



# Universal Conservationism: A Proposal to Establish World Heritage Sites Beyond Earth

Christopher M. Hearsey\*

University of North Dakota, Silver Spring, MD, 20910

This paper proposes that member States of the World Heritage Centre—an organ of the United Nations Education, Scientific and Cultural Organization—designate and include certain sites and artifacts in the Solar System on the World Heritage sites list. It considers the use of environmental ethics as a means to justify the establishment of World Heritage sites in the Solar System. It evaluates three paradigms as the basis for an environmental ethic: utilitarian, conservationist and preservationist. It also discusses the legal and policy dimensions related to protecting important historical and cultural sites and artifacts in the Solar System. Lastly, twenty recommendations of sites in the Solar System are proposed for inclusion on the World Heritage sites list. These include: Apollo 11-17 landing sites and/or impact sites of Saturn IV-B boosters on the Moon, Luna 2, 5, 7-9, 13, 15-18, 20, 23-24 impact sites, Lunar Orbiter 1-3 and 5 impact sites, Rangers 6-9 impact sites, Lunokhod 2 impact site, Surveyors 1-7 impact sites, Olympus Mons on Mars, Mars Expedition Rover Opportunity landing site, Viking 1 landing site, Viking 2 landing site, Mars Pathfinder landing site, “Face on Mars”, Mars Expedition Rover Spirit landing site, Mars Polar Lander site, Hellas Basin on Mars, Victoria Crater on Mars, Vellas Marineris on Mars, Chryse Planitia on Mars, Syrtis Major on Mars, and Martian North and South Poles. A complete list of sites requires input from the general public and governments that have launched artifacts into space. As such, these recommendations should not be considered exhaustive.

“The greatest good to the greatest number for the longest time.”

--Gifford Pinchot, in the *Fight for Conservation* (1910).

## I. Introduction

At some point in the future humans will possess the technological capabilities to send large segments of society to live beyond Earth. The expansion of human activities into space will invariably lead to consumption of resources within the Solar System resulting in waste. As a pre-industrial space society, we have already begun to leave our waste in orbit around Earth and across the Solar System.<sup>1</sup> Over time this extraterrestrial waste will accumulate further and reduce the value of many parts of our Solar System. To ensure certain parts of the Solar System are protected once humanity develops into a space-faring culture, it would be beneficial to establish protective sites from homesteading, industrialization, or claims of individual ownership.

There are two distinct issues related to the protection of the Solar System. First, we must be able to define an ethic as the foundation of protection. Second, we must consider the legal and, therefore, policy justifications for establishing such an ethic. Below I discuss several ethics which could be used to justify extraterrestrial protection. I also discuss the legal dimensions related to establishing protective sites for important historical and cultural places and artifacts in the Solar System. Lastly, I offer twenty recommendations for sites in the Solar System to be

\* Graduate Student, University of North Dakota, Space Studies Department, 1220 Blair Mill Road, Silver Spring, MD, 20910, AIAA Student Member.

<sup>1</sup> See e.g. National Aeronautics and Space Administration Johnson Space Center Website (hereinafter Johnson Space Center Website), *Orbital Debris Program Office*, <http://orbitaldebris.jsc.nasa.gov/> (accessed August 17, 2009); and William Hartmann, *Space Exploration and Environmental Issues*, 6 Environmental Ethics 227 (1984).

considered for inclusion on the World Heritage sites list by member States of the World Heritage Centre—an organ of the United Nations Educational, Scientific and Cultural Organization.<sup>2</sup>

Environmental ethics have been an important part of many cultures. Reverence for the natural order among plants, animals and humans is seen in Native American and African cultures, as well as European and American societies. Moreover, modern environmental ethics can be traced back to 17<sup>th</sup> century German forestry methods. Even in the era of the space age, States have become considerate of the consequences of fallout from atmospheric nuclear tests and the current problem of orbital debris in low Earth orbit. Consequently, states have devised rules and established ethics for Earthly and outer space environments. Protection of the Solar System is therefore a reflection of our morality toward the outer space environment.

The Solar System is a vast natural resource with unique features and qualities worth protecting. As a way of protecting several important extraterrestrial locations, States should compile and propose lists of certain identifiably important parts of the Solar System to be sent to the World Heritage Centre for designation as protected sites. Granting World Heritage status to naturally significant sites will help ensure that they are not consumed into extinction. Such extraterrestrial artifacts should also be included for World Heritage status.

While natural resources worth protecting are abundant in the Solar System, we must also consider our technological history. Since October 4, 1957, the United States and the Soviet Union have launched artificial satellites into low Earth orbit. From 1959 onward, many governments have sent terrestrially-made objects to the Moon and across the Solar System.<sup>3</sup> At the time of their launch these objects were the height of human technological progress. Like artifacts from antiquity, these objects are symbols of our past and our future. They are indicators of our evolution and a reflection of human society, possessing unique and universal value.

Setting the legal justifications aside for the moment, we must first consider the basis in which to justify the protection of outer space. Several authors have identified various arguments establishing a need to justify protection.<sup>4</sup> These arguments can be divided into three paradigms: utilitarian, preservationist, and conservationist. These paradigms are the basis for establishing an environmental ethic that can be used to protect all or parts of outer space. Moreover, each paradigm seeks to contrast the concepts of “maintaining a *status quo*” with “inherent use by humanity.” Maintaining a *status quo* requires allowing “wilderness” areas to be “kept as they are” or allowing historically and culturally significant areas to be protected and preserved. Wilderness can be defined as those areas that are “uncultivated and uninhabited”<sup>5</sup> or “an area [] where [] life [is] untrammled by man, where man is a visitor who does not remain.”<sup>6</sup> The concept of “inherent use by humanity” promotes both the Lockean and Utilitarian ideal that humanity has dominion over their environments and can take from any environment that which can sustain humanity, whether in resources or in pleasure.<sup>7</sup> However, use arguments tend to be limited by problems such as external and transactional costs, rights of use and distributive and equitable treatment among users. As a way of mitigating some of these problems, preservation and conservation arguments are employed to sustain environments for future use and posterity. Whether environmental protection is done through the establishment of park systems or

---

<sup>2</sup> I credit Tom Rogers of the Sophron Foundation for the idea that the United States should request the United Nations to designate parts of the Moon as World Heritage sites. See Tom Rogers, *Safeguarding Tranquility Base: Why the Earth's Moon base should become a World Heritage Site*, 20 *Space Policy* 5 (2004).

<sup>3</sup> For a comprehensive list of these accomplishments see Giles Sparrow, *Spaceflight, The Complete Story From Sputnik to Shuttle—And Beyond* (DK Publishing 2007), and see also Roger Launius, *Frontiers of Space Exploration* (2<sup>nd</sup> ed. Greenwood Press 2004).

<sup>4</sup> See e.g. Charles Cockell and Gerda Horneck, *Planetary Parks—Formulating a Wilderness Policy for Planetary Bodies*, 22 *Space Policy* 256 (2006); Charles Cockell and Gerda Horneck, *A Planetary Park System for Mars*, 20 *Space Policy* 291 (2004); Alan Marshall, *Ethics and the Extraterrestrial Environment*, 10 *Journal of Applied Philosophy* 227 (1993); and Holmes Rolston, *Beyond Spaceship Earth 140-182* (Eugene Hargrove ed., Sierra Club Books 1986).

<sup>5</sup> The Compact Edition of The Oxford English Dictionary (John Simpson & Edmund Wiener eds., 2<sup>nd</sup> sub. ed. Oxford University Press 1991).

<sup>6</sup> Wilderness Act, 16 USC 1131-1136, 78 Stat. 890, Pub. L. 88-557 (2007).

<sup>7</sup> See John Locke, *Two Treatises of Government: In the Former, The False Principles and Foundation of Sir Robert Filmer, And His Followers, are Detected and Overthrown. The Latter is an Essay concerning The True Original, Extent, and End of Civil-Government* (Awnsham Churchill 1689). See also Jeremy Bentham, *An Introduction to the Principles of Morals and Legislation* (Kessinger Publishing 2005) (1781).

collective security, there is ample evidence to suggest there is need and justification to do so.<sup>8</sup> Below I discuss more completely the three paradigms noted above.

Environmental ethics in outer space has its critics and there are several possible objections to this proposal. First, why should we care at all about the seemingly infinite expanse of space? One answer could be that the Solar System is the cradle of the human species and there are few good reasons to go about dumping waste in spite of its size, especially when weighed against the reasonableness of maintaining natural resources and our history in outer space. Another objection would be why should we single out some places and not others in outer space for exploitation? Again, I would argue that on Earth we do select certain areas and resources for consumption all the time: as individuals, as nations, and as a species. The reasonableness of our actions ought to be weighed against the consequences of inaction. Indeed, there are some parts of the Solar System worth exploiting, such as asteroids and parts of Mars and the Moon, but these places should not be over-consumed. Leaving intrinsically important places in the Solar System free from exploitation is not only reasonable and moral, but sets appropriate boundaries for the development of outer space.

