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## Putting a Mine on the Moon: Creating an International Authority to Regulate Mining Rights in Outer Space

Jeremy L. Zell\*

### INTRODUCTION

The second half of the twentieth century will be forever marked by the United States' and the U.S.S.R.'s race to the moon<sup>1</sup>—a race that demonstrated to the world that outer space travel was attainable and realistic. Many feared the peaceful voyages of discovery would turn toward the militarization of outer space.<sup>2</sup> The threat of cold war brinksmanship introducing nuclear weapons into space loomed on the political horizon.<sup>3</sup> The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space (Outer Space Treaty)<sup>4</sup> of

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1. See generally RIP BULKELEY, *THE SPUTNIKS CRISIS AND EARLY UNITED STATES SPACE POLICY: A CRITIQUE OF THE HISTORIOGRAPHY OF SPACE* (1991); RONALD D. HUMBLE, *THE SOVIET SPACE PROGRAMME* (1988); CHARLES MURRAY & CATHERINE BLY COX, *APOLLO: THE RACE TO THE MOON* (1989); ALAN SHEPARD & DEKE SLAYTON, *MOON SHOT: THE INSIDE STORY OF AMERICA'S RACE TO THE MOON* (1994).

2. U.S. Dep't of State, *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies*, Narrative, <http://www.state.gov/t/ac/trt/5181.htm> (last visited Jan. 26, 2006) [hereinafter *Outer Space Treaty Narrative*].

3. *Id.*

4. See *id.*

1967 and the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (Moon Agreement)<sup>5</sup> of 1979 responded to this threat by attempting to preserve the international character of outer space while preventing nations from conducting military activities beyond the Earth's atmosphere.

Today, a twenty-first century space race is on the verge of beginning.<sup>6</sup> This race will be different in spirit and kind than its predecessor. It will include new actors. China in particular has made astonishing strides toward outer space supremacy since beginning its space program in 1992.<sup>7</sup> The new actors will not be limited to nations. Private firms have begun to see commercial possibilities in the stars.<sup>8</sup> The first space race was rooted in cold war politics.<sup>9</sup> Now that the ability of nations to enter space and conduct activities there has been proven, the new space race will be grounded in economic principles. Commercial interests such as tourism and outer space mining will drive private firms to engage in activities in outer space.<sup>10</sup>

The mining of Earth's Moon, the planet Mars, and Near Earth Asteroids (NEAs) holds the potential to be a very lucrative endeavor.<sup>11</sup> Scientists believe that silicon on Mars, Helium-3 on the Moon, and other precious ores such as platinum on NEAs could sustain information and energy technologies on Earth for decades or centuries.<sup>12</sup> However, the current legal un-

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5. Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, G.A. Res. 34/68, U.N. Doc. A/RES/34/68 (Dec. 5, 1979) [hereinafter Moon Agreement].

6. *The Dawn of a New Space Race?*, BBC NEWS, Oct. 14, 2005, <http://news.bbc.co.uk/2/hi/asia-pacific/4208176.stm> (detailing the current space plans of China, India, and the United States).

7. See *infra* notes 57–58 and accompanying text.

8. Barnaby J. Feder, *Talk of Space Turns to Ways to Develop Commercially*, N.Y. TIMES, Jan. 11, 2004, at 18 (reporting the potential for private companies to retrieve and purify platinum from asteroid impact sites on the moon).

9. See generally MURRAY & COX, *supra* note 1; SHEPARD & SLAYTON, *supra* note 1.

10. See Steven Freeland, *Up, Up and . . . Back: The Emergence of Space Tourism and Its Impact on the International Law of Outer Space*, 6 CHI. J. INT'L L. 1, 1–3 (2005); April Greene Apking, Note & Comment, *The Rush to Develop Space: The Role of Spacefaring Nations in Forging Environmental Standards for the Use of Celestial Bodies for Governmental and Private Interests*, 16 COLO. J. INT'L ENVTL. L. & POL'Y 429, 442–45 (2005); Brian M. Hoffstadt, Comment, *Moving the Heavens: Lunar Mining and the "Common Heritage of Mankind" in the Moon Treaty*, 42 ULCA L. REV. 575, 576–77 (1994).

11. Feder, *supra* note 8, at 1.18.

12. *Id.* See generally Yukihiro Tomita et al., *Use of Polarized Helium-3 for the Energy Production*, 402 NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RES. A 421 (1998).

certainly regarding property rights on the Moon and other celestial bodies limits the possibility of outer space mining. Legal scholars and nations have hotly debated ambiguous language in the Outer Space Treaty and Moon Agreement declaring outer space to be the "common heritage of mankind."<sup>13</sup> Until this confusion is resolved, it will be difficult or impossible for firms or nations to realistically consider the feasibility of mining outer space, and it will continue to be seen as a science fiction fantasy.

Part I of this Note explores current international space law by summarizing the developments surrounding the cold war space race. These developments led to the drafting of the Outer Space Treaty in the 1960s.<sup>14</sup> Article II of this treaty is no longer than one sentence, but it specifically prohibits the appropriation of property in outer space.<sup>15</sup> Further developments led to the drafting of the Moon Agreement a decade later.<sup>16</sup> The Moon Agreement explicitly prohibits the appropriation of outer space property.<sup>17</sup> The Moon Agreement also declares the moon and other celestial bodies to be the "common heritage of mankind."<sup>18</sup> This language embodies a set of international principles known collectively as the internationally controversial Common Heritage Concept.<sup>19</sup> The Outer Space Treaty forms the guiding framework of the law of outer space.<sup>20</sup> Later treaties and agreements, such as the Moon Agreement, expound on its basic ideas.<sup>21</sup>

13. See Carol B. Thompson, *International Law of the Sea/Seed: Public Domain Versus Private Commodity*, 44 NAT. RESOURCES J. 841, 847-49 (2004) (discussing "common heritage of mankind" as it is used in the United Nations Convention on the Law of the Sea). See generally Carol R. Buxton, *Property in Outer Space: The Common Heritage of Mankind Principle vs. the "First in Time, First in Right" Rule of Property Law*, 69 J. AIR L. & COM. 689 (2004); Hoffstadt, *supra* note 10.

14. See generally Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, *opened for signature* Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter *Outer Space Treaty*].

15. *Id.* art. II.

16. See generally Moon Agreement, *supra* note 5.

17. *Id.* art. 11, ¶¶ 2-3.

18. *Id.* art. 11, ¶ 1.

19. KEMAL BASLAR, *THE CONCEPT OF THE COMMON HERITAGE OF MANKIND IN INTERNATIONAL LAW* 4 n.22 (1998).

20. Scott F. Cooper, Note, *The 1979 Agreement Governing the Activities on the Moon and Other Celestial Bodies: Does it Create a Moratorium on the Commercial Exploitation of the Moon's Natural Resources?*, 5 J. L. & TECH. 63, 64 (1990).

21. *Id.* See generally Moon Agreement, *supra* note 5; Convention on Registration of Objects Launched into Outer Space, *opened for signature* Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15; Convention on International Liability for Damage Caused by Space Objects, *opened for signature* Mar. 29, 1972, 24 U.S.T. 2389, 961

Part I also explores the structure of the International Seabed Authority (ISA)—an international agency created under the United Nations Convention on the Law of the Sea (UNCLOS).<sup>22</sup> The ISA regulates deep seabed mining in international waters—another area referred to as the “common heritage of mankind.”<sup>23</sup> UNCLOS’ and the Moon Agreement’s attempts to incorporate the Common Heritage Concept makes the ISA an intriguing model for developing an international agency to regulate mining in outer space.<sup>24</sup>

Part II of this Note contributes to the current debate by suggesting a framework for understanding the Common Heritage Concept as it applies to the Moon Agreement.<sup>25</sup> The framework rejects the traditional notion that the Common Heritage Concept prevents appropriation of property.<sup>26</sup> Instead, it adopts an alternative view that outer space property exists in common tenancy among the entirety of the international community.<sup>27</sup> Under the suggested framework, the international community would own interests in the space and lands beyond Earth and would be free to transfer those interests as it sees fit.<sup>28</sup> The proposed framework for the Common Heritage Concept incorporates elements of positive international law, U.S. mining law, and the English common law.<sup>29</sup> The framework seeks to adequately foster private investment in outer space mining while ensuring that space activities benefit all nations, regardless of ability to develop resources in outer space.<sup>30</sup> Part II also provides a framework for the creation of a Space Resource Authority (SRA) which would be charged with overseeing mining operations in outer space.<sup>31</sup> The idea and suggested

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U.N.T.S. 187; Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, *opened for signature* Apr. 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119. Each of these agreements was created through the United Nations Committee on the Peaceful Uses of Outer Space through the committee’s required consensus process. CARL Q. CHRISTOL, *THE MODERN INTERNATIONAL LAW OF OUTER SPACE* 17 (1982).

