ECOSYSTEM SERVICES, THE MILLENNIUM ECOSYSTEM ASSESSMENT, AND THE CONCEPTUAL DIFFERENCE BETWEEN BENEFITS PROVIDED BY ECOSYSTEMS AND BENEFITS PROVIDED BY PEOPLE

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ABSTRACT

While the idea of ecosystem services is crucial to environmental decision-making, usage of the term "ecosystem services" is haphazard at best. The Millennium Ecosystem Assessment, reflecting the consensus of the largest group of experts ever assembled in the area of ecosystem change, encouraged increased coordination between international environmental agreement regimes and between these regimes and other international organizations. Increased coordination, however, cannot take place because of a lack of uniformity in the adoption of the Millennium Ecosystem Assessment's definition. Moreover, some States discourage the use of "ecosystem services" because its usage in the context of payment for environmental services programs has created the perception that people will have to pay for previously free benefits. To implement the Millennium Ecosystem Assessment's recommendations, decision-makers will have to draw a distinction between benefits provided by ecosystems and human protection of these ecosystems and use "ecosystem services" to refer to the former exclusively.

I. INTRODUCTION

Human beings depend on the environment for their survival.[1] While this idea has been around since antiquity,[2] the concept of

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[1] Millennium Ecosystem Assessment, ECOSYSTEMS AND HUMAN WELL-BEING: SYNTHESIS at 1 (2005) [hereinafter Millennium Ecosystem Assessment Synthesis].

"ecosystem services" developed in the late 1990s to represent critical services that facilitate the conditions and processes sustaining human existence.[3] Within the scientific community, the term "ecosystem services" refers to "the benefits human populations derive, directly or indirectly, from ecosystem functions" and includes both goods and services.[4] Ecosystem services include air and water purification, flood and drought mitigation, generation of soil, and pollination.[5]

The 1997 *Nature* article *The Value of the World's Ecosystem Services and Natural Capital*[6] first drew policymakers' attention to the notion of valuing ecosystem services and highlighted the importance of such valuation.[7] In this article, a team led by Robert Costanza explained that policymakers do not give enough weight to ecosystem services even though "[t]he economies of the Earth would grind to a halt without the services of ecological life-support systems."[8] Costanza's team estimated that ecosystems provide approximately $33 trillion (in 1994 dollars) worth of services per year, a value 1.8 times greater than the 1997 global gross national product.[9] They concluded by stressing the significance of ecosystem services and the potential impact to humanity if we continue to take ecosystem services for granted.[10]

Other scientists, including E.O. Wilson, have also utilized the term "ecosystem services" to place a quantitative value on biodiversity loss and highlight the futility of creating replacements capable of providing the

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[2] Harold A. Mooney & Paul R. Ehrlich, *Ecosystem Services: A Fragmentary History*, *in* NATURE'S SERVICES: SOCIETAL DEPENDENCE ON NATURAL ECOSYSTEMS 11, 11 (Gretchen C. Daily ed., 1997).

[3] EDWARD O. WILSON, THE FUTURE OF LIFE 106 (2002); James Salzman et al., *Protecting Ecosystem Services: Science, Economics, and Law*, 20 STAN. ENVTL. L.J. 309, 310 (2001).

[4] Robert Costanza et al., *The Value of the World's Ecosystem Services and Natural Capital*, 387 NATURE 253, 253 (1997).

[5] Gretchen C. Daily, *Introduction: What are Ecosystem Services?*, *in* NATURE'S SERVICES: SOCIETAL DEPENDENCE ON NATURAL ECOSYSTEMS 1, 3-4 (Gretchen C. Daily ed., 1997).

[6] Costanza et al., *supra* note 4.

[7] Nature Magazine, *Audacious Bid to Value the Planet Whips up a Storm*, 395 NATURE 430, 430 (1998).

[8] Costanza et al., *supra* note 4, at 253.

[9] *Id.* at 253, 259. A more recent study has valued the ecosystem services insects provide within the United States at $57 billion. John E. Losey & Mace Vaughan, *The Economic Value of Ecological Services Provided by Insects*, 56 BIOSCIENCE 311, 312 (2006). The study focused on services provided by wild native insects in the areas of dung burial ($380 million), pest control ($4.5 billion), pollination ($3.07 billion), and wildlife nutrition ($49.93 billion). *Id.* at 311-312, 314-316, 319-320.

[10] Costanza et al., *supra* note 4, at 259.

same services.[11] Businesses, non-governmental organizations, States and other international fora have also adopted the concept.[12] However, a multitude of terms have been adopted to refer to the benefits ecosystems provide to people, including the terms "ecosystem services," "ecosystem benefits/services," "services," "environmental services and benefits," and "environmental services."[13]

A recent article suggests that "ecosystem services," as defined by the Millennium Ecosystem Assessment,[14] should be the preferred term to describe the benefits human populations derive from ecosystems because it conveys the value of these services and the harmful impact their degradation would present.[15] The Millennium Ecosystem Assessment used the term "to *assess the consequences of ecosystem change for human well-being* and to establish the scientific basis for actions needed to enhance the conservation and *sustainable use of ecosystems* and their contributions to human well-being."[16] While the most widely used term to describe this type of benefits remains "ecosystem services," some States have expressed concerns that the use of the term "ecosystem services" implies that individuals must pay for these previously free benefits and have opted for using alternate terms instead.[17] In turn, this has led to confusion and resistance to incorporate ecosystem services in policy discussions at the international level.[18]

This Article will compare how different terms relating to "ecosystem services" have been defined and used in various international fora to understand why some States view this term as implying payment for the benefits derived from ecosystems. Part II will describe the

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[11] WILSON, *supra* note 3, at 105-112; Daily, *supra* note 5, at 9-10.

[12] *See*, *e.g.* Goldman Sachs, *Goldman Sachs Environmental Policy Framework*, http://www2.goldmansachs.com/our_firm/our_culture/corporate_citizenship/environmental_policy_framework/docs/EnvironmentalPolicyFramework.pdf (last accessed Aug. 30, 2007); Manal Hefny et al., Millennium Ecosystem Assessment, *Linking Ecosystem Services and Human Well-being*, *in* ECOSYSTEMS AND HUMAN WELL-BEING: MULTISCALE ASSESSMENTS, VOLUME 4 (Doris Capistrano et. al. eds., 2005); Commission on Ecosystem Management, IUCN, *Ecosystem Management: Ecosystem Services*, http://www.iucn.org/themes/cem/ourwork/ecservices/index.html (last accessed Aug. 30, 2007).

