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BIOPROSPECTING ON PUBLIC LANDS: SHOULD PRIVATE COMPANIES COMPENSATE THE GOVERNMENT FOR THEIR USE OF PUBLIC LAND RESOURCES?

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INTRODUCTION

While biotechnology has been exploited by mankind for millennia,[1] in recent years the practice has become a billion-dollar industry.[2] Biotechnology may be defined as "any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use."[3] The biotechnology industry, particularly in the areas of pharmaceuticals and agriculture,[4] uses bioprospecting to gather

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[1] Linda Maher, *The Environment and the Domestic Regulatory Framework for Biotechnology*, 8 J. ENVTL. L. & LITIG. 133, 134 (1993) (noting that "[t]he benefits to man from biotechnological processes can be traced back to yeast fermentation in 6000 B.C."). Generally, Maher notes that as "the United States continues to lead the biotechnology industry in research and development, trade, patents, and environmental regulation. . . . [m]ore needs to be done, especially in the areas of independent testing and risk assessment" in order to study the impact of biotechnology on local ecosystems and to ensure the protection of the Earth's environment. *Id.* at 197-98.

[2] John R. Adair, Comment, *The Bioprospecting Question: Should the United States Charge Biotechnology Companies for the Commercial Use of Public Wild Genetic Resources?*, 24 ECOLOGY L.Q. 131, 135 (1997).

[3] United Nations Conference on Environment and Development: Convention on Biological Diversity, June 5, 1992, 31 I.L.M. 818, 823 [hereinafter Biodiversity Treaty].

[4] *See, e.g.*, Maher, *supra* note 1, at 175-76 (explaining the various applications of bioprospecting to the pharmaceutical and agricultural industries);

the wild genetic resources it needs to then develop commercial products.[5] Bioprospecting has been described by one commentator as "[t]he search of wild diversity for valuable genetic information"[6] and by another as "the search for genetic and biochemical resources in nature."[7]

United States public lands are a prime source of bioprospecting[8] and biotechnology companies derive substantial profits from the wild genetic resources they find on public lands.[9] In spite of the revenues generated by such uses of natural resources, the federal agencies responsible for regulating and managing public lands have, until now, not shared in any of the profits reaped by biotechnology companies.[10] Profit-sharing, however, presents

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Adair, *supra* note 2, at 139-40 (noting that the pharmaceutical industry "has been one of the major beneficiaries of bioprospecting activity" and that "genetic engineering technology has increased the potential value of wild genetic resources to the agricultural industry"). *See also* Dana Clark & David Downes, *What Price Biodiversity? Economic Incentives and Biodiversity Conversion in the United States*, 11 J. ENVTL. L. & LITIG. 9, 39 (1996) (explaining how "[g]enetic diversity is both crucial to agriculture and threatened by modern, large-scale, consolidated agribusiness").

[5] Adair, *supra* note 2, at 137-38.

[6] Adair, *supra* note 2, at 138.

[7] Carla Mattix, *The Debate over Bioprospecting on the Public Lands*, 13 NAT. RESOURCES & ENV'T 528 (1999). *See also* Edgar J. Asebey & Jill D. Kempenaar, *Biodiversity Prospecting: Fulfilling the Mandate of the Biodiversity Convention*, 28 VAND. J. TRANSNAT'L L. 703, 706 (1995) (defining bioprospecting as the "search for bioactive compounds contained in natural sources such as plants, fungi, insects, microbes, and marine organisms"); Margot Cohen, *Forest Fire: The Biodiversity Debate Heats Up in Asia*, FAR E. ECON. REV., Jan. 11, 1996, at 66 (defining bioprospecting as the "search for wild species of flora and fauna whose genes can yield new medicines and improved crops").

[8] Adair, *supra* note 2, at 138, 171 (stating that, as bioprospecting activities increase on federal lands, the United States must address the issue of profit-sharing to permit the government to benefit from the private use of its wild genetic resources).

[9] Adair, *supra* note 2, at 132-33, 139-40 (defining wild genetic resources as "the genetic and biochemical information found in wild plants, animals and microorganisms"). *See also* Mattix, *supra* note 7, at 528; Maher, *supra* note 1, at 175.

[10] *See* Mattix, *supra* note 7, at 528; Clark & Downes, *supra* note 4, at 65 (discussing the fact that, although scientists are allowed to collect "diverse

many advantages to both the government and the public.[11] Therefore, the benefits must be recognized and profit-sharing should be permitted. Since the existing judicial and legislative framework does not address profit-sharing adequately, a new framework must be developed.[12] Once new legislation specifically addressing the issue is enacted, it will serve as a guide to the courts in resolving the concerns raised by profit-sharing and will enable a system of profit-sharing to be implemented. New legislation, thus, is essential for the national parks and, therefore, the public to benefit from the numerous advantages presented by profit-sharing.

This Note focuses on the principle of profit-sharing and examines whether the federal agencies regulating public lands should be permitted to share in the profits gained by private companies from products derived from natural resources collected on public lands. Part I presents an overview of bioprospecting on federal public lands and examines the regulatory framework for the management of public lands. Part I also discusses bioprospecting activities since the 1960s and the bioprospecting issue recently raised in *Edmonds Institute v. Babbitt*, a case disallowing a profit-sharing arrangement.[13] Part II describes existing legislation and

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species on public lands" free of charge, they "have no obligation to return a share of the profits [resulting from products derived from the organisms collected] to the public" if "valuable compounds are discovered").

[11] *See* Adair, *supra* note 2, at 133 (explaining that profit-sharing with respect to bioprospecting means compensation to the federal government "when a commercial enterprise wants to extract wild genetic resources from its public lands in the hopes of developing a valuable commercial product"). *See also infra* notes 171-174 and accompanying text (explaining that profit-sharing benefits the environment and the public by enabling the government to reinvest the profits gained into natural resource protection and preservation of the beauty of public lands, and that profit-sharing is a fair way of ensuring that the government benefits from the nation's economic success).

[12] *See infra* Part II (discussing existing legal doctrines and their potential application to the issue of profit-sharing).

[13] 42 F. Supp. 2d 1 (D.D.C. 1999) (holding that Yellowstone National Park must suspend implementation of an agreement it entered into with a private corporation whereby the Park would receive a part of the profits derived from commercialization of wild genetic resources found on its territory, pending completion of required studies on the environmental impact of collecting such resources).

judicial decisions that arguably may be used to resolve the issue of profit-sharing, particularly in the areas of constitutional, property, and environmental law. Part III explains why new legislation is needed to establish standards and provide guidance on the issue of profit-sharing. This Part also provides some background of profit-sharing at the international level, explains why judicial precedent is not sufficient to resolve the issue of profit-sharing, raises arguments in favor of and against profit-sharing, and gives an overview of recently enacted legislation regulating national parks. Finally, this Note concludes that a logical outcome of the *Edmonds Institute* case would be to permit federal agencies to share in the profits derived from uses of natural resources found on public lands and that consistent application of profit-sharing principles necessitates the enactment of additional legislation.

I. AN OVERVIEW OF BIOPROSPECTING ON FEDERAL PUBLIC LANDS

Federal public lands are a significant source of bioprospecting for biotechnology companies.[14] After examining the laws governing those lands and the mandates of the agencies managing them, it is unclear whether bioprospecting activities fall within their accepted uses. Recent bioprospecting activities on public lands have sparked renewed controversy on acceptable uses of public lands and ignited debate as to whether the government should profit from commercial development of public natural resources. This controversy has been illustrated recently in *Edmonds Institute*.[15] In order to understand why profit-sharing in the context of bioprospecting on public lands is a controversial issue, it is necessary to explore the management of federal public lands, explain the recent developments that have renewed the debate, and analyze the issue as raised in *Edmonds Institute*.

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[14] *See* Adair, *supra* note 2, at 138 (noting that, even though some bioprospecting is conducted on privately-owned land, public lands generally offer "a greater variety of wild genetic resources").

[15] 42 F. Supp. 2d 1 (D.D.C. 1999).

A. *Regulation of Federal Public Lands*

In the United States, federal public lands include lands managed by several federal agencies. These include the Bureau of Land Management ("BLM"),[16] the National Park Service ("NPS"),[17]

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[16] *See* Dennis Michaels, *Bioprospecting Agreements: Forging a Comprehensive Strategy for Managing Genetic Resources on Public Lands*, 22-SPG ENVIRONS ENVTL. L. & POL'Y J. 3 (1999) (discussing the mandates of the various land management agencies under the supervision of the Department of the Interior and stating that a comprehensive genetic resource management strategy is necessary to ensure the preservation of genetic resources on public lands). The BLM, under the control of the Department of the Interior, has jurisdiction over "residual lands that have not been specifically designated to a particular use such as wilderness, national park or national forest" and "must observe the principles of multiple use and sustained yield in its formation of plans and management activities." *Id.* at 23-24. Examples of multiple uses of public lands are conservation, preservation, and recreation. *Id.* at 22. *See also* Marla E. Mansfield, *A Primer of Public Land Law*, 68 WASH. L. REV. 801, 854 (1993) (explaining that sustained yield means "the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the national forests without impairment of the productivity of the land"). The mandate of the BLM is delimited by the Federal Land Policy and Management Act of 1976 ("FLPMA") (43 U.S.C. §§ 1701-1784 (1994 & Supp. III 1997)), which "does not give the BLM any authority to 'classify' lands per se" for any specific use. *Id.* at 829. In enacting the FLPMA, Congress defined the role of the BLM as a "land manager" the central function of which was planning. *Id.* at 833. Despite that newly established function, "grazing and mineral functions [have] remain[ed] strong elements of [the BLM's] role" since the enactment of the FLPMA. *Id.* Additionally, the FLPMA "directed the BLM to consider disparate values in furthering the 'national interest' without demanding a specific result" and Congress "did not order the BLM to favor resource use or non-use" of the federal lands under its authority. *Id.* at 834.

[17] *See, e.g.*, 16 U.S.C. § 1 (1994 & Supp. IV 1998) (providing that "[t]here is created in the Department of the Interior a service to be called the [NPS]" and that the NPS shall "promote and regulate the use of the Federal areas" under its jurisdiction so as to fulfill the fundamental purpose of such areas, which is "to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations"); 16 U.S.C. § 3 (1994 & Supp. IV 1998) (stating that it is the role of the NPS to use and manage the "parks, monuments, and reservations under [its] jurisdiction").

the Forest Service,[18] and the Fish and Wildlife Service ("FWS").[19] These four federal agencies regulate and maintain

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[18] *See* Michaels, *supra* note 16, at 23 (explaining that the Forest Service, regulated by the Department of Agriculture, has the authority to manage "recreation, range, timber, watershed[,] wildlife and fish"); Mansfield, *supra* note 16, at 838 (explaining that the Forest Service was established by the Organic Administration Act of 1897 ("OAA") (16 U.S.C. §§ 473-482 (1994)) for the purposes of "watershed protection" and "timber production"). Protection of the forests themselves was not one of the purposes and "was only operative in regard to the watershed and timber purposes." Mansfield, *supra* note 16, at 838. Despite the limited purpose set forth by the OAA, legislation enacted since "has increased the management mandates for the National Forests, and many of the mineral laws applicable of BLM lands also operate in National Forests." Mansfield, *supra* note 16, at 838. Specifically, the Multiple-Use Sustained-Yield Act of 1960 (16 U.S.C. §§ 528-531 (1994)) established additional purposes for the Forest Service, including "outdoor recreation, range, timber, watershed, and wildlife and fish purposes." Mansfield, *supra* note 16, at 840. Further, the National Forest Management Act of 1976 (16 U.S.C. §§ 1600-1614 (1994 & Supp. IV 1998)) mandated "various silviculture standards and extensive planning for [National] [F]orests." Mansfield, *supra* note 16, at 841.

[19] *See* National Conservation Training Ctr., *Origins of the U.S. Fish & Wildlife Service* (visited Feb. 20, 2000) <http://www.nctc.fws.gov/history/-origin.html> (noting that the mission of the FWS is to protect fish and wildlife, including endangered plants and animals, by establishing and maintaining "national wildlife refuges" and to regulate migratory bird hunting and protect bird habitat); Mansfield, *supra* note 16, at 846-47 (noting that the FWS manages the National Wildlife Refuge System "for the primary purpose of protecting and promoting wildlife values" and that wildlife refuges may be used for other activities such as mining and recreation, although recreational use may only be "appropriate incidental or secondary use" not inconsistent with the primary purpose of each refuge). Mansfield explains that, "[l]ike statutes that create National Parks, any statute creating a specific refuge must be consulted to determine what uses are allowed in that refuge" and that "[i]n the 1960s, however, three acts were passed as generic authority to manage the refuges." Mansfield, *supra* note 16, at 846. Those three acts are: the Refuge Recreation Act of 1962 (16 U.S.C. §§ 460k to 460k-4 (1994)); the Refuge Revenue Sharing Act of 1964 (16 U.S.C. § 715s (1994 & Supp. IV 1998)); and the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. §§ 668dd-668ee (1994 & Supp. IV 1998)). Mansfield, *supra* note 16, at 846. *See also* Edward J. Heisel, Comment, *Biodiversity and Federal Land Ownership: Mapping a Strategy for the Future*, 25 ECOLOGY L.Q. 229, 238-39 (1998) (explaining that "the National Wildlife Refuge System (NWRS) is the only extensive system of federal lands administered specifically for wildlife conservation purposes" and

federal public lands under Congressional mandates.[20] Since this Note discusses the issue of profit-sharing in light of recent bioprospecting developments in Yellowstone National Park,[21] the mandate granted to the NPS and its regulation of the national parks is of particular importance.

Congress designated Yellowstone National Park, the first of its kind, in 1872.[22] Several national parks were subsequently established,[23] indicating the beginning of the system of national parks. The NPS was later created by the National Park Service Organic Act of 1916 ("NPSOA")[24] as an agency of the Department of the

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that the NWRS, established in 1966 by the National Wildlife Refuge System Administration Act, "consists of approximately 500 refuges," which are "found in every state" and represent "over 87 million acres"). Most refuges established after the first ones were designated by President Theodore Roosevelt at the beginning of the twentieth century, and "have been established administratively by the Secretary of the Interior under various statutory authorities, although Congress has created over thirty refuges by specific legislation." *Id.* at 238. Finally, "[a]lthough the NWRS is geared primarily toward preserving wildlife habitat, the laws governing its management fail to prohibit some activities that may negatively impact wildlife" and "hunting, fishing, trapping, and some 'commercial' activities, such as mining and hay cutting, are allowed on the refuges," although President Clinton and Congress have taken recent steps to minimize activities having a potential negative effect on the wildlife refuges. *Id.* at 239-40.

[20] *See generally* Mansfield, *supra* note 16, at 831-48; Heisel, *supra* note 19, at 238-47 (explaining the statutes governing each agency and the role played by each agency in the management of different kinds of public lands).

[21] *See* Edmonds Inst. v. Babbitt, 42 F. Supp. 2d 1, 4 (D.D.C. 1999) (explaining the novel bioprospecting agreement between Yellowstone National Park and Diversa Corporation providing for potential financial returns to the Park in exchange for Diversa's use and commercialization of natural resources found in the Park).

[22] *See* Heisel, *supra* note 19, at 241. *See also* 16 U.S.C. §§ 21-22 (1994) (codifying the creation of Yellowstone National Park).

[23] *See* Robert B. Keiter, *Preserving Nature in the National Parks: Law, Policy, and Science in a Dynamic Environment*, 74 DENV. U. L. REV. 649, 653 (1997) (listing Yosemite, Mount Rainier, and Glacier National Parks as parks designated next). *See also* 16 U.S.C. §§ 41, 43 (1994) (codifying the 1890 establishment of Sequoia National Park); 16 U.S.C. §§ 91-92 (1994) (codifying the 1899 establishment of Mount Rainier National Park); 16 U.S.C. §§ 161-162 (1994) (codifying the 1910 establishment of Glacier National Park).

[24] 16 U.S.C. §§ 1-4 (1994 & Supp. IV 1998).

Interior[25] to regulate the national parks.[26] NPSOA provides that the purpose of the national parks is "to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."[27]

Pursuant to its authority under NPSOA,[28] the NPS has enacted regulations expanding on the authorized or prohibited uses of the national parks.[29] As illustrated by these governing laws, there exists a tension between the requirement of protection of the wild resources found in national parks and that of access to the public for its use and enjoyment.[30] This tension has been exacerbated in recent years as a growing number of institutions have requested access to natural resources found in national parks for bioprospecting purposes.[31]

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[25] *See* U.S. Dep't of the Interior, *Frequently Asked Questions, What Are the Responsibilities of the Department of Interior?* (visited Feb. 20, 2000) <http://www.doi.gov/faq/#I3> (stating that the Department of the Interior, established in 1849, is the "nation's principal conservation agency" and is responsible for most of the federal public lands and natural resources). *See also* Michaels, *supra* note 16, at 20 (noting that the Department of the Interior "administers lands held by the National Park Service (80 million acres), Bureau of Land Management (450 million acres), and the Fish and Wildlife Service (88.5 million acres)" while the Department of Agriculture has authority over the lands managed by the National Forest Service, which represent 187 million acres).

[26] Mansfield, *supra* note 16, at 842-43; 16 U.S.C. § 3 (1994 & Supp. IV 1998) (granting the Secretary of the Interior the authority to "make and publish such rules and regulations as he may deem necessary or proper for the use and management of the parks, monuments, and reservations under the jurisdiction of the National Park Service").

[27] 16 U.S.C. § 1 (1994 & Supp. IV 1998).

[28] *See* 16 U.S.C. § 3 (1994 & Supp. IV 1998); 16 U.S.C. § 22 (1994).