As on Earth, there are some places worth exploiting and others worth protecting. However, unlike on Earth, the Solar System is not claimed as the sovereign territory of States, nor do States have necessarily any claim of sovereignty.<sup>9</sup> States are self-serving entities within the international system and are endowed with rulemaking abilities.<sup>10</sup> States are the subjects of international law and may apply or change the rules within the confines of international legal principles.<sup>11</sup> Even so, politics perturbs international and national rulemaking and States may find it difficult to enforce future laws, especially in places physically removed from Earth. While a future intra-solar State system is difficult to imagine, international law is extended into space via the Outer Space Treaty and its sister treaties and agreements.<sup>12</sup> Moreover, the designation of sites within the Solar System for protection does not violate the equality or non-interference clauses of the Outer Space Treaty.<sup>13</sup> This proposal is inclusive as it relies upon legitimate international institutions that maintain an active registry on all accepted sites worth preserving without making claims of ownership or title. Nonetheless, I argue that the promulgation of protection rules for outer space are legally possible, warranted, and with precedent. In this regard, intergovernmental and international organizations are sufficient tools for the protection of historically and culturally significant sites in the Solar System.

Identification is the first step in deciding which sites in the Solar System are worth protecting. Identification establishes a precedent for States to adhere. Once a comprehensive agreement and legal regime are developed for the Solar System, we can expect it will include a property rights regime. However, such a property rights regime will involve rules on how to handle State property across the Solar System and the environments in which such property is situated. The protection of State and private property in the Solar System will require enforcement by States. Since States are the primary actors under international law, they are required to perform certain duties such as enforcement of international rules.<sup>14</sup> As such, any protective effort in outer space will be initially left to States.<sup>15</sup>

Currently, State property is spread across the Solar System. Some State property may be considered artifacts due to their age and duration spent off the planet. All, if not many, of these space artifacts still have titles attached to them. Or do they? Are some objects considered abandoned? Or can States reclaim the property in the future? To answer these questions we must consider three possibilities: 1) these artifacts are the original property of the States or private entities that sent them into outer space; 2) they are abandoned property worth salvaging; or 3) the historical importance of some of the satellites and probes is greater than any property right. The issue of property

---

<sup>8</sup> See e.g. *The Great New Wilderness Debate* (J. Baird Callicott & Michael Nelson eds., University of Georgia Press 1998); *Moral Expertise: Studies in Practical and Professional Ethics* (Don MacNiven ed., Routledge 1986); and *Beyond Spaceship Earth* (Eugene Hargrove ed., Sierra Club Books 1986).

<sup>9</sup> See Article II in *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies* (hereinafter the Outer Space Treaty), opened for signature Jan. 27, 1967, 18 UST 2410, 610 UNTS 205.

<sup>10</sup> See e.g. Antonio Cassese, *International Law* 71-80 (2<sup>nd</sup> ed. Oxford University Press 2005).

<sup>11</sup> *Ibid* Cassese. See also Ben Cheng, *Air and Space Law: De Lege Ferenda* 203-217 (Tanja Masson-Zwaan & Pablo Mendes de Leon eds., Martinus Nijhoff 1992).

<sup>12</sup> See I.H. Ph. Diederiks-Verschoor & Vladimir Kopal, *Introduction to Space Law* (Kluwer Law International 3<sup>rd</sup> rev. ed. 2008).

<sup>13</sup> See Articles I, II, III, IX, X of the Outer Space Treaty.

<sup>14</sup> See *supra* Cassese, at 71-73.

<sup>15</sup> In time, States may pass off preservation efforts to the private sector. However, States will retain powers over private entities and sites in outer space either exclusively or inclusively under the current legal structure for celestial bodies based upon the nature of the site. See *supra* Outer Space Treaty, Article VI.

rights in space is beyond the scope of this paper. Nonetheless, it is doubtful that States or private entities will give up their property claims.

There is a significant probability that over-consumption will be a problem in outer space. The best illustration of over-consumption is Garrett Hardin's "Tragedy of the Commons" example.<sup>16</sup> The Tragedy of the Commons depicts a situation in which the effects of unregulated consumption of resources will lead to unintended consequences, including total depletion of resources and external and transactional costs associated with utilizing the resource. Let us consider Coase who noted that when individuals attempt to satisfy their own self-interests independently from limited common resources, they end up reducing the utility of the resource through over-consumption.<sup>17</sup> In the long run, consumers will actually destroy the resource for everyone. In an attempt to overcome this dilemma, Coase argued that when trade in an externality is possible and no transaction costs are present, bargaining will lead to an efficient outcome regardless of the initial allocation of property rights. However, an important caveat to Coase's "theorem" is that there must be no transaction costs associated with bargaining for rights or privileges. But the allocation of property rights must follow from the granting of title, and title cannot be obtained without the consent of States.<sup>18</sup> There may be transaction costs associated with establishing property rights in space. Or, given the uninhabitable nature of outer space and celestial bodies, the cost of bargaining for property rights may be too high for the efficient allocation of rights or privileges in the use of extraterrestrial resources. That is to say, the opportunity cost of choosing one way of utilizing outer space resources may be just as high as any other option available to anyone in the utilization of resources. If this is the case, efficient allocation of rights and privileges may not occur. Incidentally, States are better at internalizing costs than the private sector and States will end up bearing the financial burden of protection.

It remains to be seen whether an economically efficient process can unfold in outer space. Pricing out the Moon or Mars, in sum or in parts, without the input of States may be difficult, if not impossible. Nevertheless, early property holders in space will have a major advantage over the rest of society. Therefore, it would be reasonable for humanity as a whole to make some claims first and then allow others to make claims at some later date. This is to ensure that future claimants do not take for themselves more than can be consumed, or we will destroy the wonders of our Solar System and lose forever our astro-history.

## II. From Earthly to Universal Protection

The Soviet launch of *Sputnik I* in 1958 laid the foundation for State responsibility in outer space and instantly designated it as an international domain where States are subjects of international law.<sup>19</sup> Since 1959, States have organized internationally to promulgate rules for State conduct, responsibility and limitations on the uses of outer space.<sup>20</sup> In doing so, States have acknowledged that the outer space environment needs some sort of protection from humanity.<sup>21</sup> The degree of protection is balanced against the non-exclusionary principle and the requirement for the peaceful uses of outer space. Moreover, prohibitions on the testing, using, and keeping of weapons of mass destruction in outer space established an ethic among States.<sup>22</sup> In the last fifty years, States have widened the ethic to

---

<sup>16</sup> See Garrett Hardin, *Tragedy of the Commons*, 162 *Science* 1243 (1968).

<sup>17</sup> See Ronald Coase, *The Problem of Social Cost*, 3 *Journal of Law and Economics* 1(1960).

<sup>18</sup> There are several different theories relating to the creation of title to property. Insofar as States are concerned, title is created through discovery and application of administration over a territory. See *Island of Palmas Case*, Scott, *Hague Court Reports* 2d 83 (1932), *Perm. Ct. Arb.* (1928), 2 *U.N. Rep. Intl. Arb. Awards* 829. Moreover, under international law, natural and juridical persons cannot claim title to a thing not recognized by a legal system created by a State or claim what is not empowered to such persons under the privileges of suzerainty.

<sup>19</sup> See Bin Cheng, *United Nations Resolutions on Outer Space: "Instant" International Customary Law?*, 5 *Indian Journal of International Law* 23 (1965). See also Imre Csabafi, *The UN General Assembly Resolutions on Outer Space as Sources of Space Law*, *Proc. of the 8<sup>th</sup> Colloquium on the Law of Outer Space* 337 (1965).

<sup>20</sup> For a compilation see United Nations Publications, *United Nations Treaties and Principles on Outer Space*, ST/SPACE/11/REV.2 (2008).

<sup>21</sup> See e.g. Stephen Gorove, *Pollution and Outer Space: A Legal Analysis and Appraisal*, 5 *New York University Journal of International Law and Politics* 53 (1972), and see also Glen Reynolds and Robert Merges, *Outer Space: Problem of Law and Policy* 205-212 (Westview Press 1997) (1989).

<sup>22</sup> See e.g. *Question of General and Complete Disarmament*, G.A. Res. 1884 (Oct. 17, 1963); *Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space*, G.A. Res. 1962 (XVIII) (Dec. 13, 1963); and *supra* *Outer Space Treaty*, Article IV.

include protecting extraterrestrial environments.<sup>23</sup> Consequently, the foundation for an environmental ethic has been laid. The question is to what degree can we justify our need to protect outer space?

