds (18 kilograms) of fish over their 12-18 month feeding period.

The first recorded observation of a sea lamprey in the Great Lakes was in 1835 in Lake Ontario. Niagara Falls served as a natural barrier, confining sea lampreys to Lake Ontario and preventing them from entering the remaining four Great Lakes. However, in the late 1800s and early 1900s, improvements to the Welland Canal, which bypasses Niagara Falls and provides a shipping connection between Lakes Ontario and Erie, allowed sea lampreys access to the rest of the Great Lakes.

Sea lampreys have had an enormous, negative impact on Great Lakes fisheries. Before the sea lamprey invasion, Canada and the United States harvested about 15 million pounds of lake trout in the upper Great Lakes each year. By the late 1940s, sea lamprey populations had exploded. They fed on large numbers of lake trout, lake whitefish, and ciscoes—fish that were the mainstays of a thriving Great Lakes fishery. By the early 1960s, the catch had dropped dramatically, to approximately 300,000 pounds, about 2% of the previous average.[3]

Sea lampreys are now being controlled with help from the Sea Lamprey Control Program. Sea Lamprey populations in the Great lakes have been reduced by 90%. The success of this program is due to a multi-year effort started in the 1950s to test almost 6,000 chemical compounds to identify the compound that most effectively controls sea lampreys without harming other species. Efforts are being taken under the GLRI to further refine sea lamprey control techniques and to develop similar targeted control methods for other invasive species impacting the Great Lakes ecosystem.

Surveillance has also proven vital in preventing the spread of invasive species through the Great Lakes. Surveillance programs have been utilized to form the foundation for a multi-species early detection network. Partner agencies under the GLRI have responded to several detections, including red swamp crayfish in Wisconsin, grass carp in Michigan, Hydrilla in New York, and eDNA for silver and bighead carp in the Chicago Area Waterway System. Response to these detections has allowed for expedient action to prevent further spread from points of introduction.

The risk of invasive species introduction due to ballast water discharges has also been reduced. According to the U.S. EPA, thirty percent of invasive species in the Great Lakes have been introduced through ship ballast water.

Zebra mussels are one of the most problematic invasive species in the Great Lakes basin. Zebra mussels clog water intakes, and grow over and outplace native mussels. They were likely introduced through the ballast water of a single ship that traveled from the Black Sea to the Great lakes in 1988.[4]

Thanks to increased efforts, no new introductions have occurred through the ballast water pathway since 2006.

Efforts to prevent the introduction of new invasive species have also involved

Cross section of a pipe clogged with zebra mussels

[3] http://www.glfc.org/sealamp/

[4] https://nas.er.usgs.gov/queries/factsheet.aspx?speciesID=5

working with Great Lakes states to conduct rapid response actions or exercises, blocking pathways through which aquatic invasive species can be introduced to the Great Lakes ecosystem, and conducting early detection monitoring activities.

These techniques have been used to prevent bighead and silver (Asian) carp from becoming established in the Great Lakes ecosystem. These carps have the potential to alter Great Lakes ecosystems due to their voracious consumption of plankton that would overlap with native and economically important fishes of the Great Lakes. Asian carp have already been introduced to the Illinois and Mississippi Rivers. As Asian carp continue to spread north, the Great Lakes are now at risk. An artificial connection—known as the Chicago Waterway System—connects the Great Lakes to the Illinois River, which connects to the Mississippi River. This waterway system provides a potential pathway for entry to the Great Lakes, and if Asian carp enter the Great Lakes they will likely spread throughout the basin due to the natural and man-made connections and the widespread distribution of suitable habitat.[5]

The Great Lakes Phragmites Collaborative facilitates communication across the region and serves as a resource center for information on *Phragmites* biology, management and academic research. *Phragmites australis* is a tall, perennial wetland grass found worldwide in wetlands, ditches, shorelines, and roadsides. Native *Phragmites* has been common to the Great Lakes region for centuries; however, a European strain of *Phragmites* (haplotype M) was introduced along the Atlantic coast approximately 200 years ago. This type is an aggressive invader that has been spreading rapidly across the continent, and has become a recognized threat to the ecological health of the wetlands of the Great Lakes region. Native vegetation is often displaced from areas where the invasive strain has colonized, and thus the control of *Phragmites* is vital to maintaining ecosystem health and biodiversity.[6]

Similar species-specific collaborations are being established for monecious *Hydrilla* and grass carp, as well as other invasive species.