[29] *See, e.g.*, 36 C.F.R. § 2.1(c)(3)(v) (1999) (prohibiting the "[s]ale or commercial use of natural products" found in national parks); 36 C.F.R. § 2.5 (1999) (providing for the issuance of specimen collection permits under certain circumstances).

[30] *See* Mansfield, *supra* note 16, at 843; Heisel, *supra* note 19, at 242.

[31] *See* Edmonds Inst. v. Babbitt, 42 F. Supp. 2d 1, 7 (D.D.C. 1999) (noting that in recent years the NPS has granted approximately 250 to 300 research permits annually, including 40 or 50 for "microbial research projects").

B. *Recent Bioprospecting Activities*

The NPS has permitted bioprospecting on public lands for over a century.[32] For example, pursuant to NPS regulations, members of a "reputable scientific or educational institution" or a "State or Federal agency" may obtain permits authorizing them to gather wild genetic resources found in national parks.[33] Despite its long-standing allowance, some bioprospecting discoveries over the past four decades have given the issue a new significance.

One major national park-derived resource, famous for the biotechnology process to which it led and for the millions of dollars in profits it has since generated, is that of a microorganism known as Thermus aquaticus or Taq.[34] Thermus aquaticus, a "virtually invisible heat-loving microbe"[35] thriving in the hot springs of Yellowstone National Park, was discovered in 1966 by a scientist who had undertaken research to study thermophiles.[36] Twenty years after Thermus aquaticus was discovered and submitted to a collection center, it was used to create the "Taq polymerase chain reaction,"[37] a novel process with various DNA-

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[32] *Id.* (noting that according to the NPS, "the earliest research permit authorizing collection of microbial samples from [Yellowstone National Park] was in 1898").

[33] 36 C.F.R. §§ 2.5, 2.5(b) (1999).

[34] Clark & Downes, *supra* note 4, at 67; Mattix, *supra* note 7, at 528. *See also* The Official Website of Yellowstone National Park, *Bioprospecting* (last modified Sept. 1, 1999) <http://www.nps.gov./htdocs4/yell/nature/thermophiles/-biopro.html> [hereinafter Yellowstone].

[35] Mattix, *supra* note 7, at 528.

[36] A "thermophile" is defined as "an organism adapted to living at high temperatures, [such] as some bacteria and algae." WEBSTER'S NEW WORLD DICTIONARY 1476 (2d ed. 1986).

[37] Mattix, *supra* note 7, at 528. *See* Yellowstone, *supra* note 34 (stating that a research worker invented the process when he developed "the idea of using a heat-stable enzyme to produce unlimited copies of 'target' DNA [and that the] enzyme named in the patenting of [polymerase chain reaction] was DNA polymerase from Taq"). Additionally, the usefulness of the Taq polymerase chain reaction arises from the fact that, "[d]ue to its tolerance for near-boiling temperatures, a product of Taq DNA polymerase performs the enzymatic amplification of DNA on an industrial scale." Yellowstone, *supra* note 34.

related applications.[38] The process was patented by a biotechnology company and the patent rights later sold to the pharmaceutical company Hoffman-La Roche for $300 million.[39] Despite the increasing revenues generated by the discovery of the microorganism on its land, the NPS has not received any part thereof.[40] This incident led the NPS to enter into a new kind of agreement with a private corporation, whereby the NPS would be entitled to a percentage of any potential revenues generated by the results of the licensed corporation's bioprospecting activities.[41]

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[38] DNA, or deoxyribonucleic acid, is defined as "an essential component of all living matter and a basic material in the chromosomes of the cell nucleus [which] contains the genetic code and transmits the hereditary pattern." WEBSTER'S NEW WORLD DICTIONARY 413, 378 (2d ed. 1986). *See* Yellowstone, *supra* note 34 (noting that a major application is DNA fingerprinting technology); Edmonds Inst. v. Babbitt, 42 F. Supp. 2d 1, 6 (D.D.C. 1999) (listing DNA fingerprinting, cancer fighting, and adding that the technology has "numerous applications in medicine, law enforcement, and other fields"). *See also* Frank Clifford, *Simpson Case Boosts Microbe Conservation*, L.A. TIMES, Aug. 31, 1994, at A1 (listing the following uses of Thermus aquaticus: "police work," "diagnoses of the human immunodeficiency virus, Alzheimer's disease and sickle cell anemia," "sweetening agents for the soft drink industry," "high-powered stain removers in detergents," and "catalysts in the manufacture of clean-burning fuels").

[39] Clark & Downes, *supra* note 4, at 67; Mattix, *supra* note 7, at 528. *See also Edmonds Inst.*, 42 F. Supp. 2d at 6-7.

[40] Yellowstone, *supra* note 34 (noting that "annual sales of Taq polymerase since 1991 have grown from $200 million to $500 million"). *See also Edmonds Inst.*, 42 F. Supp. 2d at 6-7; Clark & Downes, *supra* note 4, at 67; Mattix, *supra* note 7, at 528.

[41] *Edmonds Inst.*, 42 F. Supp. 2d at 4. In *Edmonds Institute*, the NPS entered into a cooperative research and development agreement ("CRADA") with a private corporation whereby that corporation "would obtain a nonexclusive right to 'bioprospect' microbial organisms in Yellowstone, in exchange for an agreement to share potential financial returns with [Yellowstone National] Park." *Id.* Significant commercial applications other than that of Thermus aquaticus are based on "heat-stable enzymes from [Yellowstone National Park]'s thermal basins," for example, the use of "Thermoanaerobacter ethanolicus" for "converting cellulose from waste products into ethanol for use as gasohol," "bioleaching of gold ore," "removal of paint from military aircraft," and "food processing." Yellowstone, *supra* note 34; *Edmonds Inst.*, 42 F. Supp. 2d at 6.

Another famous case of a natural resource found on public lands that led to a revenue-generating commercial product is that of the bark of the Pacific yew tree.[42] In 1962, the United States Drug Administration collected such bark, and discovered a few years later that taxol, one of the chemicals it contained, inhibited cancer activity.[43] After a couple decades of further research, taxol was marketed as a drug for the treatment of certain forms of cancer.[44] Because taxol can only be extracted from the bark of the Pacific yew tree by destroying the tree, its development has had destructive consequences on Pacific yews found in United States national forests.[45] To determine the scope of the potentially

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[42] *See* Maria Costello & Kelly Kellmel, *Medical Attributes of Taxus Brevifolia—The Pacific Yew* (last updated July 1997) <http://wilkes1.wilkes.edu/~kklemow/Taxus.html> (describing the Pacific yew as a "small, slow growing evergreen tree native to the northwestern United States"); Ecosystem Processes Network-NRCan-CFS-Pacific Forestry Centre, *Questions & Answers* (visited Nov. 27, 1999) <http://www.pfc.cfs.nrcan.gc.ca/ecosystem/yew/qanda.html> (specifying that Pacific yew trees, which grow also in British Columbia, "generally live 200-300 years with some specimens [reaching] 400 years or more," that they generally do not reach "great heights," although 25-meter trees have been found, and that diameters are variable, some trees reaching 0.85 meter in diameter).

[43] Adair, *supra* note 2, at 151-53; Clark & Downes, *supra* note 4, at 67.

[44] Adair, *supra* note 2, at 151-53; Clark & Downes, *supra* note 4, at 67. *See also* Vanessa Hill, *The Anti-Cancer Drug Taxol: A Case for or Against Chemical Prospecting?* (visited Nov. 27, 1999) <http://www.colostate.edu/Depts/Entomology/courses/en570/papers_1996/hill.html> (noting that taxol "has proven to be effective against ovarian, breast, lung, head and neck, and esophageal cancers" and that the Food and Drug Administration has approved its use for treatment of ovarian and breast cancers); Charles L. Bolsinger and Annabelle E. Jaramillo, *Taxus Brevifolia Nutt, Pacific Yew, Special Uses* (visited Nov. 27, 1999) <http://willow.ncfes.umn.edu:80/silvics_manual/Volume_1/taxus/brevifolia.htm> (noting that the use of taxol has had a favorable impact on the treatment of "refractory ovarian cancer").

[45] *See* Hill, *supra* note 44 (noting that because the bark of each tree contains only a very small amount of taxol and "bark cannot be harvested without killing the tree," taxol cannot be produced in an unlimited manner without damage to the ecosystem and to the survival of the Pacific yew species). *But see* United States Department of the Interior, Bureau of Land Management, Oregon State Office, *Questions and Answers; Pacific Yew Act* (last modified Feb. 12, 1998) <http://www.blm.gov/nhp/efoia/or/fy98/IBs/b98256.htm> [hereinafter Oregon

negative consequences, Bristol-Myers Squibb,[46] the pharmaceutical company that has marketed taxol, has funded studies on the issue.[47] In addition to financing studies, Bristol-Myers Squibb recently made a $3.4 million royalty payment to the National Health Institute in return for "additional rights that extend [the company's] monopoly on [taxol]."[48] That payment was made in response to "criticism of the original deal in which the government gave the company rights to [t]axol without seeking any direct payback."[49] The funding of studies and the royalty payment make the case of the Pacific yew tree distinguishable from that of Thermus aquaticus, where the NPS received neither compensation for the use of its natural resources nor financial contribution for the government's studying of the effects of bioprospecting on the environment.[50] The total cost to Bristol-Myers Squibb of studying Pacific yew trees and developing taxol for commercialization,

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State Office] (pointing out that "[n]o Pacific yew resources have been sold from Forest Service administered lands for taxol since the fall of 1993," that plans have been implemented to "ensure the continued existence of yew through ecosystem-based management practices," that over 50 million Pacific yew trees are still in existence in Oregon and Washington National Forests and BLM administered lands, and that the Pacific yew is not an endangered species).

[46] *See* Li Fellers, *The Medicine Market*, WASH. POST, May 31, 1998, at W10 (noting that Bristol-Myers Squibb, an "international conglomerate that dominate[s] the cancer drug market" and a Fortune 500 company, sells not only drugs but also nutritional and beauty care products such as baby formula and hair coloring).

[47] *See* Clark & Downes, *supra* note 4, at 67. *See also Exclusive Rights to Pacific Yew Bark Awarded; Congressman Upset by Bristol-Myers' Corner on Market*, SEATTLE POST-INTELLIGENCER, June 20, 1991, at B5 (pointing out that Bristol-Myers Squibb had agreed to pay the Forest Service to "count, conserve, research and collect bark from some of the estimated 23 million yew trees across 8 million acres of national forests"). In addition to funding studies, Bristol-Myers Squibb has also developed synthetic sources of taxol. *See* Oregon State Office, *supra* note 45 (noting that in 1994, Bristol-Myers Squibb developed "an alternative, semi-synthetic source of taxol from the foliage of European yew trees"). *But see* Hill, *supra* note 44 (stating that to date, "no large scale, synthetic method [of producing taxol] has been developed").

[48] *Public Handouts Enrich Drug Makers, Scientists*, BOSTON GLOBE, Apr. 5, 1998, at A1.

[49] *Id.*

[50] Clark & Downes, *supra* note 4, at 67.

however, remains significantly lower than the profits the company has gained from marketing the drug.[51]

C. *Edmonds Institute*:[52] *A New Perspective on Bioprospecting*

As *Edmonds Institute* embodies the first judicial challenge to an agreement that would enable the NPS to reap profits from the use of wild genetic resources found in national parks,[53] it provides a new perspective on the issue of profit-sharing in the context of bioprospecting. The litigation in *Edmonds Institute* was sparked by Vice President Al Gore, Secretary of the Interior Bruce Babbitt,[54]

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[51] *See* Bristol-Myers Squibb, *1998 Annual Report, Financial Review, Business Segments, Medicines* (visited Feb. 20, 2000) <http://www.bristolmyers.-com/newsfinance/annual/98annu/finrev/data/frpg5a.htm> (reporting that in 1998, worldwide sales of anti-cancer drugs increased 21% to $2,925 million and that sales of Taxol alone increased 28% to $1,206 million). Additionally, revenues from Taxol are likely to increase further in the near future due to the Food and Drug Administration's approval in April 1998 of Taxol as a "first line treatment of ovarian cancer in combination with [Bristol-Myers Squibb's ovarian cancer drug] cisplatin" and to the European Union's approval in September 1998 of Taxol for "non-small cell lung cancer." *Id. See also* Fellers, *supra* note 46, at W10 (reporting that between December 1992 and May 1998, sales of Taxol amounted to $2.8 billion and that in 1997, Taxol "accounted for nearly 40 percent of Bristol's cancer drug sales"). Fellers further stated that stock analysts predicted Taxol's "slice of [Bristol-Myers Squibb's cancer drug] sales" to "soar to 55 percent" by 2004. Fellers, *supra* note 46, at W10. In comparison to those sale revenues, the "$65 million to $114 million" Bristol-Myers Squibb agreed to spend on research, manufacturing of the drug, and clinical trials appear insignificant. Fellers, *supra* note 46, at W10. Even though Bristol-Myers Squibb asserted that it had spent $1 billion on the development of the drug since 1991, that is still a lower amount than the profits it has received to date from its commercialization of Taxol. Fellers, *supra* note 46, at W10.

[52] 42 F. Supp. 2d 1 (D.D.C. 1999).

[53] *Edmonds Inst.*, 42 F. Supp. 2d at 4-5 (recognizing that this case is the first litigation of its kind, i.e., challenging a CRADA that provides for profit-sharing between a federal agency and a private corporation in exchange for the corporation's conduct of bioprospecting and that the CRADA at issue is the first involving a national park).

[54] *See* United States Department of the Interior, *Frequently Asked Questions, What Does the Secretary of the Interior Do?* (visited Feb. 20, 2000)

NPS Director Robert Stanton,[55] and Yellowstone National Park Superintendent Mike Finley's[56] announcement on August 17, 1997

<http://www.doi.gov/faq/#I2> (explaining that the Secretary of the Interior, who is a member of the President's cabinet, is currently "responsible for the management of nearly half a million acres of federal lands" and that such responsibility includes the tasks of "enforc[ing] laws that protect threatened and endangered species and that govern the management of national wildlife refuges," and "work[ing] closely with Indian Tribal leaders to insure that reservations receive adequate economic, educational and social services").

[55] *See* 16 U.S.C. § 1 (1994 & Supp. IV 1998) (providing that the Director of the NPS "shall be appointed by the President [of the United States], by and with the advice and consent of the Senate"). Additionally, the Director of the NPS "shall have substantial experience and demonstrated competence in land management and natural or cultural resource conservation." *Id.* In order to perform the task of "promot[ing] and regulat[ing] the use of . . . national parks, monuments, and reservations," the Director of the NPS "shall select two Deputy Directors," the first of whom "shall have responsibility for [NPS] operations" and the second of whom "shall have responsibility for other programs assigned to the [NPS]." *Id.* Generally, the Director of the NPS shall "under the direction of the Secretary of the Interior, have the supervision, management, and control of the several national parks and national monuments which on August 25, 1916 were under the jurisdiction of the Department of the Interior" and shall have the same control of "such other national parks and reservations of like character as may be created by Congress." 16 U.S.C. § 2 (1994 & Supp. IV 1998).

[56] *See* Joseph L. Sax & Robert B. Keiter, *Glacier National Park and Its Neighbors: A Study of Federal Interagency Relations*, 14 ECOLOGY L.Q. 207, 259 (1987) (noting that national park superintendents are "professional managers who want to maximize their own judgment, discretion, and inventiveness, and to be free of outside forces dictating what shall happen on their turf"). Superintendents readily accept Congress' authority over the mandates granted federal public land management agencies rather than attempt to "determine the fundamentals of" the policies governing national parks, but also want broad mandates so as not to be "reduced to mere pawns mechanically applying rules." *Id. See also* Lindsey Kate Shaw, Comment, *Land Use Planning at the National Parks: Canyonlands National Park and Off-Road Vehicles*, 68 U. COLO. L. REV. 795, 797-98 (1997) (explaining the decentralized structure of the NPS and management of the national parks by noting that the NPS is "headed by a director who oversees ten regional offices, each with its own regional director" and that each park's superintendent carries out planning efforts in cooperation with the corresponding regional director). Shaw further points out that the "daily management of each park" is almost entirely the responsibility of the park's superintendent and that, although a "patchwork of statutes, regulations, and guidelines" directs "the superintendent's planning and management decisions,"

that "the federal government had entered into a novel contract with San Diego-based Diversa Corporation[57] by which Diversa would obtain a nonexclusive right to 'bioprospect' microbial organisms in Yellowstone, in exchange for an agreement to share potential

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each superintendent "remains relatively unconstrained." *Id.* at 798.