To answer this question we will need to consider three paradigms. First, we must consider the utilitarian paradigm that is based upon a subjective theory of value, namely marginal utility. We must balance utilitarian arguments between the alternatives of limited use and consumption to maximize self-interest. Second, we must consider the conservationist paradigm which seeks to balance the utility of use and non-use. Third, we must consider the preservationist paradigm that seeks to ban the consumption of certain resources to maintain an environment's pristine landscape. The impact of these paradigms ranges from marginal use to prohibition of use. Deciding which ethic to employ will require a more thorough analysis.

## A. Ethics for the Solar System

Discussions of ethics and extraterrestrial environments have permeated various literatures for over thirty years. One of the earliest attempts to define an environmental ethic for extraterrestrial environments took place at the "Environmental Ethics and the Solar System" conference at the University of Georgia in 1985.<sup>24</sup> The multidisciplinary gathering of ecologists, ethicists, physical and astronomical scientists, lawyers, and theologians could not formulate a consensus answer. Instead, it laid the groundwork for research by thought experiment, as very little is known about extraterrestrial environments. Moreover, scholarship on environmental ethics in outer space covers a wide range of issues, from protecting potential signs of life to preserving environments themselves.<sup>25</sup>

One important problem in the study of environmental ethics in outer space is the so-called environmentalist's paradox.<sup>26</sup> The paradox follows a logical investigatory sequence that loops back on itself. It begins with the proposition that we want to protect extraterrestrial environments. To protect these environments we need to understand the environment first. To do so, we need to explore the environment. To explore the environment we need to send tools for measurements, i.e. spacecraft. By sending spacecraft we ruin the environment, thereby negating our initial proposition to protect the extraterrestrial environment.

Several scholars have proposed various ways out of the paradox. For example, Charles Cockell and Gerda Horneck have argued for the creation of planetary parks on planetary bodies, such as Mars.<sup>27</sup> P.J. Stooke has also proposed the creation of Lunar Historical Parks to protect all impact and landing sites from the first era of lunar exploration (1959-1969). These include: Luna 2, 5, 7-9, 13, 15-18, 20, 23-24, Lunar Orbiter 1-3 and 5, Rangers 6-9, Lunokhod 2, Surveyors 1-7, and Apollo 11-17 landing sites and/or impact sites of Saturn IV-B boosters.<sup>28</sup> Cockell, Horneck and Stooke have all proposed several sites and artifacts be protected and preserved for their intrinsic and, to some degree, historical value. However, both proposals are meant to underscore the need for disciplined and reasoned land-use policy. Cockell, Horneck and Stooke do not believe that their "parks" should be totally closed off from future space missions or that the Moon, Mars, or any other celestial body should be devoid of human development. Each author believes that protecting certain sites and artifacts in outer space is reasonable in light of the historical record of humanity's interaction with the Earth's environment.

Cockell and Horneck have been criticized on the basis that their proposal is an overreaction to the limited environmental impact from all the missions to celestial objects in the last sixty years. In one paper, Cockell and Horneck lay out four broad arguments for planetary protection of extraterrestrial environments.<sup>29</sup> These include: the

<sup>23</sup> See e.g. *supra* Gorove; Eligar Sadeh, Space Politics and Policy 151-162 (Eligar Sadeh ed., Kluwer 2002); Committee on Space Research Website, *Planetary Protection Policy*, July 2008, [http://cosparhq.cnes.fr/Scistr/PPPolicy\(20-July-08\).pdf](http://cosparhq.cnes.fr/Scistr/PPPolicy(20-July-08).pdf) (accessed August 17, 2009); and M. Hiner, *Environmental Aspects of Settlements on the Moon and Mars—Planetary Protection*, Proc. of the 34<sup>th</sup> Colloquium on the Law of Outer Space 50 (1991).

<sup>24</sup> See *supra* Hargrove, and Martyn Fogg, *The Ethical Dimensions of Space Settlement*, 16 Space Policy 205 (2000).

<sup>25</sup> See e.g. Alan Marshall, *Ethics and the Extraterrestrial Environment*, 10 Journal of Applied Philosophy 227 (1993); I. Almar & A. Horvath, *Do We Need 'Environmental Protection' in the Solar System*, Proc. of the 40<sup>th</sup> International Astronautical Congress 6 (1989); Mark Lupisella and John Logsdon, *Do We need a Cosmocentric Ethic?*, Proc. of the 48<sup>th</sup> International Astronautical Congress (1997); *supra* Cockell and Horneck (2004, 2006); *supra* Hargrove; and *supra* Fogg.

<sup>26</sup> See *supra* Cockell and Horneck (2006).

<sup>27</sup> *Ibid* Cockell and Horneck (2006).

<sup>28</sup> P.J. Stooke, *Lunar Historical Parks*, 2<sup>nd</sup> Symposium on Lunar Bases and Space Activities of the 21<sup>st</sup> Century 234 (1988).

<sup>29</sup> See *supra* Cockell and Horneck (2006).

necessity argument, the intrinsic value argument, the future generations argument, and the unknown and indirect benefits argument. The necessity argument states that humanity needs to maintain all environments' they inhabit to "create a complete and healthy concept of 'culture' and 'civilization'".<sup>30</sup> The intrinsic value argument "states that land has its own value and should be left in appreciation of [its] value."<sup>31</sup> The future generations argument states that "even if [humanity] do[es] not use the land [now] we should protect [the land] for future generations."<sup>32</sup> Lastly, the unknown and indirect benefits argument states that even though "[w]e do not know what is in the land [today], [the land] may contain things that are of benefit to [humanity] at some future time."<sup>33</sup> Each of these arguments does not depend upon human or robotic presence in extraterrestrial environments. Nonetheless, Cockell and Horneck acknowledge that while "[t]here is no immediate need to protect land on other bodies from human ruin in the same way as land on Earth... the four arguments identified above are important because they provide a set of reasons [ ] in advance of human settlement."<sup>34</sup>

Cockell's and Horneck's argument depends on the use of a "wilderness" ethic on planetary bodies. A wilderness ethic relates to the "Cosmo-centric" ethic in that the natural state of the universe ought to remain as it is, without human attempts to change it, e.g. terra-forming.<sup>35</sup> As noted above, a wilderness area can be defined as untrammelled, uncultivated or uninhabited regions of land. Further, we can define wilderness as an area meeting four requirements as defined by the United States Wilderness Act. For land to be considered wilderness it

- (1) [must] generally appear[] to have been affected primarily by the forces of nature with the imprint of man's work substantially unnoticeable;
- (2) [must] ha[ve] outstanding opportunities for solitude or a primitive and unconfined type of recreation;
- (3) [must] ha[ve] at least 5000 acres of land or [be] of sufficient size as to make practicable its preservation and use in an unimpaired condition;
- (4) [ ] may also contain ecological, geological or other features of scientific, educational, scenic, or historical value.<sup>36</sup>

Such criteria are easily met by many extraterrestrial environments.

Maintaining the ecology of celestial bodies may seem ridiculous to some now, but it is relevant to the debate regarding how the human species should go about developing outer space for long-term habitation. We should be aware of which ethics apply to outer space and whether they limit humanity's options in outer space. Ethics such as Anthropocentrism, Zoo-centrism, Eco-centrism, and Preservationism have been noted by scholars as bases for human expansion into outer space.<sup>37</sup> Anthropocentrism's central moral principle is the categorical imperative and the basis of intrinsic value is on rational and moral capacity. The Anthropocentric ethic places no limits on human conduct in adapting celestial bodies for human presence. Zoo-centrism's central moral principle is the principle of utility, where individual consciousness is the basis of intrinsic value. A Zoo-centric ethic requires moral rights for higher beings such as humans and some animals and assigns no intrinsic value to lower animals such as microbes or inanimate objects. Zoo-centrism is fully compatible with the human development of celestial bodies, so long as the moral rights of higher animals are maintained. Eco-centrism's central moral principle and basis for intrinsic value is the respect for life. An Eco-centric ethic requires that all life is equal, and therefore ought to be protected. In outer space, this would imply that we should be cautious and give due diligence to the protection of microbial or higher life-forms in the Universe. It also does not place intrinsic value on inanimate objects and adapting celestial objects devoid of life would be moral. Finally, Preservationism's central moral principle is the sanctity of existence with the basis of intrinsic value being the uniqueness of "formed integrity." A Preservationist ethic is the Cosmo-centric ethic defined above. It requires that for moral reasons humanity must not transform any extraterrestrial environment. Moreover, the uniqueness concept is not fully or adequately defined in ethical literature. For example, Alan Marshall has noted that uniqueness is not defined by human beings, but merely recognition of a things value in relation to itself.<sup>38</sup> Others have argued that uniqueness is defined by "formed integrity" via the laws of nature.<sup>39</sup> These ethics form the basis for the current debate on extraterrestrial environments.