Nonpoint Source Pollution

Nonpoint source pollutants significantly degrade Great Lakes water quality. Phosphorus is a major pollutant that enters nearshore areas as runoff from agricultural lands. This pollutant and other agricultural inputs threaten the Great Lakes ecosystem by contributing to harmful algal blooms that can cause human health effects, drinking water impairments, beach closures, exacerbated dead zones, and loss of recreational opportunities. Algal blooms can be seen from space in the western basin of Lake Erie, and in Lake St. Clair.

Nutrient runoff in watersheds is being reduced through a science-based adaptive management process to increase drinking water source protection; increase voluntary agricultural conservation practices to achieve downstream water quality improvements; track nutrient and sediment reductions achieved through conservation practices; use voluntary, incentive-based and existing regulatory approaches to reduce nutrient losses; encourage producers and agribusinesses to adopt innovative technologies and approaches to reduce nutrient runoff and soil losses; and educate agricultural producers about the links between long-term productivity, nutrient conservation and water quality.

Projects also are being implemented in urban areas to reduce stormwater's introduction of sediment, nutrients, toxic contaminants, and pathogen loadings to Great Lakes tributaries and nearshore waters. Green infrastructure projects reduce flooding, increase greenspace in urban areas and return vacant properties to productive use. Watershed management projects stabilize stream banks, increase forest cover, restore wetlands and improve water quality at beaches in urban areas.

Habitats and Species

A multitude of threats affect the health of Great Lakes habitats and

Asian carp leaping from the water in reaction to a boat wake

[5] http://www.asiancarp.us/documents/AsianCarp-TheProblem.pdf
[6] http://www.greatlakesphragmites.net/basics/phragmites-basics-intro/

species. Protection, restoration, and enhancement activities focus on open water, nearshore, connecting channels, coastal wetlands and other habitats. Dams are being removed, culverts are being replaced to create fish habitat and reconnect migratory species to Great Lakes tributaries, riparian and in-stream habitat are being improved to prevent erosion and to create sufficient habitat for aquatic species, and coastal wetlands are being protected and restored to sustain habitat necessary for populations of migratory native species. Also, offshore reefs are being rehabilitated to promote natural fish spawning, and wetlands and high-quality upland areas are being protected, restored, and managed to sustain diverse, complex, and interconnected habitats for species reproduction, growth, and seasonal refuge.

Algal blooms in lakes Erie and St. Clair

Future Challenges

Future conservation efforts should include work to lay foundations for future projects to protect and restore species diversity, reintroduce populations of native species to restored habitats and evaluate their survival, protect or restore species that are culturally significant to tribes in the Great Lakes region, manage invasive species that inhibit the sustainability of native species, pioneer species propagation and relocation techniques, and implement other activities necessary for the eventual recovery of federal and state threatened and endangered species.

Though clear improvements have been realized due to efforts of the GLRI, restoration of the Great Lakes is a work in progress. In order for successful restoration to continue, efforts to ensure that future conservation action is taken will be necessary.

Great Lakes restoration efforts will need to anticipate predicted impacts of climate change. Climate resiliency criteria must be developed and applied to the design and selection of projects. The standardized criteria will be developed using lessons learned from previous and ongoing projects and will also draw on federal agencies' climate adaptation plans and other project assessment tools. These criteria will ensure, for example, that restoration projects incorporate plant and tree species that are suitable for current and projected future climatic conditions. Similarly, these criteria will be used to design watershed restoration projects to take into account potential impacts of more frequent or intense storms on water flow, erosion and runoff.

News and Announcements

Renewable Natural Resources Foundation

Rajul (Raj) Pandya Joins RNRF Board of Directors

Rajul Pandya has joined the Board as AGU's representative. Pandya is the director of the American Geophysical Union's Thriving Earth Exchange, which connects scientists, communities, and sponsors and helps them work together to develop solutions that have local impact and global implications. Prior to working with AGU, Pandya worked as the director of Spark: Education and Outreach and the National Center for Atmospheric Research. Spark built exhibits, developed curriculum, and offered research experiences for students, teachers, and members of the public. All programs were related to climate and weather.