[13] *See infra* Part III.

[14] See Part II for more information regarding the Millennium Ecosystem Assessment.

[15] Walter Reid et. al., *'Ecosystem Services': A Vital Term in Policy Debates*, SCIENCE AND DEVELOPMENT NETWORK, August 1, 2005, http://www.scidev.net/Editorials/index.cfm?fuseaction=readEditorials&itemid=166&language=1.

[16] Millennium Ecosystem Assessment, *supra* note 1, at v (emphasis added).

[17] Walter Reid et. al., *supra* note 15.

[18] *See id.*

Millennium Ecosystem Assessment and its definition of ecosystem services. Part III will focus on the lack of uniformity in how the Millennium Ecosystem Assessment definition has been adopted by States and international organizations. Part IV analyzes alternate definitions of ecosystem services formulated within the context of payment for environmental services[19] programs and their impact on international policymaking related to the Millennium Ecosystem Assessment. Part V concludes that confusion created by the use of the term "ecosystem services" in the payment for environmental services context can be corrected by distinguishing between benefits provided by ecosystems and human protection of these ecosystems.

II. THE MILLENNIUM ECOSYSTEM ASSESSMENT'S DEFINITION OF ECOSYSTEM SERVICES

In the middle of the 1990s, scientists and people working within the regimes established by international environmental agreements recognized the need for an international ecosystem assessment.[20] Major advances in ecology, economics, and other fields were poorly reflected in policy discussions regarding ecosystems.[21] And then-existing mechanisms did not satisfy the fundamental need for scientific data to implement international environmental agreements.[22] The United Nations Environment Programme (the "UNEP"), the National Aeronautics and Space Administration, and the World Bank published a draft international assessment written by a panel composed of forty leading scientists in 1998.[23] This draft called for an integrated assessment process that could highlight the linkages between issues related to climate, biodiversity, desertification, and forestry.[24]

After this call to action, United Nations Secretary-General Kofi Annan called for the Millennium Ecosystem Assessment in 2000.[25] The Millennium Ecosystem Assessment described its goal as "assess[ing] the

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[19] The phrase "payment for environmental services" will be used to refer to programs labeled "payment for ecosystem services" or "payment for environmental services."

[20] Millennium Ecosystem Assessment, *History of the Millennium Ecosystem Assessment*, http://www.millenniumassessment.org/en/History.aspx (last visited Aug. 30, 2007).

[21] *Id.*

[22] *Id.*

[23] *Id.*

[24] *Id.*

[25] Millennium Ecosystem Assessment, *Overview of the Millennium Ecosystem Assessment*, http://www.millenniumassessment.org/en/About.aspx (last visited Aug. 30, 2007).

consequences of ecosystem change for human well-being and the scientific basis for action needed to enhance the conservation and sustainable use of those systems and their contribution to human well-being."[26] Between 2001 and 2005, an international network of 1300 natural and social scientists and other experts from ninety-five countries assessed previously available knowledge, scientific literature, and data through a format modeled on the Intergovernmental Panel on Climate Change.[27] The Millennium Ecosystem Assessment's final products, four technical volumes, were reviewed by forty-four governments, nine scientific organizations, and over 600 individual reviewers from around the globe.[28] Consequently, the Millennium Ecosystem Assessment's findings reflect the consensus of the largest group of natural and social scientists ever assembled to assess knowledge in the area of ecosystem change.[29]

The fundamental basis of the Millennium Ecosystem Assessment's work was the idea of ecosystem services.[30] The Millennium Ecosystem Assessment referred to the scientific literature[31] when defining "ecosystem services" as

> the benefits people obtain from ecosystems. These include provisioning services such as food, water, timber, and fiber; regulating services that affect climate, floods, disease, wastes, and water quality; cultural services that provide recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling.[32]

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[26] *Id.*

[27] *Id. See generally* Dagmar Lohan, *Assessing the Mechanisms for the Input of Scientific Information into the UNFCCC*, 17 COLO. J. INT'L ENVTL. L. & POL'Y 249, 265-79 (2006) (describing the format followed by the Intergovernmental Panel on Climate Change to gather the information necessary for the implementation of the United Nations Framework Convention on Climate Change).

[28] Millennium Ecosystem Assessment, *supra* note 25.

[29] *Id.*

[30] Millennium Ecosystem Assessment Synthesis, *supra* note 1, at v.

[31] MILLENNIUM ECOSYSTEM ASSESSMENT, *Ecosystems and Their Services*, *in* ECOSYSTEMS AND HUMAN WELL-BEING: A FRAMEWORK FOR ASSESSMENT 54-55 (2003) (citing Robert Costanza et al., *The Value of the World's Ecosystem Services and Natural Capital*, 387 NATURE 253, 253 (1987) and Gretchen C. Daily, *Introduction: What are Ecosystem Services?*, *in* NATURE'S SERVICES: SOCIETAL DEPENDENCE ON NATURAL ECOSYSTEMS 1, 3 (Gretchen C. Daily ed., 1997)).