<sup>30</sup> *Ibid* Cockell and Horneck (2006), at 258.

<sup>31</sup> *Ibid* Cockell and Horneck (2006), at 258.

<sup>32</sup> *Ibid* Cockell and Horneck (2006), at 258.

<sup>33</sup> *Ibid* Cockell and Horneck (2006), at 258.

<sup>34</sup> *Ibid* Cockell and Horneck (2006), at 258.

<sup>35</sup> *Ibid* Cockell and Horneck (2006), at 257.

<sup>36</sup> 16 USC 1131 (2)(c)(1-4) (2007).

<sup>37</sup> For a complete discussion of these ethics see *supra* Fogg.

<sup>38</sup> See *supra* Marshall.

<sup>39</sup> See Holmes Rolston, *Beyond Spaceship Earth* 140-182 (Eugene Hargrove ed., Sierra Club Books 1986).

What matters most in each ethic is how humans may go about adapting extraterrestrial environments in outer space. Use of resources on celestial bodies depends upon what is there and its value in relation to the activity of exploitation. In the next section, I discuss use and value in relation to the conservation and preservation of extraterrestrial environments and the impact it might have in designating certain sites and artifacts in the Solar System protected as World Heritage sites.

## B. Utilitarianism, Conservationism and Preservationism

Sooner or later parts of the Solar System will be deemed intrinsically valuable and will require some type of legal protection. In order to gauge the degree of legal protection, we will need to be able to value those places and artifacts in the Solar System worth protecting. While the celestial bodies and artifacts in the Solar System are unique, there is a distinction between value in use and value in exchange.<sup>40</sup> In “The Wealth of Nations,” Adam Smith noted this fact and concluded that “[t]he real price of every thing, what every thing really costs to the man who wants to acquire it, is the toil and trouble of acquiring it.”<sup>41</sup> Adam Smith’s explanation of the value paradox assumed that things of value were heterogeneous goods and that there was no necessary relationship between price and utility, i.e. the value of a thing is established by the labor you commit to acquire it. Smith’s argument was entirely a moral statement that, on the face of it, could only be considered an analysis of the ratio of two goods with respect to its use and exchange. As George Stigler pointed out, Adam Smith’s explanation is flawed since a sufficient explanation requires the concept of the marginal utility of income—a concept that was not known until the 19<sup>th</sup> century.<sup>42</sup> Even with the extraordinary costs of operating and maintaining life support and performing any activity beyond Earth, we can only say a site or artifact is worth as much as one is able to afford to satisfy some need or want for it, and not in the cost of acquiring such things. Moreover, the value of maintaining or using a site in the Solar System is weighed against its future profit or loss to society and not necessarily in the value of toiling for it. Consequently, States will make judgments of value for their own sake and, to some degree, humanity as a whole.

An objection could be made regarding how utility is to be measured. First, let us assume that we can divide the Solar System up into fractional units. Should we view the utility of certain parts of the Solar System with respect to society as a whole or the individual willing to pay for each additional unit of the Solar System? The problem with utilitarian arguments is that they are inherently subjective. Society could weigh the utility of use and non-use based upon an inclusive standard. However, an individual, on the assumption of maximizing self-interest, will discriminate against society in valuing the use of the outer space environment. Each additional unit desired must be substantiated by the marginal income an individual is willing to expend to acquire it. It may be the case that diseconomies of scale limit the acquisition of additional units of the Solar System by an individual. Moreover, the value in some fractional part of the Solar System is not gained *a priori* by its use, but in its intrinsic value to society. Thus, by itself, utilitarianism as an environmental ethic may be insufficient because it is hard to distinguish the value set by individuals or humanity as a whole. Nonetheless, States, as subjects of international law, can measure their own utilities for protecting sites and artifacts in the Solar System.

Let us now consider the conservationist paradigm. The conservation movement is a political, social, and scientific movement seeking to protect terrestrial resources from over-consumption.<sup>43</sup> Initially rooted in 17<sup>th</sup> and 18<sup>th</sup> century German forestry methods, it has grown into a sustained effort to protect natural environments around the world.<sup>44</sup> Modern conservation movements emphasize the protection of wilderness and biodiversity.<sup>45</sup> In the United States, conservationists seek to preserve natural resources for continued and sustainable use.<sup>46</sup> In other parts of the world, conservationism is equated with environmentalism, a broad philosophical and social movement concerned with the improvement of the environment.<sup>47</sup> Nevertheless, conservationism has evolved over time as society has grown to understand the necessity of maintaining and preserving the Earth’s environment.

<sup>40</sup> This distinction is famously known as the paradox of value. See e.g. Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* (Trahan & Cadell 1776).

<sup>41</sup> *Ibid* Smith, Book I, Ch. V, *Of the Real and Nominal Price of Commodities, or of their Price in Labour, and their Price in Money*.

<sup>42</sup> George Stigler, *The Development of Utility Theory. I*, 58 *Journal of Political Economy* 307, 308 (1950).

<sup>43</sup> Aaron Sachs, *The Humboldt Current: Nineteenth-Century Exploration and the Roots of American Environmentalism* (Viking 2006).

<sup>44</sup> *Ibid* Sachs.

<sup>45</sup> *Ibid* Sachs.

<sup>46</sup> *Ibid* Sachs.

<sup>47</sup> *Ibid* Sachs.

The American conservation movement began in the 19<sup>th</sup> century. As the US expanded west, people depended upon the land for survival. Maintaining sustainable landscapes was recognized as critical for future generations. Throughout the late 19<sup>th</sup> and early 20<sup>th</sup> centuries, it was apparent that the US was growing rapidly. In an attempt to preserve the great American landscape, intellectuals, such as Gifford Pinchot and political leaders, such as Theodore Roosevelt, moved to organize the protection of American forests. In 1891, Congress passed the Forest Reserve Act, which gave authority to the Executive to set aside forest lands for public use.<sup>48</sup> To date the United States has set aside 43.6 million acres for public use.<sup>49</sup>

Conservationism has many definitions and meanings. To Gifford Pinchot, first Chief of the Forest Service, conservationism was a matter of utilitarianism: “the greatest good to the greatest number for the longest time.”<sup>50</sup> Moreover, Pinchot was a pragmatist who saw conservationism as a means for the practical use and protection of American resources. In his book, *The Fight for Conservation*, Pinchot wrote that there were three principles of conservation: development, preservation, and protection of the public interest.<sup>51</sup> Pinchot defined development as “the use of the natural resources now existing on [the North American] continent for the benefit of the people who live [there].”<sup>52</sup> Explaining the utility of development, Pinchot wrote that “[t]here may be just as much waste in neglecting the development and use of certain natural resources as there is in [its] destruction ... The development of our natural resources and the fullest use of them for the present generation is [one’s] first duty.”<sup>53</sup> Pinchot saw preservation as “...the prevention of waste in all other directions [as] a simple matter of good business.”<sup>54</sup> Pinchot thought that “[t]he first duty of the human race [was] to control the earth it lives upon,” and believed that the protection of the public interest required that “natural resources must be developed and preserved for the benefit of the many, and not merely for the profit of a few.”<sup>55</sup> Even today these are guiding principles in the development of environmental protection laws.

Theodore Roosevelt had a similar utilitarian approach to conservationism as Pinchot. Roosevelt saw the land covering America as vital resources for maintaining the nation’s strength and productivity. But Roosevelt also realized that the use of resources was not sufficient to maintain America’s strength and productivity. In his book, *T.R.: The Last Romantic*, historian Henry Brands noted that according to Roosevelt, “[Americans] are prone to speak of the resources of this country as inexhaustible; this is not so.”<sup>56</sup> Roosevelt believed that proper management of natural resources was important for America’s future and for the future enjoyment of all its citizens.<sup>57</sup> Management of natural resources meant allowing *some* development of public lands, either for private or commercial use.<sup>58</sup> To that end, Roosevelt signed the National Reclamation Act of 1902 (NRA) that allowed for the management and settlement of federal lands.<sup>59</sup> Without the NRA of 1902, most of the Western United States would not have been settled because the NRA provided the necessary funds for the irrigation of water.<sup>60</sup>

In outer space as in the US, resources will be vital for survival. Conservationism acknowledges both the need to develop and protect resources from over-consumption, as well as protection for its own sake. The outer space environment fits into the conservationist paradigm. The environmental ethic of conservationism requires us to decide which parts of the Solar System are worth preserving without giving up the need to utilize extraterrestrial resources for survival. Just as Theodore Roosevelt noted, while the Solar System may seem to hold infinite resources, this is only an illusion. In time the Solar System’s resources will be used and conservation of the Solar System, in sites and artifacts, will require a management regime. Any future management regime will, in turn, require the consent of States. As such, any future proposal establishing a property regime in outer space should acknowledge the need for resources and artifact protection.