22. United Nations Convention on the Law of the Sea arts. 156–57, Dec. 10, 1982, 1833 U.N.T.S. 397 [hereinafter UNCLOS].

23. *Id.* art. 136.

24. *See infra* notes 111–148 and accompanying text.

25. *See infra* notes 168–194 and accompanying text.

26. *See infra* notes 75–77, 188–192 and accompanying text.

27. *See infra* notes 170–197 and accompanying text.

28. *See infra* notes 170–197 and accompanying text.

29. *See infra* notes 170–197 and accompanying text.

30. *See infra* notes 230–240 and accompanying text.

31. *See infra* notes 111–148 and accompanying text. The scope of this Note is limited to property interests as they relate to outer space mining. Property interests

workings of the SRA are based in large part on the ISA.<sup>32</sup>

## I. BACKGROUND OF CURRENT INTERNATIONAL SPACE LAW

### A. HISTORICAL FOUNDATIONS FOR THE PENDING 21ST CENTURY SPACE RACE

Beginning with the U.S.S.R.'s launch of the first satellite, *Sputnik 1*,<sup>33</sup> in October 1957, the space race developed during a period of intense political and technological competition between the two superpowers.<sup>34</sup> Many Americans feared the launch solidified the U.S.S.R.'s space dominance.<sup>35</sup> The U.S. government was not so convinced. On May 25, 1961, President John F. Kennedy challenged his country to meet the goal of "landing a man on the moon and returning him safely to the earth" by the end of the 1960s.<sup>36</sup> Subsequent speeches communicated to the world that the space race was a race the United States intended to win.<sup>37</sup>

The United States became the first nation to land humans on the Moon on July 20, 1969.<sup>38</sup> The United States returned humans to the Moon five more times between 1969 and 1972.<sup>39</sup> While the U.S.S.R. never landed a human on the Moon, it did land several automated probes which collected material from the surface and returned to Earth.<sup>40</sup> It has been estimated that the United States and the U.S.S.R. combined spent between \$31

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such as satellite orbits or tourist "destinations" are not discussed.

32. See *infra* notes 119–157 and accompanying text.

33. BULKELEY, *supra* note 1, at 3.

34. *Id.* at 156–82.

35. MURRAY & COX, *supra* note 1, at 24.

36. President John F. Kennedy, Special Message to the Congress on Urgent National Needs, May 25, 1961, <http://www.jfklibrary.org/j052561.htm> (requesting appropriations for a plan to explore space that admittedly represented a "course which will . . . carry very heavy costs").

37. See President John F. Kennedy, Address at Rice University on the Nation's Space Effort, September 12, 1962, <http://www.jfklibrary.org/j091262.htm>; President John F. Kennedy, Annual Address to the Congress on the State of the Union, January 11, 1962, <http://www.presidency.ucsb.edu/ws/index.php?pid=9082>.

38. MURRAY & COX, *supra* note 1, at 356; SHEPARD & SLAYTON, *supra* note 1, at 27.

39. GENE KRANZ, FAILURE IS NOT AN OPTION: MISSION CONTROL FROM MERCURY TO APOLLO 13 AND BEYOND 372, 381 (2000).

40. HUMBLE, *supra* note 1, at 6–8.

billion and \$37 billion in their endeavors.<sup>41</sup>

Despite the enormous price tag, the scientific and technological benefits of the race to the Moon were great.<sup>42</sup> Many modern civilian technologies resulted from the race to the Moon.<sup>43</sup> For example, technology used to remotely monitor a person's heart rate found its genesis in the need to monitor the Apollo astronauts' vital signs in space.<sup>44</sup> A need for stronger, faster computers drove innovation at several technology companies such as IBM.<sup>45</sup>

The space race cooled greatly throughout the 1970s and 1980s.<sup>46</sup> The two superpowers shifted their focus from exploring the Moon to developing and employing space stations.<sup>47</sup> In 1972, President Richard Nixon and Soviet Premier Alexsei Kosygin signed the Apollo-Soyuz Test Project agreement.<sup>48</sup> This agreement signaled the first international cooperative agreement between the United States and the U.S.S.R. The Russian space station Mir and American space station Skylab signaled the end—at least temporarily—of efforts to put humans on celestial bodies.<sup>49</sup> The U.S.S.R. and the United States continued their cooperation but separately probed the outer limits of the solar system with crafts such as the United States' *Galileo*<sup>50</sup> and the Russian *Veneras*.<sup>51</sup> The remainder of the twentieth century saw a steep decline in U.S. interest in outer space.<sup>52</sup> This decline occurred in both the public and political realms.<sup>53</sup>

Today, the international community is witnessing a revi-

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41. For cost estimates for America's portion of the space race, see NASA, NASA HISTORICAL DATA BOOK VOL. II: PROGRAMS AND PROJECTS 1958-1968, at 121 (Linda Neuman Ezell ed., 1988). For Soviet estimates, see generally JAMES HARFORD, KOROLEV (1997) (detailing Sergei P. Korolev's role in the Soviet space program). The United States' investment represented between seven- and nine-tenths of the combined cost.

42. CHRIS KRAFT, FLIGHT 353-54 (2001) (arguing, in part, that the Apollo program had a profoundly beneficial effect on numerous sectors of American and international economies); Henry Fountain, *Retracing One Small Step*, N.Y. TIMES, Sept. 25, 2005, at 2 (detailing NASA's recent moon announcement and the knowledge generated from previous exploration).

43. KRAFT, *supra* note 42, at 353-54.

44. *Id.*

45. *Id.* at 192-93.

46. HUMBLE, *supra* note 1, at 106.

47. *Id.* at 100-05.

48. *Id.* at 133-34 n.15.

49. *Id.* at 92.

50. See ROGER D. LAUNIUS, FRONTIERS OF SPACE EXPLORATION 40-41 (1998).

51. See *id.* at 31-35.

52. HUMBLE, *supra* note 1, at 106.

53. MURRAY & COX, *supra* note 1, at 448.

talization of interest in space exploration.<sup>54</sup> In January 2004—over three decades after the last man touched the Moon—President Bush announced his intention for the United States to establish a permanent moon base to be used as a stepping stone to land humans on Mars.<sup>55</sup> In September 2005, NASA announced that it would place humans on the Moon again by 2018.<sup>56</sup> One month later, China sent its second set of astronauts in two years into outer space.<sup>57</sup> These manned space flights, coupled with an announced goal of landing an automated craft on the Moon by 2007, are the first steps in a quest to become the world's premier power in outer space.<sup>58</sup> The reasons for a renewed international interest in space are many, not the least of which being commercial opportunities in resource and energy exploitation.<sup>59</sup>

## B. THE COMMON HERITAGE CONCEPT

It is important to understand the historical underpinnings of the Common Heritage Concept before one can properly examine the Moon Agreement and UNCLOS in detail. Maltese Ambassador Arvide Pardo introduced the latest incarnation of the Common Heritage Concept to international law.<sup>60</sup> In the infant stage of discussions that eventually formed UNCLOS, Amba-

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54. BBC NEWS, *supra* note 6 (detailing the current space plans of China, India, and the United States).

55. David E. Sanger & Richard W. Stevenson, *Bush Backs Goal of Flight to Moon to Establish Base*, N.Y. TIMES, Jan. 15, 2004, at A1; President George W. Bush, *President Bush Announces New Vision for Space Exploration Program*, Address at NASA Headquarters (Jan. 14, 2004), <http://www.whitehouse.gov/news/releases/2004/01/20040114-3.html>.

56. Warren E. Leary, *NASA Planning Return to Moon Within 13 Years*, N.Y. TIMES, Sept. 20, 2005, at A1. NASA admittedly issued this statement in an attempt to secure future funding of its programs as conservatives in Washington prepared to slash government spending in response to the massive amount of federal dollars needed to rebuild New Orleans after Hurricane Katrina. *Id.* at A15.

