

# Sand Mining in Baja and Alta California\*

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## I. INTRODUCTION

What happens when a prosaic construction material becomes a hot commodity for international export? Sand is a component of many construction materials<sup>1</sup> and over the last few years demand for sand in San Diego has driven a huge increase in the amount mined in Baja California.<sup>2</sup> The increased rate outstripped existing environmental

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1. For example, concrete is fifty percent sand and stucco is almost entirely sand. Tom Swaney, *New Klondike*, 45 MINING ENG'G 591, 592 (1993).

2. Victor M. Ponce, *Three Issues of Sustainable Management in the Ojos Negros Valley, Baja California, Mexico: Sand Mining* (2002), at [http://threeissues.sdsu.edu/three\\_issues\\_sandminingfacts0.html](http://threeissues.sdsu.edu/three_issues_sandminingfacts0.html).

regulatory safeguards and generated concern that exports would deprive Baja California of the sand resources required for domestic economic development.<sup>3</sup>

This comment will examine some geologic, environmental, and legal aspects of the international sand trade.<sup>4</sup> Looking at the state of sand mining in both countries will demonstrate that the United States and Mexico have parallel regulatory structures and similar environmental concerns and will show how municipal and state officials in Baja California are able to piggyback their economic concerns onto environmental regulations. This comment will also examine the sand trade issue for lessons applicable to cross border energy trade and suggest a certification mechanism that would allow continued sand exports while preserving environmental safeguards.

Sand, a constituent of concrete (about fifty percent sand) and stucco (almost entirely sand), is used in many construction and industrial activities.<sup>5</sup> A spectacular current example of concrete use is the East Mission Valley extension trolley project in San Diego, California, with its concrete elevated roadbed and large retaining walls.<sup>6</sup> San Diego County itself consumes about three and a half million tons of sand per year<sup>7</sup> for construction purposes, a volume of just over one and a half million cubic yards,<sup>8</sup> at a typical price of about twelve dollars per cubic yard.<sup>9</sup>

During most of the twentieth century, San Diego County produced the sand it required from local sources.<sup>10</sup> Local sources are preferred

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3. Sandra Dibble, *Mexican Officials Halt Sand Shipments*, SAN DIEGO UNION TRIB., Feb. 13, 2003, at B-1 [hereinafter *Mexican Officials Halt Sand Shipments*].

4. I discuss only the sand mining that occurs in river channels. There are a few sand sources in older deposits away from rivers, and in many parts of the world, mining of beach sand is common, but that does not occur in the region under consideration here. HAROLD F. WEBER, *GEOLOGY AND MINERAL RESOURCES OF SAN DIEGO COUNTY*, CALIFORNIA 230 (1963).

5. Swaney, *supra* note 1, at 592. Sand is also used for the non-construction purpose of beach replenishment, but that sand comes from other sources.

6. Curiously, an estimate of the total sand and concrete consumption over the four years of construction is difficult to determine because the sand and concrete purchases are spread-out over six hundred separate bids. Telephone Interview with David Raglin, East Mission Valley Extension Project Manager (Apr. 13, 2004).

7. Ponce, *supra* note 2.

8. Sand has a density of two grams per cubic centimeter (2 g/cm<sup>3</sup>), or 3,371 pounds per cubic yard (lb/yd<sup>3</sup>). JOHN M. REYNOLDS, *AN INTRODUCTION TO APPLIED AND ENVIRONMENTAL GEOPHYSICS* 39 (1997).

9. Ponce, *supra* note 2, (stating that the price is now approaching fifteen dollars per ton (\$15/ton)); Telephone Interview with Benny Wright, President of Carrizo Gorge Aggregates (Mar. 18, 2004).

10. George C. Copenhaver, Jr., *Mining in San Diego, California Urban Environment Past, Present and Future*, in *ENVIRONMENTAL PERILS, SAN DIEGO REGION* 217 (Patrick L. Abbott & William J. Elliott eds., 1991).

because shipping cost is the largest component of the price.<sup>11</sup> Production costs in Riverside County and Baja California are three to four dollars per ton, but trucking costs from Riverside to San Diego County can reach ten dollars per ton.<sup>12</sup> Sand can be shipped by rail or by barge from Baja California at a cost of about five dollars per ton.<sup>13</sup>

Sand mining in San Diego County (and Baja California) occurs in river channels.<sup>14</sup> As environmental concerns over the effects of riparian sand mining increased in the United States, state<sup>15</sup> and federal<sup>16</sup> regulations came into force. San Diego mine operations shut down, sand production dropped, and prices increased.<sup>17</sup> Regional sand users turned to sources in Baja California.<sup>18</sup> One study estimated that as much as forty percent of the sand used in San Diego was exported from Baja California.<sup>19</sup> In early 2003, Baja California state and municipal leaders became concerned with the issues of domestic growth requirements for sand and environmental damage caused by unlicensed mining activities.<sup>20</sup> They shut down mines for operating permit violations, and Calexico municipal leaders halted a trainload of sand destined for export at the border.<sup>21</sup>

## II. SAND MINING

Most local sand mining operations are located in river channel deposits.<sup>22</sup> River channel deposits provide the clean, well-sorted sand appropriate for industrial applications.<sup>23</sup> Major sand mining has occurred

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11. This is because sand weighs a lot and has a low-value density.

12. Anna Gorman, *Mexican Officials Dig in Their Heels over Mining of Baja Sand*, L.A. TIMES, Mar. 25, 2003, at B-6.

13. *Id.*

14. WEBER, *supra* note 4; Copenhaver, *supra* note 10.

15. Surface Mining and Reclamation Act of 1975, CAL. PUB. RES. CODE §§ 2710–97 (West 2004).

16. Federal Water Pollution Control Act of 1977, 33 U.S.C. §§ 1251–1387 (West 2004).

17. Telephone Interview with Benny Wright, *supra* note 9.

18. *Id.*

19. Ponce, *supra* note 2.

20. *Mexican Officials Halt Sand Shipments*, *supra* note 3, at B-1, B-7.

21. *Id.*

22. Michael Sandeck & Catherine Avila, *Channel Adjustments from Instream Mining: San Luis Rey River, San Diego County, California*, in 11 REVIEWS IN ENGINEERING GEOLOGY: STORM INDUCED GEOLOGIC HAZARDS: CASE HISTORIES FROM THE 1992-1993 WINTER IN SOUTHERN CALIFORNIA AND ARIZONA 39 (Robert A. Larson & James E. Slosson eds., 1997); Ponce, *supra* note 2; Copenhaver, *supra* note 10, at 220.