[32] MILLENNIUM ECOSYSTEM ASSESSMENT, *supra* note 31, at 49; Millennium Ecosystem Assessment Synthesis, *supra* note 1, at v; *see also* Evaluación de los Ecosistemas del Milenio [Millennium Ecosystem Assessment], Ecosistemas y Bienestar Humano:

Provisioning services are the products humans acquire from ecosystems.[33] Regulating services are defined as "the benefits obtained from the regulation of ecosystem processes."[34] Cultural services are those "nonmaterial benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences."[35] Supporting services are described as the necessary services for the production of all ecosystem services whose impact on human populations are indirect or long-term.[36]

The Millennium Ecosystem Assessment presented four major findings for decision-makers. First, humans have caused a substantial and irreversible biodiversity loss by altering ecosystems during the last fifty years faster and more extensively than ever.[37] Second, changes to ecosystems have led to improved human well-being and economic development but at the cost of the degradation of many ecosystem services.[38] Third, this degradation of ecosystem services could grow worse during the next fifty years.[39] Fourth, it is possible to reverse the degradation of ecosystem services while meeting increasing demands for services if policies, institutions, and practices are changed according to the suggestions of the Millennium Ecosystem Assessment.[40]

One suggested change is increased coordination between international environmental agreement regimes and between international environmental agreement regimes and other international organizations.[41]

Oportunidades y Desafíos Para las Empresas y la Industria [Ecosystems and Human Well–being: Opportunities and Challenges for Business and Industry] 3 (2005) (defining "servicios de los ecosistemas" as "los beneficios que los seres humanos obtienen de los ecosistemas, y son producidos por interacciones dentro del ecosistema"); Manal Hefny et al., *supra* note 12, at 45 ("Ecosystem services are the benefits that people obtain from ecosystems, including food, natural fibers, a steady supply of clean water, regulation of pests and diseases, medicinal substances, recreation, and protection from natural hazards such as floods."); Millennium Ecosystem Assessment, *Reader's Guide and Acknoledgements*, *in* Ecosystems and Human Well-being: Wetlands and Water Synthesis at v (2005) [hereinafter Millennium Ecosystem Assessment Wetlands] (defining "ecosystem services" as "the benefits people obtain from ecosystems" and including a description of the four types of ecosystem services).

[33] MILLENNIUM ECOSYSTEM ASSESSMENT, *supra* note 31, at 56.

[34] *Id.* at 57.

[35] *Id.* at 58.

[36] *Id.* at 59.

[37] Millennium Ecosystem Assessment Synthesis, *supra* note 1, at 1.

[38] *Id.*

[39] *Id.*

[40] *Id.*

[41] *Id.* at 20.

The Millennium Ecosystem Assessment suggests that this increased coordination is necessary to ensure that international environmental agreement regimes, other international organizations, and national institutions do not hinder each other's work.[42] Because communication would be essential to this proposed coordination, the importance of having different international environmental agreement regimes, international organizations, and national institutions speaking the same language becomes apparent.

Several international environmental agreement regimes, international organizations, and national institutions have adopted the Millennium Ecosystem Assessment's terminology and are on their way to implementing the Millennium Ecosystem Assessment's recommended increase in coordination. The Millennium Ecosystem Assessment's definition of "ecosystem services" has been used by the scientific community,[43] the U.N. Food and Agriculture Organization (the "FAO"),[44] the UNEP,[45] the U.N. Economic Commission for Europe (the "UNECE"),[46] and the United States Department of Agriculture Forest Service.[47] The Subsidiary Body on Scientific, Technical and Technological Advice for the Convention on Biological Diversity[48] (the "CBD SBSTTA"), while not defining the term directly, has stated that some of its documents are consistent with the terminology used by the Millennium Ecosystem Assessment, including the term "ecosystem services."[49] Furthermore, Ducks Unlimited Canada and Nature

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[42] Millennium Ecosystem Assessment Synthesis, *supra* note 1, at 20.

[43] *E.g.* Claire Kremen & Richard S. Ostfeld, *A Call to Ecologists: Measuring, Analyzing, and Managing Ecosystem Services*, 3 FRONTIERS ECOLOGY & ENV'T 540, 540 (2005); Jeffrey D. Sachs & Walter V. Reid, *Investments Toward Sustainable Development*, 312 SCIENCE 1002, 1002 (2006).

[44] U.N. Food and Agriculture Organization, *FAO/Netherlands Conference: Glossary*, http://www.fao.org/ag/wfe2005/glossary_en.htm (last accessed Aug. 30, 2007).

[45] U.N. Environment Programme, *GEO: Global Environment Outlook – GEO Year Book 2006*, http://www.unep.org/geo/yearbook/yb2006/011.asp (last accessed Aug. 30, 2007).

[46] U.N. ECONOMIC COMMISSION FOR EUROPE [UNECE], CONVENTION ON THE PROTECTION AND USE OF TRANSBOUNDARY WATERCOURSES AND INTERNATIONAL LAKES, NATURE FOR WATER: INNOVATIVE FINANCING FOR THE ENVIRONMENT 4 (2006), *available at* http://www.ramsar.org/key_unece_water_brochure02.pdf.

[47] United States Department of Agriculture Forest Service, *Valuing Ecosystem Services*, http://www.fs.fed.us/ecosystemservices/introduction.shtml (last accessed Aug. 30, 2007).

[48] Convention on Biological Diversity, June 5, 1992, 1760 U.N.T.S. 79.

[49] Convention on Biological Diversity, Subsidiary Body on Scientific, Technical and Technological Advice, *Draft Guidance on Biodiversity-Inclusive Strategic Environmental Assessment*, Annex III ¶ 5, U.N. Doc. UNEP/CBD/SBSTTA/11/INF/19 (2005).

Conservancy Canada use the term "ecosystem services" in a manner consistent with the Millennium Ecosystem Assessment's approach.[50]

However, two problems hindering the uniform usage of "ecosystem services" as defined by the Millennium Ecosystem Assessment have emerged. First, the use of multiple terms to refer to the benefits ecosystems provide to people has created confusion and indicates a lack of consensus among international environmental agreement regimes, international organizations, and national institutions.[51] Second, the use of the term "ecosystem services" within the context of payment for environmental services has created the misconception that people will have to pay for benefits ecosystems provide to people rather than for services people provide to protect ecosystems.[52] These problems will be addressed in the next two parts of this Article.

III. THE LACK OF UNIFORMITY IN THE ADOPTION OF THE MILLENNIUM ECOSYSTEM ASSESSMENT'S DEFINITION OF ECOSYSTEM SERVICES

A survey of the practice of international environmental agreement regimes, international organizations, and States demonstrates that the concerns regarding the diversity of definitions of "ecosystem services" are well founded. While agreement regimes, organizations, and States have increasingly acknowledged the importance of the benefits people obtain from ecosystems, the use of the term "ecosystem services" to refer to these benefits has not been uniform.