Pandya has managed internships and mentored students, taught in college and high school, collaborated with diverse communities internationally and in the U.S., and worked on educational technology. He has led multi-disciplinary efforts to increase diversity in the sciences, manage meningitis vaccines more effectively in Africa, and improve student learning of weather and climate.

Rajul (Raj) Pandya

Pandya is a founding member of the board of the Citizen Science Association, a new member of the board for Public Lab, and chair of the National Academies study committee on "Designing Citizen Science to Support Science Learning." He holds a Ph.D. from University of Washington in atmospheric science.

American Geophysical Union

New Study Models Shoreline Change in Southern California

Using a newly-developed computer model called "CoSMoS-COAST" (Coastal Storm Modeling System – Coastal One-line Assimilated Simulation Tool) scientists predict that with limited human intervention, 31 to 67 percent of Southern California beaches may become completely eroded (up to existing coastal infrastructure or sea-cliffs) by the year 2100 under scenarios of sea-level rise of one to two meters.

"Beaches are perhaps the most iconic feature of California, and the potential for losing this identity is real. The effect of California losing its beaches is not just a matter of affecting the tourism economy. Losing the protecting swath of beach sand between us and the pounding surf exposes critical infrastructure, businesses and homes to damage. Beaches are natural resources, and it is likely that human management efforts must increase in order to preserve them," said Sean Vitousek, who was a post-doctoral fellow at the U.S. Geological Survey when he conducted this study. Vitousek is now a professor in the Department of Civil & Materials Engineering at the University of Illinois at Chicago, and lead author of the new study accepted for publication in the Journal of Geophysical Research: Earth Surface, a publication of the American Geophysical Union.

Although a majority (72 percent) of beaches in Southern California show historical trends of accretion or getting larger (due to large artificial beach nourishments since the 1930s), future predictions indicate that nearly all of the beaches will experience erosion (will get smaller) due to accelerated sea-level rise.

"Beaches in Southern California are a crucial feature of the economy, and the first line of defense against coastal storm impacts for the 18 million residents in the region. This study indicates that we will have to perform massive and costly interventions to preserve these beaches in the future under the erosive pressures of anticipated sea level rise, or risk losing many of the economic and protective benefits beaches provide," said USGS geologist and coauthor, Patrick Barnard.

Important for coastal hazard assessment and management planning, CoSMoS–COAST is a numerical model used to predict shoreline-change due to both sea level rise and changing storm patterns driven by climate change. The model takes into consideration sand transport both along the beach (due to longshore currents) and across the beach (cross-shore transport) by waves and sea-level rise. Although Southern California beaches are a complex mixture of dunes, bluffs, cliffs, estuaries,

river mouths, and urban infrastructure, the model is applicable to virtually any coastal setting. Additionally, the CoSMoS-COAST model uses information about historical shoreline positions and how beaches change in response to waves and climate cycles such as El Niño, to improve estimates and improve confidence in long-term prediction of coastline changes in Southern California.

Although shoreline change is very hard to predict, scientists are confident in the accuracy and reliability of the model's predictive capability applied to the forecast period (2010-2100), because of how accurately the model is able to reproduce the historical shoreline change between 1995 and 2010.

"The public already has to overcome obstacles in getting to the beach, from limited public transportation to illegally blocked pathways," said California Coastal Commission Executive Director John Ainsworth. "The prospect of losing so many of our beaches in Southern California to sea level rise is frankly unacceptable. The beaches are our public parks and economic heart and soul of our coastal communities. We must do everything we can to ensure that as much of the iconic California coast is preserved for future generations."

This news article was issued by the U.S. Geological Survey, the California Coastal Commision and AGU as a press release on March 27, 2017.

AGU Sends Letter to Federal Agencies Urging Protection of Scientific Integrity and Open Communication of Scientific Information

AGU wrote to federal agency heads on January 26, expressing concern over recent reports about violations of scientific integrity and interference with public access to and communication of scientific information.