<sup>48</sup> Forest Reserve Act, 26 Stat. 1095 (2007).

<sup>49</sup> United States Department of the Interior National Park Service Website, *Quick Facts*, <http://www.nps.gov/aboutus/quickfacts.htm> (accessed August 17, 2009).

<sup>50</sup> Gifford Pinchot, *The Fight for Conservation* (Doubleday, Page & Company 1910).

<sup>51</sup> *Ibid* Pinchot.

<sup>52</sup> *Ibid* Pinchot.

<sup>53</sup> *Ibid* Pinchot.

<sup>54</sup> *Ibid* Pinchot.

<sup>55</sup> *Ibid* Pinchot.

<sup>56</sup> H.W. Brands, *T.R.: The Last Romantic* (Basic Books 1997).

<sup>57</sup> *Ibid* Brands.

<sup>58</sup> *Ibid* Brands.

<sup>59</sup> National Reclamation Act, Pub. L. 57-161, 32 Stat. 388 (2007).

<sup>60</sup> See *supra* Brands.

Lastly, let us consider the preservationist paradigm. The preservationist paradigm is opposed to the utilitarian and conservationist paradigms. Preservationist John Muir, founder of the Sierra Club, believed such natural environments should remain pristine, untouched, and any development on those lands ought to be banned.<sup>61</sup> Muir thought forest lands ought to be preserved for their beauty, scientific investigation, and recreation.<sup>62</sup> Today the Sierra Club is one of the oldest and largest non-profit organizations (NGOs) in the United States.<sup>63</sup> Their mission is to advocate:

- The exploration, enjoyment, and protection the wild places of the earth;
- The practice and promotion of responsible use of the earth's ecosystems and resources;
- The education and enlistment of humanity to protect and restore the quality of the natural and human environment;
- The use of all lawful means to carry out these objectives.<sup>64</sup>

Tensions still exist between preservationists, conservationists, and utilitarians over how best to manage natural resources.

It is doubtful that a preservationist paradigm should be a basis for a sufficient environmental ethic for outer space. Human presence on celestial bodies will require some sort of *in-situ* resource utilization for long-term life support and scientific analysis. Moreover, creation of an economy of sufficient magnitude to enable habitation would be hampered by an environmental ethic that prohibits the use of natural outer space resources. It would perpetuate the environmental paradox and hamper outer space development. Furthermore, the preservationist paradigm would inhibit State activity on celestial bodies, which would be contrary to national space policies and international space law. Hence, preservationism is not an adequate basis for an environmental ethic in outer space.

### C. Brief Historical Review Regarding the Protection of International Sites and Artifacts

Conservationism is a sufficient environmental ethic for outer space—although it may not be the only one. From early German foresters to American conservation efforts, the goals of conservationism have spread further across the planet. For example, in 1948, an international organization, the International Union for Conservation of Nature and Natural Resources (IUCN), was created. The mission of the IUCN “is to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.”<sup>65</sup> The IUCN organizes both governments and non-governmental organizations for the preservation of natural resources around the world.

The efforts of conservationists have expanded beyond the protection of nature to the protection of human culture. The issue of preserving culture arose in 1954 when the government of Egypt decided to build the Aswan Dam.<sup>66</sup> The dam was to flood a valley containing the Abu Simbel and Philae temples, treasures of Ancient Egypt.<sup>67</sup> In an effort to protect the historical value of the temples, the United Nations Educational, Scientific and Culture Organization (UNESCO) launched a worldwide campaign to protect the temples.<sup>68</sup> Despite appeals from the Egyptian and Sudanese governments, the Abu Simbel and Philae temples were taken apart, moved to a higher location, and put back together in original form.<sup>69</sup>

As a result of organizing to save the Abu Simbel and Philae temples, two major international organizations were created. First, the International Council on Monuments and Sites (ICOMOS) was founded in 1965.<sup>70</sup> The ICOMOS is a professional association that works for the conservation and protection of cultural heritage places around the world.<sup>71</sup> Second, the World Heritage Centre (WHC) was adopted as a UNESCO organization on November 16,

<sup>61</sup> Larry Schweikart & Michael Allen, *A Patriot's History of the United States* (Penguin 2004).

<sup>62</sup> *Ibid* Schweikart & Allen.

<sup>63</sup> Sierra Club Website, *Sierra Club Policies*, <http://www.sierraclub.org/policy/> (accessed August 17, 2009).

<sup>64</sup> *Ibid* Sierra Club Website.

<sup>65</sup> International Union for Conservation of Nature and Natural Resources Website, *About IUCN*, <http://www.iucn.org/about/index.cfm> (accessed August 17, 2009).

<sup>66</sup> World Heritage Centre Website, *About the World Heritage, Brief History*, <http://whc.unesco.org/en/169/> (accessed August 17, 2009).

<sup>67</sup> *Ibid* World Heritage Centre Website.

<sup>68</sup> *Ibid* World Heritage Centre Website.

<sup>69</sup> *Ibid* World Heritage Centre Website.

<sup>70</sup> International Council on Monuments and Sites Website, *About ICOMOS*, <http://www.international.icomos.org/about.htm> (accessed August 17, 2009).

<sup>71</sup> *Ibid* ICOMOS Website.

1972, by the United Nations General Assembly.<sup>72</sup> The WHC identifies and catalogues names and conserves sites of outstanding cultural or natural importance to the common heritage of humanity.<sup>73</sup> It is supported by the World Heritage Fund, which solicits donations from private sources and receives funding from member nations.<sup>74</sup> A World Heritage site (WHS) is not owned by the WHC.<sup>75</sup> Each WHS is the property of the country on which it is located, but the conservation of a WHS is considered in the interest of the entire international community.<sup>76</sup>

The preservation and maintenance of natural and cultural sites has been established at the national and international level. Below I discuss how the World Heritage Centre can help protect outer space and establish procedures to secure sites for conservation.

### III. Applying Universal Protection: A Future Role for the World Heritage Centre

Several proposals have been put forth by various authors regarding how best to protect the outer space environment. These proposals range from establishing a planetary park system to conserving specific sites on celestial bodies.<sup>77</sup> In 2004, Tom Rogers wrote an article calling for Tranquility Base on the Moon to be submitted by the United States to the World Heritage Centre for inclusion in and designation as a World Heritage site.<sup>78</sup> However, Mr. Rogers' article did not include a discussion on how the World Heritage Centre operates or whether Tranquility Base could even be included on the World Heritage site list. This paper seeks to expand on Mr. Roger's proposal.

#### A. World Heritage Centre: Definitions and Guidelines

The *Convention Concerning the Protection of the World Cultural and Natural Heritage* (The Convention) was adopted by UNESCO in 1972.<sup>79</sup> The Convention established the World Heritage Committee to identify and review the natural and cultural wonders on Earth. The Convention explicitly states "that deterioration or disappearance of any item of [] cultural or natural heritage constitutes a harmful impoverishment of the heritage of all the nations of the world."<sup>80</sup> The Convention addresses the need to safeguard "parts of the cultural or natural heritage [] of outstanding interest and [the] need to [] preserve [individual cultural or natural heritage] as part of the world heritage of mankind as a whole."<sup>81</sup> The Convention stresses that "it is incumbent on the international community as a whole to participate in the protection of the cultural and natural heritage of outstanding universal value."<sup>82</sup> The Convention calls for the "adopt[ion] [of] new provisions in...establishing an effective system of collective protection of the cultural and natural heritage of outstanding universal value."<sup>83</sup> These principles form the basis of international law pertaining to the safeguarding of humanity's heritage.

Cultural and natural heritage are defined under Articles 1 and 2, respectively. Article 1 defines "cultural heritage" as:

"[M]onuments: architectural works, works of monumental sculpture and painting, elements or structures of an archaeological nature, inscriptions, cave dwellings and combinations of features, which are of outstanding universal value from the point of view of history, art or science;

[G]roups of buildings: groups of separate or connected buildings which, because of their architecture, their homogeneity or their place in the landscape, are of outstanding universal value from the point of view of history, art or science;

---

<sup>72</sup> World Heritage Centre Website, *Convention Concerning the Protection of the World Cultural and Natural Heritage* (hereinafter The Convention), adopted Nov. 16, 1972, <http://whc.unesco.org/en/conventiontext/> (accessed August 17, 2009).

<sup>73</sup> *Ibid* The Convention, Article 11.

<sup>74</sup> *Ibid* The Convention, Article 15.