The Committee for the Review of the Implementation of the Convention to Combat Desertification[53] (the "CRIC") recently decided to replace the term "ecosystem services" with "ecosystem protection, rehabilitation and restoration in drylands" because there was a lack of

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[50] NANCY OLEWILER, THE VALUE OF NATURAL CAPITAL IN SETTLED AREAS OF CANADA 2-5 (Ducks Unlimited Canada & the Nature Conservancy of Canada 2004) ("[E]nvironmental and ecosystem resources . . . are assets that yield goods and services over time (goods and services that are essential to the sustained health and survival of our population and economy)."). The report defines "ecosystems or environmental capital" as "systems that provide essential environmental goods and services such as our atmosphere and waste assimilation provided by wetlands." *Id.* at 1. Elsewhere, the report lists examples of "Ecosystem Services" as "Goods and Services Provided", such as carbon storage and sequestration, water regulation, water supply and treatment, and other benefits that ecosystems provide people. *Id.* at 4.

[51] *See infra* Part III.

[52] *See infra* Part IV.

[53] United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Draught and/or Desertification, Particularly in Africa, June 17, 1994, 1954 U.N.T.S. 3.

consensus on the meaning of "ecosystem services."[54] The CRIC concluded that "ecosystem services had not yet been defined" despite specifically referring to the Millennium Ecosystem Assessment and its emphasis on ecosystem services.[55] Consequently, the phrase "ecosystem protection, rehabilitation and restoration in drylands" is currently used in documents relating to this convention instead of the more generally accepted "ecosystem services."[56]

The Ramsar Convention[57] Conference of the Parties (the "COP"), for its part, has not used the term "ecosystem services" exclusively when promoting sustainability. The Ramsar COP requested the Scientific and Technical Review Panel (the "STRP") to

> report to COP9 concerning identified gaps and disharmonies in defining and reporting . . . giving priority to advice and guidance on practical matters on issues that should include . . . evaluating the values and functions, goods and services provided by wetlands.[58]

The STRP subsequently recognized that the Millennium Ecosystem Assessment stated that the use of "ecosystem services" corresponded to the phrase "products, functions and attributes" as used by the COP in the Ramsar definition of "ecological character."[59] Document 16, prepared for Ramsar COP9, used the term "ecosystem services" exclusively.[60] In Ramsar Resolution IX.1, however, the COP decided to use "ecosystem

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[54] CONVENTION TO COMBAT DESERTIFICATION, X REGIONAL MEETING OF THE LATIN AMERICAN AND THE CARIBBEAN COUNTRY PARTIES [XLAC], FINAL REPORT 48 note 6 (2005), http://www.unccd.int/regional/lac/meetings/regional/XLAC2005/report-eng.pdf.

[55] Convention to Combat Desertification, Committee for the Review of the Implementation of the Convention [CRIC3], June 23, 2005, *Report of the Committee on Its Third Session*, ¶ 61, U.N. Doc. ICCD/CRIC(3)/9, http://www.unccd.int/cop/officialdocs/cric3/pdf/9eng.pdf.

[56] CRIC3, *supra* note 55, at ¶¶ 48, 55; XLAC, *supra* note 54, at 48.

[57] Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat, Feb. 2, 1971, 996 U.N.T.S. 245, 11 I.L.M. 969 (entered into force Dec. 21, 1975), *available at* http://ramsar.org/key_conv_e.htm.

[58] Ramsar Res. VIII.7, ¶ 15(b), Conference of the Parties, 8th Meeting, http://www.ramsar.org/res/key_res_viii_07_e.pdf (Nov. 18-26 2002).

[59] Ninth Meeting of the Ramsar Conference of the Parties [COP9], Nov. 8-15, 2005, *Rationale for Proposals for* A Conceptual Framework for the Wise Use of Wetlands *and the Updating of Wise Use and Ecological Character Definitions*, ¶¶ 23-25, Ramsar COP9 Doc. 16, http://www.ramsar.org/cop9/cop9_doc16_e.pdf; *see* Millennium Ecosystem Assessment Wetlands, *supra* note 32, at v (relating Millennium Ecosystem Assessment's definition of "ecosystem services" to Ramsar's definition of "ecological character").

[60] COP9, *supra* note 59, at ¶¶ 5, 6(vi), 21-26.

benefits/services" as a synonym for the Millennium Ecosystem Assessment's definition of "ecosystem services."[61]

While the Ramsar COP has utilized the term "ecosystem benefits/services" as a synonym for the Millennium Ecosystem Assessment's definition of "ecosystem services,"[62] other organizations that have used the term "ecosystem benefits" have not defined it. For example, the International Union for Conservation of Nature has used the term "ecosystem benefits" interchangeably with "ecosystem services" without defining either term[63] while the CBD SBSTTA has used the terms "ecosystem benefits," "ecosystem services," and "environmental services" interchangeably without defining these terms.[64] This use of "ecosystem benefits" fails to clarify the relationship between the terms and instead creates confusion.

Other organizations and States also adopted the Millennium Ecosystem Assessment's conceptualization of "ecosystem services" under a different term. The UNEP, in a document dated shortly after the Millennium Ecosystem Assessment formulated its definition, uses the term "ecological services" to "refer[] to the conditions and processes through

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[61] Ramsar Res. IX.1, Annex A ¶¶ 8-9, 23-24, Conference of the Parties, 9th Meeting, http://www.ramsar.org/res/key_res_ix_01_annexa_e.pdf (Nov. 8-15, 2005).

[62] *Id.* at Annex A ¶ 23-24.

[63] *E.g.* International Union for Conservation of Nature [IUCN], *Economic Valuation of Ecosystem Services for Water Resources Management*, http://www.iucn.org/themes/wani/value/keymessages.html (last accessed June 19, 2006); Achim Steiner, Director General, IUCN, Statement at the 13th Session of the UN Commission on Sustainable Development: IUCN Statement on Integrated Water Resources Management (April 21, 2005), *available at* http://www.un.org/esa/sustdev/csd/csd13/statements/2204_iucn.pdf; IUCN, *IUCN Report Shows the Profits of Investing in Ecosystems for Water* (Nov. 20, 2004), http://app.iucn.org/congress/documents/press/2004-11-20-wani.pdf.