In the letter AGU emphasized scientific integrity and transparency as critical to "advancing national security, a strong economy, public health, and food security." AGU calls on the agencies, and the administration, to reverse policies that threaten scientific integrity and open communication as soon as possible and urges that they not be reinstated.

"Access to scientific information improves and informs many aspects of our everyday lives," said Chris McEntee, AGU's Executive Director and CEO. "AGU will be monitoring to see if the policies have been lifted and whether the scientific information that is currently available remains. It is critical to our economic success, national security and public health that the American people continue to receive the most up-to-date scientific research and information."

The letter was sent to the following agencies and institutions:

Department of Agriculture
Department of Energy
Department of the Interior
Department of State
Environmental Protection Agency
National Aeronautics and Space Administration
National Oceanic and Atmospheric Administration
National Park Service
National Science Foundation
United States Geological Survey

AGU has a position statement related to scientific integrity entitled, "AGU Supports Free and Open Communication of Scientific Findings." The statement was adopted in 2011 and reaffirmed in September 2016.

In late 2016, AGU launched a petition calling on the new administration to make the appointment of a scientific advisor a top priority. The petition currently has nearly 9,000 signatures.

For more information contact AGU, 2000 Florida Avenue NW, Washington, DC 20009; (202) 462-6900, www.agu.org.

American Meteorological Society

AMS's Summer Policy Colloqium

The American Meteorological Society's Summer Policy Colloquium (SPC) is scheduled for June 4-13.

The SPC is a 10-day intensive introduction to the federal policy process for Earth scientists. Participants work through case studies and group exercises. They visit Capitol Hill and meet with policy officials from congress and the federal agencies. They learn from media experts, talk to policy researchers, and hear from corporate entrepreneurs–founders and leaders of large firms. Over the ten days, participants learn to engage the policy process more effectively and constructively.

To learn more visit www.ametsoc.org/spc, or contact AMS, 45 Beacon Street, Boston, MA 02108-3693

American Society of Civil Engineers

ASCE's New Infrastructure Report Card: Another D+, But Solutions Available

ASCE's 2017 Infrastructure report card offers the nation both bad news and good news.

The bad is the average grade, D-plus, has not changed since the last report card four years ago, reflecting a continued dire need of overhaul.

The good news is the report card says such an overhaul is still attainable, and offers suggested solutions that can make that overhaul happen.

While the overall infrastructure grade remains unchanged since 2013, seven of the 16 infrastructure categories assessed did see improvement: hazardous waste,

inland waterways, levees, ports, rail, schools, and wastewater.

Rail received the highest category grade–earning a B. Transit, meanwhile, received the lowest, a D-minus.

A team of 28 civil engineers from across the country with decades of expertise in all 16 categories prepared the report card. ASCE's Committee on America's Infrastructure amassed and assessed all relevant data and reports, consulting with technical and industry experts, and assigning grades using the following criteria: capacity, condition, funding, future need, operation and maintenance, public safety, resilience, and innovation.

The Infrastructure report card recommends three key steps toward raising the grades. Greg DiLoreto, former ASCE president and current chair of the CAI team that assembled the report card laid out the solutions at the release event: "… We are underfunded in our infrastructure, so the No. 1 solution is that we have to increase our investment in infrastructure, and we have to do that at all levels. At the federal, at the state, and at the local level. It has to be increased."

"Secondly, we again need leadership and planning in doing this. Those increases are going to be as a result of an actual enactment of legislation to create those. So we need our elected officials to be leaders and say, 'This is really important,' and we need the American public to say, 'This is important.'

"Finally, we have to look at how we do these projects as engineers. We need to build them sustainably, and we need to build them resilient. We need to look at the total life of that project, from the day we put a shovel in the ground until the day we retire that project– a cradle-to-grave approach in how we do this."

Investment, leadership, preparation for the future. Each is intertwined to the other, but it all starts with money. As former Pennsylvania Governor Edward G. Rendell said during the release event's panel discussion, "The key is investment, there's no getting around it." ASCE estimates that the nation's infrastructure needs a total of $2 trillion across the 16 categories through 2025. The report card estimates that a failure to do so, what Rendell called "the cost of doing nothing," would cause a $3.9 trillion hit to the gross domestic product by 2025, $7 trillion in lost business sales by 2025, and 2.5 million lost jobs by 2025.