[57] *See* Diversa Corporation, *Corporate Information, Corporate Overview* (visited Feb. 20, 2000) <http://www.diversa.com/corpinfo/corpover.asp> (describing Diversa as a "global leader in discovering and developing novel enzymes and other biologically active compounds, together known as biomolecules, from diverse environmental sources for use in agricultural, chemical processing, industrial and pharmaceutical applications"); Diversa Corporation, *Technology Platform, Biodiversity Access* (visited Feb. 20, 2000) <http://www.diversa.com/techplat/disc.asp> (noting that Diversa has "[b]iodiversity access agreements" with numerous countries besides the United States, including Bermuda, Costa Rica, Iceland, Indonesia, and Mexico, and that such agreements enable Diversa to "collect DNA that may produce beneficial bioactive molecules and enzymes" from those countries); Diversa Corporation, *Press Releases, Current Releases* (visited Feb. 20, 2000) <http://www.diversa.com/presrele/currele/20000107.asp> (stating that Diversa owns several patents for "methods for discovering bioactive compounds from gene expression libraries [in which] mixed populations of organisms [are organized and catalogued]"). *See also Diversa Corp.*, THE IPO REP., Feb. 7, 2000 (reporting that Diversa's enzymes and "other compounds from environmental sources" have numerous applications, including in the agricultural, industrial, and pharmaceutical areas, and that Diversa has already commercialized a product and "has 42 other projects with multiple production applications in various stages of development"); Mary Welch, *Diversa Raises $200.1M in IPO; Stock Takes Off on First Day*, BIOWORLD TODAY, Feb. 15, 2000 (pointing out Diversa's successful initial public offering ("IPO") and stating that Diversa applies the methods it develops to the acquisition of "previously unaccessed genetic material from uncultured organisms found in [the] natural environments [of numerous countries]"); Rhonda L. Rundle, *Diversa Shares Triple on First Day, Boosted by Enthusiasm for Biotech Firms*, WALL ST. J., Feb. 15, 2000, at B7 (reporting the more than tripled value of Diversa's shares on their first day of trading and pointing out the various applications of the enzymes Diversa has developed from samples collected in several countries); *Biotech Co. Diversa Up on First Day of Trading*, DOW JONES NEWS SERV., Feb. 14, 2000 (noting Diversa's considerable rise in revenues between 1998 and 1999); *Patent Disclosures*, BIOWORLD TODAY, Jan. 20, 2000 (reporting the issuance of a patent to Diversa for "methods for forming normalized DNA libraries"); *Press Release: Diversa Gets Gene Discovery Patent*, DOW JONES NEWS SERV., Mar. 3, 2000 (announcing Diversa's new patent for "sequence-based gene discovery from the environment").

financial returns with the Park."[58] Even though a cooperative

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[58] *Edmonds Inst.*, 42 F. Supp. 2d at 4. The financial arrangement is described as follows by Yellowstone National Park:

> Diversa agreed to pay Yellowstone $25,000 a year for five years for permission to collect microbes in the park. If Diversa develops a profitable product from research based on Yellowstone microbes, the park will also be entitled to a royalty based on the profits. The agreement does not enable Diversa to do anything that was not already allowed under the NPS research permit system; it simply provides compensation to the park for access.

Yellowstone, *supra* note 34. *See also* Tom Laceky, *Park Service Won't Fight Judge's Order over Research Contract*, ASSOCIATED PRESS NEWSWIRES, March 25, 1999 (stating that Diversa "agreed to pay Yellowstone $175,000 over five years, plus an undisclosed percentage of whatever commercial profits grow from its microbe research" and that the secrecy of the CRADA is the basis for a separate suit by the *Edmonds Institute* plaintiffs). Yellowstone National Park explained that confidentiality was required by the existence of trade secrets, "commercial and pricing interests," the disclosure of which could be harmful to Diversa and could prevent the federal government from negotiating "the most advantageous arrangements for benefit-sharing related to permitted park research." Yellowstone, *supra* note 34. However, Yellowstone National Park disclosed "that the royalties that could result from [its agreement with Diversa] range up to 10 percent of net revenues earned by Diversa on research results involving biological samples from the park." Yellowstone, *supra* note 34. As Yellowstone National Park declined to release the details of the CRADA, specifically its financial and technological provisions, Edmonds Institute filed a Freedom of Information Act action in the United States District Court for the District of Columbia requesting access to the CRADA. *See* Edmonds Inst. v. National Park Serv., No. 98-482 (D.D.C. filed Feb. 25, 1998). This action is separate from the *Edmonds Institute* case, which is the basis for this Note, and was recently settled. Michael Milstein, *Microbes for Money*, BILLINGS GAZETTE (Mont.), Jan. 11, 2000, at 1B (stating that the NPS released the confidential details of the CRADA, including the facts that, under the agreement, Diversa would pay the NPS "one-half percent of the net sales of any commercial products" derived from organisms found in Yellowstone National Park, "3 percent of the net sales of 'research reagent or diagnostic' products based on the genetic codes" of such organisms, and "8 percent of net sales of 'native enzymes purified from cultured microorganisms'" collected in the Park); *Interior's Disclosure Prompts New Slap at Yellowstone CRADA*, FED. TECH. REP., Jan. 13, 2000, at 9 (announcing the settlement of the Freedom of Information Act action, reporting the royalties of 0.5%, 3%, and 8% provided for in the CRADA, and noting that the annual $20,000 Diversa agreed to pay for five years in return for collecting samples "would be reduced by any revenues [Yellowstone National

research and development agreement ("CRADA") had been entered into between a federal agency and a non-federal party and challenged in court before *Edmonds Institute*,[59] that agreement did not include the profit-sharing provision included in the CRADA at issue in *Edmonds Institute*.[60] As noted by the court, the profit-sharing provision was the "most innovative feature" of the CRADA between the government and Diversa Corporation.[61] The plaintiffs in *Edmonds Institute* filed suit after the NPS denied their request that it not enter into a CRADA with Diversa Corporation without notifying the public and conducting an environmental impact assessment.[62] The plaintiffs alleged that, by entering into a

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Park] received from product sales").

[59] *See* Chem Serv., Inc. v. Environmental Monitoring Sys. Lab., 12 F.3d 1256, 1258 (3d Cir. 1993) (holding that a competitor to several private laboratories had standing to sue the Environmental Protection Agency ("EPA") to enjoin the EPA from performing certain functions agreed to in CRADAs between the EPA and the private laboratories).

[60] *See Chem Serv.*, 12 F.3d at 1258-61; *Edmonds Inst.*, 42 F. Supp. 2d at 4-6. *Chem Service* may be distinguished from *Edmonds Institute* on the following grounds: (i) unlike *Edmonds Institute*, the federal laboratory in *Chem Service* was not a national park; (ii) the federal agency involved in *Chem Service* was the EPA, whereas in *Edmonds Institute* it was the NPS; (iii) while the CRADA entered into in *Edmonds Institute* related to future technologies derived from yet-to-be-done research, the CRADAs in *Chem Service* included pre-existing technologies; and (iv) the CRADA between the EPA and NSI Technology Services Corporation challenged in *Chem Service*, while providing that the EPA would receive part of the profits of the sale of reference materials, is different from the profit-sharing provision in the CRADA challenged in *Edmonds Institute* because of the scope and nature of the potential benefits. *Chem Serv.*, 12 F.3d at 1258-61; *Edmonds Inst.*, 42 F. Supp. 2d at 4-6.

[61] *Edmonds Inst.*, 42 F. Supp. 2d at 5.

[62] *Id.* at 9 (explaining that plaintiffs are: Edmonds Institute, a not-for-profit public interest organization, the goals of which are, among others, "the regulation of biotechnology and the maintenance and protection of biodiversity"; Alliance for the Wild Rockies, a not-for-profit organization "dedicated to the preservation and protection of the native biodiversity of the Northern Rockies Region"; International Center for Technology Assessment, a not-for-profit corporation "focused on the environmental, economic, and ethical issues surrounding the biotechnology industry"; and Phil Knight, a resident of Montana who likes to "hike, photograph, and otherwise enjoy [the] aesthetic and recreational qualities [of Yellowstone National Park]").

CRADA with Diversa Corporation, the defendants[63] violated the Federal Technology Transfer Act of 1986 ("FTTA"),[64] NPSOA,[65] the Yellowstone National Park Organic Act,[66] the National Environmental Policy Act ("NEPA"),[67] the Administrative Procedure Act ("APA"),[68] and the public trust doctrine.[69] After deciding that the plaintiffs had standing to sue both under Article III of the United States Constitution[70] and under the "zone of interest"

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[63] *Id.* (stating that defendants are Secretary of the Interior Bruce Babbitt and Director of NPS Robert Stanton, each sued only in his official capacity).

[64] 15 U.S.C. §§ 3710a-3710d (1994 & Supp. IV 1998). *See infra* notes 173-174 and accompanying text (noting the broad congressional purpose of fostering technological cooperation between the federal government and the private sector by encouraging technology transfers, thereby increasing the nation's competitiveness in that area).

[65] 16 U.S.C. §§ 1-4 (1994 & Supp. IV 1998). *See supra* notes 24, 27 and accompanying text (noting that NPSOA provided the mandate for the creation of the NPS and that NPSOA recognizes that the purpose of the national parks is "to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations").

[66] 16 U.S.C. §§ 21-22 (1994) (establishing Yellowstone National Park by defining its boundaries and recognizing that Yellowstone National Park "shall be under the exclusive control of the Secretary of the Interior," who "shall make regulations providing for the preservation, from injury or spoliation, of all timber, mineral deposits, natural curiosities, or wonders, within the park, and their retention in their natural condition").

[67] 42 U.S.C. §§ 4321-4370d (1994 & Supp. III 1997). *See infra* note 145 and accompanying text (recognizing the implementation of NEPA as a result of the public's awareness of the increasing damage done to the environment and the need to take remedial action).

[68] 5 U.S.C. §§ 551-559, 701-706 (1994 & Supp. IV 1998). The APA allows parties to bring a cause of action challenging interpretations of law and other final agency actions alleged to be in violation of a statute. 5 U.S.C. § 702 (1994).

[69] *See infra* Part II.B.2 (discussing the public trust doctrine and explaining that under the public trust doctrine, the public's rights in certain natural resources are enforced by the government acting as the trustee of a public trust).

[70] U.S. CONST. art. III, § 2, cl. 1 (providing that "[t]he judicial Power shall extend to all Cases, in Law and Equity, arising under this Constitution, the Laws of the United States, and Treaties made, or which shall be made, under their Authority"); Edmonds Inst. v. Babbitt, 42 F. Supp. 2d 1, 10, 13 (D.D.C. 1999) (noting that the courts have interpreted the authority granted the judiciary under

requirement of the FTTA,[71] the court ordered the NPS to suspend the implementation of the CRADA "pending the completion of any and all review mandated by the National Environmental Policy Act, including but not limited to the preparation of an Environmental Assessment"[72] or Environmental Impact Statement ("EIS").[73]

Article III to "impose a constitutional limitation on what persons or entities may bring suit in federal court").

[71] *Edmonds Inst.*, 42 F. Supp. 2d at 14. Additionally, the court found that plaintiffs had "stated a cause of action under the APA that the defendants have acted in violation of the FTTA" and that plaintiffs had stated a cause of action under NPSOA and the Yellowstone National Park Organic Act. *Id.* at 15-16. However, the court concluded that plaintiffs had not stated a cause of action under the public trust doctrine. *Id.* at 16-17. *See* Chem Serv., Inc. v. Environmental Monitoring Sys. Lab., 12 F.3d 1256, 1265 (3d Cir. 1993) (explaining the "zone of interest" requirement by noting that, although Congress did not anywhere in the FTTA "confer a right on private entities to bring suit to challenge a CRADA," the United States Supreme Court "has recognized that Congress does not need to specifically confer a right to bring suit for agency disregard of the law" and that all the court must find is that "Congress intended for entities possessing interests such as those of [the plaintiff] to be relied upon to challenge the EPA's disregard for the law").

[72] *Edmonds Inst.*, 42 F. Supp. 2d at 20. An Environmental Assessment is defined as a brief public document that: 1) provides "sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact;" 2) assists in "an agency's compliance with [NEPA] when no environmental impact statement is necessary;" or 3) "[f]acilitate[s] preparation of a[n environmental impact] statement when one is necessary." 40 C.F.R. § 1508.9 (1999). Following the court's decision, the NPS announced that it would not appeal and would "immediately begin environmental studies." Laceky, *supra* note 58.

[73] *Edmonds Inst.*, 42 F. Supp. 2d at 20. An EIS is:

> [A] detailed statement by the responsible official on–
> (i) the environmental impact of the proposed action,
> (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,
> (iii) alternatives to the proposed action,
> (iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity,
> (v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

42 U.S.C. § 4332(2)(C) (1994).

Governmental sharing of profits derived from commercial uses of public natural resources has become more open and controversial since the commercialization of Thermus aquaticus and Pacific yew tree bark. In addition, the issue has now led to litigation, as illustrated by *Edmonds Institute*. The intensified debate is due partly to the lack of clarity of the existing statutory framework regulating public lands, which is silent on whether profit-sharing is an acceptable use of those lands. Although profit-sharing is gaining attention, adequate legislation providing that profit-sharing should be permitted has yet to be passed. The existing legislative and judicial framework in various areas of the law must be examined to determine whether some or all of that framework may be applied to resolve the issue of profit-sharing.

II. THE EXISTING LEGISLATIVE AND JUDICIAL FRAMEWORK

The issue of the federal government sharing the profits of the commercialization of natural resources found on public lands with private industry must be analyzed in view of existing legal principles to determine whether any may be used to justify or condemn profit-sharing. First, several constitutional arguments must be considered in support of and against profit-sharing. Second, profit-sharing must be analyzed in light of property law arguments, including general property rights, the public trust doctrine, and the doctrine of accession. Finally, compensation to the government also must be analyzed in view of environmental law, more particularly the purposes and requirements of NEPA.

A. Constitutional Law

Several constitutional issues present themselves when considering the legality of the government sharing in revenues generated by private companies from resources found on public lands. While these different constitutional doctrines may provide both justifications for and arguments against the validity of profit-sharing, other legal principles may prove stronger for the respective sides. Even so, the constitutional issues must be considered in brief.

The Property Clause of the United States Constitution[74] provides the basis for an argument that the government has authority over the management of federal public lands and therefore can make any decisions affecting such lands, including the decision to enter into a CRADA with a profit-sharing provision.[75] Additionally, the Property Clause has been interpreted to give the federal government authority to regulate activities that "directly interfere with the management of public resources."[76]

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[74] U.S. CONST. art. IV, § 3, cl. 2 (providing that "[t]he Congress shall have Power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States").

[75] *See* Susan D. Baer, Comment, *The Public Trust Doctrine—A Tool to Make Federal Administrative Agencies Increase Protection of Public Land and Its Resources,* 15 B.C. ENVTL. AFF. L. REV. 385, 422-24 (1988). *See also* Kleppe v. New Mexico, 426 U.S. 529, 546 (holding that Congress had authority to protect wildlife on public lands under the Property Clause), *reh'g denied,* 429 U.S. 873 (1976); United States v. Gardner, 107 F.3d 1314, 1318 (9th Cir. 1996) (noting that "under the Property Clause, the United States can administer its federal lands any way it chooses, including the establishment of a national forest reserve"). Arguably, the court's conclusion in *Gardner* may provide support for the concept that the Property Clause gives the federal government the authority to enter into agreements including profit-sharing provisions, since establishing a forest reserve, thereby protecting the environment, is analogous to receiving profits that can be used for further preservation of genetic resources.

[76] Marla E. Mansfield, *On the Cusp of Property Rights: Lessons from Public Land Law,* 18 ECOLOGY L.Q. 43, 54-55 (1991). Even though this statement was made in the context of governmental regulation of activities "undertaken on private land surrounded by public land," the argument is even stronger in favor of regulation of such activities occurring on public land. *Id.* at 55. *See* McGrail v. Babbitt, 986 F. Supp. 1386, 1394 (S.D. Fla. 1997) ("'Congress clearly has the power to dedicate federal land for particular purposes. As a necessary incident of that power, Congress must have the ability to insure that these lands be protected against interference with their intended purposes.'" (quoting Minnesota v. Block, 660 F.2d 1240, 1249 (8th Cir. 1981))). Illustrating the principle that the federal government has the power under the Property Clause to regulate both federal lands and non-federal property adjacent thereto in order to achieve the designated purpose of federal lands, the court in *McGrail* went on to find that the FWS had the authority to regulate the activities of a private boat-chartering company "through state-owned waters to federally-owned [land]." *Id.* at 1394-95. *See also* Klump v. United States, 38 Fed. Cl. 243, 248 (1997) (stating that the Property Clause gives Congress the power "to control the occupancy and use of public land and to protect that land from trespass and injury" (citing Kleppe v.

Under this rationale, the Property Clause can be invoked to authorize federal land management agencies to enter into agreements providing for profit-sharing, since permitting private companies to use federal land natural resources without receiving any of the profits derived therefrom would be equal to an interference with the management of such resources.

One might also argue that the use of public lands without compensation to the landowner, the United States, constitutes a "taking" in violation of the Takings Clause of the United States Constitution.[77] This argument, however, seems invalid because public lands are by definition not "private property"[78] and, therefore, their use without compensating the federal government does not constitute a "taking." Even though recent United States Supreme Court cases have evidenced a trend that environmental land-use regulations by the government require compensation under the Fifth Amendment,[79] the argument has not been extended to regulations by the government of its own lands.

A constitutional argument opposing profit-sharing could be made that, by entering into CRADAs with some corporations and not others, federal agencies such as the NPS violate a private user's constitutional right to equal access to natural resources and equal treatment. A similar argument was unsuccessful[80] and it is not

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New Mexico, 426 U.S. 529, 540 (1976))).

[77] U.S. CONST. amend. V (providing, in part, that "private property [shall not] be taken for public use, without just compensation").

[78] Private property is defined as property "over which the owner has exclusive and absolute rights." BLACK'S LAW DICTIONARY 1233 (7th ed. 1999).

[79] *See, e.g.*, Dolan v. City of Tigard, 512 U.S. 374, 395-96 (1994) (holding that certain conditions imposed by the city in return for granting a building permit violated the Takings Clause); Lucas v. South Carolina Coastal Council, 505 U.S. 1003, 1030 (1992) (holding that when a state's anti-erosion law restricting construction in a coastal zone denies a landowner "all economically productive or beneficial uses of [his] land," a taking has occurred and therefore compensation is required).