[64] *See* Convention on Biological Diversity, Subsidiary Body on Scientific, Technical and Technological Advice, *Report of the Subsidiary Body on Scientific, Technical and Technological Advice on the Work of its Eleventh Meeting*, 48-49, U.N. Doc. UNEP/CBD/COP/8/3 (2005) (mentioning "that biodiversity and its resources and functions provide important **ecosystem services** to humankind[,]" "that identifying and assessing the value of biodiversity and the **environmental services** it provides can be an incentive in itself," and calling for the "valuation of biodiversity resources and functions and associated **ecosystem benefits**") (emphasis added).

which natural ecosystems sustain and fulfil [sic] human life."[65] The UNEP uses this term interchangeably with "ecosystem benefits."[66]

Another term for "ecosystem services" as defined by the Millennium Ecosystem Assessment can be found in a recently proposed rule by the United States Army Corps of Engineers ("Corps of Engineers") that seeks "to replace aquatic resource functions, services, and values that are lost to permitted impacts" through a compensatory mitigation system.[67] The Corps of Engineers defines "services" as "the benefits that human populations receive from functions that occur in aquatic resources and other ecosystems. For example, providing habitat for birds is a biological function of some aquatic habitat types, which in turn provides bird watching services to humans."[68] According to the proposed rule, "aquatic resource services" "can only be accomplished when people have opportunities to interact with those aquatic resources."[69] As such, the term "services" is defined in accordance with the Millennium Ecosystem Assessment's definition of "ecosystem services."

The World Wide Fund for Nature ("WWF") follows a similar approach. In its brochure advocating payments for environmental services programs,[70] the WWF explains that "[n]atural ecosystems provide a wide range of *environmental services*[] from which people benefit, and upon

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[65] UNEP, International Environmental Technology Centre, Division of Technology, Industry and Economics, *Environmentally Sound Technologies for Sustainable Development* 21 (revised Sept. 21, 2003), *available at* http://www.unep.or.jp/ietc/techTran/focus/SustDev_EST_background.pdf.

[66] *See id.* ("Public awareness of the value of these **ecosystem benefits** is essential for the development and implementation of public policies for the protection of important habitats. It is therefore important to determine the values of these **ecological services**.") (emphasis added).

[67] Compensatory Mitigation for Losses of Aquatic Resources, 71 Fed. Reg. 15,520, 15,522 (proposed Mar. 28, 2006).

[68] *Id.* at 15,525.

[69] *Id.* at 15,522.

[70] Thailand has defined payment for environmental services within the forestry context as "[a]ny national system which involves rewarding local stakeholders for decreased deforestation or degradation." United Nations Framework Convention on Climate Change, Subsidiary Body for Scientific and Technological Advice, *Views on the Range of Topics and Other Relevant Information Relating to Reducing Emissions from Deforestation in Developing Countries: Submissions from Parties*, 81, http://unfccc.int/resource/docs/2007/sbsta/eng/misc02.pdf (Mar. 2, 2007) [hereinafter UNFCCC Party Submissions]. For more information on payment for environmental services programs, see *infra* Part IV.

which all life depends."[71] The WWF further explains that "environmental services" and "ecosystem services" are synonyms.[72] The WWF provides no support for either of these two statements.[73] While the WWF cites the Millennium Ecosystem Assessment in this report, it does not directly incorporate the Millennium Ecosystem Assessment's terminology or explain why it failed to do so.[74]

In the late 1990s, several States began incorporating the term "environmental services" in national environmental legislation. El Salvador and Perú did not define the term, but recognized that natural resources provided "environmental services."[75] El Salvador has made the conservation of "environmental services and benefits" one of the goals of its program for managing legally protected natural areas.[76] El Salvador defines "environmental services and benefits" as "those natural processes and conditions of ecosystems . . . through which human beings obtain benefits."[77] Salvadorian legislation specifically identified oxygen production, carbon fixation, climate regulation, and the protection of biodiversity and hydrological resources as "environmental services" provided by forests.[78]

Mexico has been using similar terminology since at least 1992. Mexico's National Waters Law defines "environmental services" as "[t]he benefits of social interest that are generated or derived from the

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[71] WORLD WILDLIFE FUND, PAYMENTS FOR ENVIRONMENTAL SERVICES: AN EQUITABLE APPROACH FOR REDUCING POVERTY AND CONSERVING NATURE 2 (2006), *available at* http://assets.panda.org/downloads/pes_report_2006.pdf (emphasis added).

[72] *Id.*

[73] *Id.*

[74] *Id.*

[75] Ley de Medio Ambiente de El Salvador Art. 14(a), Legis. Decree No. 233 (May 4, 1998) (El Sal.) (available at http://www.cesta-foe.org/recursos/pdfs/Ley_de_medio_ambiente.pdf); Reglamento de la Ley de Áreas Naturales Protegidas Art. 88, Sup. Decree No. 038-2001-AG, (June 22, 2001) (Perú), *available at* http://biblioteca.unmsm.edu.pe/redlieds/Recursos/archivos/Legislacion/Peru/DS038-2001-AG.pdf; Ley Orgánica Para el Aprovechamiento Sostenible de los Recursos Naturales Art. 10, Law No. 26821 (June 25, 1997) (Perú), *available at* http://www.congreso.gob.pe/comisiones/1996/ambiente/lib01/ 9.htm.

[76] Ley de Áreas Naturales Protegidas Art. 16(c), Legis. Decree No. 579 (Feb. 15, 2005) (El Sal.), *available at* http://www.marn.gob.sv/patrimonio/Ley_ANP_15022005.pdf.

[77] The original Spanish text reads, "**BIENES Y SERVICIOS AMBIENTALES**: Son aquellas condiciones y processos naturales de los ecosistemas, incluyendo las provenientes de las especies y los genes, por medio de las cuales el ser humano obtiene beneficios." *Id.* at Art. 4 (emphasis in original).