Additional information regarding the report card, category grades, and state report cards and information, as well as infographics, videos, and other resources, can be found on www.infrastructurereportcard.org or via the Save America's Infrastructure app in the Google Play and App Stores.

For more information, contact ASCE, 1801 Alexander Bell Drive, Reston, VA 20191; (800) 548-2723. www.asce.org.

American Society of Landscape Architects

ASLA Named to List of Professional Societies Most Engaged on Climate Issues

The American Society of Landscape Architects is one of nine exemplar organizations exhibiting the most comprehensive approaches to educating and engaging their members on climate issues, according to a report released today by the Kresge Foundation.

The Kresge report, "Professional Societies and Climate Change," analyzes how professional societies are helping their members integrate climate change into their thinking and decision making. Researchers found that the professional societies most engaged on climate issues recognize the substantial impacts that climate change will have on their missions and membership.

ASLA has identified climate change as a key issue for its members, according to ASLA Executive Vice President and CEO Nancy Somerville, Hon. ASLA.

"ASLA is honored to be recognized by the Kresge Foundation," said Somerville. "Most landscape architects acknowledge the reality of climate change, and as a result their work helps make communities more resilient and better able to recover from disruptive climate events."

The Society provides substantial climate mitigation resources, including a policy statement on climate change and a code of environmental ethics; a Professional Practice Network focused on Sustainable Design and Development; a webpage on combating climate change with numerous mitigation-related resources; a resource guide on increasing energy efficiency and an energy efficient home landscapes animation. Various articles in Landscape Architecture Magazine (LAM) and ASLA's blog "The Dirt" are related to mitigation, such as a 2014 post on "How to create a climate change mitigation and adaptation plan." In addition, a working group was formed to provide input on model codes within ASHRAE 189.1 "Standards for the Design of High-Performance Green Buildings" specific to site sustainability and water use.

Climate adaption resources developed by ASLA includes a webpage on combatting climate change; resource centers for critical issues like storm water; resource guides on topics like green infrastructure, livable communities and sustainable transportation; and a new Guide to Resilient Design.

ASLA works with educators and schools through the Council of Educators of Landscape Architecture. ASLA's "Landscape Architecture Continuing Education System" (LACES™) has offered courses on adaptation, such as the 2012 "Landscape Systems, Urban Heat Island, and Climate Change: a landscape architecture approach to adapt." The Society helped to develop

The Sustainable Sites Initiative™ (SITES®), a rating system for the sustainable design, construction and maintenance of landscapes now owned by Green Business Certification Inc. (GBCI).

The Society is also engaged in political advocacy and public education on the topic of resilience and social justice. It will convene an interdisciplinary blue ribbon task force later this year to develop climate change and resilience related public policy recommendations.

The report was authored by independent climate adaptation consultant Dr. Missy Stults and Ph.D. researcher and consultant Sara Meerow.

For more information, contact ASLA, 636 Eye Street, NW, Washington, DC, 20001; (202) 898-2444, www.asla.org.

American Water Resources Association

Position Statement on Flood and Drought Approved by AWRA Board on January 27-28, 2017

Position Statement: In recognition that flood and drought frequently occur at great cost to society, AWRA recommends that communities overall—as well as mayors, city councils, and legislatures specifically—prepare themselves for these events.

AWRA recommends that negative impacts are best mitigated by integrated preparation for both flood and drought events. Such preparations include:

Develop and/or Strengthen Partnerships.

Establish or Enhance:

- coordination between public agencies and researchers to gather and process information and to ensure the results are publicly available and used to enhance public awareness;
- partnerships between actors with roles in mitigation, response, and recovery; and
- frameworks for engaging new sectors, such as public health or finance, during integrated preparation for management of extreme-flows.

Information Gathering and Synthesis.

Determine:

- the extent to which every community is vulnerable and how;
- which hydrometeorologic, hydrologic, hydraulic, or other conditions indicate differing stages of emergency;
- the historic location of impact by floods or droughts, and how changes in land use or land cover in watersheds including upstream impervious surface and geomorphology may change the location, strength or duration of floods or droughts, floodways, and flood discharge;
- what are the past and future economic, social, environmental, and other impacts of these events; and
- what new extremes may be expected based upon the best available climate science and where these are most likely to have special effect.