23. WEBER, *supra* note 4, at 228.

along the San Diego, San Luis Rey, Tijuana, Sweetwater, and San Dieguito rivers in San Diego County.<sup>24</sup> In Baja California, deposits of the El Barbon Wash in the Ojos Negros Valley,<sup>25</sup> Guadalupe Valley,<sup>26</sup> and Las Palmas Valley<sup>27</sup> have recently been mined.

A riverine mining operation uses bulldozers or drag lines to remove sand from pits or to scrape a uniform depth of sand from the riverbed.<sup>28</sup> The sand is washed and sorted on site to provide a uniform grain size<sup>29</sup> (sand grains are one-sixteenth to two millimeters in diameter<sup>30</sup>).

Sand in the study area forms from the disaggregation of rocks from the Peninsular Ranges of Southern California and Baja California.<sup>31</sup> The sand is transported along rivers, carried down the parts of relatively steep gradient, and deposited in areas of relatively low gradients.<sup>32</sup> The rate of sand supply is a complex function of the river drainage area, gradient, rock type, vegetation cover, and climate.<sup>33</sup> There are methods for estimating the sand supply rate<sup>34</sup> so that sand removal can be calibrated to the supply; thus, sand potentially is a sustainable resource. Sand mine operators, however, rarely perform the studies required to determine the sand supply rate,<sup>35</sup> and sand removal rates are not generally constrained by replenishment concerns.<sup>36</sup>

### III. ENVIRONMENTAL EFFECTS

River sand mining can cause detrimental environmental effects through plant and animal habitat loss and change in river grade.<sup>37</sup> The study area has an arid climate, so because of the availability of water, riparian areas host relatively dense concentrations of plant and animal

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24. Copenhaver, *supra* note 10.  
25. Ponce, *supra* note 2.  
26. Jennifer Dorroh, *Mexican Sand Smuggled to Hawaii*, THE NEWS (Mex.), Oct. 15, 2002.  
27. *Mexican Officials Halt Sand Shipments*, *supra* note 3, at B-1, B-7.  
28. WEBER, *supra* note 4, at 223-30.  
29. *Id.*  
30. JAMES S. MONROE & REED WICANDER, PHYSICAL GEOLOGY: EXPLORING THE EARTH 461 fig.16-16 (1992).  
31. Gary H. Girty et al., *Petrology of Holocene Sand, Peninsular Ranges, California and Baja Norte, Mexico: Implications for Provenance Discrimination Models*, 58 J. SEDIMENTARY PETROLOGY 881 (1988).  
32. MONROE, *supra* note 30, at 472-74.  
33. HARVEY BLATT ET AL., ORIGIN OF SEDIMENTARY ROCKS 20-29 (2d ed. 1972).  
34. Ponce, *supra* note 2. Sand transport can be estimated for an assumed flood discharge rate (the product of rainfall and catchment area) if the channel shape, channel grade, and distribution of sand grain sizes are known.  
35. See Sandecki, *supra* note 22, at 40.  
36. *Id.* at 39; Ponce, *supra* note 2.  
37. *Id.*

species.<sup>38</sup> Sand removal and processing activities necessarily remove plants. Plants provide animal habitat, so the loss of plants causes loss of animals.<sup>39</sup> Some of the plant and animal species affected in this way are listed under the Endangered Species Act<sup>40</sup> (ESA). Thus, the ESA has provided some of the statutory basis of regulatory action controlling sand mining in the United States.

Sand removal changes the local elevation of the riverbed relative to undisturbed parts of the riverbed, altering the local gradient and therefore producing changes in local erosion patterns.<sup>41</sup> A steeper gradient increases erosion and the enhanced erosion zone typically migrates upstream.<sup>42</sup> In the San Luis Rey River (San Diego County), that process has undermined bridges and aqueducts, requiring expensive mitigation measures.<sup>43</sup> The erosion also undermines vegetation and associated animal habitat.<sup>44</sup> The material removed by the enhanced erosion may be deposited unpredictably downstream, overwhelming plant and animal habitat and human infrastructure.<sup>45</sup>

Sand removal can alter the course of the river and decrease the degree of river water infiltration to the subsurface, lowering the water level in local wells.<sup>46</sup> Alternately, sand removal can lower the riverbed below the ground water level so that the ground water drains as surface water flows, thus depleting ground water resources.<sup>47</sup>

Sand mining operations require placement of debris along the riverbed.<sup>48</sup> The debris may alter or destroy riparian habitat.<sup>49</sup> This practice is regulated in the United States by § 404 of the Federal Water Pollution Control Act<sup>50</sup> (known as the Clean Water Act or CWA); denial of permits for this practice has shut down many sand mines.<sup>51</sup>

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38. ELNA BAKKER, *AN ISLAND CALLED CALIFORNIA: AN ECOLOGICAL INTRODUCTION TO ITS NATURAL COMMUNITIES* 367–68 (2d ed. 1984).

39. *Id.*

40. Endangered Species Act of 1973, 16 U.S.C. §§ 1531–44, 1533(c) (West 2004).

41. MONROE, *supra* note 30, at 472–74.

42. Sandecki, *supra* note 22, at 42–43.

43. *Id.* at 44.

44. *Id.* at 47.

45. MONROE, *supra* note 30, at 474.

46. Ponce, *supra* note 2.

47. *Id.*

48. Swaney, *supra* note 1, at 591.

49. Ponce, *supra* note 2.

50. 33 U.S.C. § 404 (West 2004); Federal Water Pollution Control Act of 1977, 33 U.S.C. §§ 1251–1387 (West 2004).

51. Sandecki, *supra* note 22, at 46.

#### IV. SAND MINING IN MEXICO

As sand production in San Diego County has dropped, the demand has been met by increasingly importing sand from Riverside and San Bernardino Counties in California<sup>52</sup> and from Baja California.<sup>53</sup> Estimates of the amount imported from Baja California ranges from ten<sup>54</sup> to forty<sup>55</sup> percent of San Diego's annual demand.