57. Edward Cody, *Chinese Astronauts Return Safely Home*, WASH. POST, Oct. 17, 2005, at A12; *Chinese Astronauts Land*, N.Y. TIMES, Oct. 17, 2005, at A4.

58. Cody, *supra* note 57, at A12 ("Wang Yongzhi, the Chinese space program's chief general designer, told the agency that the low-orbit flight marked an important step forward in the nation's long-term ambitions for space exploration."); Jim Yardly & William J. Broad, *Heading for the Stars, and Wondering if China Might Reach Them First*, N.Y. TIMES, Jan. 22, 2004, at A8 (suggesting that Bush's 2004 declaration to send humans to Mars was in response to China's recent space efforts).

59. See Feder, *supra* note 8, at A18; Mike Lafferty, *Destination: Red Planet*, COLUMBUS DISPATCH, Jan. 20, 2004, at 6A (reporting the potential for a "Western-style land rush" for mineral rights).

60. BASLAR, *supra* note 19, at 80–81.



sador Pardo requested the United Nations General Assembly to declare the deep seabed and its resources the common heritage of mankind.<sup>61</sup> Pardo believed the language would ensure that developing nations such as his own would enjoy an equal share of profits generated from the ocean's resources.<sup>62</sup>

The United States introduced the same language to the Moon Treaty discussions in response to a preliminary draft of the Moon Agreement that the Soviet Union submitted in 1971.<sup>63</sup> Article VIII of the Soviet Draft prohibited nations from laying claim to surface or subsurface areas on the Moon or other celestial bodies.<sup>64</sup> The same article also sought to prohibit the sale or exchange of property on the Moon.<sup>65</sup> The language employed by the United States was an implicit attempt to create a right to property in outer space.<sup>66</sup> The property rights would convey the ability to exploit the common resources.<sup>67</sup>

Throughout the drafting of UNCLOS and the Moon Agreement, three camps began to form around the Common Heritage Concept.<sup>68</sup> The United States put forth the western belief that the Common Heritage Concept allowed appropriation and exploitation as long as it was done for peaceful purposes and mankind benefited in some way.<sup>69</sup> Developing nations argued that the concept prevented appropriation and required that the profits from exploitation must be distributed among all nations *equally*.<sup>70</sup> Socialist nations took the middle ground by suggesting that the Common Heritage Concept prevented appropriation but did not require equal sharing of the benefits of exploitation.<sup>71</sup>

These divergent views highlight the controversial debate that has surrounded the Common Heritage Concept since its introduction into modern international law. Understanding the concept requires a brief examination of its four traditional elements. Before examining those elements, it is important to understand that the "common heritage of mankind" is an interna-

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61. *Id.* at xix.

62. *Id.* at 32.

63. Cooper, *supra* note 20, at 73.

64. *Id.* at 72 n.53.

65. *Id.*

66. *See id.* at 72-74.

67. *See id.* at 74.

68. BASLAR, *supra* note 19, at 161-64.

69. Arthur W. Blaser, Note, *The Common Heritage in Its Infinite Variety: Space Law and the Moon in the 1990s*, 5 J. L. & TECH. 79, 90-91 (1990).

70. BASLAR, *supra* note 19, at 165.

71. *Id.* at 163-64.

tional *concept* and not a *principle*. The term principle is a term of art in international law. A general principle of international law is “[a] principle that gives rise to international legal obligations.”<sup>72</sup> The fact that several nations disagree on what, if any, obligations are related to the common heritage of mankind demonstrates how the concept falls short of being a principle. The term “concept” is more accurate because, as Kemal Baslar explains, “the word concept is rooted in the Latin word ‘*conceptus*,’ meaning literally collecting, bundling and gathering together. From a philosophical viewpoint, ‘concept’ point[s] to a deductive approach, meaning an abstract notion generalized from particular instances.”<sup>73</sup>

The “common heritage of mankind” as used in UNCLOS and the Moon Agreement collects, or bundles, four traditional elements.<sup>74</sup> First, the Common Heritage Concept stands for a prohibition against the appropriation of territory or resources.<sup>75</sup> Article 137 of UNCLOS and Article 11 of the Moon Agreement both explicitly prohibit the appropriation of rights over the surface or subsurface of the respected regulated areas.<sup>76</sup> In the case of the Moon Agreement, this prohibition conforms to similar language in Article II of the foundational Outer Space Treaty.<sup>77</sup>

Second, the Common Heritage Concept requires the establishment of an international authority to manage the regulated area and its resources.<sup>78</sup> Part XI of UNCLOS calls specifically for the establishment of the ISA.<sup>79</sup> The Moon Agreement calls for the establishment of an international authority once exploitation becomes feasible but does not provide for the form and function of this authority.<sup>80</sup>

Third, the Common Heritage Concept stands for the sharing of benefits among the nations in one form or another.<sup>81</sup> UNCLOS and the Moon Agreement both call for the *equitable* sharing of the exploited resources.<sup>82</sup> UNCLOS and the Moon

72. BLACK'S LAW DICTIONARY 706 (8th ed. 2004). For a more thorough discussion of the superiority of describing the language as a concept, see BASLAR, *supra* note 19, at 1–7.

73. BASLAR, *supra* note 19, at 6.

74. *Id.* at 82.

75. *Id.* at 82–83.

76. UNCLOS, *supra* note 22, art. 137; Moon Agreement, *supra* note 5, art. 11.

77. Outer Space Treaty, *supra* note 14, art. II.

78. BASLAR, *supra* note 19, at 83.

79. UNCLOS, *supra* note 22, pt. XI.

80. Moon Agreement, *supra* note 5, art. 11, ¶ 5.

81. BASLAR, *supra* note 19, at 83.

82. UNCLOS, *supra* note 22, art. 140; Moon Agreement, *supra* note 5, art. 11, ¶

Agreement also suggest a vague balancing test to be used to determine equity. This test would weigh the needs of the developing world against their contribution to the exploitation of the resources.<sup>83</sup>

Finally, the Common Heritage Concept calls for the regulated areas to be reserved for peaceful purposes.<sup>84</sup> Articles 141 and 143 of UNCLOS call for the commercial and scientific activities in the deep seabed to be dedicated to peaceful purposes.<sup>85</sup> Similarly, Article 3 of the Moon Agreement calls for the Moon to be "used by all States Parties exclusively for peaceful purposes."<sup>86</sup>

### C. THE OUTER SPACE TREATY

During the first space race, the international community had a strong interest in making sure the race to the Moon did not become hostile.<sup>87</sup> The international community also had an interest in preserving the international character of outer space. As a result, the United States, the U.S.S.R., and eighteen other nations ratified the Outer Space Treaty, which entered into force on October 10, 1967.<sup>88</sup> The fear that either the United States or the U.S.S.R. would use its newfound space technologies to militarize space compelled the authoring of the Outer Space Treaty.<sup>89</sup> In particular, both nations wanted to keep nuclear weapons out of outer space.<sup>90</sup> The Soviets originally sought to tie the treaty to proposed disarmament agreements between the two nations but changed their position after the signing of the Limited Test Ban Treaty.<sup>91</sup> In October 1963, the United Nations General Assembly unanimously passed a resolution calling for nations to refrain from introducing nuclear weapons into outer space.<sup>92</sup> The resolution eventually compelled the two nations to submit draft treaties that would later form the Outer

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7(d).