<sup>75</sup> *Ibid* The Convention, Article 4.

<sup>76</sup> *Ibid* The Convention, Article 4.

<sup>77</sup> See e.g. *supra* Cockell & Horneck (2004, 2006); and *supra* Rogers.

<sup>78</sup> See *supra* Rogers.

<sup>79</sup> See *supra* The Convention.

<sup>80</sup> *Ibid* The Convention, Preamble.

<sup>81</sup> *Ibid* The Convention, Preamble.

<sup>82</sup> *Ibid* The Convention, Preamble.

<sup>83</sup> *Ibid* The Convention, Preamble.

[S]ites: works of man or the combined works of nature and man, and areas including archaeological sites which are of outstanding universal value from the historical, aesthetic, ethnological or anthropological point of view.”<sup>84</sup>

Article II defines “natural heritage” as:

“[N]atural features consisting of physical and biological formations or groups of such formations, which are of outstanding universal value from the aesthetic or scientific point of view;

[G]eological and physiographical formations and precisely delineated areas which constitute the habitat of threatened species of animals and plants of outstanding universal value from the point of view of science or conservation;

[N]atural sites or precisely delineated natural areas of outstanding universal value from the point of view of science, conservation or natural beauty.”<sup>85</sup>

From the definitions of cultural and natural heritage, we can see that space artifacts and certain parts of the Solar System can be defined under Articles 1 and 2. For example, the Apollo 11 landing site at Tranquility base could be considered a monument or site, while the plaque left by astronauts Neil Armstrong and Buzz Aldrin could be classified as an inscription or monumental sculpture that arguably has “outstanding universal value from the point of view of history, art or science.”<sup>86</sup> On the other hand, Olympus Mons on Mars could be defined as a natural feature or site with outstanding universal value from either an aesthetic, scientific, or conservatory point of view. Nonetheless, there are criteria for determining what can be classified as a cultural or natural heritage.

In 2005, the WHC composed new guidelines for determining whether something was of cultural or natural heritage.<sup>87</sup> The guidelines consist of ten criteria:

I. To represent a masterpiece of human creative genius;

II. To exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design;

III. To bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared;

IV. To be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history;

V. To be an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change;

VI. To be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance. (The Committee considers that this criterion should preferably be used in conjunction with other criteria.)

VII. To contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance;

VIII. To be outstanding examples representing major stages of Earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features;

IX. To be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals;

X. To contain the most important and significant natural habitats for in-site conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.”<sup>88</sup>

To be selected as a World Heritage Site, the site must possess universal value and at least one out of the ten criteria must be met. It is plain to see that some objects in the Solar System meet at least one of these criteria.

While not specifically addressing its application to space, The Convention does not define “the world.” It is not clear whether “the world” definition is meant to imply to the Earth as a geographic body relative to the Solar System or to the realm of human activities. If the latter, then “the world” definition would apply to those places humans can reach. Moreover, due to the international scope of The Convention, there is intent to make clear that geographic boundaries do not to apply. The Convention establishes the importance of protecting humanity’s natural and cultural

<sup>84</sup> *Ibid* The Convention, Article 1.

<sup>85</sup> *Ibid* The Convention, Article 2.

<sup>86</sup> *Ibid* The Convention, Article 1.

<sup>87</sup> See World Heritage Centre Website, *The Operational Guidelines for the Implementation of the World Heritage Convention* (hereinafter Operational Guidelines), <http://whc.unesco.org/en/guidelines/> (accessed August 17, 2009).

<sup>88</sup> *Ibid* Operational Guidelines.

heritage and protection is not necessarily bounded by geography. Nevertheless, since it is an international convention ratified by 186 States, The Convention is part of national and international law.<sup>89</sup> Coincidentally, international law is extended into space via the Outer Space Treaty. Therefore, The Convention can be considered part of outer space law.

## B. Outer Space Law and the Limits of the World Heritage Convention

On October 10, 1967, the *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies* (Outer Space Treaty) entered into force.<sup>90</sup> The Outer Space Treaty created the legal regime for outer space under the auspices of the United Nations.<sup>91</sup> Some of the major principles include: “the exploration and use of outer space shall be carried out for the benefit and in the interests of all countries and shall be the province of all mankind; outer space shall be free for exploration and use by all States; outer space is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means; the Moon and other celestial bodies shall be used exclusively for peaceful purposes; States shall be responsible for national space activities whether carried out by governmental or non-governmental activities; and States shall avoid harmful contamination of space and celestial bodies.”<sup>92</sup> These principles form the foundation of outer space law.

The Outer Space Treaty established the first regime for and defined the nature and limits of outer space. The use and exploration of outer space is open to all, but no part of outer space may be subject to private appropriation or claim of sovereignty.<sup>93</sup> However, objects launched into outer space are still the property of the launching State. The nationality of space objects is further defined by the *Convention on Registration of Objects Launched into Outer Space* (Registration Convention).<sup>94</sup> The Registration Convention requires that States provide the following when launching an object: “[the] [n]ame of [the] launching State; [a]n appropriate designator of the space object or its registration number; [a] date and territory or location of launch; [and some] [b]asic orbital parameters.”<sup>95</sup> These requirements ensure the international community can properly distinguish the nationality of objects sent into outer space.<sup>96</sup>

With respect to locations of property, Article 3 of the World Heritage Convention requires that “each State Party to [the] Convention [] identify and delineate the different properties situated on its territory.”<sup>97</sup> There are some objects not within the physical territory of State parties. That is not to say that these properties are neither of universal value nor the property of States or private entities. As the Registration Convention states, every object in space is the property of the launching State unless otherwise indicated.<sup>98</sup> Even so, there are some objects that have been launched that were purposefully destroyed or left in orbit.<sup>99</sup> Under the flag principle of aviation, admiralty, and international diplomatic law, flagged property is simultaneously the property and territory of a flagged State.<sup>100</sup> Therefore, objects in orbit or on extraterrestrial sites are functionally the territory and property of States on Earth.<sup>101</sup>

<sup>89</sup> The number of signatories to The Convention are as of August 17, 2009.

<sup>90</sup> See *supra* Outer Space Treaty.

<sup>91</sup> Between 1959 and 1969 there were several United Nations General Assembly (UNGA) resolutions that expressed the will of the international community regarding outer space and they have been recognized as ‘instant customary international law.’ See *supra* Cheng (1965), and see also *supra* Csabafi (1965).

<sup>92</sup> United Nations Office of Outer Space Affairs Website, *Outer Space Treaty*, <http://www.unoosa.org/oosa/SpaceLaw/outerspt.html> (accessed August 17, 2009).

<sup>93</sup> See *supra* Outer Space Treaty, Article II.

<sup>94</sup> Convention on Registration of Objects Launched into Outer Space (hereinafter Registration Convention), open for signature Nov. 12, 1974, 1023 UNTS 15.

<sup>95</sup> United Nations Office of Outer Space Affairs Website, *Registration Convention*, <http://www.unoosa.org/oosa/SORegister/regist.html> (accessed August 17, 2009).

<sup>96</sup> However, the success of this requirement is debatable. See *supra* Diederiks-Verschoor & Kopal.

<sup>97</sup> See *supra* The Convention, Article 3.

<sup>98</sup> See *supra* Registration Convention, Article II(2).

<sup>99</sup> See *Supra* Johnson Space Center Website.

<sup>100</sup> However, the flag must be flown legitimately. See 80 C.J.S. *Shipping* §1 (2009). See also Article XXII, Vienna Convention on Diplomatic Relations, open for signature March 1, 1961, 500 UNTS 95.

<sup>101</sup> See Benedetto Conforti, *International Law and the Role of Domestic Legal Systems*, 140-150 (Martinus Nijhoff Publishers 1993). See also Anthony Csabafi, *The Concept of State Jurisdiction in International Law* 126-138 (Martinus Nijhoff 1971).

However, celestial bodies, wherein such objects reside, are not instantly the territory of States. The Outer Space Treaty and international law do not validate claims of appropriation by merely placing a flagged object on the surface of a celestial body.<sup>102</sup> In other words, exclusive jurisdiction does not apply to celestial bodies. Moreover, scholars have noted the use of functional jurisdiction on celestial bodies.<sup>103</sup> Functional jurisdiction means “a State may exercise its jurisdiction only if that exercise is necessary to achieve a goal or to further a specific interest.”<sup>104</sup> The use of functional jurisdiction is sufficiently applicable to States with respect to establishing claims over State property (i.e. artifacts) on extraterrestrial sites. Functional jurisdiction will only enable State title holders of space objects to create and maintain extraterrestrial World Heritage sites for artifact(s) on any given site, as long as equal access to celestial bodies is not prohibited.