Sand shipments through the Port of Ensenada doubled in just two years, from 1999 to 2001, to nearly 700,000 tons.<sup>56</sup> Some of that sand may be exported to other Pacific rim locations, although the amount is uncertain.<sup>57</sup> Sand also traveled to San Diego via truck and train during that period.<sup>58</sup>

Larger sand mine operations geared for export in Baja California are typically subsidiaries of U.S.<sup>59</sup> and international companies.<sup>60</sup> In every reported action of Baja California state and municipal government officials halting operation of sand mines for operating or environmental permit violations, the foreign partners insisted that the permits were proper.<sup>61</sup> This insistence is telling because it indicates that the foreign partners are sensitive to the potential negative environmental consequences associated with sand mining.<sup>62</sup> Many permits may not have been legitimately obtained,<sup>63</sup> however, and some mining operations (producing for domestic consumption) were allegedly completely undocumented.<sup>64</sup>

Baja California municipal and State officials became alarmed in 2002 about both the deleterious environmental effects of widespread sand mining for export<sup>65</sup> and the possibility that exports would exhaust the

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52. Where sand is mined from large riverbeds with very high sand replenishment rates.

53. Gorman, *supra* note 12.

54. *Id.*

55. Ponce, *supra* note 2.

56. Puerto de Ensenada [Port of Ensenada], *Serie Anual de Movimiento Portuario* [Annual Series of Harbor Movement], at [http://www.puertoensenada.com.mx/serie\\_anual.html](http://www.puertoensenada.com.mx/serie_anual.html) (last visited Apr. 14, 2004) (on file with the author).

57. Dorroh, *supra* note 26.

58. Gorman, *supra* note 12; *Mexican Officials Halt Sand Shipments*, *supra* note 3.

59. *Mexican Officials Halt Sand Shipments*, *supra* note 3 (discussing an American partner that ships sand mined by a Mexican sand mine concession holder).

60. Gorman, *supra* note 12; Swaney, *supra* note 1.

61. Gorman, *supra* note 12; *Mexican Officials Halt Sand Shipments*, *supra* note 3, at B-1, B-7 (quoting an official of an American partner saying: "What we're doing is environmentally friendly").

62. *Id.*

63. Dorroh, *supra* note 26.

64. *Id.*; Sandra Dibble, *Baja Sandbox is Being Emptied into the U.S.: Extensive Mining Takes Toll on the Environment*, SAN DIEGO UNION TRIB., Oct. 31, 2002, at B-1 [hereinafter *Baja Sandbox Emptied into U.S.*].

65. Gorman, *supra* note 12.

region's sand resources without leaving resources for future domestic needs.<sup>66</sup> They reacted by instituting stepped-up permit enforcement<sup>67</sup> and halting export shipments.<sup>68</sup>

## V. U.S. REGULATORY FRAMEWORK

Sand mining activities in California are regulated under state<sup>69</sup> and federal laws<sup>70</sup> (described below) that regulate minimal reclamation standards,<sup>71</sup> dumping of debris into waterways,<sup>72</sup> and the preservation of habitat of endangered plant and animal species.<sup>73</sup> County governments may act as local lead agencies in the execution of state regulations.<sup>74</sup>

California state regulations are embodied in the State Surface Mining and Reclamation Act (SMARA) of 1975.<sup>75</sup> SMARA has been amended many times since passage.<sup>76</sup> The original SMARA directed the California Division of Mines and Geology (CDMG) to designate areas of significant mineral deposits.<sup>77</sup> The designation is meant to aid local jurisdictions in land use planning decisions.<sup>78</sup> The economic importance of sand<sup>79</sup> was recognized when it was the first mineral commodity selected for designation in the 1978 CDMG Priorities for Mineral Land Classification.<sup>80</sup>

CDMG produced a 1982 report<sup>81</sup> classifying sand resource lands in western San Diego County. In 1985, CDMG transmitted to the County

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66. *Mexican Officials Halt Sand Shipments*, *supra* note 3; Gorman, *supra* note 1212.

67. Gorman, *supra* note 12.

68. *Mexican Officials Halt Sand Shipments*, *supra* note 3.

69. Surface Mining and Reclamation Act of 1975, CAL. PUB. RES. CODE §§ 2710–97 (West 2004).

70. Federal Water Pollution Control Act of 1977, 33 U.S.C. §§ 1251–1387 (West 2004).

71. CAL. PUB. RES. CODE §§ 2755–2779.

72. 33 U.S.C. § 1344.

73. Endangered Species Act of 1973, 16 U.S.C. §§ 1531–1544 (West 2004).

74. CAL. PUB. RES. CODE § 2774.4.

75. CAL. PUB. RES. CODE §§ 2710–97.

76. SMARA has been amended twenty-three times, most recently in 2003. *See id.* § 2710.

77. *Id.* § 2761.

78. Copenhaver, *supra* note 10.

79. Other aggregate materials, such as gravel, were also recognized as economically important at that time.

80. SUSAN L. KOHLER & RUSSELL V. MILLER, MINERAL LAND CLASSIFICATION: AGGREGATE MATERIALS IN WESTERN SAN DIEGO COUNTY PRODUCTION—CONSUMPTION REGION 153 (1982).

81. *Id.*

of San Diego and western county cities SMARA Designation Report Number 4. This report identified significant regional sand resources. In 1991, the County issued a land use overlay covering the significant sand mining areas under county jurisdiction to inform land use decisions with an eye to protecting the areas for future sand extraction use. Some cities encompass sand resources outside of county control, but at least some of those municipalities use the SMARA designation information in land use planning.<sup>82</sup> The San Diego area is noted for its intention not to cover sand resources by urban sprawl, in marked contrast to the rest of the country.<sup>83</sup>

SMARA requires that surface mine operators prepare reclamation plans.<sup>84</sup> These plans are supposed to “prevent or minimize adverse effects” of the mining operations and reclaim the land into a condition “readily adaptable for alternate land uses.”<sup>85</sup> Amendments in 1990 to the SMARA require mine operators to give assurances that they have the financial wherewithal to perform reclamation.<sup>86</sup> The SMARA amendments do not specify a time period to implement reclamation plans.<sup>87</sup> In practice, the reclamation plans typically call only for revegetation of the mine site without addressing the problems associated with river grade changes.<sup>88</sup>

San Diego County is the lead SMARA agency for mining activities in the county.<sup>89</sup> San Diego County officials checked operations of the eight active sand mines along the San Luis Rey River in 1990, which then comprised about seventy percent of the county’s river sand resources.<sup>90</sup> Five of the mines were not in compliance with their reclamation plans or operating permits, so they shut down.<sup>91</sup> Marginal profits and lack of resources for restoration planning and activities may have contributed to the non-compliance.<sup>92</sup>

Federal regulations controlling sand mining activities are the CWA, regulating dumping in waterways,<sup>93</sup> and the ESA, regulating disturbance

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82. Copenhaver, *supra* note 10.