83. UNCLOS, *supra* note 22, art. 140; Moon Agreement, *supra* note 5, art. 11, ¶ 7(d).

84. BASLAR, *supra* note 19, at 83-84.

85. UNCLOS, *supra* note 22, arts. 141, 143.

86. Moon Agreement, *supra* note 5, art. 3.

87. Outer Space Treaty Narrative, *supra* note 2.

88. Outer Space Treaty, *supra* note 14, n.1.

89. Outer Space Treaty Narrative, *supra* note 2.

90. *Id.*

91. *Id.*

92. *Id.*

Space Treaty.<sup>93</sup>

The preamble and Article I of the Outer Space Treaty introduced the fundamental notion that carried on throughout subsequent space-related agreements: “[t]he exploration and use of outer space . . . shall be carried out for the benefit . . . of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind.”<sup>94</sup> This idea is also present in Article II of the treaty, which states: “[o]uter space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.”<sup>95</sup> Article II is a single sentence, but it stands for a prohibition of laying claim to private property in space.<sup>96</sup> The prohibition was later included in the Moon Agreement and UNCLOS both explicitly and through the Common Heritage Concept.<sup>97</sup>

#### D. THE MOON AGREEMENT

The Outer Space Treaty was intended to serve as a set of foundational elements to be augmented by later agreements.<sup>98</sup> In an attempt to regulate commercial activity in outer space, nations began submitting working papers to the United Nations Committee for the Peaceful Uses of Space (UNCOPUS) in the early 1970s.<sup>99</sup> UNCOPUS opened the Moon Agreement for signature in the late 1970s and it entered into force in 1984.<sup>100</sup> To date, the United States, Russia, and other influential nations have not become parties to this treaty.<sup>101</sup> This is due in large part to the disagreement over the Common Heritage Concept in Article 11.<sup>102</sup>

The Moon Agreement, among other things, reaffirmed the notion that space is the “province of all mankind,”<sup>103</sup> expanded the prohibition against laying claim to private property in

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93. *Id.*

94. Outer Space Treaty, *supra* note 14, art. I.

95. *Id.* art. II.

96. *Id.*

97. UNCLOS, *supra* note 22, arts. 136–37; Moon Agreement, *supra* note 5, art. 11.

98. Cooper, *supra* note 20, at 64.

99. *Id.* at 71–73.

100. *Id.* at 77.

101. Moon Agreement, *supra* note 5.

102. See BASLAR, *supra* note 19, at 166–75.

103. Moon Agreement, *supra* note 5, art. 4.

space,<sup>104</sup> and called for the creation of an "international regime" to oversee the exploitation of resources in space once such exploitation becomes feasible.<sup>105</sup>

The prohibition against laying claim to private property applies to the "surface . . . [,] the subsurface of the moon [or other celestial bodies,] . . . any part thereof [and] *natural resources in place*."<sup>106</sup> It prevents "any State, international intergovernmental or non-governmental organization, national organization or non-government entity [and] any natural person" from laying such claim.<sup>107</sup> This language represents the treaty's first explicit recognition of private firms as potential actors in space.

The Moon Agreement does not prohibit the international regime, once in place, from changing this prohibition.<sup>108</sup> The agreement states that the main purposes of the regime include: "(a) [t]he orderly and safe development of the natural resources of the moon [or other celestial bodies]; (b) [t]he rational management of those resources; [and] (c) [t]he expansion of opportunities in the use of those resources."<sup>109</sup> The agreement goes on to state:

An equitable sharing by all States Parties in the benefits derived from those resources, whereby the interests and needs of the developing countries, as well as the efforts of those countries which have contributed either directly or indirectly to the exploration of the moon [or other celestial bodies], shall be given special consideration.<sup>110</sup>

The agreement does not provide criteria for determining when the international regime becomes necessary. To date, little attention has been given to invoking the necessity for the international regime.

## E. THE INTERNATIONAL SEABED AUTHORITY

Establishment of such a regime is not unprecedented. In 1994, amendments to UNCLOS established the ISA to oversee mining interests in international waters.<sup>111</sup> The convention

104. *Id.* art. 11, ¶ 3.

105. *Id.* art. 11, ¶¶ 5-7.

106. *Id.* art. 11, ¶ 3 (emphasis added).

107. *Id.*

108. *Id.* ("The foregoing provisions are without prejudice to the international regime referred to in paragraph 5 of this article.")

109. Moon Agreement, *supra* note 5, art. 11, ¶ 7.

110. *Id.*

111. Agreement Relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982, G.A. Res. 48/263, Preamble, U.N. Doc. A/Res/48/263 (July 28, 1994) [hereinafter Part XI Agreement] (agreeing to

strongly emphasized the need for the authority to maintain deep seas as the "common heritage of mankind."<sup>112</sup>

The ISA consists of three bodies: the Assembly, the Council, and the Secretariat.<sup>113</sup> Each body is comprised of members whose salaries are paid by their states of origin.<sup>114</sup> The Assembly's main functions include, among other things, electing the Council, assessing contributions, and issuing decisions on the sharing of revenues to the Authority from mining.<sup>115</sup>

The Council is the ISA's executive body. It is responsible for administering the rules and regulations for deep sea mining. It is composed of four members representing the world's greatest consumers of minerals,<sup>116</sup> four members representing the nations with the largest investment in deep seabed mining,<sup>117</sup> four members representing the land-based exporters of minerals, including at least two developing nations whose mineral exports have a "substantial bearing upon their economies,"<sup>118</sup> six members to represent special interests among developing countries,<sup>119</sup> and the remaining eighteen members to achieve overall equitable geographic distribution.<sup>120</sup> The Council's functions include, among other things, the approval of plans of work for exploration or exploitation of mineral resources and overseeing compliance with approved plans of work.<sup>121</sup>

UNCLOS establishes a Legal and Technical Commission,<sup>122</sup> a Finance Committee,<sup>123</sup> and an Economic Planning Commission<sup>124</sup> as subsidiary organs of the Council. The Legal and Tech-

the implementation of the ISA contemplated in Part XI of the Sea Convention).

112. UNCLOS, *supra* note 22, art. 136.

113. *Id.* art. 158.

114. *Id.*

115. *Id.* art. 160.

116. *Id.* art. 161(1)(a) ("[F]our members from among those States Parties which . . . have either consumed more than 2 per cent of the total world consumption or have net imports of more than 2 per cent of total world imports of the commodities produced from the categories of minerals to be derived from the Area . . . as well as the largest consumer.").

117. *Id.* art. 161(1)(b).

118. UNCLOS, *supra* note 22, art. 161(1)(c).

119. *Id.* art. 161(1)(d) ("The special interests to be represented shall include those of States with large populations, States which are land-locked or geographically disadvantaged, States which are major importers of the categories of minerals to be derived from the Area, States which are potential producers of such minerals, and least developed States.").

120. *Id.* art. 161(1)(e).

121. *Id.* art. 162.

122. *Id.* art. 163.

123. *Id.* Annex IX.

124. UNCLOS, *supra* note 22, art. 163. Similar to the international regime con-

nical Commission is a fifteen-member body of technical experts elected by the Council.<sup>125</sup> Its functions range from recommending approval of plans of work and drafting proposed rules to monitoring the environmental impact of mining operations.<sup>126</sup> The Finance Committee was created to respond specifically to the United States' and other industrialized nations' request that UNCLOS more strongly reflect free market principles.<sup>127</sup> The Committee is comprised of the five largest contributors to the budget and will continue to be until the ISA becomes cost-effective.<sup>128</sup> The Finance Committee must approve by consensus any decision by the Council or Assembly with budgetary implications.<sup>129</sup>

UNCLOS provides the basic rules by which the ISA governs mining rights in the deep sea portion of international waters.<sup>130</sup> UNCLOS divides the activity of mining into three categories: prospecting, exploration, and exploitation. "Prospecting" is defined as the search for minerals in the seabed.<sup>131</sup> "Exploration" is defined as the search for minerals in the seabed with exclusive rights.<sup>132</sup> "Exploitation" is defined as the commercial recovery of minerals in the seabed.<sup>133</sup>

The convention does not require approval from the ISA before nations or private entities may prospect the deep seabed for natural resources,<sup>134</sup> but prospecting activities and other forms of initial investment do not confer any proprietary rights to discovered resources.<sup>135</sup> In addition, nations or firms must obtain

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templated in the Moon Agreement, the establishment of this commission is reserved until commercial deep seabed mining begins. Part XI Agreement, *supra* note 111, § 1(4).

125. UNCLOS, *supra* note 22, art. 165.

126. *Id.* art. 165.

127. United Nations Convention on the Law of the Sea, with Annexes, and the Agreement Relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea, with Annex, "Finance Committee," July 29, 1994, S. TREATY DOC. NO. 103-39 (1994) [hereinafter Status of the United Nations Convention on the Law of the Sea].

128. Part XI Agreement, *supra* note 111, § 9(3).

129. *Id.* § 3(7).

130. UNCLOS, *supra* note 22, art. 153 & Annex III.

131. U.N. International Seabed Authority Assembly, Decision of the Assembly Relating to the Regulations on Prospecting and Exploration for Polymetallic Nodules in the Area, 6th Sess., 76th mtg. at 2, ¶ 3(e), Annex, U.N. Doc. ISBA/6/A/18 (July 13, 2000).