[80] *See* Eiseman v. Andrus, 433 F. Supp. 1103, 1106-07 (D. Ariz. 1977), *aff'd*, 608 F.2d 1250 (9th Cir. 1979), *cert. denied*, 446 U.S. 982 (1980) (concluding that the NPS's "allocation of usage" of the Colorado river has a "rational basis, . . . furthers the legitimate governmental objective of providing for the greatest possible public enjoyment of the river experience subject to ecological, environmental and public safety limitations," and does not violate the

clear from this precedent alone whether such argument may prevail in the future. When an equal protection argument was raised in objection to the different treatment accorded commercial and non-commercial users of the Colorado river, a district court found a rational basis for treating the two classes of users differently.[81] Similarly, another district court held that an individual's constitutional rights to travel and to equal protection were not violated by Forest Service regulations limiting travel on an unpaved forest development road through a national forest as a means of protecting national resources.[82] Thus, such constitutional arguments in opposition to profit-sharing seem likely to fail.

B. Property Law

Because natural resources found on public lands arguably are owned either by the federal government[83] or by the public,[84] sharing the profits derived from their use necessarily raises property law issues. The issue of profit-sharing may be explored in light of general property rights inherent in land ownership. In addition, the public trust doctrine may be considered to resolve the issue of profit-sharing. Finally, profit-sharing may be analyzed under the doctrine of accession to decide whether the government may acquire title to products derived from natural resources found on public lands.

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constitutional rights of the users of the river); Mountain States Legal Found. v. Espy, 833 F. Supp. 808, 815-16, 821 (D. Idaho 1993) (concluding that plaintiffs' "constitutional right to travel" and right to equal protection were not violated by Forest Service restrictions on forest road traffic, and that the Constitution provides "no express right to travel").

[81] *Eiseman*, 433 F. Supp. at 1107.

[82] *Mountain States Legal Found.*, 833 F. Supp. at 821.

[83] *See infra* note 92 and accompanying text (discussing the status of the federal government as a proprietor of public lands).

[84] *See infra* notes 121-122 and accompanying text (discussing the rights possessed by the public in certain natural resources).

1. Property Rights in General

Many rights flow from property ownership.[85] A landowner, for example, has the right to use her land,[86] to exclude others from her land,[87] to sell, donate, bequeath or otherwise convey her land

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[85] *See generally* United States v. General Motors Corp., 323 U.S. 373, 378 (1945) (describing property rights as the rights "to possess, use and dispose of [property]"); Moore v. Regents of the Univ. of Cal., 793 P.2d 479, 509 (Mosk, J., dissenting) (describing the "'bundle of [property] rights'" as the rights "to possess the property, to use the property, to exclude others from the property, and to dispose of the property by sale or by gift" (citing Union Oil Co. v. State Bd. of Equal., 386 P.2d 496 (Cal. 1963))).

[86] *See, e.g.*, Reaver v. Martin Theatres of Fla., 52 So. 2d 682, 683 (Fla. 1951) (stating that "a property owner may put his own property to any reasonable and lawful use" provided that he does not "deprive the adjoining landowner of any right of enjoyment of his property which is recognized and protected by law" and that his use of his property does not amount to a nuisance); Allen v. McClellan, 405 P.2d 405, 407-08 (N.M. 1965) (recognizing the right of a landowner to hunt game on his own land); Jones v. Wagner, 624 A.2d 166, 168 (Pa. Super. Ct. 1993) (pointing out the long-recognized principle that "the landowner has the exclusive right to the space above the surface of his property"); Prah v. Maretti, 321 N.W.2d 182, 194 (Wis. 1982) (Callow, J., dissenting) (acknowledging the existence of policies "favoring the right of a landowner to use his property as he lawfully desires" and stating that "[t]he right of a property owner to lawful enjoyment of his property should be vigorously protected").

[87] *See* Loretto v. Teleprompter Manhattan CATV Corp., 458 U.S. 419, 421-22, 435 (1982) (stating that the "power to exclude has traditionally been considered one of the most treasured strands in an owner's bundle of property rights" and holding that the installation of a television cable on parts of the roof and side of plaintiff's building constituted a taking, despite the fact that the cable was "less than one-half inch in diameter and . . . approximately 30 feet in length"). *See also* Blackstone's description of the right to exclude others:

> For the right of *meum* and *tuum*, or property, in lands once established, it follows as a necessary consequence, that this right must be exclusive; that is, that the owner may retain to himself the sole use and occupation of his soil: every entry therefore thereon without the owner's leave, and especially if contrary to his express order, is a trespass or transgression.

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to others,[88] and to derive profits from the use of her land.[89] The issue of profits derived from use of a landowner's property has been litigated extensively, particularly in the area of mineral resources.[90] Courts have held not only that landowners have the right to derive such profits, but also that they have the right to use resources found underneath their land.[91] Such judicial precedent

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[88] *See, e.g.*, Metropolitan Dade County v. Sunlink Corp., 642 So. 2d 551, 562 (Fla. Dist. Ct. App. 1993) (Cope, J., dissenting) (agreeing with the trial court's finding that the plaintiff's "'right to alienate, transfer, use and convey its property'" had been unreasonably and illegally restricted, resulting in the restriction being "'void ab initio and of no further force and effect'"); Robertson v. Simmons, 322 S.W.2d 476, 481 (Ky. Ct. App. 1959) (noting that at common law, "all restraints on the alienation of land held in fee were void" and that the rule prevailing in Kentucky was that a restriction on alienation was allowed if it was for a "reasonable" period of time); Moffit v. Sederlund, 378 N.W.2d 491, 498 (Mich. Ct. App. 1985) (explaining that when "one's interest in property is absolute, as a fee simple, restriction on his right of alienation is void as repugnant to the grant"); Brace v. Black, 144 A.2d 385, 389-90 (N.J. Super. Ct. App. Div. 1958) (noting the "well-recognized policy of freedom of alienation of property" and the "strong public policy in favor of the free transferability of property"); Solberg v. Heeb, No. 17910-9-III, 1999 WL 982390, at *2 (Wash. Ct. App. Oct. 26, 1999) (noting that "[a] property owner may dedicate, donate or grant a portion of its land to the public or an individual").

[89] *See, e.g.*, Martin v. City of Gadsden, 584 So. 2d 796, 797-98 (Ala. 1991) (recognizing a city's right, as landowner, to use its land for commercial purposes and to derive a profit therefrom, even though there was sufficient evidence that the city did not intend to derive a profit from the use of its park); Minard Run Oil Co. v. Pennzoil Co., 214 A.2d 234, 235 (Pa. 1965) (stating that a landowner who had sold a pipeline easement to his land retained the right "to use the rest of [his] land in a manner profitable to [his] own business" and could not be prevented "from working his land so as to derive the greatest profit therefrom").

[90] *See, e.g.*, *In re* Senior-G & A Operating Co., 957 F.2d 1290, 1296 (5th Cir. 1992) (stating that, "[u]nder Louisiana law, the landowner has the right to explore and develop mineral resources under his land"); *In re* Hillsborough Holdings Corp., 207 B.R. 299, 303 (Bankr. M.D. Fla. 1997) (noting that "the right held by the landowner is 'the right to reduce the oil and gas to possession or to sever this right for economic consideration'" (quoting NCNB Texas Nat'l Bank, N.A. v. West, 631 So. 2d 212, 223 (Ala. 1993))).

[91] *See, e.g.*, *In re Hillsborough*, 207 B.R. at 303; *NCNB Texas Nat'l Bank*, 631 So. 2d at 223; Union Gas Sys. v. Carnahan, 774 P.2d 962, 967 (Kan. 1989) (stating that "landowners ha[ve] the right to recover and keep injected gas which had moved under the landowners' property" (citing Anderson v. Beech Aircraft

may be used to resolve the issue of governmental profit-sharing with respect to commercial exploitation of natural resources found on public lands because the federal government may be considered the owner of federal lands[92] and, therefore, the holder of a right to use the natural resources found thereon and to derive profits from such use.[93]

A counter-argument may be raised, however, that once the federal government agrees to dispose of some of the natural resources found on its lands, for example by allowing biotechnology companies to collect specimens, the government loses its rights

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Corp., 699 P.2d 1023 (Kan. 1985))); Carbon County v. Union Reserve Coal Co., 898 P.2d 680, 688-89 (Mont. 1995) (stating that "petroleum and gas, as long as they remain in the ground, are a part of the realty, . . . belong to the owner of the land, and are a part of it as long as they are on it or in it, or subject to [the landowner's] control"); Barshop v. Medina County Underground Water Conservation Dist., 925 S.W.2d 618, 623 (Tex. 1996) (noting that "[h]istorically, landowners have had property rights in the water beneath their land").

[92] *See, e.g.*, Kleppe v. New Mexico, 426 U.S. 529, 540 (1976) (stating that "Congress exercises the powers both of a proprietor and of a legislature over the public domain"); Light v. United States, 220 U.S. 523, 536 (1911) (emphasizing the federal government's ownership of public lands by noting that Congress "'may deal with [its] lands precisely as a private individual may deal with his farming property . . . [and] may sell or withhold them from sale'" (quoting Camfield v. United States, 167 U.S. 518, 524 (1897))); Fort Leavenworth R.R. v. Lowe, 114 U.S. 525, 526 (1885) (analogizing the United States as a "proprietor" with respect to public lands); United States v. Nye County, 920 F. Supp. 1108, 1120 (D. Nev. 1996) (holding that "the United States owns and has the power and authority to manage and administer the unappropriated public lands . . . within Nye County, Nevada"); Mountain States Legal Found. v. Espy, 833 F. Supp. 808, 816 (D. Idaho 1993) (stating that "as a landowner, the United States, through its Forest Service, has the right to regulate when and under what circumstances the public may enter and use national forest lands so as to protect those lands and the resources found there").

[93] *See* Moore v. Regents of the Univ. of Cal., 793 P.2d 479, 517 (Cal. 1990) (Mosk, J., dissenting) (recognizing that "[s]ocietal notions of equity and fairness demand recognition of property rights" and that "[t]o deny the person contributing the raw material a fair share of the benefits [derived from human biologics] is both unfair and morally wrong"). Arguably, natural resources may be analogized to the human body for purposes of this unjust enrichment argument because, as an individual's body provides the raw materials necessary to medical research, public lands provide the raw materials necessary to scientific research and potential development of commercially valuable products.

to such resources and, therefore, is not entitled to any profits derived from commercial application of those resources. A similar argument was made in *Moore v. Regents of the University of California*,[94] though it is unlikely that the argument would prevail in the context of ownership of public lands as the "property" involved in *Moore* was body parts.[95]

In *Moore*, the plaintiff's body parts consisted of cells taken from his blood and other bodily substances.[96] The plaintiff was diagnosed with hairy-cell leukemia and consented to having his spleen removed upon his physician's assurance that the operation was necessary to "slow down the progress of [the] disease."[97] Before Moore's spleen was removed, his physician realized that his blood contained certain substances likely to be of high commercial value.[98] Upon this discovery, and without informing Moore, the physician made arrangements to have access to Moore's spleen once removed.[99] Moore's physician, assisted by other parties, then developed an extremely valuable cell line from the cells taken from Moore's spleen and from the withdrawal of Moore's blood, bone marrow aspirate, and other bodily substances over a period of several years after the operation.[100] Moore was never informed of the commercial applications derived from his cells.[101] A patent[102] was subsequently issued for the cell line developed from

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[94] 793 P.2d 479 (Cal. 1990). Moore alleged that he still owned his cells after their removal and that he had a proprietary interest in any commercial applications derived from his cells. *Id.* at 487. The Supreme Court of California held that Moore did not retain either possession of, or an ownership interest in, his cells after their removal and, therefore, could not sustain either a cause of action for conversion or a proprietary claim in the products derived from his cells. *Id.* at 488-89.

[95] *Moore*, 793 P.2d at 485.

[96] *Id.*

[97] *Id.* at 481.

[98] *Id.*

[99] *Id.*

[100] *Id.*

[101] *Id.*

[102] *See* 35 U.S.C.A. § 154(a)(1) (West 2000) (providing that a patent is a privilege granted by the government to an inventor, allowing such inventor "to exclude others from making, using, offering for sale, or selling the invention" for which a patent was granted).

Moore's cells, bestowing enormous benefits to its inventors, without any part thereof allocated to Moore.[103] Moore then unsuccessfully filed a lawsuit seeking a share of the profits.[104]

Ownership and commercialization of human body parts is a highly controversial issue that has not yet been resolved.[105] The controversy stems from the fear that, if body parts are deemed to be personal property, thereby giving their owners the right to use them in a commercial manner, a tidal wave may ensue whereby

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[103] *Moore*, 793 P.2d at 482.

[104] *Id.* at 482-83.

[105] *Id.* at 498 (Arabian, J., concurring). Justice Arabian recognized that the moral, philosophical, and religious implications of "recognizing and enforcing a property interest in body tissues are not known, but are greatly feared." *Id.* Additionally, in his concurrence and dissent, Justice Broussard recognized that allowing an individual or private entity to profit from human body parts is problematic and that, "as a matter of policy or morality, it would be wiser to prohibit [commercial uses] of a human body" but noted that creating a system that would allow such uses "for the betterment of society as a whole" is better left to the Legislature. *Id.* at 505 (Broussard, J., concurring and dissenting). *See* National Organ Transplant Act, 42 U.S.C. §§ 273-274e (1994 & Supp. III 1997) (prohibiting the sale of "human organs," including "kidney, liver, heart, lung, pancreas, bone marrow, cornea, eye, bone, and skin or any subpart thereof" and "any other human organ," but not including replenishable tissues such as blood and cells); United States v. Garber, 607 F.2d 92, 97 (5th Cir. 1979) (recognizing a tangible property interest in blood plasma); People v. Young, 248 N.Y.S.2d 287, 298 (Westchester County Ct. 1964) (stating that the defendant's blood, which had been obtained through an illegal search and seizure, was his property). *See also* Helen R. Bergman, Note and Comment, *Case Comment:* Moore v. Regents of the University of California, 18 AM. J.L. & MED. 127, 135-36 (1992) (recognizing the existence of and limitations on "property-like interests in the human body" by pointing out that "individuals appear to have a property interest in certain body by-products" such as semen and blood, which can be sold); Stephen R. Munzer, *The Special Case of Property Rights in Umbilical Cord Blood For Transplantation*, 51 RUTGERS L. REV. 493, 509-10 (1999) (stating that, although "much controversy exists on whether anyone has property rights in his or her own body or body parts, or in the bodies or body parts of others," it may be assumed that "at least sometimes some persons have some property rights in some body parts"); Richard Gold, *Owning Our Bodies: An Examination of Property Law and Biotechnology*, 32 SAN DIEGO L. REV. 1167, 1246 (1995) (noting that traditionally "[t]he human body and human health have not . . . been considered property").

individuals, attracted by financial reward,[106] may sell their body parts without regard for any moral, ethical, philosophical, or religious concerns.[107] Another possible negative consequence of recognizing an individual's ownership interest in his or her own body parts and of allowing such individual to prevent the scientific community from commercializing them without compensation is the potential hindrance of medical research due to "restrict[ed] access to the necessary raw materials"[108] or to the possible "destruction of the researcher's incentive to search."[109] On the other hand, denying an individual a property interest in his or her own body and allowing third parties to exploit one's cells freely is

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[106] Moore v. Regents of the Univ. of Cal., 793 P.2d 479, 498 (Cal. 1990) (Arabian, J., concurring) (mentioning, among other possible effects of allowing an individual to commercialize his or her own body parts, the "development of competitive bidding for such [commercialized body parts]"). *See* Munzer, *supra* note 105, at 538 (noting that "[v]irtually all people cringe when they read of a poor man in India who sells one of his kidneys to have enough money for his family"); Brian G. Hannemann, Comment, *Body Parts and Property Rights: A New Commodity for the 1990s*, 22 SW. U. L. REV. 399, 420 (1993) (giving the example of a desperate father selling his son's kidney for $10,000 in order to "provide food and shelter for his family").

[107] *Moore*, 793 P.2d at 498 (Arabian, J., concurring). *See* Munzer, *supra* note 105, at 539 (suggesting that it may be "morally objectionable to sell body parts if it offends human dignity to transfer them for a reason that is not strong enough in light of the nature of the parts sold"); Bergman, *supra* note 105, at 139 (noting the existence of "significant ideological reasons for prohibiting [persons whose tissues are used] from sharing in commercial profits," including the possibility that "economically disadvantaged people will be compelled to sell organs and tissue simply for the profit involved").

[108] *Moore*, 793 P.2d at 494 (explaining the critical role played by human cells in medical research).

[109] Robert Heidt, *Maintaining Incentives for Bioprospecting: The Occasional Need for a Right to Lie*, 13 BERKELEY TECH. L.J. 667, 670, 672 (1998) (generally arguing for a researcher's right to lie to patients or study subjects about the value of their cells and against compensating them for the use of such cells, and specifically explaining that such compensation, by "undermining the incentive to search," would result in a loss to the scientific community and therefore to society).

a sign of disrespect to the human being as an individual and may be analogized to slavery.[110]

Even though the plaintiff in *Moore* lost the argument that he had a property interest in his cells and, therefore, was entitled to a share of the profits derived from their commercial exploitation,[111] this does not suggest that the government has no proprietary interest in the natural resources found on public lands. Commercialization of removed body parts as raised in *Moore* and that of natural resources removed from government lands may be distinguished on several grounds. First, it is easier to recognize a proprietary interest in wild genetic resources found on federal lands[112] than it is to do so in removed body parts.[113] Second, even assuming one has a property right in one's body parts or cells, disposing of the property as a result of a medical procedure is different from the government authorizing private entities to collect specimens on public lands. In most instances, specimens collected are not from resources disposed of by the government, but attached to public lands.[114] The use of medically extracted body parts,

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[110] *Moore*, 793 P.2d at 515 (Mosk, J., dissenting) (noting societal recognition of the human body and the policy and ethical considerations leading to the prohibition of "direct abuse of the body by torture or other forms of cruel or unusual punishment" as well as "indirect abuse of the body by its economic exploitation for the sole benefit of another person"). In his dissent, Justice Mosk alleges that the specter of slavery is raised in today's research laboratories, where scientists claim "the right to appropriate and exploit a patient's tissue for their sole economic benefit–the right, in other words, to freely mine or harvest valuable physical properties of the patient's body." *Id.* at 515-16. *See* Bergman, *supra* note 105, at 136 (stating that "[s]lavery was the most far-reaching property right in human bodies ever recognized").