83. *Id.*

84. Surface Mining and Reclamation Act of 1975, CAL. PUB. RES. CODE §§ 2755–79 (West 2004).

85. *Id.* § 2733.

86. *Id.* § 2770.

87. *Id.* §§ 2755–79.

88. Sandeck, *supra* note 22, at 46.

89. *Id.*

90. *Id.*; Bob Mazzeo, *Sand Mining Threatens Stability of Pipes Carrying Water Supply*, 12 SAN DIEGO BUS. J. 1 (1991).

91. Sandeck, *supra* note 22, at 46. The three remaining mines were cited for CWA violations in 1992.

92. Telephone Interview with Benny Wright, *supra* note 9.

93. 33 U.S.C. § 1344 (West 2004).



of endangered plant and animal species.<sup>94</sup>

Section 404 of the CWA<sup>95</sup> authorizes the federal government to "issue permits, after notice and opportunity for public hearings for the discharge of dredged or fill material into the navigable waters at specified disposal sites."<sup>96</sup> The Administrator of the Environmental Protection Agency generally administers the CWA,<sup>97</sup> but the Section 404 permits are issued by the Secretary of the Army, acting through the Chief of Engineers of the Army Corps of Engineers<sup>98</sup> (the Corps). The Administrator may prohibit the designation of any area as a disposal site.<sup>99</sup> Further, "he is authorized to deny or restrict the use of any defined area for specification (including the withdrawal of specification) as a disposal site, whenever he determines, after notice and opportunity for public hearings, that the discharge of such materials into such area will have an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas."<sup>100</sup>

Note that Section 404 refers to "navigable waters".<sup>101</sup> In Southern California, the rivers mined for sand are not navigable waters in the traditional sense of carrying boat traffic. The CWA was passed with the congressional objective "to restore and maintain the chemical, physical, and biological integrity of the *Nation's waters*."<sup>102</sup> In 1977, the Corps, in response to a 1975 federal court directive<sup>103</sup> to expand regulations consistent with congressional intent ("the Nation's waters"), defined their jurisdiction expansively.<sup>104</sup> Congress, in debate over 1977 amendments to the CWA, expressed approval of the expanded geographic jurisdiction claimed by the Corps.<sup>105</sup> In 1985, the Supreme Court held that the Corps

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94. 16 U.S.C. § 1540 (West 2004).

95. 33 U.S.C. § 1344 (entitled "Permits for Dredged or Fill Material").

96. *Id.* § 1344.

97. *Id.* § 1252.

98. *Id.* § 1344. This is in line with the Corp. of Engineers' duty to maintain the navigable waterways of the United States.

99. *Id.*

100. *Id.*

101. *Id.*

102. *Id.* § 1251 (italics added).

103. *Sun Enterprises, Ltd. v. Train*, 394 F.Supp. 211, 223-24 (D.C.N.Y. 1975).

104. See, e.g., Final Rule for Regulatory Program of the Corps of Engineers, 51 Fed. Reg. 41,206, 41,217 (Nov. 13, 1986) (*codified in* 40 C.F.R. § 323.3(a)).

105. 123 Cong. Rec. 10,369, 10,420-10,434 (daily ed. Apr. 5, 1977) (statement of the Clerk). The expansive definition was based on the Commerce Clause authority of Congress. In particular, a failed bill: H.R. 3199, 95 Cong. (1977), which would have

had authority to interpret the CWA to reach wetlands that abutted on a navigable waterway.<sup>106</sup> Thus, Section 404 would appear to control the dumping of materials in the intermittently flowing rivers of San Diego County.

In 1986, the Corps issued the “Migratory Bird Rule”<sup>107</sup> that extended the Corps’ jurisdiction to any isolated water body used by endangered birds or birds that migrated over state lines. In 2001, the Supreme Court rejected this rule on the grounds that Congress (through the CWA) has only a limited authority to regulate under the Commerce Clause.<sup>108</sup> This is the first constriction of Section 404 since the CWA was passed. Since this constriction, there has been no Section 404 based regulatory actions on San Diego area sand mines.

The federal ESA<sup>109</sup> prohibits the taking of any listed endangered animals<sup>110</sup> and the removal, damage, or destruction of listed plant species.<sup>111</sup> The Secretary of the Interior, acting through the U.S. Fish and Wildlife Service, manages the ESA.<sup>112</sup> Similarly, the California Endangered Species Act<sup>113</sup> (CESA), administered by the California Department of Fish and Game, prohibits the taking of plant and animal species designated by the Fish and Game Commission as either threatened or endangered in the state of California.

The San Diego County riparian areas used by sand mines host relatively high numbers of plant and animal species, including endangered species, in a small area because of the availability of water.

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defined “navigable waters” as “all waters which are presently used, or are susceptible to use in their natural condition or by reasonable improvement as a means to transport interstate or foreign commerce.”

106. *U.S. v. Riverside Bayview Homes, Inc.*, 474 U.S. 121, 133 (1985) (construing “navigable waters” broadly to include wet areas that affect water quality in navigable waters).

107. Final Rule for Regulatory Program of the Corps of Engineers, 51 Fed. Reg. at 41,217 (defining additional waters under Corp jurisdiction as:

- a. Which are or would be used as habitat by birds protected by Migratory Bird Treaties; or
- b. Which are or would be used as habitat by other migratory birds which cross state lines; or
- c. Which are or would be used as habitat for endangered species; or
- d. Used to irrigate crops sold in interstate commerce.”)

108. *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Eng’rs*, 531 U.S. 159, 174 (2001) (stating that federal jurisdiction “over ponds and mudflats falling within the ‘Migratory Bird Rule’ would result in a significant impingement of the States’ traditional and primary power over land and water use”).

109. Endangered Species Act of 1973, 16 U.S.C. §§ 1531–44 (West 2004).

110. *Id.* § 1538.

111. *Id.*

112. *Id.* § 1537(a).

113. California Endangered Species Act, CAL. FISH & GAME CODE §§ 2050–2097 (West 2004), available at [http://www.essexenv.com/endangered\\_species/cesa.html](http://www.essexenv.com/endangered_species/cesa.html).