132. *Id.* ¶ 3(b).

133. *Id.* ¶ 3(a).

134. UNCLOS, *supra* note 22, Annex III, art. 2.

135. Part XI Agreement, *supra* note 111, § 9(3).

approval from the ISA before they may begin exploration or exploitation of discovered resources.<sup>136</sup> The applicants must submit a written plan of work that, upon approval, takes the form of a contract between the applicant and the authority.<sup>137</sup> The application fees for nations or firms who wish to mine resources in the international seabed are substantial. Article 13, paragraph II of Annex III requires a \$500,000 application fee which is split between a \$250,000 fee for the exploration phase and a \$250,000 fee for the exploitation phase.<sup>138</sup> Applications for exploration are approved on a first-come, first-served basis.<sup>139</sup> The ISA is required to grant approval of exploration work plans for fifteen years.<sup>140</sup> At the end of this period, the applicant must submit a plan for exploitation.<sup>141</sup> An approved plan for work exploration confers to the contractor a right of priority for an approved plan for work exploitation.<sup>142</sup> This preference may be withdrawn for unsatisfactory performance.<sup>143</sup>

Applicants approved for exploration rights must set aside reserved areas for possible future use by a body of the ISA called the "Enterprise."<sup>144</sup> The Enterprise may, if feasible, engage in its own mining operations.<sup>145</sup> The application must cover enough area to sustain two mining operations and the contractor must divide the area into roughly equal value.<sup>146</sup>

Procedures exist to grandfather in nations or private entities that undertook substantial deep seabed mining activities prior to the entry of the Sea Convention into force.<sup>147</sup> These nations or entities are known as pioneer investors.<sup>148</sup>

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136. UNCLOS, *supra* note 22, art. 153 & Annex III, art. 3.

137. *Id.*

138. *Id.*

139. *Id.* Annex III, art. 6(3).

140. Part XI Agreement, *supra* note 111, § 1(9). If a contractor is unable to sufficiently explore the area within the allotted fifteen years and can demonstrate good cause for its inability, then the ISA may grant five-year exploration extensions. *Id.*

141. *Id.*

142. UNCLOS, *supra* note 22, Annex III, art. 10.

143. Part XI Agreement, *supra* note 111, § 1(13).

144. UNCLOS, *supra* note 22, Annex III, art. 8.

145. *Id.*

146. *Id.*

147. Part XI Agreement, *supra* note 111, § 1(6)(a)(ii).

148. *Id.*



## II. A FRAMEWORK FOR THE SPACE RESOURCE AUTHORITY

### A. WHY MINE OUTER SPACE?

Discussions surrounding the topic of space mining inevitably lead to one basic question: why would a firm, nation, or the international community as a whole want to invest the immense resources needed to mine outer space? There are at least two answers to that question. First, mining outer space has the strong potential to yield large returns on investment. These returns take the form of revenue generated from selling the commodities derived from mining<sup>149</sup> as well as from advances in science and technology and the creation of new jobs.<sup>150</sup> The latter returns are what economists commonly call "positive externalities." Second, mining outer space has the strong potential to provide innovative solutions to the international community's current energy needs.<sup>151</sup>

#### 1. *Outer Space's Potential to Yield Large Returns on Investment*

Firms and nations will not mine outer space unless they believe that their activities will yield profits.<sup>152</sup> Many gases and minerals that exist in outer space (e.g., hydrogen, magnesium, and silicon) also exist on Earth.<sup>153</sup> The limited introduction of another source for commodities that exist in current markets would be beneficial to the market and the firm or nation supplying the commodity. However, introducing another source for these commodities too quickly would flood the supply and cause a steep drop in price.<sup>154</sup> The drop in price would cause the return to be significantly smaller than the investment. Rational producers would theoretically work to ensure the introduction occurs at an appropriate pace to preserve the market. In fact, production will likely not begin until the market is ready for introduction of space commodities and firms begin to act accord-

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149. See Hoffstadt, *supra* note 10, at 576.

150. Klaus P. Heiss, *Tapping the Wealth of the Moon*, 29 J. OF SOC. POL. & ECON. STUDIES 3, 17-18 (2004).

151. See *infra* notes 167-173 and accompanying text.

152. See Henry R. Hertzfeld & Frans G. von der Dunk, *Bringing Space Law into the Commercial World: Property Rights Without Sovereignty*, 6 CHI. J. INT'L L. 81, 91-94 (2005).

153. Hoffstadt, *supra* note 10, at 576.

154. See Heiss, *supra* note 150, at 59-60.

ingly.<sup>155</sup> Earth's resources are finite. Mining outer space provides an alternative source of resources that will slow the depletion of resources on Earth.

Aside from the revenue that trading outer space commodities will generate, the second, and perhaps greater, return on investment is the positive externalities associated with the human capital needed to develop outer space mining programs. Outer space exploration in general and mining in particular will require technology that has not yet been invented and the modernizing of lessons and technology learned from past space exploration.<sup>156</sup> Vast public and private resources will be needed to educate a new generation of scientists and engineers.<sup>157</sup> The most direct results will be experienced in the ailing aerospace industry,<sup>158</sup> but ultimately, industries far removed from outer space mining will benefit from the sharp increase in the number of jobs that are geared toward innovation.<sup>159</sup> The Apollo program's investment in American industry yielded similar results.<sup>160</sup> Sectors ranging from healthcare to consumer electronics all received an economic boost from the billions of dollars spent in the quest to send the first humans to the Moon.<sup>161</sup>

## 2. Outer Space's Potential to Create Innovative Energy Solutions

Many nations in the international community have begun to strongly emphasize the need to develop energy solutions that reduce the world's reliance on fossil fuels.<sup>162</sup> Many theories have been advanced,<sup>163</sup> and it is possible that the most workable theories have yet to be conceived. However, the proposed helium-3 fusion reactor is an intriguing thought which deserves some attention.

Helium-3 is a helium isotope that is rare on Earth but is believed to be abundant on the Moon.<sup>164</sup> The Apollo program's re-

155. See Hertzfeld & von der Dunk, *supra* note 152, at 93.

156. See Heiss, *supra* note 150, at 17-19.

157. See *id.*

158. See *id.*; Daniel C. Tam, *The Business of Space Exploration*, 2001 SPACE TECH. & APPLICATIONS INT'L FORUM 202, 204.

159. See generally Heiss, *supra* note 150, at 17-19.

160. See *supra* notes 42-45 and accompanying text.

161. See *supra* notes 42-45 and accompanying text.

162. See, e.g., Kyoto Protocol to the United Nations Framework Convention on Climate Change, *opened for signature* Dec. 10, 1997, 37 I.L.M. 22. It is beyond the scope of this Note to explore the totality of energy solutions that exist in outer space.

163. See generally Heiss, *supra* note 150; Feder, *supra* note 8.

164. Tomita et al., *supra* note 12, at 421-22. Mr. Tomita and his colleagues es-

search on the lunar surface indicated that microwaves could be used to draw helium-3 out of the Moon's surface.<sup>165</sup> Once removed, the isotope can be used in a fusion reaction that is cheap to produce, long lasting, and produces nominal amounts of radioactive waste.<sup>166</sup> One group of physicists theorizes that the total amount of helium-3 on the Moon could meet the totality of Earth's energy needs for 500 years.<sup>167</sup>

## B. INTERPRETING THE COMMON HERITAGE CONCEPT

Before one can contemplate a model for a workable international regime to regulate space mining, the concept that space is the "common heritage of mankind" must be given meaning—particularly in regard to property rights. The absence of a stable definition agreed upon by the international community has led to conflict between industrialized nations and developing nations in the drafting and implementation of UNCLOS.<sup>168</sup>

The issues of nonappropriation and benefit sharing are the primary sources of tension in interpreting the concept.<sup>169</sup> Developing nations argue that international territories represent property that belongs to the international community,<sup>170</sup> access to which should be guaranteed not only to those nations and firms that are currently able to make use of the resources, but also to nations and firms that might one day be able to make use of the resources.<sup>171</sup> In addition, benefits from the exploitation of these resources should be shared equally among the nations without regard to any one nation's investment in the exploitation process.<sup>172</sup> This position benefits developing nations because it promotes a system of limited access in which industrialized nations are granted either qualified access to resources in international territories or are bound to share a portion of their commercial proceeds with developing nations, or both.<sup>173</sup> In either scenario, developing nations still reap the benefits of

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timate the amount of Helium-3 on the moon to equal 1,000,000 tons. *Id.* at 424.