[111] *Moore*, 793 P.2d at 497 (holding that plaintiff does not have a cause of action for conversion).

[112] *See supra* note 92 and accompanying text (discussing the status of the federal government as a proprietor of public lands).

[113] *Moore*, 793 P.2d at 487-89 (stating that no court had ever "imposed conversion liability for the use of human cells in medical research," that a cause of action for conversion required either title to or possession of the allegedly converted property, and that no cases have held "that a person retains a sufficient interest in excised cells to support a cause of action for conversion").

[114] *See supra* Part I.B (discussing commercial products derived directly from samples collected in national parks or bark removed from national forest trees).

however, occurs after they have been removed from the body as they are no longer necessary or useful to the patient.[115] Finally, unlike ownership of body parts, ownership of natural resources found on public lands does not involve such highly controversial moral, ethical, and philosophical dilemmas.

2. *Public Trust Doctrine*

The public trust doctrine relies on the concept that the government is a "trustee of a public trust for the benefit of the people"[116] and, as trustee, has the obligation to ensure that the public's interest in natural resources is protected.[117] In *Edmonds Institute*, the court found that plaintiffs had not stated a cause of action under the public trust doctrine[118] because "Congress had supplanted any trust obligations by enacting the detailed regulatory system governing the national parks."[119] However, this doctrine

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[115] *Moore*, 793 P.2d at 491-92 (pointing out statutory limits to a "patient's control over excised cells" and requirements that human body parts, tissues, and other remains be disposed of after being used for scientific purposes, thereby inferring that cells and body parts are no longer useful to a patient once extracted from the body).

[116] National Audubon Soc'y v. Superior Court, 658 P.2d 709, 718 (Cal. 1983) (quoting Colberg, Inc. v. California *ex rel.* Dept. Pub. Works, 432 P.2d 3 (Cal. 1967)).

[117] *See* Illinois Cent. R.R. Co. v. Illinois, 146 U.S. 387, 453-54 (1892) (stating that the state, as trustee of lands under navigable waters, had the duty to protect the people's interest in such lands and, therefore, was not authorized to remove them fully from its direction and control). *See also National Audubon Soc'y*, 658 P.2d at 724 (supporting the very significant role played by the state as trustee):

> [T]he public trust is more than an affirmation of state power to use public property for public purposes. It is an affirmation of the duty of the state to protect the people's common heritage of streams, lakes, marshlands and tidelands, surrendering that right of protection only in rare cases when the abandonment of that right is consistent with the purposes of the trust.

Id.

[118] Edmonds Inst. v. Babbitt, 42 F. Supp. 2d 1, 16-17 (D.D.C. 1999).

[119] *Id.* at 17 (citing Sierra Club v. Andrus, 487 F. Supp. 443, 449 (D.D.C. 1980)).

is still recognized by some courts as a property rights doctrine.[120]

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[120] Even though many of the judicial decisions applying the public trust doctrine recognize the state as the trustee of public lands, some courts have also applied the doctrine to the federal government. *See, e.g.*, Idaho Sporting Congress, Inc. v. United States Forest Serv., 92 F.3d 922, 924, 928 (9th Cir. 1996) (holding that the U.S. Forest Service did not violate the public trust doctrine when it developed forest projects including salvage timber sales in response to a series of destructive wildfires); National Ass'n of Home Builders v. New Jersey Dep't of Envtl. Protection, 64 F. Supp. 2d 354, 357-58 (D.N.J. 1999) (applying the doctrine to the state of New Jersey and recognizing that title to public trust property, i.e., property "which was submerged under the Hudson River, was artificially filled in, and upon which [a waterfront] [w]alkway [is required by the state to be] built," and is subject "to the public's right to use and enjoy the property, even if such property is alienated to private owners" as the "right of the public to use and enjoy . . . 'public trust lands' does not disappear simply because the land that was once submerged is filled in"); United States v. Burlington N. R.R. Co., 710 F. Supp. 1286, 1287 (D. Neb. 1989) (holding that under the public trust doctrine, the United States, similar to an individual state, could "maintain an action to recover for damages to its public lands and the natural resources on them"); United States v. 1.58 Acres of Land, 523 F. Supp. 120, 125 (D. Mass. 1981) (concluding that, similar to the state of Massachusetts, the federal government is restricted, under the public trust doctrine, "in its ability to abdicate to private individuals its [sovereignty] in the land"); *In re* Steuart Transp. Co., 495 F. Supp. 38, 40 (E.D. Va. 1980) (holding that "[u]nder the public trust doctrine, the State of Virginia and the United States have the right and the duty to protect and preserve the public's interest in natural wildlife resources"); National Audubon Soc'y v. Superior Court, 658 P.2d 709, 728 (Cal. 1983) (concluding that "[t]he state has an affirmative duty to take the public trust into account in the planning and allocation of water resources, and to protect public trust uses whenever feasible"); Matthews v. Bay Head Improvement Ass'n, 471 A.2d 355, 358, 368-69 (N.J. 1984) (noting that the public trust doctrine, originally recognizing that "the ownership, dominion and sovereignty over land flowed by tidal waters, which extend to the mean high water mark, is vested in the State in trust for the people," has been extended to dry sand beach areas (citing Neptune City v. Borough of Avon-by-the-Sea, 294 A.2d 47 (N.J. 1972)) and holding that the public has a right to use and access New Jersey's shoreline areas under the public trust doctrine); United Plainsmen Ass'n v. North Dakota State Water Conservation Comm'n, 247 N.W.2d 457, 460, 462 (N.D. 1976) (holding that the "discretionary authority of state officials to allocate vital state resources is not without limit but is circumscribed by [the public trust doctrine]" which requires, at a minimum, "a determination of the potential effect of the allocation of water on the present water supply and future water needs of [the state]"). *See also* Richard J. Lazarus, *Changing Conceptions of Property and*

As one commentator noted, the public trust doctrine is based on the notion "that the public possesses inviolable rights in certain natural resources"[121] and was established as a public property regime to resist "the exercise of private property rights in natural resources deemed contrary to the public interest."[122]

Even though the implementation of an increasing number of environmental protection laws[123] in recent years has led to the decline of the concept underlying the doctrine,[124] courts since 1970 have allowed some private citizens to "maintain actions against governmental and private parties to vindicate public trust doctrine interests."[125] Additionally, although the public trust doctrine originally applied solely to water resources,[126] it was

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Sovereignty in Natural Resources: Questioning the Public Trust Doctrine, 71 IOWA L. REV. 631, 643-44 (1986) (discussing the impact of the public trust doctrine "on litigation brought by parties on behalf of natural resource protection" since 1970).

[121] Lazarus, *supra* note 120, at 632.

[122] Lazarus, *supra* note 120, at 633.

[123] *See, e.g.*, NEPA, codified in 42 U.S.C. §§ 4321-4370d (1994 & Supp. III 1997) (requiring that federal agencies comply with certain provisions before undertaking any action that may have an impact on the environment, thereby embodying the same concept of agency accountability to the public as that in the public trust doctrine); Clean Air Act, 42 U.S.C. § 7604(a) (1994) (furthering that concept by allowing private suits against federal agencies for failure to comply with statutory provisions); Endangered Species Act of 1973, 16 U.S.C. § 1540(g) (1994) (allowing "citizen suits" against private parties and governmental agencies for violation of the statute).

[124] Lazarus, *supra* note 120, at 633.

[125] Lazarus, *supra* note 120, at 646. *See, e.g.*, *National Audubon Soc'y*, 658 P.2d at 728, 732 (noting that statutes enacted to codify the concept of public trust uses have not rendered the doctrine superfluous, reaffirming the importance of the doctrine, and holding that the plaintiffs can rely on the doctrine in challenging the allocation of water from a state lake); Marks v. Whitney, 491 P.2d 374, 381-82 (Cal. 1971) (allowing an individual to request judicial recognition of a public trust easement on the property of another individual and recognizing different actions that members of the public have been allowed to bring under the public trust doctrine); Paepcke v. Public Bldg. Comm'n of Chicago, 263 N.E.2d 11, 18 (Ill. 1970) (recognizing that members of the public, being the beneficiaries of the "public trust," must have "the right and standing to enforce [the public trust]").

[126] Lazarus, *supra* note 120, at 647.

later extended to other resources.[127] Despite this judicial expansion of the doctrine, it has diminished in strength in the context of environmental protection due to the government's increased authority over environmental matters,[128] the implementation of environmental and natural resources statutes,[129] and the active role now played by federal agencies in environmental protection and conservation.[130] In light of the diminished authority of the public trust doctrine and its replacement by better means of

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[127] Lazarus, *supra* note 120, at 649 (giving as examples beaches, rural parklands, historic battlefields, wildlife, archaeological remains, and downtown areas). *See also In re* Steuart Transp. Co., 495 F. Supp. 38, 40 (E.D. Va. 1980) (applying the public trust doctrine to the protection of migratory waterfowl); *National Audubon Soc'y*, 658 P.2d at 712 (recognizing that the public trust "protects environmental and recreational values" (citing Marks v. Whitney, 491 P.2d 374 (Cal. 1971))); People v. Harbor Hut Restaurant, 196 Cal. Rptr. 7, 8 (Ct. App. 1983) (extending the doctrine to the protection of sport-caught fish); Gould v. Greylock Reservation Comm'n, 215 N.E.2d 114 (Mass. 1966) (applying the doctrine to the protection of parkland); Payne v. Kassab, 312 A.2d 86, 93 (Pa. 1973) (applying the public trust concept to "the management of public natural resources," including "clean air, pure water, and . . . natural, scenic, historic, and esthetic values of the environment").

[128] Lazarus, *supra* note 120, at 665-69, 674 (analyzing how the "expansion of police power authority" over environmental matters and the "erosion of private property" in the face of such authority have eroded the use of the public trust doctrine in the prevention of environmental harm). *See also* Conservation Law Found. v. Clark, 590 F. Supp. 1467, 1480 n.8 (D. Mass. 1984) (stating that, even though the Secretary of the Interior had a public trust duty to stop off-road vehicle use on Cape Cod National Seashore lands, further consideration of the public trust doctrine was unnecessary in light of the existence of congressional and executive mandates protecting the Seashore).

[129] Lazarus, *supra* note 120, at 685-86 (giving as an example of such statutes NEPA, which "requires federal agencies to consider the environmental impacts of proposed actions, which include issuing federal permits, spending federal funds, and managing vast federal properties, prior to taking any such action").

[130] Lazarus, *supra* note 120, at 688-91 (noting that federal administrative agencies such as the EPA and the FWS, "whose primary mandates are to prevent needless environmental degradation and to maintain a healthy environment," are major players in the management of environmental matters). *But see* Baer, *supra* note 75, at 387 (supporting the proposition that, "although the public trust doctrine is not currently an effective tool in forcing federal agency protection of natural resources, it has the potential to be one upon some initiative by the judiciary and future plaintiffs").

enforcement, the doctrine seems inappropriate to resolve the novel issue of governmental profit-sharing of revenues derived from natural resources found on its lands.

3. *Doctrine of Accession*

Accession has been defined as a common-law doctrine whereby "the owner of property gets title to everything his property produces, or that is attached to it, either naturally or artificially."[131] Courts in various jurisdictions have applied this doctrine to numerous kinds of chattels, such as computer equipment,[132] paint used on buildings,[133] parts of a van,[134] and automobile engines.[135] Courts have established two major inquiries in their determination of who owns title to property under the doctrine of accession.[136]

First, courts have analyzed title to property where one owner's original property becomes new property as a result of skill or labor

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[131] Arthur Allen Leff, *The Leff Dictionary of Law: A Fragment*, 94 YALE L.J. 1855, 1887 (1985). The doctrine of accession includes: "the addition to real property produced by the gradual deposit of solid matter by running water"; "the acquisition by the landholder of personal property immovably attached to [the chattel]"; "the right of an owner of a female domestic animal to its [offspring]"; and "the right of the owner of property to its income." *Id.* Another similar definition provides that the doctrine of accession signifies "the acquisition of title to personal property by its conversion into an entirely different thing by labor bestowed on it or by its incorporation into a union with other property." 1 AM. JUR. 2D *Accession and Confusion* § 1 (1994).

[132] *See* Computer Sys. of Am. v. Unum Life Ins. Co., 975 F.2d 922 (1st Cir. 1992).

[133] *See* Fanderlick-Locke Co. v. United States *ex rel.* Morgan, 285 F.2d 939 (10th Cir. 1960).

[134] *See* Bank of Am. v. J. & S. Auto Repairs, 694 P.2d 246 (Ariz. 1985).

[135] *See* Havas Used Cars, Inc. v. Lundy, 276 P.2d 727 (Nev. 1954).

[136] *See* 1 AM. JUR. 2D *Accession and Confusion* § 1 (1994) (stating that, "[i]f materials of one person are combined or united with the materials of another by skill and labor, forming a single, joint product, the owner of the principal materials which go to make up the whole acquires by accession the right of property in the whole" whereas "a claim of title by accession where materials of another are united may be defeated if such materials can be identified and severed without injury to the original property").

brought by a third party.[137] This means that if a party owns a piece of property and that property is later altered or improved by another's skill or labor, the owner of the original property also becomes the owner of the end property.[138] Courts in such cases have found that title to the end product passes to the owner of the principal piece of property after some items of lesser importance have been added to the principal piece.[139] Second, courts have looked into whether the chattels that have been added to a principal piece of property may be removed or detached from the principal piece without causing injury thereto.[140] If the answer to this inquiry is affirmative, courts have held that the added goods have not become part of the original piece of property and, therefore, the owner of the principal piece of property does not acquire title to those added goods.[141]

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[137] *Id.*

[138] *Id.*

[139] *See, e.g., In re* Amereco Envtl. Servs., 138 B.R. 590, 595 (Bankr. W.D. Mo. 1992) (holding that storage tank owner gained title to catwalks and ladders welded to the tanks); Mossler Acceptance Co. v. Norton Tire Co., 70 So. 2d 360, 361 (Fla. 1954) (stating that ordinary repairs upon personal property merge into the principal piece of property and the owner of the principal piece thereby acquires title to the new property after repairs); Capitol Chevrolet Co. v. Earheart, 627 S.W.2d 369, 371 (Tenn. Ct. App. 1981) (holding that a buyer who had purchased in good faith stripped-down hulls of stolen automobiles and thereafter used his own labor and materials to reconstruct vehicles acquired title to such vehicles); Ralston Purina Co. v. Toycen Motors, 124 N.W.2d 24, 27 (Wis. 1963) (noting that when the chattels of two different owners are incorporated together, title to the resulting piece of property is vested in the owner of the principal chattels).

[140] 1 AM. JUR. 2D *Accession and Confusion* § 1 (1994).

[141] *See, e.g.*, Rabtoay Gen. Tire Co. v. Colorado Kenworth Corp., 309 P.2d 616, 621 (Colo. 1957) (holding that title is not acquired by accession in the case of vehicle equipment when the equipment is distinguishable from the vehicle and may be detached therefrom without any damage resulting thereto); Omaha Std., Inc. v. Nissen, 187 N.W.2d 721, 724 (Iowa 1971) (holding that title was not acquired by accession where the body and accessories of a truck could be removed from the truck without any resulting injury thereto); Havas Used Cars, Inc. v. Lundy, 276 P.2d 727, 728 (Nev. 1954) (holding that an automobile engine had not become part of the vehicle when it could have been removed without damaging the vehicle and, therefore, the vehicle owner did not have title to the engine); Olive's Store v. Thomas, 294 P.2d 562, 563 (Okla. 1956) (holding that

While the doctrine of accession applies mostly to personal property, as opposed to real property,[142] one can draw an analogy between personal and real property and argue that, when an element such as real or personal property is added to a principal piece of real property, for example public lands, and the combination of the two results in a completely different piece of property, title to the whole is vested in the owner of the principal piece. This principle can be applied to the issue of profit-sharing in commercial applications of natural resources found on public lands. Thus, one can argue that, where the federal government owns the principal piece, i.e., the national parks and all natural resources found therein, and a third party, i.e., a private corporation, collects specimens therefrom to which it adds its own skill and labor, the federal government acquires title to the resulting product, i.e., a pharmaceutical or agricultural product, and is entitled to proceeds from any benefits derived from the end product. Additionally, one can argue that removing the added skill or labor from the principal piece of property would be either impossible or would result in damage to the original piece and, therefore, the exception to the doctrine of accession does not apply.[143]

This analogy between the doctrine of accession as it is applied to personal property and the doctrine as it may be applied to real property results in a strong argument in favor of profit-sharing by federal land management agencies. However, the courts to date

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the doctrine of accession did not apply to tires placed on vehicles on the basis that the tires could be removed from the vehicles without causing any damage thereto).