Thus, riverbed mining operations are more likely to threaten endangered species simply because of the higher concentration of species in riparian habitats. There are over two hundred species endemic to San Diego that are listed as endangered.<sup>114</sup>

The federal regulations under the CWA and ESA have had an enormous impact on riverbed sand mining in San Diego County.<sup>115</sup> Mine operators typically ignored permit requirements until enforcement occurred in earnest.<sup>116</sup> For example, the county's 1990 check of eight sand mine operators along the San Luis Rey River in San Diego County found five mines out of compliance with state SMARA regulations.<sup>117</sup> The 1990 permit checks should have served to put the mine operators on notice of the various state and federal regulatory requirements; however, the remaining three mines were cited in 1992 by the EPA for CWA Section 404 violations.<sup>118</sup> County wide, state and federal regulatory pressures have reduced the number of riverbed sand mines from ten to four since 1995.<sup>119</sup>

## VI. MEXICAN REGULATORY FRAMEWORK

The Mexican Constitution provides the basis for federal regulation of natural resources.<sup>120</sup> Article 27 establishes that the nation has original dominion over the "... lands and waters within national territorial limits ..." and the transfer of dominion to individuals constitutes private property.<sup>121</sup> It also authorizes the federal government to impose conditions on private property for the benefit of the public interest and specifies that the purpose of such regulation includes the preservation and restoration of ecological balance.<sup>122</sup> Article 73 of the Constitution establishes federal jurisdiction over particular environmental protection matters, including national waters, mining, and the protection of water and land species.<sup>123</sup>

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114. Species are listed under Section 4 of the ESA. The number given includes plants and animal species listed under the State ESA. Multiple Conservation Species Act, 14 SAN DIEGO MUN. CODE §§ 143.0101-143.0160 (2004), available at <http://www.sannet.gov/mscp/plansum.shtml>.

115. Mazzeo, *supra* note 90; Sandeck, *supra* note 22, at 46.

116. *Id.*

117. *Id.*

118. *Id.*

119. Gorman, *supra* note 12.

120. CONST. tit. 1, ch. 1, art. 27; tit. 3, ch. 2, § 3, art. 73 (Mex.).

121. *Id.* at tit. 1, ch. 1, art. 27.

122. *Id.*

123. *Id.* at tit. 3, ch. 2, § 3, art. 73 § X.

The Mexican Constitution, as amended in 1987, authorizes Congress "to enact laws establishing concurrence among federal, state, and municipal governments, within the ambit of their respective jurisdictions, in matters relating to environmental protection and preservation of ecological balance."<sup>124</sup> Federal laws designate some areas of environmental responsibilities that will be delegated to the states and municipalities, allowing a decentralization of environmental protection.<sup>125</sup>

The federal General Law of Ecological Equilibrium and Environmental Protection (GLEEEP), as amended, implements the jurisdictional distribution of environmental responsibilities for mining activities. The federal government is responsible for regulation of activities related to the ecological effects of exploitation and mining of the nation's subsurface materials.<sup>126</sup> The States have the power over preventing pollution from the use of "deposits of a nature similar to the components of earth, such as rocks or products of their decomposition that can only be used for the manufacture of materials for the construction."<sup>127</sup>

The Mining Law of 1992,<sup>128</sup> a federal regulation of mining activity authorized by Article 27 of the Constitution, contains similar language. It exempts from application "rocks or products of their decomposition, which may only be used for the manufacture of construction materials or which are used for construction"<sup>129</sup> and "whose exploitation is mainly carried out by means of open pit work."<sup>130</sup> Sand is formed from the decomposition of rocks, is used for construction (e.g., to make cement), and is mined directly from the surface ("open pit"). Thus, the Mining Law of 1992 exempts sand mining from federal regulation (if, as

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124. *Id.* at tit. 3, ch. 2, § 3, art. 73 § XXIX-G.

125. ENVTL. LAW INST., DECENTRALIZATION OF ENVIRONMENTAL PROTECTION IN MEXICO: AN OVERVIEW OF STATE AND LOCAL LAWS AND INSTITUTIONS 9 (1996).

126. "Ley General del Equilibrio Ecologico y de Proteccion al Ambiente" [General Law of Ecological Equilibrium and Environmental Protection], D.O., Jan. 28, 1998, at tit. 1, ch. 2, art. 5 XIV [hereinafter GLEEP] ("Regulation of activities related to the exploration, exploitation and mining of the minerals, substances and other resources of the subsoil belonging to the nation, insofar as it relates to the effects that those activities might generate on the ecological balance and on the environment").

127. *Id.* at tit. 1, ch. 2, art. 7 X.

The prevention and control of the pollution generated by the use of substances not reserved to the Federation, that constitute deposits of a nature similar to the components of earth, such as rocks or products of their decomposition that can only be used for the manufacture of materials for the construction or ornamentation of works.

*Id.* Products of rock decomposition include sand.

128. "Ley Reglamentaria del Artículo 27 Constitucional en Materia Minera" [Law Regulating Article 27 of the Constitution in the Area of Mining], D.O., Dec. 22, 1975 [hereinafter Mining Law of 1992], translated in FAUSTO C. MIRANDA ET AL., MINING LAW AND REGULATIONS OF MEXICO, 1992-1993 29-92 (1993).

129. *Id.* at art. 5 IV.

130. *Id.* at art. 5 V.

discussed below, it does not occur in riverbeds), leaving regulation to the States.

GLEEEP, however, places national waters under federal jurisdiction.<sup>131</sup> It authorizes federal specifications of "... the requirements, specifications, conditions, procedures, goals, parameters, and permissible limits that must be observed in regions, zones, watersheds or ecosystems, in the use of natural resources."<sup>132</sup> GLEEEP also states that "grant of authorizations to affect the course or bed of water flows shall be subject to the ecological criteria contained herein."<sup>133</sup> The 1992 Law of National Waters<sup>134</sup> establishes a federal zone extending ten meters from the highest water level in the nation's rivers.<sup>135</sup> There is consequently ample statutory basis for federal regulation of sand mining in riverbeds. Environmental impact statements may be required prior to federal permitting.<sup>136</sup>

The principal federal environmental agency is the Secretariat of Environment, Natural Resources and Fisheries,<sup>137</sup> known as SEMARNAT. Within SEMARNAT is the National Water Commission (NWC). The NWC implements the Law of National Waters and issues the permits that riverbed sand miners must have to operate.<sup>138</sup> The Federal Environmental Protection Office (PROFEPA) has oversight and review authority over the permits.