[78] Ley de Medio Ambiente de El Salvador, *supra* note 75, at Art. 77(a); *see also id* at Art. 78 (e) (recognizing the environmental services provided by legally-protected natural areas).

hydrological basins and their components," including climate regulation, erosion control, flood control, soil formation, water purification, and carbon sequestration.[79] The Mapimí Notice, produced by the Mexican Secretary of the Environment and Natural Resources, defines "environmental services" as "the capacity ecosystems have to generate useful products for man," including gas regulation, scenic beauty, protection of biodiversity, soils, and water flows.[80]

Costa Rica also defined the term "environmental services" in its Ley Forestal of 1996 [Forestry Law of 1996].[81] "Environmental services" are those services provided by forests "that directly affect the protection and the improvement of the environment."[82] Under Costa Rican law, "environmental services" include carbon sequestration, protection of water, biodiversity protection, and protection of ecosystems, organisms, and scenic beauty.[83]

As this brief survey indicates, international environmental agreement regimes, international organizations, and States have increasingly acknowledged the benefits people obtain from ecosystems. But the use of the term "ecosystem services" is not universal. The usage of diverse terms such as "services" or "environmental services," by itself, to denote the benefits people obtain from ecosystems would probably not hinder the kind of coordination envisioned by the Millennium Ecosystem

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[79] Ley de Aguas Nacionales [L.A.N.] [National Waters Law], *as amended*, Diario Oficial de la Federación [D.O.], Art. 3(XLIX), 29 de Abril de 2004 (Mex.).

[80] Aviso Mediante el Cual se Informa al Público en General, que la Secretaría de Medio Ambiente y Recursos Naturales ha Concluido la Elaboración del Programa de Manejo del Área Natural Protegida con el Carácter de Reserva de la Biosfera Mapimí [Mapimí Notice], Diario Oficial de la Federación [D.O.], Annex, 24 de Octubre de 2006 (Mex.).

[81] Ley Forestal, Law No. 7575 (Feb. 5, 1996) (Costa Rica), *available at* http://www.asamblea.go.cr/ley/leyes/7000/7575.doc. This legislation established the current Costa Rican system of payment for environmental services. *Id.* at Art. 46.

[82] The original Spanish text reads

> Los que brindan el bosque y las plantaciones forestales y que inciden directamente en la protección y el mejoramiento del medio ambiente. Son los siguientes: mitigación de emisiones de gases de efecto invernadero (fijación, reducción, secuestro, almacenamiento y absorción), protección del agua para uso urbano, rural o hidroeléctrico, protección de la biodiversidad para conservarla y uso sostenible, científico y farmacéutico, investigación y mejoramiento genético, protección de ecosistemas, formas de vida y belleza escénica natural para fines turísticos y científicos.

Id. at Art. 3(k).

[83] *Id.*

Assessment.[84] However, the usage of terms used to convey a different meaning in other contexts—particularly "environmental services"—has led to the concerns that the use of the term "ecosystem services" implies that individuals must pay for these previously free benefits as explained below.[85]

IV. PAYMENT FOR ENVIRONMENTAL SERVICES AND BENEFITS PROVIDED BY PEOPLE

Some States have objected to the use of the term "ecosystem services" because they think usage of "ecosystem services" implies that people must now pay for what were previously free benefits.[86] At the root of some of these objections is the increased use of economic approaches to support the conservation of ecosystem services by international organizations in recent years.[87] One such approach is the payment for environmental services system.

Under the World Bank's payment for environmental services system, users pay landowners for the environmental services their lands generate.[88] Generally, the payment to landowners is more than the additional benefit they would receive from alternative land uses and less than the value of the benefit to the end users.[89] The goal of the payment for environmental services system is to capture a portion of the benefits received by environmental service users and channel it to land users to provide an incentive to protect ecosystems, *not* to provide compensation for the actual value of the service provided by the ecosystems.[90]

The World Bank has been using the term "environmental services" in its efforts to develop payment for environmental services programs in several Latin American States since at least 2002.[91] While the World

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[84] *See* Millennium Ecosystem Assessment Synthesis, *supra* note 1, at 20.
[85] *See* Walter Reid et. al., *supra* note 15.
[86] Walter Reid et. al., *supra* note 15.
[87] *Id.*; *see* James Salzman, *A Field of Green? The Past and Future of Ecosystem Services*, 21 J. LAND USE & ENVTL. L. 133, 141 (2006).
[88] Stefano Pagiola & Gunars Platais, *Payments for Environmental Services*, *in* 3 ENVTL. STRATEGY NOTES 1, 2 (2002) (available at http://chm.moew.government.bg/nnps/upload/Common/Baurle_literature_NOF/Local%20Publish/World_Bank_EnvStrategyNote3_2002.pdf).
[89] *Id.*
[90] *Id.* at 3; LATIN AMERICAN NETWORK FOR TECHNICAL COOPERATION IN WATERSHED MANAGEMENT, U.N. FOOD AND AGRICULTURE ORGANIZATION, ELECTRONIC FORUM ON PAYMENT SCHEMES FOR ENVIRONMENTAL SERVICES IN WATERSHEDS – FINAL REPORT 7 (2004), *available at* http://www.rlc.fao.org/foro/psa/pdf/report.pdf.
[91] Pagiola & Platais, *supra* note 88, at 2.

Bank never defines "environmental services," one may infer that "environmental services" encompass "water services," "emission reductions," and "ecosystem services,"[92] indicating that "environmental services" and "ecosystem services" are not synonymous.

In fact, "environmental services" is the main term used to describe services provided by people that benefit ecosystems.[93] For instance, the World Trade Organization defined "environmental services" in 1998 as including sewage services, refuse disposal services, sanitation services, and other environmental services provided by governments or the private sector including cleaning of exhaust gases, noise abatement services, as well as nature and landscape protection services.[94] South Carolina follows this approach by defining "environmental services" as "the provision, collectively or individually, of water facilities, sewerage facilities, solid waste facilities, or management services."[95] PRISMA,[96] a non-governmental organization concerned with development and the environment, has defined "environmental services" as the restoration, incrementation, and/or the mitigation of the deterioration of the essential ecological processes that sustain human activity.[97] Australia, similarly, defined "natural resource environmental service" as including either: (1) the establishment, purchase, or maintenance of, *inter alia*, forests for carbon sequestration, soil and water improvement, and biodiversity

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[92] World Bank, *Environmental Economics & Indicators – Designing a System of Payments for Environmental Services*, http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/EXTEEI/0,,contentMDK:20487921~menuPK:1187857~pagePK:148956~piPK:216618~theSitePK:408050,00.html (last accessed Aug. 30, 2007) (see graphic).