[142] Personal property is defined as "[a]ny movable or intangible thing that is subject to ownership and not classified as real property." BLACK'S LAW DICTIONARY 1233 (7th ed. 1999). Real property is defined as "[l]and and anything growing on, attached to, or erected on it, excluding anything that may be severed without injury to the land." *Id.* at 1234. Accession generally signifies "acquisition of title to *personal* property by bestowing labor on a raw material to convert it to another thing" or "[a]n improvement to existing *personal* property." *Id.* at 13 (emphasis added).

[143] *See supra* notes 140-141 and accompanying text (explaining that the exception lies in the fact that title is not acquired by accession where the added chattels are identifiable from the original property and may be removed therefrom without injury thereto).

have yet to consider the doctrine of accession in this light, and thus it is unlikely that the doctrine of accession could be used successfully in resolving the issue of profit-sharing.

C. *Environmental Law: the National Environmental Policy Act of 1969*

The National Environmental Policy Act of 1969 ("NEPA")[144] was implemented as a means of protecting the environment in an era when both the public and legislators became conscious of its importance and of the increasing damage being inflicted on the environment.[145] NEPA requires that each federal land management agency[146] comply with certain requirements whenever the agency makes a decision concerning the public lands it manages.[147] Specifically, NEPA requires each agency to prepare an

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[144] 42 U.S.C. §§ 4321-4370d (1994 & Supp. III 1997).

[145] *See, e.g.*, Dinah Bear, *NEPA at 19: A Primer on an 'Old' Law with Solutions to New Problems*, 19 ENVTL. L. REP. 10060, 10060 (1989) (noting that NEPA was "[a] product of the growing environmental consciousness of American society during the 1960s" and was "Congress' first modern environmental law"); Paul S. Weiland, *Amending the National Environmental Policy Act: Federal Environmental Protection in the Twenty-first Century*, 12 J. LAND USE & ENVTL. L. 275, 275-76 (1997) (noting that the public "began to recognize the adverse impact of humanity on the environment" after World War II and pointing out a "rise in consciousness [that] catapulted the issue of environment into the national arena").

[146] The four federal land management agencies are: the BLM, the NPS, the Forest Service, and the FWS. Mansfield, *supra* note 16, at 831-48; Heisel, *supra* note 19, at 236-37.

[147] *See* 42 U.S.C. § 4321 (1994 & Supp. III 1997) (stating the purposes of NEPA):

> To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.

Id.

EIS[148] with each proposal "for legislation and other major Federal actions significantly affecting the quality of the human environment."[149] One of the goals that NEPA seeks to achieve is biodiversity protection,[150] as illustrated by regulations enacted by the Council on Environmental Quality, which require federal land management agencies to "report impacts on ecosystems, including 'effects on natural resources and on the components, structures, and functioning of affected ecosystems' in an EIS."[151] The role played by NEPA in the conservation and protection of biodiversity, however, is limited as a result of NEPA requirements having been interpreted by the courts as solely procedural.[152] Additionally, even though the requirements of NEPA are subject to judicial review, "courts have not consistently required federal agencies to prepare full EISs before taking action [with respect to nonintervention, conservation, or restoration of biodiversity]."[153] Specifically, the general conservation policy enacted by the NPS has not been subject to compliance with NEPA's procedural requirements and therefore has not been scrutinized by the courts.[154]

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[148] *See supra* note 73 (giving NEPA's definition of an EIS).

[149] 42 U.S.C. § 4332(2)(C) (1994).

[150] Bradley C. Karkkainen, *Biodiversity and Land*, 83 CORNELL L. REV. 1, 15-16 (1997) (stating that NEPA is an "important piece[ ] of the biodiversity conservation policy puzzle" and that, although it "neither constitute[s] nor require[s] a broad biodiversity strategy" in its current form, "[b]iodiversity considerations are clearly within [its] ambit").

[151] *Id.* at 16 (quoting 40 C.F.R. § 1508.8 (1996)).

[152] *Id.* at 16. *See* Edmonds Inst. v. Babbitt, 42 F. Supp. 2d 1, 20 n.12 (D.D.C. 1999) (noting that the court itself recognized that it was concerned "solely with enforcing the procedural requirements of the NEPA" and that, because debates as to substantive environmental issues are better addressed by the legislature than by the judiciary, the court's role is "merely to ensure that the [federal land management] agencies act through the processes mandated by Congress in reaching their substantive determinations"). The court explained that it was only concerned with the procedural requirements because the issue of the "substantive validity of bioprospecting as a natural resource management strategy" is "one of considerable debate among and within many groups, including environmentalists and park enthusiasts." *Id.*

[153] Keiter, *supra* note 23, at 680.

[154] Keiter, *supra* note 23, at 680 (stating specifically that the NPS's 1988 Management Policies document "was not prepared under NEPA procedures" and

The shortcomings in the nature of NEPA's requirements and in their interpretation by the courts weaken the positive impact that NEPA may have on biodiversity policies and thus require the implementation of additional legislation to protect the environment. Additionally, NEPA itself is silent on the issue of profit-sharing by federal land management agencies, even though profit-sharing is one method of ensuring the conservation and protection of biodiversity. Therefore, NEPA cannot be used to resolve the issue of profit-sharing raised in *Edmonds Institute*.[155]

The legal doctrines established in the areas of constitutional, property, and environmental law are neither adequate nor sufficient to resolve the issue of profit-sharing. In response, one must look beyond them and further analyze the issue to determine how to address it outside the existing legislative and judicial framework. Before concluding that a new framework is needed, it is first essential to establish the importance of profit-sharing. It is then necessary to explore why new legislation specifically addressing the issue of profit-sharing must be enacted.

III. THE NEED FOR NEW LEGISLATION

The principle of profit-sharing has been successfully implemented at an international level and, thus, should be engaged in by the United States.[156] The existing legislative and judicial framework in America is insufficient to ensure consistent governmental profit-sharing in the future to the benefit of the government and the public. New legislation addressing the issue is necessary. In order to explain why profit-sharing is an important issue worthy of specific legislation, it is essential to examine how it became an international concern and what steps have been taken to address it. It is also necessary to explore the benefits that would result from profit-sharing both to the public and the environment. Analyzing

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therefore "escaped the harsh glare of public scrutiny that accompanies NEPA disclosures [and was] effectively insulated from judicial review").

[155] 42 F. Supp. 2d at 19-20.

[156] *See infra* note 168 and accompanying text (explaining various policies implemented by foreign countries in order for the governments of those countries to share the profits derived from the use of their wild genetic resources).

the background of profit-sharing and stressing the significant benefits it can bring leads to the natural conclusion that new legislation must be enacted as judicial resolution is inadequate and existing legislation is insufficient.

A. *Background of Profit-sharing*

Even though profit-sharing with respect to natural resources found on public lands has not yet been implemented in the United States, it has gained support at the international level.[157] The concept of profit-sharing internationally arose from the fact that numerous private corporations from industrial nations conduct bioprospecting activities in lesser developed countries and derive substantial profits without giving any part thereof to the countries from which the valuable natural resources emanated.[158] The disparity between the immense benefit to industrial nations and the complete lack of revenue to the originating countries was a major factor in the development of the United Nations Convention on Biological Diversity in 1992 ("Biodiversity Treaty").[159]

The Biodiversity Treaty specifically provides for sharing the profits derived from commercial applications by one member

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[157] *See infra* note 168 and accompanying text (explaining various policies implemented by foreign countries in order for the governments of those countries to share the profits derived from the use of their wild genetic resources).

[158] *See* Adair, *supra* note 2, at 141 (stating that private biotechnology companies reaped substantial benefits from the use of wild genetic resources while justifying free access to those resources "by arguing that their use of these resources led to benefits that accrued to all the people of the world"). Wild genetic resources were traditionally viewed as a "'common heritage of humankind' that should be available without restriction" and, therefore, the countries in which such resources were found granted to others free rights to collect specimens. Adair, *supra* note 2, at 141. *See also* Mattix, *supra* note 7, at 530 (stating that historically, private bioprospecting companies have had free access to genetic resources found on public lands and noting that the activities conducted by private bioprospecting companies may lead to the development of "valuable commercial product[s] that benefit mankind," and that those companies may derive substantial benefits from the development of such products).

[159] Biodiversity Treaty, *supra* note 3, at 818. *See* Adair, *supra* note 2, at 141 (explaining that developing countries began to discuss the unfairness of the situation and to ask for changes).

country of the wild genetic resources found in another member country.[160] One basis upon which the Biodiversity Treaty was founded was the agreement signed in 1991 between the National Biodiversity Institute of Costa Rica ("INBio"),[161] a not-for-profit scientific organization, and Merck pharmaceutical company ("Merck-INBio agreement").[162] Costa Rica had been an early advocate for change where developing countries did not receive any of the profits derived from the use of their biodiversity.[163] As a measure to stop granting free use of its wild genetic resources to biotechnology companies and to regulate access to those resources, Costa Rica established INBio at the end of the 1980s.[164] The Merck-INBio agreement provided that INBio would receive royalties on any pharmaceutical products developed by Merck from plant, animal, and soil chemical samples given to Merck by INBio.[165] Additionally, Merck paid INBio a fee and gave INBio scientific equipment in exchange for such chemical samples and the exclusive right to their exploitation.[166]

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[160] Biodiversity Treaty, *supra* note 3, at 828. Article 15, section 7 provides that each contracting party to the Biodiversity Treaty shall take measures toward "sharing in a fair and equitable way the results of research and development and the benefits arising from the commercial and other utilization of genetic resources with the [c]ontracting [p]arty providing such resources." Biodiversity Treaty, *supra* note 3, at 828. Additionally, such sharing of profits shall be implemented "upon mutually agreed terms." Biodiversity Treaty, *supra* note 3, at 828.

[161] Yellowstone, *supra* note 34. *See also* Mattix, *supra* note 7, at 531 (noting that the Biodiversity Treaty, particularly Article 15 thereof, "reflects the concepts embodied in [Costa Rica's] Merck/InBio agreement"); Adair, *supra* note 2, at 142 (stating that the Biodiversity Treaty embodies the basic principles established by the Merck-INBio agreement).

[162] *See* Adair, *supra* note 2, at 141-42.

[163] *See* Mattix, *supra* note 7, at 531 (stating that "Costa Rica was one of the first countries to seek greater benefits from bioprospectors and set the stage for the [Biodiversity Treaty]"); Adair, *supra* note 2, at 141.

[164] *See* Adair, *supra* note 2, at 141-42.

[165] Adair, *supra* note 2, at 142 (adding that "[f]ifty percent of these royalties will be paid to Costa Rica's National Park Fund").

[166] Adair, *supra* note 2, at 142 (stating that Merck paid INBio a fee in the amount of $1 million and gave INBio $130,000 worth of scientific equipment in exchange for 10,000 chemical samples and the exclusive right to analyze them

The United States declined to sign the Biodiversity Treaty when it was finalized in 1992 and, although President Clinton signed it in 1993, the Senate has failed to ratify it.[167] The Biodiversity Treaty represents a major step toward the globalization of fair access to biodiversity and is a model to be followed.[168] The

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for two years). *See also* Mattix, *supra* note 7, at 531 (adding that INBio and Merck "shared worldwide licensing rights for products developed from the [animal, plant, and soil] samples [given by INBio to Merck]").

[167] *See* Adair, *supra* note 2, at 144-45 (pointing out that the Biodiversity Treaty was enacted internationally on December 29, 1993 and that the United States would retain observer status until it ratifies it). *See also Parties to Biodiversity Treaty Make Some Progress on Implementation*, BUS. & ENV'T, Jan. 1, 1995 (explaining that parties that have not yet ratified the Biodiversity Treaty may attend its meetings but do not qualify as "parties" and therefore may not participate in the decision-making process); Rick Weiss and Justin Gillis, *U.S. "Observers" Lobby Against Trade Curbs on Biotechnology; Accord Would be First to Target Genetically Engineered Products*, WASH. POST, Feb. 13, 1999, at A4. The United States still has not ratified the Biodiversity Treaty, which has been consistently opposed in the Senate by Sen. Jesse Helms. Joan Lowy, *Environmental Nightmare; Foreign Species Are Disrupting Local Ecosystems*, KNOXVILLE NEWS-SENTINEL, Sept. 12, 1999, at H1; Joan Lowy, *Foreign Invaders Threaten Environment Across Nation*, PLAIN DEALER (Cleveland, OH), Aug. 15, 1999, at 28A. Congress's persistent refusal to ratify the Biodiversity Treaty since 1993 is partly due to the U.S. pharmaceutical industry's lobbying against ratification. Anthony Faiola, *Amazon Cash Crop; Brazil Seeks "Bioroyalties" from Western Drug Firms*, WASH. POST, July 9, 1999, at A21. *See also* Andrew Pollack, *Biological Products Raise Genetic Ownership Issues*, N.Y. TIMES, Nov. 26, 1999, at A1 (reporting that "the United States Senate has never ratified [the Biodiversity Treaty], in part because of fears it would hurt the biotechnology industry"). Despite the fact that the United States has not ratified the Biodiversity Treaty, 175 countries had ratified it as of September 30, 1999. *UN: Committee Hears Calls for Action on Biosafety Protocol, Commitment Small Island Developing States*, M2 PRESSWIRE, Oct. 26, 1999.

[168] *See* Adair, *supra* note 2, at 145-46 (stating that many countries have been enthusiastic about the enactment of the Biodiversity Treaty and that Mexico, Indonesia, and Kenya have developed similar agreements to the Merck-INBio agreement). *See also* Pollack, *supra* note 167, at A1 (mentioning that numerous countries, including the Philippines, Costa Rica, Bolivia, Colombia, Ecuador, Peru, Venezuela, Brazil, and India, have implemented or are considering legislation regulating access to genetic resources and "requiring compensation"); Faiola, *supra* note 167, at A21 (explaining the interest of pharmaceutical companies and "foreign institutions" in Brazil's "cat's nail," a leaf found in the

Merck-INBio agreement itself, which is a major illustration of successful profit-sharing, has already been considered as a possible model for use in the United States.[169] However, the United States currently lags behind its international counterparts in this major aspect of natural resource preservation, as illustrated by the 1997 CRADA between Yellowstone National Park and Diversa Corporation, which was the first to include a profit-sharing provision with respect to federal lands.

B. Potential Benefits and Arguable Disadvantages of Profit-sharing

Allowing the federal government to receive some of the profits obtained from commercial application of natural resources found on public lands will benefit the public because, by using these profits to maintain public lands and the natural resources they contain, the federal government can ensure that their beauty and wilderness are protected consistent with the intent of existing laws.[170] In addition, profit-sharing will not impair the rights of recreational users to enjoy the public lands. Federal lands for many years have provided for both public enjoyment and exploitation by

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Amazon which is believed to fight certain tumors, and noting that Brazil "is among an increasing number of tropical nations trying to prevent [uncompensated use of their natural resources] by the West"). As Faiola points out, Brazil, which has not yet ratified the Biodiversity Treaty, is in the process of implementing its own version of the Treaty, requiring that foreign institutions pay royalties on "any income they derive from plants [found on Brazilian territory]." Faiola, *supra* note 167, at A21.

[169] Yellowstone, *supra* note 34 (explaining the advantages of receiving income from commercial use of publicly owned natural resources and noting that "Yellowstone Superintendent Mike Finley and some of his science staff visited Costa Rica in 1996 to learn first-hand about the INBio program—a possible model for future use of resources developed from research done in [United States] national parks").

[170] *See* Edmonds Inst. v. Babbitt, 42 F. Supp. 2d 1, 8 (D.D.C. 1999); 16 U.S.C. § 1133(b) (1994) (providing that wilderness areas, including national forests, national parks, and national wildlife refuges, "shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical use").

private parties.[171] Therefore, commercial bioprospecting on public lands with the government sharing in the profits would only be one more example of such multiple uses.[172] Likewise, authorizing a federal agency such as the NPS to receive profits derived from natural resources found on its lands would be consistent with congressional intent that public lands contribute to the nation's economic success[173] and would simply allocate to the federal agency its fair share of such success.[174]

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[171] *See* Daniel S. Levy & David Friedman, *The Revenge of the Redwoods? Reconsidering Property Rights and the Economic Allocation of Natural Resources*, 61 U. CHI. L. REV. 493, 522-23 (1994) (explaining the multiple uses of federal lands by noting the coexistence of such diverse activities as "oil, mineral, and timber harvesting, as well as ranching and recreation," and stating that "[t]he extensive, multi-faceted use of federal lands allows private interests to claim that they enjoy certain exploitation rights which the public may not curtail without providing compensation").

[172] Yellowstone, *supra* note 34 (recognizing that the Park's mission is "to preserve and protect park resources" while "allow[ing] public access, as long as no harm is done, to those resources").

[173] *See* Chem Serv., Inc. v. Environmental Monitoring Sys. Lab., 12 F.3d 1256, 1258, 1265 (3d Cir. 1993) (stating that Congress's intent in enacting the Federal Technology Transfer Act ("FTTA"), 15 U.S.C. §§ 3710a-3710d, was "'to improve the transfer of commercially useful technologies from the Federal laboratories and into the private sector'" (quoting S. REP. NO. 99-283, at 1 (1986), *reprinted in* 1986 U.S.C.C.A.N. 3442) and that "Congress intended the FTTA to be used to transfer technology from the laboratories and increase the nation's economic competitiveness").