The federal sand extraction permit process had developed to deal with relatively low-volume mine operations geared to support local construction projects.<sup>139</sup> The environmental issues associated with high volume mining for export motivated the federal regulators in 2003 to consider issuing a tentative emergency norm<sup>140</sup> to safeguard the sand resources of the country. The final version is still under consideration. The tentative norm defines the federal stream zone width and has requirements

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131. GLEEP, *supra* note 126, at tit. 1, ch. 2, art. 5 XI.

132. *Id.* at tit. 1, ch. 4, art. 36 I.

133. *Id.* at tit. 3, ch. 1, art. 91.

134. Ley de Aguas Nacionales de 1992 [Law of National Waters], D.O., Dec. 1, 1992 at tit. 1, ch. 1, art. 3, § VIII [hereinafter L.A.N.].

135. *Id.*

136. GLEEP, *supra* note 126, at tit. 1, ch. 4, art. 28.

137. ENVTL. LAW INST., *supra* note 125, at 17. In Mexico, the agency is known as the "Secretaría de Medio Ambiente, Recursos Naturales y Pesca."

138. L.A.N., *supra* note 134, at tit. 5, art. 73.

139. *Id.*

140. *Mexico Moves to Limit Environmental Harm from Mining of Sand for U.S. Construction*, 26 Int'l Env't Rep. 293 (2003).

for grading depth and aquifer protection.<sup>141</sup> It does not address economic concerns, such as preserving sand resources for local domestic needs.

The legal framework for environmental protection by the State of Baja California is the 1992 Law of Ecological Balance and Environmental Protection of the State of Baja California (LEBEP). Its scope includes preserving ecological balance<sup>142</sup> and the rational use of natural resources.<sup>143</sup>

LEBEP requires a permit to mine some natural materials used in construction,<sup>144</sup> and dust from the mining activity must be controlled.<sup>145</sup> The state must approve an environmental impact statement (EIS) for any activity covered by the state LEBEP or the federal GLEEP,<sup>146</sup> and any citizen who thinks that a project has exceeded the applicable environmental standards may ask the state to request the project to submit an EIS.<sup>147</sup>

The LEBEP is administered by the General Office of Ecology of the State of Baja California (Ecology Office).<sup>148</sup> Under the federal Constitution's rubric of "concurrence,"<sup>149</sup> state and municipal officials enforce both the state and federal environmental regulations on matters within their respective jurisdictions.<sup>150</sup> There is a high level of informal cooperation between the municipal, state, and federal agencies.<sup>151</sup> If a federal guideline or rule has been established, the state and municipal regulations must conform to the federal rule.<sup>152</sup>

State and municipal regulators can inspect regulated facilities without advance notice, and the facility must allow access.<sup>153</sup> If warranted by the risk of ecological problems, the facility can be shut down temporarily or permanently.<sup>154</sup> This creates a powerful motive for permit holders to remain in compliance with environmental regulations. A sand industry official has claimed though that, prior to the recent increase in export activity, mining permits were not enforced.<sup>155</sup>

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141. Ponce, *supra* note 2.

142. Ley del Equilibrio Ecológico y de Protección al Ambiente de Baja California [Law of Ecological Equilibrium and Environmental Protection for Baja California], D.O., Dec. 10, 1993, at art. 2 § XI [hereinafter L.G.E.E.B.C.].

143. *Id.* at art. 3.

144. *Id.* at arts. 119–20.

145. *Id.* Dust is a common complaint near sand mines.

146. *Id.* at arts. 52, 66.

147. *Id.* at art. 55.

148. *Id.* at arts. 7, 18, 23.

149. CONST. tit. 3, ch. 2, § 3, art. 73 § XXIX-G (Mex.).

150. ENVTL. LAW INST., *supra* note 125, at 46–48.

151. *Id.*

152. GLEEP, *supra* note 126, at tit. 1, ch. 2, art. 4.

153. L.G.E.E.B.C., *supra* note 142, at arts. 222, 224, 226.

154. *Id.* at art. 229.

155. David Hummel, southwest president of Hanson Aggregates, said in March 2003: "Historically there have been a lot of rogues on the river. Use permits for mining have not been enforced over the years." Stephen Siciliano, *Mexico Moves to Limit*

## VII. RECENT DEVELOPMENTS IN BAJA CALIFORNIA

Mexican federal, state, and local officials have responded sharply during the past two years to the recent increase of sand exports to the San Diego area. In mid-October 2002, PROFEPA suspended the activities of seventy operations thought to have illegally mined 450,000 tons of sand<sup>156</sup> at over thirty-six sites near Tecate and Ensenada. Residents reported hundreds of trucks carrying sand from dry riverbeds;<sup>157</sup> the trucks used back roads to avoid environmental officials.<sup>158</sup> By late October 2002, sixteen sand operations had reopened following permit reviews by SEMARNAT. They were allowed to mine only one-tenth of the amount of sand they had requested. A PROFEPA official said that most of the operations closed a few weeks before had permits, but few had submitted the required EIS reports.<sup>159</sup>

In early November 2002, Carlos de la Parra, head of the SEMARNAT office in Baja California, announced that SEMARNAT would work to better regulate sand mining in the state and revamp the EIS requirements to include estimates of the amount of sand that can be removed without damage.<sup>160</sup> In January 2003, Governor Eugenio Elorduy called for an end to the export of sand to California. He said: "California will have to make other arrangements on this matter. ... We don't think it's fair that we are the supplier."<sup>161</sup> While de la Parra pointed out that regulators had a lack of information about the state's riverbeds, Jorge Escobar Martinez, then head of the state Ecology Office, said: "We know enough to take action." He said at least ten riverbeds had been damaged by illegal operations.<sup>162</sup>

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*Environmental Harm from Mining of Sand for U.S. Construction*, 26 INT'L ENVTL. REP. 293 (2003).

156. Four hundred and fifty thousand tons of sand is roughly equivalent to one hundred and ninety thousand cubic yards.

157. Manuel Villegas, *Sand Stolen from Baja California, Some Sent to US*, FRONTERA (Tijuana), Oct. 17, 2002, available at <http://www.nmsu.edu/~frontera/dec02/envi.html> (last visited Jan. 6, 2005).

158. *Id.*

159. *Baja Sandbox Emptied into U.S.*, *supra* note 64.

160. Zulema Flores, *Mexican Feds Respond to Sand Mining Issues*, FRONTERA (Tijuana), Nov. 5, 2002, available at <http://www.nmsu.edu/~frontera/nov02/Tijuananews.html> (last visited Jan. 6, 2005).