Additionally, with respect to property claims, Article 4 of the World Heritage Convention states that “[e]ach State Party to [the] Convention recognizes that the duty of ensuring the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage referred to in Articles 1 and 2 and situated on its territory, belongs primarily to that State.”<sup>105</sup> Every State party who has a site registered with the World Heritage Centre does not give up title to that property. Hence, the US still has a property right claim to abandoned Apollo materials, and designating Tranquility Base as a World Heritage site does not change the title of the US property or create title to any part of the Moon that such property is situated upon.

The Convention does outline duties that member States must perform. In conjunction with Article 6(1), “States on whose territory the cultural or natural heritage ...is situated, and without prejudice to property right provided by national legislation, [] State Parties to [the] Convention [have a duty to] recognize [that] such heritage constitutes a world heritage for whose protection it is the duty of the international community as a whole to co-operate.”<sup>106</sup> Therefore, States have a duty to cooperate in maintaining humanity’s heritage. Moreover, Article 7 defines international protection as “the establishment of a system of international co-operation and assistance designed to support States Parties to the Convention in their efforts to conserve and identify that heritage.”<sup>107</sup> Hence, as a matter of comity, States have a duty to ensure and maintain natural and cultural objects for conservation.

Furthermore, The Convention does not include a provision for dispute settlement. However, Article 11(2) notes that “[t]he inclusion of a property in the World Heritage List requires the consent of the State concerned. The inclusion of a property situated in a territory, sovereignty or jurisdiction over which is claimed by more than one State shall in no way prejudice the rights of the parties to the dispute.”<sup>108</sup> It is possible that disputes will occur. If heritage sites overlap or artifacts of different States are found in one site, then the members of the World Heritage Centre, in consultation with the State property holders, will need to decide how artifacts are to be handled. In all likelihood, States will claim their property regardless of where the site is and may remove State property from sites. Removal of claimed State property from any site, while contrary to the purpose of conservation, is entirely the right of States with respect to their own property in outer space. However, it is doubtful that conflicts will arise that would negate the establishment of World Heritage sites.

On the other hand, designating parts of the Solar System as natural heritage sites would not be limited by the Outer Space Treaty. First, the designation of a mountain range, a basin or valley, or plain on a celestial body, e.g. on Mars, as a natural heritage site would not violate the non-appropriation clause or the equal access clause of the Outer Space Treaty and would be in accordance with international law.<sup>109</sup> As the Convention stipulates, it is the duty of States to protect and maintain the value of the natural heritage site irrespective of property claims to objects within the perimeter of the site.<sup>110</sup> Second, establishing natural heritage sites would promote exploration and use since natural heritage sites would be preserved for all States irrespective of socio-economic and technological status.<sup>111</sup> Third, States would still bear international responsibility for their public and private activities on celestial bodies.<sup>112</sup> Fourth, The Convention promotes cooperation and mutual assistance among States and requires States to use all

---

<sup>102</sup> See *supra* Outer Space Treaty, Article II, and *supra* Island of Palmas Case.

<sup>103</sup> See e.g. *supra* Csabafi (1971).

<sup>104</sup> See *supra* Conforti, at 140.

<sup>105</sup> See *supra* The Convention, Article 4.

<sup>106</sup> *Ibid* The Convention, Article 4(1).

<sup>107</sup> *Ibid* The Convention, Article 7.

<sup>108</sup> *Ibid* The Convention, Article 11(2).

<sup>109</sup> See *supra* Outer Space Treaty, Articles II & III.

<sup>110</sup> See *supra* The Convention, Article 6(1).

<sup>111</sup> See *supra* Outer Space Treaty, Article I.

<sup>112</sup> *Ibid* Outer Space Treaty, Article VI.

means necessary to protect the outer space environment.<sup>113</sup> Fifth, The Convention promotes exploration and use via international organizations.<sup>114</sup> Hence, The Convention sufficiently augments outer space law.

There are several benefits to designating certain objects in the Solar System as part of humanity's cultural and natural heritage. First, there is financial support for the maintenance, repair, and/ or protection of the site. Second, it promotes peace and international cooperation among States. Third, it provides future generations the ability to learn from and enjoy the sites. Fourth, the WHC promotes the universal value of the site. These are important principles enshrined in conservationism.

Following in the spirit of conservation on Earth, designating World Heritage sites in outer space would be beneficial to the future of humanity and the development of outer space. Now is the time to start thinking about what is worth protecting in the Solar System for future generations. Below I propose several sites that I believe would be beneficial to designate as future World Heritage sites.

#### IV. Proposed Sites

Under World Heritage rules, an individual cannot propose which sites in the Solar System have universal value. Nevertheless, citizens of States may petition their governments to seek registration of certain high value sites. Below I list some reasonable places worth considering for World Heritage status. This list should not be considered exhaustive; it merely reflects this author's opinion regarding which natural or cultural sites should be designated as World Heritage sites and are not in any order of preference.<sup>115</sup> Furthermore, a full list requires input from the general public and governments that have launched artifacts into space. These examples are thus a starting point for discussion:

1. **Apollo 11-17 landing sites and/or impact sites of Saturn IV-B boosters, Moon**
2. **Luna 2, 5, 7-9, 13, 15-18, 20, 23-24 impact sites, Moon**
3. **Lunar Orbiter 1-3 and 5 impact sites, Moon**
4. **Rangers 6-9 impact sites, Moon**
5. **Lunokhod 2 impact site, Moon**
6. **Surveyors 1- 7 impact sites, Moon**
7. **Olympus Mons, Mars**
8. **Mars Expedition Rover Opportunity landing site**
9. **Viking 1 landing site, Mars**
10. **Viking 2 landing site, Mars**
11. **Mars Pathfinder landing site**
12. **"Face on Mars"**
13. **Mars Expedition Rover Spirit landing site**
14. **Mars Polar Lander site**
15. **Hellas Basin, Mars**
16. **Victoria Crater, Mars**
17. **Vellas Marineris, Mars**
18. **Chryse Planitia, Mars**
19. **Syrtis Major, Mars**
20. **Martian North and South Poles, Mars**

#### V. Conclusion

To ensure that the future of our Solar System is not destroyed by human expansion into outer space, I have laid out a proposal for the security of sites and artifacts in the Solar System through the use of the World Heritage Centre. To further international cooperation and establish a reasonable approach to outer space development, I

---

<sup>113</sup> *Ibid* Outer Space Treaty, Article IX.

<sup>114</sup> *Ibid* Outer Space Treaty, Article XIII.

<sup>115</sup> I do not consider the establishment of planetary parks, which has a greater range under the conservationist ethic, and because several authors have noted how a planetary park system could be established. However, a planetary park system would complement World Heritage sites without much problem.

believe setting aside land for all of humanity to enjoy without fear of over-consumption is meritorious and is an application of a balanced approach for expanding human society beyond Earth.

Many scholars have pointed out various ethics for establishing a justification for the protection of outer space. Protection of outer space can include contamination controls and planetary conservation and preservation. As noted above, environmental ethics and international law do apply to all extraterrestrial environments. In this regard, a sufficient basis has been laid by historical environmental standards, outer space law and policy, and the conduct of States in outer space for the protection of extraterrestrial environments.

However, the degree of environmental protection necessary to balance the interests of outer space development is not clear. If and when States realize that protecting certain sites in the Solar System is worthwhile, protection could most likely be granted using international institutions. The World Heritage Centre and the various international organizations that work toward maintaining and preserving sites all over the Earth will be invaluable resources via their expertise and funds. As the World Heritage Centre cannot claim ownership over sites or artifacts in the Solar System, the Centre can help promote the principles promulgated by outer space law. By helping to acknowledge the importance of various sites and artifacts throughout the Solar System, the Centre can educate and inspire all on Earth and keep alive the spirit of peace, equality, and scientific exploration that outer space has helped promote.

Outer space has a legal framework but it is not completely defined. Nevertheless, space law has attempted to keep up with human activity in outer space. As such, devising rules ahead of human presence beyond Earth is not without precedent. There is a compelling case to secure for our social and scientific posterity significant places on Mars, the Moon, and some celestial bodies. Now is the time to start thinking seriously about which places in the Solar System are worth protecting.

This proposal intentionally sidesteps the question of property rights in outer space. The question of property rights is a complicated issue. At some point in the future, property rights will be established on celestial bodies. This proposal helps establish some new parameters in the consideration of future regimes. Moreover, a reasonable perimeter around high value sites with universal, historic, scientific, and aesthetic value will be left to States. The designation of places and artifacts as World Heritage sites do not add or remove property claims, but merely extends a legal framework from which to preserve our astro-history and intra-solar environments for future development.