[174] *See* S. REP. NO. 99-283 (1986) (recommending that the FTTA be passed). In recommending adoption of the FTTA, the Senate emphasized that collaboration between federal laboratories and the industry was required by the national interest and that "[t]he ultimate purpose of [f]ederal support for [research and development] is to develop the science and technology base needed for a strong national defense, for the health and well-being of U.S. citizens, and for a healthy U.S. economy." *Id.* at 2. The Senate defined federal laboratories broadly as a "facility or group of facilities owned, leased, or otherwise used by a Federal agency, a substantial purpose of which is the performance of research and development by employees of the Federal Government." *Id.* at 11. The Senate specifically recommended that federal agencies be allowed to enter into "cooperative research agreements" with universities, the industry, and other parties, and to "negotiate patent licensing agreements." *Id.* at 5. With respect to the issue of compensation, the Senate recommended that, should an invention developed by an agency employee be licensed to the agency, 15% of the

The government should be permitted to benefit financially from bioprospecting to the same extent the biotechnology industry does. Specifically, patent law[175] affords broad protection to companies engaged in bioprospecting, allowing them to enjoy a monopoly[176] and to reap substantial benefits from products derived from the use of wild genetic resources found on public lands.[177] While the biotechnology industry becomes wealthier by preventing others from developing the same products for many years, the federal government currently does not share in any of that wealth.

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royalties received would be allocated to the inventor and the balance distributed among the laboratories under the agency's authority. *Id.* More significantly, with respect to the issue of profit-sharing, the Senate recommended adoption of section 5 whereby, within the scope of cooperative research agreements, defined as agreements in which the federal government "provides resources, but not funds," federal laboratories would have "the authority to accept *funds*, services, and property from the collaborating parties." *Id.* at 10 (emphasis added). Finally, the Senate pointed out that "the primary purpose of [cooperative research] agreements is to take technologies that originate in [federal] laboratories [as defined above] and to stimulate or support their development and *commercialization*." *Id.* at 11 (emphasis added). Thus, commercialization of and financial benefits from inventions resulting from cooperative research agreements between the federal government and third parties was a major part of the proposed bill. *See also* Yellowstone, *supra* note 34 (acknowledging that, as industrial applications of research specimens collected in Yellowstone National Park can lead to a substantial benefit to corporations, "the park resources can also reap some of this benefit without commercialization and detriment").

[175] *See* Patent Act of 1952, 35 U.S.C.A. §§ 1-376 (West 2000). The Patent Act provides that "[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor." *Id.* § 101.

[176] *See* 35 U.S.C.A. § 154 (West 2000) (providing that, for a term of 20 years from the filing date of a patent application, a patentee enjoys the right "to exclude others from making, using, offering for sale, or selling the invention" for which a patent was granted).

[177] *See supra* note 39 and accompanying text (noting that the patent received by a biotechnology company for the Taq polymerase chain reaction was sold to the pharmaceutical company Hoffman-La Roche for $300 million). *See also* Michaels, *supra* note 16, at 16-17 (stating that the revenues from applications of the Taq polymerase chain reaction were expected to reach over $1 billion by the new millennium and that annual revenues from taxol, which was originally developed from bark of Pacific yew trees harvested in national forests, is also expected to exceed $1 billion).

Allowing the government to share the profits gained by biotechnology companies from their patented products[178] would reduce the imbalance created by their exclusive benefit of patent law and the monopolistic advantages it affords.

Besides bridging the gap between the benefits reaped by the biotechnology industry and the lack of profits received by federal agencies such as the NPS, profit-sharing may help resolve the financial crisis facing the NPS.[179] As more visitors enjoy the national parks each year, the NPS is facing increasing maintenance costs.[180] At the same time, it is more difficult for the NPS to maintain a balance between its purposes of preservation and recreation.[181] Despite soaring costs, the NPS does not have the authority to raise park entrance fees.[182] Raising those fees would help the NPS solve its financial difficulties but, since it is not

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[178] *See* Diamond v. Chakrabarty, 447 U.S. 303, 318 (1980) (holding that patent protection could be afforded to human-made, genetically engineered bacteria). *See also* Michaels, *supra* note 16, at 36-37 (noting that the *Diamond* decision set precedent for extension of patent protection to "a host of biotechnology products").

[179] *Plan Needed to Offset Funding Cuts for National Parks* (National Public Radio broadcast, July 23, 1996) (noting that in 1996 the NPS was already "approaching financial crisis" with a decreasing annual budget since 1983 and overdue maintenance and repairs). *See* Todd Wilkinson, *Taking the Initiative*, NAT'L PARKS, Nov. 1, 1999, at 30 (noting the current crisis facing the NPS, including "a $3.54-billion backlog in infrastructure maintenance, controversy over agency spending, declining employee morale, and growing concern about insufficient funding to assess the status of imperiled wildlife and plants"); Denise M. Visconti, Note, *Reform in the National Park System: Is Vision 2020 Enough?*, 23 SETON HALL LEGIS. J. 409, 431 (1999) (noting the NPS's "current budgetary crisis").

[180] *Plan Needed to Offset Funding Cuts for National Parks*, *supra* note 179 (noting that national park visitation is growing by five to ten percent a year, making it very difficult for "funding to keep up with the need"); Wilkinson, *supra* note 179, at 30 (pointing out increasing expenses, including the costs of meeting the requirements of new laws).

[181] *Plan Needed to Offset Funding Cuts for National Parks*, *supra* note 179 (pointing out the growing conflict between preservation and access to the public and reporting that lack of sufficient funds have led to the deterioration of numerous facilities in the national parks).

[182] Visconti, *supra* note 179, at 427-28 (stating that the NPS lacks "authority over park entrance fees").

allowed to do so, it must look for other means of raising necessary funds.[183] Receiving a share of the profits derived from commercial uses of natural resources found in national parks is therefore a fund-raising method that the NPS should be permitted to consider.

Contrary to claims regarding the environmental consequences of entering into CRADAs such as the agreement involved in *Edmonds Institute*,[184] these agreements will not lead to further harm to the environment, since the NPS already has statutory authority to grant research permits for educational or scientific purposes and uses such authority.[185] The fact that the NPS now may be able to receive benefits from the results of research

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[183] Visconti, *supra* note 179, at 428 (pointing out that, although "money alone is hardly the solution to the dire condition of the National Parks," increasing recreation fees would be one method towards solving the NPS's financial crisis).

[184] Even though the environmental consequences of the Yellowstone-Diversa CRADA may not be known at the time it is entered into, the court in *Edmonds Institute* recognized, and the defendants conceded, that the overall impact of collecting specimens, despite each sample being only the size of a teaspoon, is not "teaspoon-sized" and will intrude "into the delicate ecosystems around Yellowstone's thermal features." Edmonds Inst. v. Babbitt, 42 F. Supp. 2d 1, 11 (D.D.C. 1999). Additionally, in their complaint the plaintiffs in *Edmonds Institute* alleged that, as a result of the Yellowstone-Diversa CRADA, Yellowstone National Park's "scenery and natural objects, curiosities and wonders" would not be kept in a "natural, unspoiled and unimpaired condition" and therefore plaintiffs' "aesthetic, recreational, informational and educational, and economic interests" would be "directly and adversely affected." First Amended Complaint for Declaratory and Injunctive Relief at 7, 9, Edmonds Inst. v. Babbitt, 42 F. Supp. 2d 1 (D.D.C. 1999) (No. 98-561). Finally, the plaintiffs alleged that the areas of Yellowstone National Park where specimen collection takes place will be permanently injured as a result of the permanent removal from the park of "biologic materials, plants and rocks and other resources." First Amended Complaint at 20.

[185] *See, e.g.*, 16 U.S.C. § 3 (1994 & Supp. IV 1998) (granting the Secretary of the Interior the authority to "make and publish such rules and regulations as he may deem necessary or proper for the use and management of the parks, monuments, and reservations under the jurisdiction of the National Park Service"); 36 C.F.R. § 2.5 (1999); *Edmonds Inst.*, 42 F. Supp. 2d at 7 (noting that in recent years the NPS has granted approximately 250 to 300 research permits annually, including 40 or 50 for "microbial research projects").

undertaken through such permits does not mean that more permits will be granted to the detriment of the environment because the NPS "has neither authority nor desire to harm the resources [it] is charged to protect" and a profit-sharing provision will simply be an added benefit to the routine practice of granting research collection permits.[186] To the contrary, receiving funds for use of its natural resources will enable the government to invest greater resources in the creation of biodiversity reserves, thereby ameliorating the current biodiversity crisis.[187]

Biodiversity, or biological diversity, can be defined as "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; [including] diversity within species, between species and of ecosystems."[188] As one commentator stated, "[t]he loss of biodiversity is generally agreed to be among the top environmental crises facing humanity today" and "[t]here are numerous justifications for preserving biodiversity."[189] The loss of biodiversity has recently reached a

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[186] Yellowstone, *supra* note 34.

[187] Yellowstone, *supra* note 34 (acknowledging that the CRADA the Park entered into with Diversa Corporation, which is the subject of the *Edmonds Institute* litigation, "does not enable Diversa to do anything that was not already allowed under the NPS research permit system" and "simply provides compensation to the park for access"). Additionally, Yellowstone National Park expects that, through bioprospecting agreements such as the one involved in *Edmonds Institute*, the park will "bolster its conservation mission while encouraging research that may continue to benefit humankind." Yellowstone, *supra* note 34.

[188] Biodiversity Treaty, *supra* note 3, at 823.

[189] Heisel, *supra* note 19, at 233 n.13 (explaining that it is important to preserve biodiversity because it: (i) "'supports the integrity and resilience of ecological systems on which humans depend' by providing genetic variation to allow for future adaptation and evolution in response to changes in climate and other broadscale [sic] changes to the environment"; (ii) "harbors the sources of new medicines"; (iii) "provides a source of new food crops and a reserve of genetic traits that may improve species already used for human sustenance"; (iv) has an "intrinsic value that justifies its preservation in addition to, or absent, any anthropocentric concerns"; and (v) "is aesthetically valuable and enhances our everyday surroundings"). *See also* Clark & Downes, *supra* note 4, at 11-12 (pointing out that biodiversity "sustains life," that, in order to fully understand the necessity of biodiversity preservation, people must "become more aware of

critical level because of the alarming rate at which species have become extinct and habitats have been put at risk.[190] Even though recent efforts have been made to preserve biodiversity on federal public lands, such efforts have not been sufficient to establish a comprehensive biodiversity reserve system.[191] A considerable

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their reliance on local, regional, and global ecosystems," and that loss of biodiversity "threatens to destabilize" those ecosystems, and thereby destroy essential resources to humans); Richard J. Fink, *The National Wildlife Refuges: Theory, Practice, and Prospect*, 18 HARV. ENVTL. L. REV. 1, 2-4 (1994) (noting that "[t]he deteriorating condition of wildlife populations—as measured by statistics such as extinction rates and loss of biological diversity—is one of the principal environmental problems facing the United States and the world" and stating that, because "public recognition of the values of wildlife has increased," biodiversity preservation has become a more serious concern).

[190] *See* Neil Gunningham & Mike D. Young, *Toward Optimal Environmental Policy: The Case of Biodiversity Conservation*, 24 ECOLOGY L.Q. 243, 248-49 (1997) (recognizing the increasing rate of biodiversity loss worldwide, stating that every year, "more than 10,000 species become extinct globally," and noting that "scientists estimate that roughly five to ten percent of tropical forest species face extinction within the next thirty years," possibly resulting in the extinction of "60,000 of the world's plant species, and perhaps even higher proportions of vertebrate and insect species"). Since very often "biodiversity loss is irreversible," the crisis level reached recently is highly significant and it is extremely important to take steps preventing further loss of biodiversity before "a major environmental catastrophe or system collapse" occurs. *Id.* at 251. *See also* David Eugene Bell, *The 1992 Convention on Biological Diversity: The Continuing Significance of U.S. Objections at the Earth Summit*, 26 GEO. WASH. J. INT'L L. & ECON. 479, 487-90 (1993) (noting the increasing rate of species extinction due to human intervention, stating that some experts suggest that "twenty-five percent of the world's species present in the mid-1980s may be extinct by the year 2015," and pointing out the "potential for mass extinctions" of numerous species); Christopher J. Hunter, Comment, *Sustainable Bioprospecting: Using Private Contracts and International Legal Principles and Policies to Conserve Raw Medicinal Materials*, 25 B.C. ENVTL. AFF. L. REV. 129, 134-35 (1997) (estimating that, "without greater global conservation efforts, twenty-five percent of the world's species will become extinct within the next fifty years, while the habitats in which they live will suffer a similar rate of extinction through deforestation, desertification, and destruction of wetlands" and that the rate of extinction as well as the lack of specific knowledge of numerous species have produced a "dangerous situation").

[191] Heisel, *supra* note 19, at 252-54 (stating that efforts to preserve biodiversity must start with a "comprehensive national biological inventory" implemented

amount of planning and consultation is needed to create biodiversity reserves.[192] In order to do so, additional funds are needed.[193] One way to obtain the necessary funds is to allow for profit-sharing between the federal government and private corporations in return for the use of natural resources found on public lands. Allowing federal agencies to enter into CRADAs such as the one challenged in *Edmonds Institute* would be a much needed first step toward solving the current biodiversity crisis.

Finally, allowing federal agencies to receive part of the profits derived from commercial use of public land biodiversity may be an incentive to implement conservation strategies.[194] For example, federal agencies could focus on entering into CRADAs solely with corporations whose bioprospecting activities would not result in

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by a "cohesive system for gathering biological data" because gathering such data and assessing the value of biological resources on federal lands is essential to remedying the current crisis). The results of an assessment of the biological worth of public lands then can be used for "use restrictions on those lands of high biological value," "to ease or lift restrictions where biodiversity is not threatened," and "to ensure that any federal land disposition, through land exchanges or otherwise, does not impair the goal of biodiversity preservation." Heisel, *supra* note 19, at 252. Recent efforts by the government to create an agency whose tasks would include "inventorying, mapping, and monitoring biodiversity, and performing research that [would] enable the government to make more informed natural resource decisions" have come under attack, possibly undermining those steps toward biodiversity preservation. Heisel, *supra* note 19, at 254-55.

[192] *See* Heisel, *supra* note 19, at 261-63.

[193] Heisel, *supra* note 19, at 264 (noting that the resources available are not sufficient to meet the needs of biodiversity preservation). Heisel further notes that "the political will necessary to make [the resources] available" is not adequate either. Heisel, *supra* note 19, at 264. However, making the necessary funds available by allowing for profit-sharing is a concept that legislators may not have considered fully to date and that may appeal to them, thereby creating the required "political will." Heisel also describes various existing federal laws and programs that "can be used to preserve biodiversity through federal land ownership" and concludes that improving or altering them may be an essential step toward biodiversity preservation. Heisel, *supra* note 19, at 264-308.

[194] Clark & Downes, *supra* note 4, at 15-16 (explaining that economic incentives may be beneficial to environmental regulation provided that such incentives do not "create an entitlement to conduct environmentally damaging activities").

environmental harm or biodiversity loss. Even though this argument is usually made in the context of compensation to private parties in return for environmental conservation,[195] it equally could be made in favor of compensating the federal government.

Despite the potential benefits of profit-sharing, opponents argue that its disadvantages warrant against it being implemented. One commentator has argued that profit-sharing should not be allowed because commercial activities in connection with national parks are objectionable and may lead to a slippery slope.[196] Specifically, the article sets forth three major objections to such commercialization[197] and suggests that two of them are particularly relevant in the context of bioprospecting, namely the negative impacts of "commodification"[198] and the fact that only a portion of the public will enjoy the benefits of commercialization.[199] These two objections can be countered by the facts that (1) any negative impact from commercialization of bioprospecting will be outweighed by the benefit of additional revenue to be used for the

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[195] Clark & Downes, *supra* note 4, at 16.

[196] Holly Doremus, *Nature, Knowledge and Profit: The Yellowstone Bioprospecting Controversy and the Core Purposes of America's National Parks*, 26 ECOLOGY L.Q. 401, 469-77 (1999).

[197] *Id.* at 472 (stating that allowing commercial activities may lead the national parks to slide down a slippery slope, that "commodification" will affect the national parks negatively, and that only a "small portion of the public" enjoys the benefits of commercialization, whereas the national parks should be for the enjoyment of the public at large). The slippery slope objection "is connected principally to concern for the physical resources of [national] parks" and to the fear that, "if commercial use is allowed at all, it may prove impossible to restrict it." *Id.* The commodification objection relates to the idea that "commercial transactions rob [national] parks of their special status as resources removed from the marketplace" and that nature should not be treated as a "fungible article of trade." *Id.* at 473-74. The final objection to commercialization is that "commerce serves private interests, while the resources of [national] parks should be reserved for the benefit of the public as a whole" and that "[a]llowing a few to exploit [national] parks to line their own pockets is inconsistent with the parks' tradition of shared use and access." *Id.* at 476.

[198] *Id.* at 469, 473 (explaining that commodification is the treatment of natural resources, which are removed from the marketplace, as market commodities).

[199] *Id.* at 479-81.

further protection of the environment and the enjoyment of the public, and (2) the public at large will benefit from the use of that additional revenue.[200]

It is also argued that commercial bioprospecting in national parks is "inconsistent with the inspirational purposes of the parks."[201] However, national parks already have several purposes.[202] Only one of them is the enjoyment of the beauty and wilderness by the public and there is no reason to believe that commercializing bioprospecting will alter the balance between those purposes.[203] Finally, it is argued that the decision to commercialize bioprospecting should not be made by either the Department of the Interior or a national park without specific congressional mandate.[204] Congress, however, has recently moved in the direction of allowing commercial bioprospecting and profit-sharing with the National Parks Omnibus Management Act of 1998.[205]

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[200] *See supra* notes 170-172 and accompanying text (discussing the various purposes of federal lands, specifically the national parks).