161. Sandra Dibble, *Sand Exports from Mexico may Dry Up: Baja Governor Wants Supply to U.S. Halted*, SAN DIEGO UNION TRIB., Jan. 30, 2003, at A-1 [hereinafter *Sand Exports may Dry Up*].

162. *Id.*

In February 2003, Cosme Cazares, a Tecate City councilman, and a state official stopped a train load of export sand from crossing the border. The importer, Carrizo Gorge Aggregates, said the sand was mined under proper permits and claimed the mining was done in an "environmentally friendly" manner. Governor Elorduy said: "The idea is that the sand should be for the use by Baja California, for construction, for highways—for our needs. What we've had here is plundering—irresponsible plundering."<sup>163</sup>

A week later, in a move to buy time to develop new protective policies, the state temporarily shut down the large Oso Negros Valley operation of Petreos del Pacifico (a joint venture of Hanson Aggregates, a British based company, and a Baja California company) on the grounds that certain machinery lacked permits. The sand produced there was slated to be barged to San Diego. Escobar said: "The state's policy is to not permit sand exporting. We are using the instruments that are available to us."<sup>164</sup> The Oso Negros operation was back in production in March.<sup>165</sup>

A February 17, 2003 press release from Governor Elorduy's office announced that state and federal agencies had performed 108 interventions of inspection of sand mine operations.<sup>166</sup> Many of the permit holders were said to have not followed the conditions of their permits, especially those that were producing for export to the United States.<sup>167</sup> Those permit holders were unlikely to have their permits renewed.<sup>168</sup> The interventions of inspection were to be followed by studies to determine the rate of sand extraction that could be achieved without environmental harm.<sup>169</sup>

The NWC is currently mulling a tentative federal emergency norm<sup>170</sup> which would control requirements for grading depth and aquifer protection during sand mining activities.<sup>171</sup> It is not clear when that regulation will be issued.<sup>172</sup> SEMARNAT has recognized that the

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163. *Mexican Officials Halt Sand Shipments*, *supra* note 3.

164. Sandra Dibble, *Leaders in Baja Draw a Line in the Sand: Fear of Depletion Prompts Move to Cut Exports to U.S.*, SAN DIEGO UNION TRIB., Feb. 14, 2003, at B-1 [hereinafter *Leaders in Baja Draw Line in Sand*].

165. Gorman, *supra* note 12.

166. Press Release, Office of Governor Elorduy, Se Han Realizado 108 Intervenciones de Inpeccion de Arena en Baja California [108 Interventions have been Carried Out in Inspection of Sand] (Feb. 17, 2003). Fifty-one inspections were by the NWC, and fifty-seven by PROFEPA and the State Ecology Office.

167. *Id.*

168. *Id.*

169. *Id.*

170. *Mexico Moves to Limit Environmental Harm*, *supra* note 140.

171. Ponce, *supra* note 2.

172. Interview with Victor Ponce, Professor of Engineering, San Diego State University,



current environmental impact statements are inadequate. A presentation given at a multi-agency meeting to define the research required to support rational regulations organized by SEMARNAT pointed out that environmental impact statements are not currently required to consider important factors.<sup>173</sup> These environmental and geologic factors include the synergistic effect of multiple mines, erosion and deposition patterns of the sand, the re-supply rate of the sand, and the hydrodynamics of sand in running water.<sup>174</sup> The presentation noted that without consideration of those effects, the actual environmental impact of sand mining is unknown.<sup>175</sup> Unfortunately, the proposed research has not yet been performed.<sup>176</sup>

At the present time, no sand from Baja California is being exported by truck or train,<sup>177</sup> but Petreos del Pacifico is barging sand from Ensenada to San Diego.<sup>178</sup> Petreos del Pacifico (part of a large multi-national company) has invested a substantial amount in infrastructure for sand mining, including at the Port of Ensenada.<sup>179</sup> Thus, sand export by small-scale firms has ended,<sup>180</sup> and only the largest exporter remains. San Diego area sand users have turned to sources in Riverside and San Bernardino counties; Imperial County is a likely future source as train service to San Diego becomes available.<sup>181</sup>

#### VIII. PARALLELS BETWEEN THE U.S. AND MEXICO

Mexico and the United States both have domestic uses for sand and legitimate environmental concerns associated with riverbed sand production. Both countries manifest their environmental concerns through legislation

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San Diego, Cal. (Apr. 14, 2004).

173. E-mail from Juan Carlos Avitia, Baja California office of SEMARNAT, to author (Apr. 13, 2004, 16:13:30 PDT) (on file with author).

174. *Id.*

175. *Id.*

176. Interview with Victor Ponce, *supra* note 172.

177. Telephone Interview with Benny Wright, *supra* note 9.

178. *Id.*

179. *Sand Exports from Mexico may Dry Up*, *supra* note 161. Petreos del Pacifico is a joint venture between Baja California-based Amaya Curiel and British-based Hansen Aggregates. They have invested forty million dollars in rock and sand mining infrastructure, including port facilities and barges.

180. Telephone Interview with Benny Wright, *supra* note 9. The Mexican miner that previously supplied Carrizo Gorge Aggregates now sells his entire production within Baja California.

181. *Id.*

enacted to conduct riverbed sand mining in an environmentally responsible manner. Each country has both state and federal regulations affecting operations of sand mining. In the San Diego area, for example, every one of eight then-active sand mines along the San Luis Rey river was out of compliance with either state SMARA or federal CWA Section 404 regulations in the 1990-1992 period.<sup>182</sup> In Baja California, application of state and federal regulatory authority shut down (permanently or temporarily) every active sand mine while officials reviewed operating and export permits.<sup>183</sup>

The history of regulatory compliance by miners and enforcement by governmental agencies is similar in both countries. Two phases can be identified. The first phase occurs while sand producers are serving the local domestic market and demand grows as a linear function of local population. During this phase, sand miners typically do not comply with regulatory requirements (and there are regulations on the books), and governmental oversight is minimal. This phase lasted until about 1990 in the San Diego area and until about 2002 in Baja California.

In the second phase, governments become aware of environmental problems and start enforcing existing regulations or bring new regulations to bear. In both countries, the problems came to light because local agencies or citizen groups were harmed by the sand production activities. In San Diego, unprecedented erosion along the San Luis Rey River in 1991-1992, due to badly managed sand mines, caused damage to water pipelines and transportation infrastructure. The water agency brought the sand mine activity to the attention of state and federal regulators. In Baja California, a citizen's group noticed the increased truck traffic serving unregulated sand mines, found the damage to local riverbeds, and notified authorities.