165. Heiss, *supra* note 150, at 34.

166. Tomita et al., *supra* note 12, at 422.

167. *Id.* at 424. ("The minable helium-3 on the lunar surface is estimated as about 10<sup>6</sup> tons, which corresponds to the amount of the energy demand in all of the world at the middle of the next century during 500 yr.")

168. See Hoffstadt, *supra* note 10, at 596-603.

169. *Id.*

170. Buxton, *supra* note 13, at 691-93.

171. *Id.*

172. *Id.*

173. *Id.*

the resources through benefit sharing.<sup>174</sup>

Industrialized, capitalist nations take an unlimited access view. Under this view, all nations enjoy unlimited access to international territories.<sup>175</sup> The Common Heritage Concept binds nations and firms to make the most of what their access grants them.<sup>176</sup> In other words, if a nation or firm is unable to properly exploit a resource found in international territories, then that resource should be left to a nation or firm that is able.<sup>177</sup> This view is aligned with the "first in time, first in right" view of ownership.<sup>178</sup> Industrialized nations promote this view because, unlike the limited access view of the developing world, unlimited access promotes and rewards private investment.<sup>179</sup>

The access debate played out in the drafting of UNCLOS.<sup>180</sup> The first convention, signed in 1982, heavily favored developing nations.<sup>181</sup> The 1994 Amendments shifted favor to the side of industrialized nations and their firms, which prompted the United States to finally sign the agreement.<sup>182</sup> Despite the fact that the United States signed the agreement in 1994 under President Clinton, UNCLOS went into force in November 1994 without ratification from the United States.<sup>183</sup> The United States had a provisional right to contribute to the administration of UNCLOS until 1998 but is now barred from appointing members to arbitration panels and barred from membership in the Law of the Sea Tribunal and the Continental Shelf Commission.<sup>184</sup> The mishandling of the Common Heritage Concept debate may have led to UNCLOS' failure to gain acceptance from influential nations such as the United States.<sup>185</sup>

The establishment of the Space Resource Authority (SRA) would certainly reenergize the debate but the debate must take a different form. The true question underlying the meaning of the Common Heritage Concept is much more basic than the

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174. BASLAR, *supra* note 19, at 185–90.

175. Buxton, *supra* note 13, at 691–93.

176. *Id.*

177. *Id.*

178. *Id.* at 690.

179. *Id.* at 691–93.

180. Hoffstadt, *supra* note 10, at 596–603.

181. *Id.*

182. *Id.*

183. Thompson, *supra* note 13, at 848–49 (citing *The Law of the Sea*, 29(2) DEF. MONITOR 4, 4 (2000), available at <http://www.cdi.org/dm/2000/issue2/law-of-sea.html>).

184. *Id.*

185. Hoffstadt, *supra* note 10, at 596–603.

amount of access that should be granted. The question is: who owns outer space?

The issue of appropriating property in space is at the heart of this question. Traditionally, the Common Heritage Concept has been understood to prohibit appropriation in outer space.<sup>186</sup> The Outer Space Treaty and Moon Agreement are explicit in this prohibition.<sup>187</sup> An alternative view is that the Common Heritage Concept does not prohibit appropriation but instead prohibits exclusive use.<sup>188</sup> This view allows for nations and firms to appropriate territory and resources in outer space, but the nations and firms would be accountable to the international community.<sup>189</sup> Therefore the international community would be able to regulate resource exploitation and ensure its uses benefit mankind in some way.<sup>190</sup> This view incorporates both the limited and unlimited access beliefs by allowing for private appropriation but giving a voice to the developing world.

Operating under the notion that the Common Heritage Concept prohibits exclusive use by non-appropriation paves the way for a workable system of property ownership in outer space. Through declaring that outer space is the "common heritage of mankind," the international community effectively laid claim to the entirety of outer space to be held by the international community in a form of ownership similar to the English common law's tenancy in common.<sup>191</sup> That is to say that every member of the international community owns an equal and indivisible interest in the property of outer space.<sup>192</sup> If the international community decides to transfer parcels of outer space to nations and firms, it will be through a transfer of property interests from the international community to the firms or nations. These property interests could take the form of fee simple, easements, or other common law property interests. This view is similar to the prohibition of exclusive use because it allows for appropriation but provides sufficient opportunity for interna-

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186. See *supra* notes 76-78 and accompanying text.

187. Moon Agreement, *supra* note 5, art. 11, ¶ 2; Outer Space Treaty, *supra* note 14, art. II.

188. BASLAR, *supra* note 19, at 85.

189. *Id.* at 91.

190. *Id.*

191. Tenancy in common is defined as "[a] tenancy by two or more persons, in equal or unequal undivided shares, each person having an equal right to possess the whole property but no right of survivorship." BLACK'S LAW DICTIONARY, *supra* note 72, at 1506.

192. *Id.*

tional oversight.

This meaning of the Common Heritage Concept is also supported by Article 137 of UNCLOS, which states that “[a]ll rights in the resources of the [international deep seabed] are *vested* in mankind as a whole, on whose behalf the Authority shall act.”<sup>193</sup> In other words, the international community owns the deep seabed, and the ISA takes it upon itself to regulate the use of the international property.<sup>194</sup> The remainder of Part II argues that the adoption of this view is essential to the creation of a workable SRA.

### C. MODEL SPACE RESOURCE AUTHORITY (SRA)

#### 1. Structure and Member Composition

Like the ISA, the SRA should consist of an administrative body whose responsibilities and authority are divided among different organs.<sup>195</sup> The SRA's Council should be the most powerful body and retain duties identical to the ISA's Council; namely, implementing the regime through approving and regulating exploration and exploitation working plans.<sup>196</sup> The SRA's Council membership should mimic that of the ISA's, save that the SRA Council should not reserve seats for representatives of the developing world.<sup>197</sup> Developing countries would still have the opportunity to serve on the Council but they should not be guaranteed a seat. A commonly raised criticism during the drafting of the Moon Agreement was that the equitable sharing provisions would be interpreted too harshly against the industrialized world if the developing world was given too much power.<sup>198</sup> The United States was partially concerned with the implementation of outrageous royalties.<sup>199</sup> This criticism was one of the reasons the United States and other industrialized nations refused to take part in the treaty.<sup>200</sup> Limiting develop-

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193. UNCLOS, *supra* note 22, art. 137 (emphasis added).

194. *Contra* Status of the United Nations Convention on the Law of the Sea, *supra* note 127, at 103–39 (emphasizing the right of equal access to the international deep seabed while not mentioning any significance to the word “vested”).

195. *See supra* notes 113–115 and accompanying text.

196. *See supra* notes 116–121 and accompanying text.

197. *See supra* notes 116–121 and accompanying text.

198. BASLAR, *supra* note 19, at 173.

199. *Id.*

200. *Id.* at 162.

ing nations' influence on the Council will work to stem similar fears because the Council, through advice from its Finance Committee, should be responsible for setting and collecting permit fees and royalties from outer space mining activities.<sup>201</sup>

The permit process should be identical to the ISA's. Firms or nations can prospect for free, but prospecting would convey no proprietary rights over discovered materials.<sup>202</sup> After discovering potentially minable materials, a firm or nation would pay a fee to receive an exploration permit and an additional fee at the exploitation phase.<sup>203</sup> The Council would set the amount of fees a firm must pay.

Once the firm or nation begins commercial mining, the Council would levy a production royalty on the operations. The production royalty could be a percentage of the mine's gross proceeds, net proceeds, overall value of the minable materials, or some other determination of the mine's value. The royalty process is used in U.S. law as a quasi-tax on oil and gas production.<sup>204</sup>

These fees and royalties will serve two purposes. First, they will work to limit the number and extent of mining operations in outer space by adding to the high level of capital firms must invest in starting and maintaining a mine.<sup>205</sup> Limiting the number of firms that are capable of mining outer space will admittedly make it more difficult for the developing world to take part in outer space mining. However, such a limitation also prevents the wholesale mining of outer space, thus reducing the environmental impact. Second, the revenue will be used to maintain the functions of the SRA.