As the human species moves toward a space-faring culture, we should be concerned about how we view and interact with the environment we seek to conquer. The history of the conservation movement reminds us that we should respect the world around us and maintain its splendor for “the greatest good to the greatest number for the longest time.” Therefore, by establishing World Heritage sites across the Solar System, we can ensure that future generations will not forget our past and that the wonders that exist beyond Earth will not disappear forever.

### Acknowledgments

Mr. Hearsey wishes to thank the session Chairs Mr. Tom Gangale and Dr. Jim Pass for organizing the Astrosociology, Space Policy, and Space Law Session. And as always, Mr. Hearsey wishes to thank Ms. Suzanne Roosen for her feedback in the development of this manuscript.

### References

1. I. Almar & A. Horvath, *Do We Need ‘Environmental Protection’ in the Solar System*, Proc. of the 40<sup>th</sup> International Astronautical Congress 6 (1989).
2. Jeremy Bentham, *An Introduction to the Principles of Morals and Legislation* (Kessinger Publishing 2005) (1781).
3. H.W. Brands, T.R.: *The Last Romantic* (Basic Books 1997).
4. *The Great New Wilderness Debate* (J. Baird Callicott & Michael Nelson eds., University of Georgia Press 1998).
5. Antonio Cassese, *International Law* (2<sup>nd</sup> ed. Oxford University Press 2005).
6. Bin Cheng, *United Nations Resolutions on Outer Space: “Instant” International Customary Law?*, 5 *Indian Journal of International Law* 23 (1965).
7. Ronald Coase, *The Problem of Social Cost*, 3 *Journal of Law and Economics* 1(1960).
8. Charles Cockell & Gerda Horneck, *A Planetary Park System for Mars*, 20 *Space Policy* 291 (2004).
9. Charles Cockell & Gerda Horneck, *Planetary Parks—Formulating a Wilderness Policy for Planetary Bodies*, 22 *Space Policy* 256 (2006).
10. Committee on Space Research Website, *Planetary Protection Policy*, July 2008, [http://cosparhq.cnes.fr/Scistr/PPP/Policy\(20-July-08\).pdf](http://cosparhq.cnes.fr/Scistr/PPP/Policy(20-July-08).pdf) (accessed August 17, 2009).
11. Benedetto Conforti, *International Law and the Role of Domestic Legal Systems* (Martinus Nijhoff Publishers 1993).
12. World Heritage Website, *Convention Concerning the Protection of the World Cultural and Natural Heritage (hereinafter The Convention)*, adopted Nov. 16, 1972, <http://whc.unesco.org/en/conventiontext/> (accessed August 17, 2009).
13. 80 *Corpus Juris Secundum Shipping* §1 (2009).

14. Imre Csabafi, *The UN General Assembly Resolutions on Outer Space as Sources of Space Law*, Proc. of the 8<sup>th</sup> Colloquium on the Law of Outer Space 337 (1965).
15. Anthony Csabafi, *The Concept of State Jurisdiction in International Law* (Martinus Nijhoff 1971).
16. Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, G.A. Res. 1962 (XVIII) (Dec. 13, 1963).
17. I.H. Ph. Diederiks-Verschoor & Vladimir Kopal, *Introduction to Space Law* (Kluwer Law International 3<sup>rd</sup> rev. ed. 2008).
18. Martyn Fogg, *The Ethical Dimensions of Space Settlement*, 16 Space Policy 205 (2000).
19. Forest Reserve Act, 26 Stat. 1095 (2007).
20. Stephen Gorove, *Pollution and Outer Space: A Legal Analysis and Appraisal*, 5 New York University Journal of International Law and Politics 53 (1972).
21. Garrett Hardin, *Tragedy of the Commons*, 162 Science 1243 (1968).
22. *Beyond Spaceship Earth* (Eugene Hargrove ed., Sierra Club Books 1986).
23. William Hartmann, *Space Exploration and Environmental Issues*, 6 Environmental Ethics 227 (1984).
24. M. Hiner, *Environmental Aspects of Settlements on the Moon and Mars—Planetary Protection*, Proc. of the 34<sup>th</sup> Colloquium on the Law of Outer Space 50 (1991).
25. International Council on Monuments and Sites Website, <http://www.international.icomos.org> (accessed August 17, 2009).
26. International Union for Conservation of Nature and Natural Resources Website, <http://www.iucn.org> (accessed August 17, 2009).
27. *Island of Palmas Case*, Scott, Hague Court Reports 2d 83 (1932), Perm. Ct. Arb. (1928), 2 U.N. Rep. Intl. Arb. Awards 829.
28. Roger Launius, *Frontiers of Space Exploration* (2<sup>nd</sup> ed. Greenwood Press 2004).
29. John Locke, *Two Treatises of Government: In the Former, The False Principles and Foundation of Sir Robert Filmer, And His Followers, are Detected and Overthrown. The Latter is an Essay concerning The True Original, Extent, and End of Civil-Government* (Awnsham Churchill 1689).
30. Mark Lupisella and John Logsdon, *Do We need a Cosmocentric Ethic?*, Proc. of the 48<sup>th</sup> International Astronautical Congress (1997).
31. *Moral Expertise: Studies in Practical and Professional Ethics* (Don MacNiven ed., Routledge 1986).
32. Alan Marshall, *Ethics and the Extraterrestrial Environment*, 10 Journal of Applied Philosophy 227 (1993).
33. *Air and Space Law: De Lege Ferenda* (Tanja Masson-Zwaan & Pablo Mendes de Leon eds., Martinus Nijhoff 1992).
34. National Aeronautics and Space Administration Johnson Space Center Website, *Orbital Debris Program Office*, <http://orbitaldebris.jsc.nasa.gov/> (accessed August 17, 2009).
35. United States Department of the Interior National Park Service Website, <http://www.nps.gov/> (accessed August 17, 2009).
36. National Reclamation Act, Pub. L. 57-161, 32 Stat. 388 (2007).
37. Gifford Pinchot, *The Fight for Conservation* (Doubleday, Page & Company 1910).
38. *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies* (hereinafter the Outer Space Treaty), opened for signature Jan. 27, 1967, 18 UST 2410, 610 UNTS 205.
39. *Question of General and Complete Disarmament*, G.A. Res. 1884 (Oct. 17, 1963).
40. *Convention on Registration of Objects Launched into Outer Space* (hereinafter Registration Convention), open for signature Nov. 12, 1974, 1023 UNTS 15.
41. Glen Reynolds and Robert Merges, *Outer Space: Problem of Law and Policy* (Westview Press 1997) (1989).
42. Tom Rogers, *Safeguarding Tranquility Base: Why the Earth's Moon base should become a World Heritage Site*, 20 Space Policy 5 (2004).
43. Aaron Sachs, *The Humboldt Current: Nineteenth-Century Exploration and the Roots of American Environmentalism* (Viking 2006).
44. Eligar Sadeh, *Space Politics and Policy* (Eligar Sadeh ed., Kluwer 2002).
45. Larry Schweikart & Michael Allen, *A Patriot's History of the United States* (Penguin 2004).
46. Sierra Club Website, <http://www.sierraclub.org> (accessed August 17, 2009).
47. *The Compact Edition of The Oxford English Dictionary* (John Simpson & Edmund Wiener eds., 2<sup>nd</sup> sub. ed. Oxford University Press 1991).
48. Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* (Trahan & Cadell 1776).
49. Giles Sparrow, *Spaceflight, The Complete Story From Sputnik to Shuttle—And Beyond* (DK Publishing 2007).
50. George Stigler, *The Development of Utility Theory*, 58 Journal of Political Economy 308 (1950).
51. P.J. Stooke, *Lunar Historical Parks*, 2nd Symposium on Lunar Bases and Space Activities of the 21st Century 234 (1988).
52. P.J. Stooke, *Preserving Exploration Heritage in the Moon 2.0 Era*, NASA Lunar Science Institute Lunar Science Conference (2008), <http://www.lpi.usra.edu/meetings/nlsc2008/pdf/2021.pdf> (accessed August 17, 2009).
53. United Nations Office of Outer Space Affairs Website, <http://www.unoosa.org> (accessed August 17, 2009).
54. United Nations Publications, *United Nations Treaties and Principles on Outer Space*, ST/SPACE/11/REV.2 (2008).
55. *Vienna Convention on Diplomatic Relations*, opened for signature March 2, 1961, 500 UNTS 95.
56. *Wilderness Act*, 16 USC 1131-1136, 78 Stat. 890, Pub. L. 88-557 (2007).
57. World Heritage Centre Website, *The Operational Guidelines for the Implementation of the World Heritage Convention*, <http://whc.unesco.org/en/guidelines/> (accessed August 17, 2009).
58. World Heritage Centre Website, <http://whc.unesco.org> (accessed August 17, 2009).