Designing Resiliency into Community Planning.

Ensure:

- alternate and redundant sources of water through use of conservation, water treatment, development and other strategies;
- regional technical support for small municipalities; and
- innovation in adopting and implementing policies, procedures, regulations, and zoning that allow flexibility while protecting human health, social systems, economic systems, the built environment, and natural systems, including floodplains, wetlands, and upland forested areas.

Communication and Education.

Encourage:

- education of flood and drought risk at primary and secondary educational institutions, as well as to the general public;
- financial institutions to engage stakeholders as to risk and incentives;
- simulation training for emergency managers and first responders; and
- the use of procedures and communication avenues to coordinate emergency managers and public information prior and during an extreme event.

For more information, contact AWRA, P.O. Box 1626, Middleburg, VA 20118; (540) 687-8390. www.awra.org.

Geological Society of America

Deadline to Apply for Annual Meeting Funding

The Deadline to Apply for Student Funding to Attend GSA's 2017 Annual Meeting is May 26th.

Join hundreds of students who have been provided with funding to attend their first GSA Annual Meeting. Travel awards are available to students from a diversity of backgrounds, and students from underrepresented groups are strongly encouraged to apply. As an "On to the Future" (OTF) awardee, you will have special opportunities to be paired with a meeting mentor and attend morning sessions connecting students with key GSA leaders.

Check the OTF website for eligibility guidelines and application information: http://www.geosociety.org/GSA/Education_Careers/Grants_Scholarships/otf/GSA/OTF/Apply.aspx or contact GSA for more information: P.O. Box 9140, Boulder, CO 80301; (303) 357-1806. www.geosociety.org.

Society of Environmental Toxicology and Chemistry

Meeting on Risk Assessment of Chemical Mixtures

SETAC North America will be holding a meeting on the "Risk Assessment of Chemical Mixtures: From Scientific Evidence to Environmental Regulation"

Understanding the joint toxicity of complex chemical exposures is essential in protecting the environment and public health.

Chemical management initiatives across the globe have prompted the need for sound science supporting oversight of chemical mixtures in the environment.

This SETAC North America Focus Topic Meeting on Risk Assessment of Chemical Mixtures will provide information on the latest advancements in fundamental and applied research that enable risk managers to make sound decisions. SETAC welcomes contributions addressing all chemical classes, exposure scenarios, biological levels of organization and facets of the risk assessment paradigm.

The meeting will be held from September 6-8, 2017 in Boulder, Colorado.

For more information, visit https://mixtures.setac.org/register-2/why-attend/. or contact SETAC, 229 S. Baylen Street, Pensacola, FL 32502; (850) 469-1500. www.setac.org.

Society of Wood Science and Technology

2017 IUFRO Conference

The 2017 International Union of Forest Research Organizations (IUFRO) Conference will take place from June 12-16, 2017 in Vancouver, BC. In recognition of the pressing global need for the forest sector to be a leader in sustainability, diversification, and innovation, the theme of the conference is "Forest Sector Innovations for a Greener Future."

This Innovation/Sustainability theme will form a unifying basis for the week-long Conference and will guide the agenda through a series of plenary sessions that will catalyze discussion on what the future forest products sector might look like. Each morning will feature two keynote presentations; one a research-based talk featuring a prominent academic, the other a more pragmatic, real-world talk featuring a prominent practitioner from industry, government, civil society, or an indigenous community. Plenary topics include:

- Forest Sector Innovation: How can innovative forest sector based environmental and social approaches assure a greener future for our global society?
- Innovations in Forest Products and Services: How will fiber and forests be used in the near and long term?
- Innovations in Wood Building and Design: What will the next generation's needs for shelter and buildings be and how will they be met?
- Innovations in Forest Management, Policy and Market: Will there be enough biomass and sustainable products to support the growing global population?
- Innovations in Business Models and Management: What will the businesses of forestry look like in the near and long-term?

For more information contact SWST, P.O. Box 6155, Monona, WI 53716; (608) 577-1342, www.swst.org.