[93] In contrast, "ecosystem services" are those "benefits people obtain from ecosystems." Millennium Ecosystem Assessment, *supra* note 31, at 49.

[94] Council for Trade in Services, World Trade Organization, *Environmental Services*, ¶ 6, WT/S/C/W/46 (July 6, 1998).

[95] S.C. CODE ANN. § 11-40-30(7) (2005) (enacted 1994). California uses the term "environmental services" to denote efforts to comply with environmental law in the context of public work projects. CAL. GOV. CODE § 4525 (West 2006) (became effective 1991); CAL. PUB. CON. CODE § 10510.4 (West 2006). Georgia uses the same term to refer to the provision of projects and structures to supply, distribute, and treat water and the management of such projects and structures. GA. CODE ANN. § 12-5-471(2) (West 2006) (enacted 1989).

[96] Programa Salvadoreño de Investigación Sobre Desarrollo y Medio Ambiente

[97] The original Spanish text reads, "se entiende por *servicio ambiental* la mitigación del deterioro, restauración y/o incremento, en forma consciente, de los procesos ecológicos esenciales que mantienen las actividades humanas." JOHN BURSTEIN ET AL., PRISMA, PAGO POR SERVICIOS AMBIENTALES Y COMUNIDADES RURALES: CONTEXTO, EXPERIENCIAS Y LECCIONES DE MÉXICO 1 (Herman Rosa ed., 2002) (emphasis in original), *available at* http://www.rlc.fao.org/foro/psa/pdf/rurales.pdf.

conservation; (2) the provision of any necessary or incidental service to the establishment, purchase or maintenance of forests; or (3) any other service legally prescribed for the use or management of forests.[98]

But perhaps UNECE's and Mexico's usage of the terms "ecosystem services" and "environmental services" has contributed most to the confusion surrounding these terms. UNECE defines "ecosystem services" as the "variety of processes through which natural ecosystems, and the species that they contain, help sustain human life."[99] UNECE's definition is in accordance with the definition of "ecosystem services" as the benefits people receive from ecosystems,[100] but it is provided within a different conceptual background. While other international organizations define the term in the context of promoting the importance of ecosystems for the survival of humanity and the need for environmental sustainability, UNECE uses the term within the context of payment for environmental services programs.[101] UNECE defines payment for environmental services as "a contractual transaction between a buyer and a seller for an ecosystem service or a land use/management practice likely to secure that service."[102]

Mexico has also defined the term "environmental services" within its payment for environmental services system. "Environmental services" means the services "offered by the forest ecosystems naturally or through the sustainable handling of the forest resources."[103] The Mexican payment for environmental services program aims to distribute the cost of conserving forest ecosystems and the "environmental services" these ecosystems provide to society in general.[104] This use of the term "ecosystem services" within the payment for environmental services context is problematic because it is inconsistent with the terminology used by the World Bank[105] and several States that have implemented payment for environmental services programs.

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[98] Natural Resources Legislation Amendment (Rural Environmental Services) Bill, 1999, sched. 3 (N.S.W. Austl.).

[99] UNECE, *supra* note 46, at 4.

[100] U.N. Economic and Social Council, UNECE, June 6, 2006, *Draft Code of Conduct on Payments for Ecosystem Services in Integrated Water Resources Management* 7, U.N. Doc. ECE/MP.WAT/WG.1/2006/3, http://www.ramsar.org/wn/w.n .unece_code_comment.pdf.

[101] UNECE, *supra* note 46, at 2-3; UNECE, *supra* note 100, at 7.

[102] UNECE, *supra* note 100, at 8.

[103] Ley General de Desarrollo Forestal Sustentable [General Law of Sustainable Forest Development], *as amended*, Diario Oficial de la Federación [D.O.], Art. 7(XXXVII), 26 de Diciembre de 2005 (Mex.).

[104] *Id.* at Art. 30(VI).

[105] See *supra* notes 88-92 and accompanying text.

In the Costa Rican payment for environmental services program established under the auspices of the World Bank, half of the fee charged to end users is used to promote and finance projects developed to conserve, restore, protect, and contribute to the sustainable use of hydrological resources.[106] Nevertheless, the executive decree establishing the Costa Rican payment for environmental services program uses the undefined term "environmental services" to refer to what are clearly "ecosystem services" under the Millennium Ecosystem Assessment framework. In paragraph IX of the decree's preamble, as in Costa Rica's Ley Forestal of 1996,[107] the regulation highlights the importance of the "environmental service" provided by forest and forest plantations of protecting the State's hydrological resources for human use.[108] This type of "environmental service" provided by forests is not the same type of service provided by the conservation programs being promoted and financed by the fee charged to end users and would be better classified as one of the benefits people receive from ecosystems.

The Peruvian payment for environmental services system also fails to define "environmental services."[109] However, it defines payment for environmental services as "the economic repayment that allows society to maintain the natural capital's environmental functions, creating a financial mechanism of compensation to the suppliers of the environmental services on the part of the users, in a sustainable manner."[110] The use of the terms "environmental services" to describe a landowner's conservation efforts and "environmental functions" to describe the object of the legislation's conservation efforts demonstrates that "environmental services" are not the benefits people receive from ecosystems.

By contrast, UNECE and the Tenth Regional Meeting of the Latin American and the Caribbean Country Parties to the United Nations Convention to Combat Desertification and Draught (X LAC Regional

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[106] Canon por Concepto de Aprovechamiento de Aguas Art. 14, Exec. Decree No. 32868, 21 LA GACETA 2, 4 (Jan. 30, 2006) (Costa Rica), *available at* http://historico.gaceta.go.cr/2006/01/COMP_30_01_2006.pdf; *see* James Salzman, *Creating Markets for Ecosystem Services: Notes from the Field*, 80 N.Y.U. L. REV. 890, 897-99 (2005).

[107] See *supra* notes 81-83 and accompanying text.

[108] Canon por Concepto de Aprovechamiento de Aguas, *supra* note 106, at 2.