The SRA should adopt the spirit of the ISA's Enterprise but alter it significantly. Under the ISA, prospectors who submit exploration plans of work must reserve enough surface area to support a second mining operation and reserve half of the value of the minable materials for extraction by the ISA.<sup>206</sup> The Enterprise is the ISA's arm responsible for extracting the reserved materials.<sup>207</sup> Under the SRA, firms and nations should remain

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201. See *supra* notes 128–130 and accompanying text.

202. See *supra* note 134–135 and accompanying text.

203. See *supra* note 138 and accompanying text.

204. See Mineral Lease Act of 1920, 30 U.S.C. § 223 (2000).

205. Andrew P. Morris et al., *Homesteading Rock: A Defense of Free Access Under the General Mining Law of 1872*, 34 ENVTL. L. 745, 752 (2004) (relating the capital-heavy nature of the mining industry).

206. See *supra* notes 144–146 and accompanying text.

207. See *supra* note 144 and accompanying text.

responsible for reserving surface area and half the value of minable materials to the SRA's Enterprise, but the SRA's Enterprise should not engage in mining operations. The ISA's Enterprise is responsible for mining the areas reserved to it but to date it has not been formed.<sup>208</sup> If it begins operating, it is intended to contribute to the ISA's self-sufficiency. Some question the wisdom of leaving the ISA to profit from the operation of deep seabed mines while simultaneously writing and enforcing the regulations that govern those operations.<sup>209</sup> The SRA's Enterprise should avoid potential conflicts of interest by separating itself from actually operating mines.

Instead, the SRA's Enterprise should manage the reserved surface areas and minable materials. It should possess the power to sell or rent surface and subsurface easements and ownership interest in reserved minable materials. The proceeds would then be equitably distributed among non-spacefaring developing nations as well as used to promote the establishment of space-related enterprises in the developing world. The SRA's Enterprise should be substantially, if not exclusively, administered by representatives of developing nations, as elected by the Assembly.

## 2. *Exploitation Easements*

Under the ISA, firms that engage in the exploration or exploitation phase of mining do so through contractual agreements between the ISA and the firm.<sup>210</sup> The exploration contract is granted for fifteen years.<sup>211</sup> Contractors are granted exploitation rights based on a number of factors.<sup>212</sup> In particular, duration is determined by "the economic life of the mining project, taking into consideration such factors as the depletion of the ore, the useful life of mining equipment and processing facilities and commercial viability."<sup>213</sup> The duration of an exploitation contract is meant to be long enough to allow for the construction and use of commercial mining facilities but short enough to al-

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208. Jason C. Nelson, *The Contemporary Seabed Mining Regime: A Critical Analysis of the Mining Regulations Promulgated by the International Seabed Authority*, 16 *COLO. J. INT'L ENVTL. L. & POL'Y* 27, 35 (2005).

209. *Id.* at 64.

210. UNCLOS, *supra* note 22, art. 153 & Annex III, art. 3(5).

211. *See supra* note 140 and accompanying text.

212. *See* UNCLOS, *supra* note 22, Annex III, art. 17, ¶ 2(b)(iii).

213. *Id.*



low for amendments to the contract when necessary.<sup>214</sup>

The SRA should adopt the fifteen year exploration contract<sup>215</sup> but should not adopt the ISA's exploitation contract system.<sup>216</sup> Instead, it should grant easements to the surface and subsurface mining operation to firms that wish to begin the exploitation phase. Unlike the ISA's exploitation contract, which has a limited duration to allow for amendments, an easement would grant exploitation rights to a firm for as long as the firm maintained a mining facility on the surface and used the subsurface to extract material.

This would increase the incentive for nations or private firms to mine outer space by extending the life of their exploitation operations. Under the ISA's contract system, the bargaining process is heavily slanted toward the ISA. A nation or firm with an established mining operation stands to lose what they have invested in a given site.<sup>217</sup> Therefore, it is very important to the firm or nation that the contract be renewed so that they do not lose their investment. Under the proposed SRA easement system, the firm or nation would receive a virtual guarantee that the mine would operate for as long as it was productive. Thus, the imbalanced bargaining would be removed, making it safer for firms and nations to invest.

The easements should cover the surface and subsurface but not the minable materials. The SRA should transfer title over the minable materials to the firm or nation that seeks to take the materials to market. This is necessary because a firm or nation cannot sell what they do not own.<sup>218</sup> Again, the Council would set the fees and royalties associated with obtaining the appropriate easement and ownership rights.<sup>219</sup>

### 3. *Royalty, Fee, and Movable Material Dedication Forgiveness*

The ISA passes a portion of the fees along to developing nations that are incapable of deep seabed mining.<sup>220</sup> The SRA should give no part of the fees and royalties taken from mining operations to non-spacefaring and/or developing nations. However, the SRA should forgive some or all of the fees and royalties

214. *Id.*

215. *See supra* note 140 and accompanying text.

216. *See supra* note 141 and accompanying text.

217. Morris et al., *supra* note 205, at 752.

218. Blaser, *supra* note 69, at 92.

219. *See supra* notes 206-207 and accompanying text.

220. UNCLOS, *supra* note 22, art. 82(4).

in proportion to a firm or nation's investment of its space mining operations in developing nations. In addition, the SRA should reduce the amount of the minable materials devoted to the Enterprise in proportion to a firm or nation's investment in a developing nation.

Royalty, fee, and minable material dedication forgiveness is superior to direct payments for two reasons. First, it increases the chances that industrialized nations will support the system because it eliminates the direct equity sharing that has made the Moon Agreement unpopular.<sup>221</sup> A healthy amount of American resistance to the Moon Treaty was focused on developing nations' belief that the Common Heritage Concept required an equal—or at least equitable—sharing of the Moon's resources.<sup>222</sup> Many in the west viewed this as a "socialist concept."<sup>223</sup> While the fear of socialism has declined greatly since the fall of the Soviet Union, industrialized nations still fear sharing resources because it reduces the return on their investment and acts as a disincentive.<sup>224</sup> Elimination of fee and royalty sharing will eliminate the opportunity for similar criticism of the SRA.

Second, instead of simply making cash payments to developing nations, the royalty and fee forgiveness program encourages firms and nations to invest in the developing world's infrastructure. One criticism of the ISA's proposed system of payment is that there would not be enough money available to significantly impact developing economies.<sup>225</sup> These payments could yield some positive results, but direct investment in a developing nation's infrastructure has a better potential to increase the quality of life in that nation. The firm or nation's investment will yield jobs directly related to their space activities. In addition, the firm or nation's investment will increase the quality of infrastructure related to the space activities. This has a potential to yield jobs and income ancillary to the space activities.

As an illustration of the type of investment contemplated, imagine ACME Space Mining, an imaginary firm based in the United States. For ACME to mine outer space it needs technology to get into space, operate a mine, and return the materials

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221. See *supra* notes 201–203 and accompanying text.

222. See *supra* notes 201–203 and accompanying text.

223. ANTONIO CASSESE, *INTERNATIONAL LAW IN A DIVIDED WORLD* 381 (1986).

224. See BASLAR, *supra* note 19, at 190.

225. See Aaron L. Danzig, *A Funny Thing Happened to the Common Heritage on the Way to the Sea*, 12 *SAN DIEGO L. REV.* 655, 664 (1975).

to Earth for sale. In addition, it needs at least one facility on Earth through which it can monitor the status of its mining activities. In other words, it needs mission control facilities.

ACME may design, build, and launch its equipment into outer space from one or several industrialized nations. It may also establish its mission control in an industrialized nation. If ACME does this, then the standard fees and royalties will be collected from its mining operations, thus increasing its investment and reducing its return. However, ACME can elect to erect all or part of its operations in one or more developing nations. It may decide to assemble its technology in Madagascar or launch from Panama or station its mission control in the Solomon Islands. The extent of its investment in developing countries will determine the extent to which the Authority will forgive the fees and royalties associated with its mining operations and/or reduce the amount of the minable materials to be dedicated to the Enterprise. If the distance between the headquarters and the sites in developing nations is too great to justify investment in developing nations, then the standard royalty, fees, and minable material dedication requirements will benefit developing nations in ways described below.

#### D. PROMOTING PRIVATE INVESTMENT

A successful SRA must promote independent investment in outer space while upholding the core of the Common Heritage Concept. This is an onerous balance to strike and few, if any, international agreements have been able to do so.<sup>226</sup> The proposed SRA would adequately promote private investment in outer space in at least four ways.