International News

Food and Agriculture Organization of the United Nations

World's Future Food Security "In Jeopardy" Due to Multiple Challenges, Report Warns

Mankind's future ability to feed itself is in jeopardy due to intensifying pressures on natural resources, mounting inequality, and the fallout from a changing climate, warns a new FAO report.

Though very real and significant progress in reducing global hunger has been achieved over the past 30 years, "expanding food production and economic growth have often come at a heavy cost to the natural environment," says "The Future of Food and Agriculture: Trends and Challenges."

"Almost one-half of the forests that once covered the Earth are now gone. Groundwater sources are being depleted rapidly. Biodiversity has been deeply eroded," it notes.

As a result, "planetary boundaries may well be surpassed, if current trends continue," cautions FAO Director-General José Graziano da Silva in his introduction to the report.

By 2050 humanity's ranks will likely have grown to nearly 10 billion people. In a scenario with moderate economic growth, this population increase will push up global demand for agricultural products by 50 percent over present levels projects "The Future of Food and Agriculture," intensifying pressures on already-strained natural resources.

At the same time, greater numbers of people will be eating fewer cereals and larger amounts of meat, fruits, vegetables and processed food—a result of an ongoing global dietary transition that will further add to those pressures, driving more deforestation, land degradation, and greenhouse gas emissions.

Alongside these trends, the planet's changing climate will throw up additional hurdles. "Climate change will affect every aspect of food production," the report says. These include greater variability of precipitation and increases in the frequency of droughts and floods.

To reach zero hunger, we need to step up our efforts

The core question raised by today's FAO publication is whether, looking ahead, the world's agriculture and food systems are capable of sustainably meeting the needs of a burgeoning global population?

The short answer? Yes, the planet's food systems are capable of producing enough food to do so, and in a sustainable way, but unlocking that potential—and ensuring that all of humanity benefits—will require "major transformations."

Without a push to invest in and retool food systems, far too many people will still be hungry in 2030—the year by which the new Sustainable Development Goals (SDG) agenda has targeted the eradication of chronic food insecurity and malnutrition, the report warns.

"Without additional efforts to promote pro-poor development, reduce inequalities and protect vulnerable people, more than 600 million people would still be undernourished in 2030," it says. In fact, the current rate of progress would not even be enough to eradicate hunger by 2050.

Where will our food come from?

Given the limited scope for expanding agriculture's use of more land and water resources, the production increases needed to meet rising food demand will have to come mainly from improvements in productivity and resource-use efficiency.

However, there are worrying signs that yield growth is leveling off for major crops. Since the 1990s, average increases in the yields of maize, rice, and wheat at the global level generally run just over 1 percent per annum, the report notes.

To tackle these and the other challenges outlined in the report, "business-as-usual" is not an option, "The Future of Food and Agriculture" argues.

"Major transformations in agricultural systems, rural economies and natural resource management will be needed if we are to meet the multiple challenges before us and realize the full potential of food and agriculture to ensure a secure and healthy future for all people and the entire planet," it says.

"High-input, resource-intensive farming systems, which have caused massive deforestation, water scarcities, soil depletion and high levels of greenhouse gas emissions, cannot deliver sustainable food and agricultural production," adds the report.

More with less

The core challenge is to produce more with less, while preserving and enhancing the livelihoods of small-scale and family farmers, and ensuring access to food by the most vulnerable. For this, a twin-track approach is needed which combines investment in social protection, to immediately tackle undernourishment, and pro-poor investments in productive activities—especially agriculture and in rural economies—to sustainably increase income-earning opportunities of the poor.

The world will need to shift to more sustainable food systems which make more efficient use of land, water and other inputs and sharply reduce their use of fossil fuels, leading to a drastic cut of agricultural greenhouse gas emissions, greater conservation of biodiversity, and a reduction of waste. This will necessitate more investment in agriculture and agrifood systems, as well as greater spending on research and development, the report says, to promote innovation, support sustainable production increases, and find better ways to cope with issues like water scarcity and climate change.

Along with boosting production and resilience, equally critical will be creating food supply chains that better connect farmers in low- and middle-income countries to urban markets—along with measures which ensure access for consumers to nutritious and safe food at affordable prices, such as pricing policies and social protection programs, it says.

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