[109] Resolución Jefatural No. 185-2005-INRENA (Aug. 9, 2005) (Perú), *available at* http://www.inrena.gob.pe/psa/blegal/creacion/rj_185-2005-inrena.pdf.

[110] The original Spanish text reads, "el Pago por Servicios Ambientales es la retribución económica que realiza la sociedad para mantener funciones ambientales del capital natural, creando un mecanismo financiero de compensación a los proveedores de los servicios ambientales por parte de los usuarios, en forma sostenible." *Id.* at Preamble.

Meeting) have also used the term "ecosystem services" to refer to payment for environmental services programs. However, unlike UNECE's usage mentioned above,[111] the X LAC Regional Meeting decided to adopt the new terminology developed by the CRIC and used "ecosystem protection, rehabilitation and restoration in drylands" instead of "ecosystem services."[112]

UNECE's use of "ecosystem services" to refer to the conservation programs being promoted and financed by payment for environmental services programs, the use of the term "environmental services" to refer to the benefits people receive from ecosystems, and the World Bank's use of the term "environmental services" create confusion between these two concepts. Likewise, the usage of the terminology "ecosystem protection, rehabilitation and restoration in drylands" within the context of the U.N. Convention to Combat Desertification and "environmental services and benefits" in Salvadorian legislation fails to clarify the relationship between the terms and instead creates further confusion that impairs the type of coordination envisioned by the Millennium Ecosystem Assessment.

V. CONCLUSION

The Millennium Ecosystem Assessment's suggested increased coordination[113] is currently being hampered by the lack of uniformity in the usage of "ecosystem services."[114] While the term "ecosystem services" corresponds to the original terminology used within the scientific community and would facilitate communication with scientists regarding policy decisions,[115] the use of this term and similar terms within the context of establishing payment for environmental services programs has discouraged States from adopting the Millennium Ecosystem Assessment's terminology.[116]

A good first step toward the increased coordination envisioned by the Millennium Ecosystem Assessment would be for the World Bank, other organizations, and those States developing and implementing

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[111] See *supra* notes 99-102 and accompanying text.
[112] XLAC, *supra* note 54, at 48.
[113] Millennium Ecosystem Assessment Synthesis, *supra* note 1, at 20.
[114] *See supra* Part III.
[115] *See* MILLENNIUM ECOSYSTEM ASSESSMENT, *supra* note 31, at 54-55 (citing Robert Costanza et al., *The Value of the World's Ecosystem Services and Natural Capital*, 387 NATURE 253, 253 (1987) and Gretchen C. Daily, *Introduction: What are Ecosystem Services?*, *in* NATURE'S SERVICES: SOCIETAL DEPENDENCE ON NATURAL ECOSYSTEMS 1, 3 (Gretchen C. Daily ed., 1997)).
[116] *See* Walter Reid et. al., *supra* note 15.

payment for environmental services programs to define clearly "environmental services" and to differentiate between benefits provided by ecosystems and benefits provided by people. Argentina and the FAO have taken steps in this direction. Argentina, in its submissions to the Subsidiary Body for Scientific and Technological Advice of the United Nations Framework Convention on Climate Change,[117] pointed out that there is a conceptual difference between "ecosystem services" (consisting of the benefits provided by ecosystems) and "environmental services" (as defined in the WTO context).[118]

Likewise, the FAO formulated a definition for "ecosystem services,"[119] similar to the Millennium Ecosystem Assessment's, as part of the FAO/Netherlands International Conference on Water for Food and Ecosystems in an effort "to identify and discuss the concrete progress being made in the implementation of sustainable water management for food and ecosystems."[120] The FAO has defined "environmental goods and services" as the "actions and products derived from human activity rather than benefits obtained directly from the natural environment" which includes pollution-reducing equipment, waste management, environmentally-friendly goods, and eco-tourism.[121]

Drawing a clear distinction between benefits provided by ecosystems ("ecosystem services") and benefits provided by people ("environmental services") should help allay States' concerns that "individuals must begin to pay for benefits that were formerly obtained for free."[122] Any payments for "environmental services" would be used to provide an incentive to protect ecosystems and the ecosystem services they provide, *not* as payment for services provided by the ecosystems.[123] Once this distinction is recognized, international environmental agreement regimes, international organizations, and national institutions would be

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[117] United Nations Framework Convention on Climate Change, May 9, 1992, 1771 U.N.T.S. 107, 31 I.L.M. 849.

[118] UNFCCC Party Submissions, *supra* note 70, at 5. This document was produced in English and will be debated by the UNFCCC SBSTA at its twenty-sixth session held in Bonn on May 7-18, 2007.

[119] U.N. Food and Agriculture Organization, *supra* note 44.

[120] U.N. FOOD AND AGRICULTURE ORGANIZATION, REPORT OF THE CONFERENCE ON WATER FOR FOOD AND ECOSYSTEMS 1 (2005), http://www.fao.org/ag/wfe2005/.

[121] U.N. Food and Agriculture Organization, *supra* note 44. However, the FAO has also adopted the use of the undefined term "environmental services" in the context of payment for environmental services programs. LATIN AMERICAN NETWORK FOR TECHNICAL COOPERATION IN WATERSHED MANAGEMENT, *supra* note 90.

[122] Walter Reid et. al., *supra* note 15.

[123] Pagiola & Platais, *supra* note 88, at 3; LATIN AMERICAN NETWORK FOR TECHNICAL COOPERATION IN WATERSHED MANAGEMENT, *supra* note 90, at 7.

better able to adopt the same language facilitating the increased coordination advocated by the Millennium Ecosystem Assessment.

The next step would be the uniform use of the term "ecosystem services" to alert policymakers to the importance of ecosystems for the survival of humanity and the need for environmental sustainability. International environmental agreement regimes, international organizations, and national institutions should heed the consensus definition of "ecosystem services" developed by the largest group of natural and social scientists ever assembled to address ecosystem change issues. Usage of any term other than "ecosystem services" to describe the benefits human populations derive from ecosystems should be discouraged[124] if we want to implement the Millennium Ecosystem Assessment's suggestions to reverse the degradation of ecosystem services while meeting increasing demands for services.

[124] Reid et. al., *supra* n. 15.