[201] Doremus, *supra* note 196, at 407. Doremus explains that the national parks "should be places where the populace can be inspired with the wonder of nature and the understanding that some things are too special to be sold." Doremus, *supra* note 196, at 438. Defining inspiration further, Doremus adds that "the special function of the natural units of the park system today is to expose all visitors to nature in a way that inspires wonder, awe and respect." Doremus, *supra* note 196, at 447-48.

[202] 16 U.S.C. § 1133(b) (1994) (providing that national parks were designed to fulfill several purposes of "recreational, scenic, scientific, educational, conservation, and historical use").

[203] *See supra* notes 171-172 and accompanying text (discussing the mission of the NPS).

[204] Doremus, *supra* note 196, at 477, 483.

[205] National Parks Omnibus Management Act of 1998, Pub. L. No. 105-391, 112 Stat. 3497, codified at 16 U.S.C. §§ 1, 1a, 3, 17b, 20, 470h, 5901, 5911-5914, 5931-5937, 5951-5966, 5981-5982, 5991-5995, 6011 (Supp. IV 1998). The primary purpose of the statute is to "provide for improved management and increased accountability for certain National Park Service programs, and for other purposes." *Id.* Significantly, Doremus herself concedes that the National Parks Omnibus Management Act of 1998 "contains a provision that may have been intended to validate [the CRADA between Diversa and the NPS challenged in *Edmonds Institute*]." Doremus, *supra* note 196, at 425-26. Doremus further states that the provision in the National Parks Omnibus Management Act of 1998 allowing for profit-sharing arrangements "could be cited to support an argument

Furthermore, opponents may charge that once the federal government is allowed to receive profits from commercial uses of public lands, it will issue a larger number of bioprospecting permits in order to gain more profits, which will lead to the destruction of the environment. Regardless of whether profit-sharing leads to a higher number of permits,[206] however, several facts show that it cannot be forbidden. First, the "explosive growth in the commercialization of biotechnology" must inevitably lead to profit-sharing among the different parties involved in order to ensure fruitful collaboration.[207] Second, the raw materials used for research and potential commercial development are absolutely necessary to the resulting product and therefore fairness and equity simply require that the provider of such raw materials be compensated for their use.[208] Finally, the concept of property is broad enough to encompass rights and privileges, thereby recognizing the right of any property owner to derive profits from its use.[209] In addition, one

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that the Park Service enjoys the discretion to permit bioprospecting" before alleging that such provision does not validate the Diversa CRADA. Doremus, *supra* note 196, at 431. *See also infra* notes 219-221 and accompanying text (further discussing the profit-sharing opportunities provided by the National Parks Omnibus Management Act of 1998).

[206] As previously explained, profit-sharing will not lead to a higher number of permits. *See supra* note 186 and accompanying text.

[207] Moore v. Regents of the Univ. of Cal., 793 P.2d 479, 507 (Cal. 1990) (Mosk, J., dissenting).

[208] *Id.* at 511, 516 (Mosk, J., dissenting). *See* Heidt, *supra* note 109, at 706-07, 714 (recognizing and rejecting a fairness and equity argument in favor of allowing a patient to share revenues derived from the commercialization of his or her cells); Gold, *supra* note 105, at 1246 (noting that the situation whereby "researchers and pharmaceutical companies are likely to be able to apply for and receive patent rights in human tissues while the sources of such tissues are left without compensation, is not acceptable" and that patients "will continue to feel exploited as their bodies are treated as natural resources by others while they are not permitted to participate in such exploitation").

[209] *Moore*, 793 P.2d at 509 (Mosk, J., dissenting). *See* Martin v. City of Gadsden, 584 So. 2d 796, 797-98 (Ala. 1991) (recognizing a city's right, as landowner, to use its land for commercial purposes and to derive a profit therefrom); Minard Run Oil Co. v. Pennzoil Co., 214 A.2d 234, 235 (Pa. 1965) (recognizing a landowner's right to use his land "in a manner profitable to [his] own business" and to derive "the greatest profit therefrom").

of the fundamental components of the bundle of property rights is the right "to dispose of the property by sale or by gift" which empowers an owner to sell its property or any parts thereof for a profit.[210]

Finally, the enactment of adequate legislation can prevent the issuance of a higher number of bioprospecting permits and, thus, that argument against profit-sharing is moot. Such legislation will need to provide specifically that the number of permits issued shall remain unchanged and that profit-sharing shall not authorize federal agencies simply to commercialize natural resources and turn public lands into a profit-making enterprise. As judicial action has proved to be inadequate, Congress is moving in the right direction through the National Parks Omnibus Management Act of 1998.

C. *Insufficiency of Judicial Precedent and the Beginning of Statutory Resolution of Profit-sharing: The National Parks Omnibus Management Act of 1998*

Although the *Edmonds Institute* court may reach a final decision in favor of profit-sharing, judicial precedent alone cannot resolve the issue.[211] First, courts in other jurisdictions will not be

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[210] *Moore*, 793 P.2d at 509 (Mosk, J., dissenting). *See* Munzer, *supra* note 105, at 514-15 (giving examples of a person's right to dispose by sale or by gift of certain body parts, such as a woman's power to "donate her ova to aid infertile couples," a man's power to "sell his semen to a sperm bank," or an adult's right to "sell a pint of his or her blood").

[211] *See* Flanagan v. Mount Eden Gen. Hosp., 248 N.E.2d 871, 875-76 (N.Y. 1969) (recognizing that, in developing tort law, the judiciary and the legislature play complementary roles and that "[j]udicial action is often necessary to bring to the attention of the Legislature a particular problem in order for it to accomplish the necessary reform which only legislative action can fashion"). *But see* Shands Teaching Hosp. v. Smith, 480 So. 2d 1366 (Fla. Dist. Ct. App. 1985) (holding that, absent "constitutional or statutory authority reflecting a change in established law," the Florida courts do not have the authority to overrule "controlling precedent of the Florida Supreme Court" and that changing the law is within the power of the legislature rather than the courts). The issue of whether legislation is needed for certainty and uniformity as opposed to simply following precedent arose in a very different context from that in *Edmonds Institute*, namely, in the context of an action by a hospital against the wife of a deceased patient for non-payment of the husband's medical bills. *Id.*

bound by the decision reached by the court in *Edmonds Institute*. Second, the fact that some courts may follow *Edmonds Institute* while others may not will result in uncertainty of outcome[212] and possibly lead to a proliferation of litigation by parties that may decide to file suit on the ground that they have a fifty percent chance of winning. Finally, even assuming, arguendo, that a majority of jurisdictions will adopt the *Edmonds Institute* decision as precedent, it will take time before uniformity is achieved throughout the country, thereby resulting in litigation that may have been avoided had a standard been adopted earlier. Those factors show that relying solely on judicial precedent to resolve the issue of governmental profit-sharing will result in inefficient administration of justice, which is contrary to the goal of the judiciary to ensure the "just, speedy, and inexpensive determination of every [case]."[213] Legislation governing the issue, on the other hand, will provide certainty of outcome and uniformity, thereby benefitting society as a whole.

A first indication of a legislative resolution of profit-sharing was the enactment of the National Parks Omnibus Management Act of 1998 ("NPOMA"),[214] which may be a significant step in

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[212] *See Flanagan*, 248 N.E.2d at 875 (illustrating the uncertainty of outcome resulting from the legislature's inaction by overruling an established precedent in order to give a plaintiff a medical malpractice cause of action (citing Woods v. Lancet, 102 N.E.2d 691 (N.Y. 1951); Greenberg v. Lorenz, 173 N.E.2d 773 (N.Y. 1961))). *See also* Arrow Builders Supply Corp. v. Hudson Terrace Apartments, 105 A.2d 387, 391 (N.J. 1954) (arguing in favor of overruling established precedent in certain circumstances by acknowledging that, despite the "great social value" of "stability and predictability" in the legal system, the principle of stare decisis is not absolute and must sometimes be sacrificed in favor of "serv[ing] justly the needs of present day society").

[213] FED. R. CIV. P. 1 (also defining the scope and purpose of the Federal Rules of Civil Procedure as "govern[ing] the procedure in the United States district courts in all suits of a civil nature whether cognizable as cases at law or in equity"). Under the United States Constitution, courts have the power to decide a broad range of cases at law and in equity. U.S. CONST. art. III, § 1; § 2, cl. 1. The application of the Federal Rules of Civil Procedure and the efficient administration of justice fall within the constitutional mandate given the courts.

[214] Pub. L. No. 105-391, 112 Stat. 3497, codified at 16 U.S.C. §§ 1, 1a, 3, 17b, 20, 470h, 5901, 5911-5914, 5931-5937, 5951-5966, 5981-5982, 5991-5995, 6011 (Supp. IV 1998).

Congress recognizing a need for more efficient management of the National Park system, including the need for the NPS to receive profits derived from the use of its natural resources.[215] NPOMA was developed as a result of the NPS's recognition that it was "unable to achieve even the most fundamental aspects of its mission."[216] The primary purpose of NPOMA is to "provide for improved management and increased accountability for certain National Park Service programs, and for other purposes"[217] and thus to restore the NPS's health and ensure its long-term viability.[218]

One major change brought about by NPOMA over previous statutes is the opportunity for the NPS to enter into profit-sharing agreements with the "private industry"[219] and not solely with the "research community."[220] This new legislation recognizes that receiving profits obtained from commercial uses of natural resources found in national parks may assist the NPS in furthering its purpose of "conserv[ing] the scenery and the natural and historic objects and the wild life [in the national parks] and [providing] for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."[221] Additionally, it is clear from the language of the Act that profit-sharing arrangements will not be allowed to the detriment of the protection of the natural resources found in national parks[222] but rather will provide for the enhancement of

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[215] 16 U.S.C. § 5935(d) (Supp. IV 1998) (providing that "[t]he Secretary [of the Interior] may enter into negotiations with the research community and private industry for equitable, efficient benefits-sharing arrangements").

[216] Visconti, *supra* note 179, at 410. The NPS situation was assessed at a symposium held in October 1991 in Vail, Colorado. Visconti, *supra* note 179, at 410. In order to address some of the problems facing the NPS, Congress passed a bill entitled "Vision 2020: National Parks Restoration Act" in October 1998, the title of which was changed to the National Parks Omnibus Management Act of 1998 after it passed in the House. Visconti, *supra* note 179, at 411.

[217] Pub. L. No. 105-391, 112 Stat. 3497 (1998).

[218] Visconti, *supra* note 179, at 411-12.

[219] 16 U.S.C. § 5935(d).

[220] *Id.*

[221] 16 U.S.C. § 1 (1994 & Supp. IV 1998).

[222] 16 U.S.C. § 5931(2) (Supp. IV 1998).

"management and protection of national park resources."[223] Finally, the Act reiterates Congress's intent to promote quality scientific studies of national park resources[224] and to give the NPS broad authority to solicit such studies.[225]

In spite of its many efforts to better the NPS's current economic situation, NPOMA cannot achieve that goal as it is currently drafted because it provides mainly for revenues to the NPS in the form of concession contracts,[226] thus providing "a $38 million panacea to an estimated $8 billion crisis."[227] Similarly, despite language in NPOMA addressing the protection of natural re-

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[223] 16 U.S.C. § 5935(b)(2).

[224] 16 U.S.C. § 5931(2) (providing that management and protection of national park resources shall be enhanced "by providing clear authority and direction for the conduct of scientific study in the National Park System"); 16 U.S.C. § 5931(4) (stating as one of the purposes of this subchapter the encouragement of others "to use the National Park System for study to the benefit of park management as well as broader scientific value"); 16 U.S.C. § 5932 (Supp. IV 1998) ("The Secretary [of the Interior] is authorized and directed to assure that management of units of the National Park System is enhanced by the availability and utilization of a broad program of the highest quality science and information.").

[225] 16 U.S.C. § 5935(a) (Supp. IV 1998) (reflecting Congress's intent that "[t]he Secretary [of the Interior] may solicit, receive, and consider requests from Federal or non-Federal public or private agencies, organizations, individuals, or other entities for the use of any unit of the National Park System for purposes of scientific study").

[226] *See* Visconti, *supra* note 179, at 412 n.14.

[227] Visconti, *supra* note 179, at 412-13. The funds needed by the NPS include "capital construction needs," "natural resource protection," "cultural resource management needs," and "land acquisition obligations." Visconti, *supra* note 179, at 412 n.15. Visconti explains that capital construction needs include "infrastructure repairs, building and land restoration, improvements to employee housing, and repairs to utilities," and cultural resource management needs encompass "preservation and cataloging of museum collections, archeological surveys, and ethnographic studies." Visconti, *supra* note 179, at 412 n.15. *See* 143 CONG. REC. S3233, S3234 (1997) (statement of Sen. Thomas) (explaining that authorized land acquisitions are "private lands that are authorized within authorized park boundaries, but . . . have never been acquired" and stating that natural resource protection includes gathering "basic information on the extent[,] the condition and the inventory of [the] valuable natural resources [found in national parks]").

sources[228] and promotion of scientific studies,[229] NPOMA fails to make natural resource conservation a priority and to include provisions that would specifically require protection of natural resources.[230]

In order for NPOMA to provide for additional revenue needed by the NPS and, therefore, contribute to a greater extent to natural resource protection, it needs further provisions that specifically authorize profit-sharing provisions in CRADAs or allow patent royalties.[231] Additionally, NPOMA should clarify what acceptable uses the NPS may make of the profits it receives from the private industry, such as reinvesting those profits into the conservation and protection of the environment, including natural resources found on public lands.[232] Even though NPOMA is a step forward in resolving the issue raised in *Edmonds Institute*, it needs to provide for additional guidance on which potential parties to a CRADA may rely and that the judiciary may apply in future litigation.[233]

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[228] *See* 16 U.S.C. §§ 5931(2), 5935(b)(2) (Supp. IV 1998).

[229] *See* 16 U.S.C. §§ 5931(2), 5931(4), 5932, 5935(a) (Supp. IV 1998).

[230] *See* Visconti, *supra* note 179, at 437-38 (noting that NPOMA "fails to address many of the major threats to the resources the NPS is trying to protect").

[231] *See* Moore v. Regents of the Univ. of Cal., 793 P.2d 479, 511 (Mosk, J., dissenting) (explaining that the patient whose cells were used in the development of a profitable cell line was entitled to compensation from the moment his cells were utilized and long before a patent was issued for the cell line). Even though obtaining a patent for a newly created product is one method of ensuring revenues, it is not the only method, and profits may be granted to the provider of necessary materials without the existence of a patent. *See* Roy Hardiman, Comment, *Toward the Right of Commerciality: Recognizing Property Rights in the Commercial Value of Human Tissue*, 34 UCLA L. REV. 207, 223 (1986) (noting the significance of agreements in the protection of economic rights in new creations by pointing out that "[b]esides patent protection, intangible property rights in human biologics arise through contractual ordering"). In addition to ordinary contracts, economic rights in newly created products may be secured by trade secrets, which provide protection without adhering to the strict requirements of patentability and are, therefore, "popular among biotechnology companies." *Moore*, 793 P.2d at 514 (Mosk, J., dissenting).

[232] *See supra* notes 170-174 and accompanying text (discussing the various ways in which profit-sharing would enable the federal government to increase environmental protection and biodiversity preservation).

[233] *See* Bryan S. Schultz, Comment, *Electronic Money, Internet Commerce, and the Right to Financial Privacy: A Call for New Federal Guidelines*, 67 U.

As profit-sharing has become an area of increasing concern, particularly at the international level, it must be addressed in the United States in a manner that will ensure consistent resolution. This is particularly important in light of the significant advantages that will result from profit-sharing once it is accepted and implemented with respect to all federal public lands. While Congress has taken a first step in that direction in enacting NPOMA, the statute still lacks specificity to be fully efficient on its own. Therefore, either new legislation or amendments to NPOMA are needed to ensure that the potential advantages of profit-sharing will occur and benefit the public.

CONCLUSION

Bioprospecting on public lands is a lucrative and pervasive industry. In light of increasing demand for bioprospecting permits, the government should share in the profits derived from bioprospecting activities. Profit-sharing should not be viewed as a negative development that will harm the environment. Rather, it should be considered as a useful tool to ensure that the agencies managing public lands have sufficient funds to further their environmental protection objectives, thereby benefitting the public at large.

Despite broad recognition that the issue of profit-sharing needs resolution, very little has been done in that direction. Even though NPOMA is a first step, additional provisions are still needed to ensure that profit-sharing is developed in a positive manner and does not lead to pure commercialization of wild genetic resources

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CIN. L. REV. 779, 800-05 (1999) (explaining that existing statutory and common law is insufficient to resolve all the privacy issues raised by commercial transactions conducted over the Internet, and proposing new legislation to address those issues). Clear guidelines are needed in the area of Internet transactions and, even though a few federal statutes already exist, they are limited in scope and fail to provide the safeguards that have become necessary as a result of such transactions. *Id.* at 800-07. Even though Schultz focuses on Internet transactions, an area very different from that at issue in *Edmonds Institute*, an analogy arguably can be drawn between the two because they are both areas that cannot be left to the courts for regulation and that need legislation in order to keep their significant places in modern society.

found on public lands. Additionally, the court in *Edmonds Institute* should allow the NPS to enter into a CRADA that provides for profit-sharing. Such judicial precedent would be an additional step in assisting federal land management agencies with their task and in ensuring that profit-sharing becomes a widely recognized practice in the future.

As the benefits of profit-sharing to the government, the public, and the environment become more evident with the implementation of new CRADAs, it is essential that a legislative and judicial framework be developed to address the issues raised by those CRADAs. Since existing legal doctrines are not satisfactory to address and expand the concept of profit-sharing, additional steps must be taken in that direction. Those steps should recognize that profit-sharing is both inevitable and beneficial and, thus, should be widely permitted.