First, giving meaning to the Common Heritage Principle provides a stable legal framework, which in turn allows firms and nations a stable footwork from which to judge the feasibility of mining outer space. Mining, almost more than any other industry, is an endeavor which requires a tremendous amount of initial capital.<sup>227</sup> One does not know where to find resources to mine without first prospecting.<sup>228</sup> Prospecting can encompass several sites, millions of dollars, and countless hours and still

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226. See generally Hoffstadt, *supra* note 10 (recounting the inability of international agreements to adequately incorporate the Common Heritage principle).

227. Morris et al., *supra* note 205, at 752-55.

228. See *id.* at 754.

yield little.<sup>229</sup> The money and energy spent prospecting is justified by the belief that sooner or later the prospector will find success and the prospector will receive an adequate return on his or her investment.<sup>230</sup> This process has been described as "buying a lottery ticket" because the payoffs are randomly awarded.<sup>231</sup>

It is nearly impossible for a firm or nation to calculate potential returns on investment for mining outer space if the legal status of its claim is unknown. Currently, the debate over the Common Heritage Concept leaves many debating whether it is possible to make claims on materials in space and who receives the benefits of the extracted material and in what proportions.<sup>232</sup> The SRA would resolve this confusion by adapting the Common Heritage Concept to space and outlining a regime that will regulate and appropriate property in space. With an SRA in place, nations and firms would be able to include property rights in their cost/benefit analyses. In addition, the current uncertainty leaves many potential actors hesitant to spend even modest resources exploring the feasibility of space mining.<sup>233</sup> The SRA would eliminate that uncertainty and foster an increase in the research and development of space mining programs.

Second, the SRA's Council should reserve seats for the world's largest mineral producers and consumers.<sup>234</sup> In this way the nations and firms with the largest investment in outer space mining will have a substantial voice in creating the rules that will regulate outer space mining. This provides an added amount of stability to the legal framework because it gives industrialized nations and their firms a hand in their own destiny. Regulations governing space mining will be promulgated by nations containing the firms with the greatest to gain and lose in the space mining industry.

Third, the SRA provides methods through which firms or nations who invest in developing nations can maximize their return on investment. In the ACME illustration, it is possible for ACME to receive complete forgiveness of its fee and royalty obligations with a large enough investment in developing nations. ACME would then be entitled to the entirety of the return on its

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229. *See id.*

230. *See id.*

231. *Id.*

232. Hertzfeld & von der Dunk, *supra* note 152, at 84-86.

233. *See id.* at 86.

234. *See supra* note 120 and accompanying text.

mining operations. Firms with the resources and willingness to invest in the developing world stand to make a great deal of profit under the SRA. This is a strong incentive for private investment in outer space mining.

Fourth, granting exploitation easements would provide greater incentive to outer space miners than the contract-based system of the ISA. Under the contract system, a firm or nation's control over its operation can only last as long as the contract allows. As such, those who wish to mine outer space are unable to know the amount of benefit they may receive from a mine before the contract expires and they are forced to negotiate new terms or walk away from their investment. Clearly, the international authority regulating the mining has the upper hand in subsequent contract negotiations. Under an easement system, the firm or nation would be guaranteed use of the surface and subsurface for as long as it mined at that location. This guarantee creates stability in judging the feasibility of outer space mining by increasing the amount of return an investor can plan to receive from a mine.

#### E. BENEFITING NON-SPACEFARING DEVELOPING NATIONS

While sufficiently promoting private investment in space mining activities, the SRA would also sufficiently adhere to the Common Heritage Concept. Operating under the notion that the Common Heritage Concept vests ownership of all outer space territories in the international community, it becomes clear that all nations, whether industrialized or developing, are entitled to benefit from the joint tenancy. However, developing nations, by definition, lack significant economic capital. The capital-intensive nature of space travel in general and space mining in particular renders it highly improbable that a developing nation would be able to enter outer space, let alone harvest its resources. Therefore, adhering to the Common Heritage Concept requires that developing nations receive some benefit from the mining activities in outer space.

The SRA would contain two provisions which specifically seek to share the wealth of outer space with developing nations. First, the fee and royalty forgiveness program would not only maximize the return on investment for those who mine outer space but would also create strong incentives for firms or nations with the ability to mine outer space to invest in the developing world. More importantly, the investment would come in the form of moderate- to high-technology jobs. A firm or nation

cannot establish any enterprise in a developing nation and expect to reduce fees and royalties owed to the SRA, but instead must establish an enterprise directly related to their outer space mining operations.

Without this requirement, a multinational corporation could invest in any type of activity in a developing nation and then apply for a reduction in fees or royalties. An example of this would be a multinational mining operation that mines in both space and on Earth. If that operation began mining in a developing country while simultaneously mining on the Moon, it would qualify for a reduction in fees and royalties. The multinational company would receive a higher return from its outer space mining while contributing little to the infrastructure or general well-being of the developing nation in which it began mining. However, the SRA would require that investment be tied directly to the firm or nation's mining activities. Like similar national space programs, the building and launching of outer space mining technology and the firm or nation's mission control would require a large amount of high-tech infrastructure<sup>235</sup> and skilled laborers.<sup>236</sup> Therefore, investment in developing countries would bring with it a level of infrastructure and labor that could help drive growth in other sectors of that nation's economy.<sup>237</sup> The firm or nation taking advantage of the forgiveness program benefits from a higher rate of return while developing countries benefit from a higher degree of investment.

Second, the SRA's Enterprise will benefit developing nations by providing a source of income to developing nations and promoting the development of space-related enterprises in developing nations. In addition, the Enterprise will provide developing nations with something they rarely possess: economic leverage that can be used in negotiations with industrialized firms and nations.

The Enterprise is a good complement to the royalties, fees, and lode dedication forgiveness program. If the forgiveness program is successful, then the amount of area and lode dedicated to the Enterprise would be minimal, leaving little money to be divided among nations and given out as grants. If the forgiveness program is unsuccessful, then a great number of firms and

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235. See T.A. HEPPENHEIMER, *COUNTDOWN: A HISTORY OF SPACE FLIGHT 338-58* (1997) (recounting the cost of American and Russian space endeavors in the 1990s).

236. See Heiss, *supra* note 150, at 18.

237. See *id.*

nations will be required to dedicate surface area and half of the discovered lode to the Enterprise. This increases the amount of money the Enterprise can raise through the sale and renting of surface easements and lode ownership. An unsuccessful forgiveness program translates into a successful and prosperous Enterprise, but a successful forgiveness program means a less prosperous Enterprise. Either way, developing nations enjoy the benefit of increased investment and infrastructure and/or direct proceeds from mining operations. In addition to direct payments to developing nations, the Enterprise's proceeds could also be used to promote space-related enterprises in developing nations. This can be done by funding start up enterprises or by providing grants to firms or nations that want to invest part of their operations in developing nations but lack the resources.

The notion of non-spacefaring nations selling or renting property in space is not new. In the late 1980s the Pacific Island nation of Tonga leased and sold off satellite orbits allotted to it by the International Telegraph Union (ITU).<sup>238</sup> At the time Tonga had been allotted six orbits despite its complete inability to utilize those slots.<sup>239</sup> The unforeseen instance of a nation using the orbits for purposes other than flying satellites prompted the ITU to require allotted orbits to be used primarily by the holder.<sup>240</sup> While Tonga's actions were contrary to the ITU's intended use for the orbits, the incident stands as an example of nations who are capable of space flight and are interested in purchasing or leasing property rights in space from nations that are incapable.

## CONCLUSION

The time for the formation of a regime to govern the exploration and exploitation of space resources is overdue. Activities undertaken by the United States, China, and other potentially space-faring nations represent the beginning of a twenty-first century space race which will be inextricably tied to mining rights on the Moon, the planet Mars, and NEAs. By viewing the territory of outer space as being vested in the international community, a workable authority to govern mining interests in space can be established. The Space Resource Authority pro-

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238. Buxton, *supra* note 13, at 703-04.

239. *Id.*

240. *Id.*

posed in this article would create economic incentive for nations and firms to simultaneously invest in outer space and developing nations. The hope is that, by eliminating disagreement over the meaning of the Common Heritage Concept, the international community can begin to peacefully develop outer space's resources in a way that truly benefits all of humanity.