The break-point between the first and second stages can come about in two ways. First, non-compliant mining continues to meet a steady increase in local demand until environmental damage accumulates to such a degree that it cannot be ignored. This was the situation in San Diego along the San Luis Rey River. Second, relatively modest local demand is met by compliant or non-compliant mining until external demand motivates a rapid increase in non-compliant mining. This is the situation in Baja California, where the export demand overheated the market and spurred a large increase in non-compliant mining.

At the present time, the two countries may be moving in different regulatory directions. The U.S. Supreme Court is weakening federal

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182. Sandeck, *supra* note 22, at 46.

183. *Leaders in Baja Draw Line in Sand*, *supra* note 164; *Sand Exports may Dry Up*, *supra* note 161; Flores, *supra* note 160.

control of the environmental impacts of dumping dredged material (CWA Section 404).<sup>184</sup> This loosening of federal control will likely have negligible economic impacts on sand mining because state regulations remain unchanged. Meanwhile, the Mexican federal government is posed to issue new, more stringent regulations controlling mining activities in riverbeds.<sup>185</sup> These could potentially raise sand mining costs because the regulations are likely to greatly restrict the amount of sand that can be removed from any site.

#### IX. MEXICO ACCOMMODATES ECONOMIC CONCERNS WITHIN ENVIRONMENTAL REGULATIONS

Mexican federal, state, and municipal officials and citizens have appropriate and legitimate concerns about the environmental effects of riverbed sand mining activities in Baja California. These concerns are addressed by the current and pending regulations discussed above; however, there is also the economic concern expressed by the Governor of Baja California about mining sand for export to the San Diego area. This concern is that unbridled export of sand will leave inadequate amounts for domestic economic growth. Baja California Governor Elorduy said in February of 2003: "The idea is that the sand should be for the use by Baja California, for construction, for highways—for our needs. What we've had here is plundering—irresponsible plundering."<sup>186</sup>

This poses a difficulty for the State. Federal law controls export matters, but sand exports are not regulated under the federal law. State environmental laws must explicitly follow federal environmental regulations under the rubric of 'concurrence,' but no federal environmental law prohibits the export of sand. Thus, the State does not have a basis under export or environmental law to directly restrict sand exports.

A solution is to use the environmental regulations. The criteria to grant sand mine operating permits could include economic and social considerations in addition to environmental considerations.

SEMARNAT, the federal environmental agency, is planning to factor social and economic considerations into its decision-making process

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184. See *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Eng'rs*, 531 U.S. 159 (2001).

185. *Mexico Moves to Limit Environmental Harm*, *supra* note 140.

186. *Mexican Officials Halt Sand Shipments*, *supra* note 3.

regarding sand mining. SEMARNAT organized a multi-agency meeting to define the studies required to provide the foundation to support granting sand mining permits. Items in the proposed study include “characterization of social and environmental impact, as well as its economic impact” and “identification of the best sites for said extractions and designations of conservation sites according to its environmental, economic and social conditions.”<sup>187</sup>

This proposed study has not yet been performed,<sup>188</sup> but the inclusion of social and economic items in it indicates the willingness of permit granting agencies to include more than purely environmental findings in their decisions. This provides a potential avenue for Governor Elorduy’s concerns to be discreetly met.

#### X. CURRENT STATE OF SAND EXPORTS FROM BAJA CALIFORNIA TO SAN DIEGO

One year ago, the Baja California to San Diego sand export situation was in turmoil, with weekly news reports of Baja California officials shutting down exports and San Diego users facing higher prices from alternate U.S. suppliers. Since then, there has been little news—new Mexican federal regulations expected a year ago have not been released and necessary environmental studies have not been performed.<sup>189</sup> This leads some observers to wonder if the State has quietly dropped the issue.<sup>190</sup>

Currently the only exporter of sand from Baja California<sup>191</sup> is a joint venture between Baja California-based Amaya Curiel and British-based Hansen Aggregates called Petreos del Pacifico.<sup>192</sup> Petreos del Pacifico mines the sand in Ojos Negros Valley and barges it from Ensenada to San Diego.<sup>193</sup> The company has invested forty million dollars in rock and sand mining infrastructure, including facilities at the Port of Ensenada and barges.

Petreos del Pacifico was shut down by regulators several times in 2001 and 2002. Governor Elorduy said in January 2003: “It’s such big money that they think they can fool around and do things they wish, without

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187. E-mail from Juan Carlos Avitia, *supra* note 173.

188. Interview with Victor Ponce, *supra* note 172. Lack of funding may be responsible for holding up the proposed study.

189. *Id.*

190. Telephone Interview with Sandra Dibble, Reporter, San Diego Union Tribune, San Diego, Cal. (Mar. 18, 2004).

191. Telephone Interview with Benny Wright, *supra* note 9.

192. *Sand Exports from Mexico may Dry Up*, *supra* note 161.

193. *Id.*

respect to the law. This is intolerable in the state I govern. ...”<sup>194</sup> The company claimed, however, that their investment motivated them to quickly correct any violations,<sup>195</sup> and they are still in business, now as the only exporter.<sup>196</sup>

Smaller scale importers of sand have decided not to deal with the perceived hassles of maintaining permits and moving sand across the border and have opted for U.S. sources of sand.<sup>197</sup> These sources are in Riverside and San Bernardino counties, with Imperial County being a likely future source as train service to San Diego becomes available.<sup>198</sup>

Sand mined in Baja California that had been exported to San Diego is now being consumed domestically. For example, until early 2003, Campo-based Carrizo Gorge Aggregates had imported 2000 tons of sand per day by train but has now stopped importation.<sup>199</sup> Benny Wright, President of Carrizo Gorge Aggregates, says his former supplier now sells his entire production within Baja California.<sup>200</sup> Thus, the goal of preserving sand for domestic consumption has been met. The goal was achieved not by new regulations, but by a combination of stricter enforcement of existing regulations and jawboning by government officials.

#### XI. SAND TRADE ISSUES AS A TEMPLATE FOR FUTURE TRADE ISSUES

Sand is a necessary ingredient for an industrial society; electricity is another. There are parallels between some recent developments in sand and electricity markets: demand for both commodities has increased in Southern California and supplies for both commodities have been sought in Baja California.<sup>201</sup> It is of interest to compare the experience with sand to the potential future of electricity.

As discussed above, the perceived costs of meeting the regulatory requirements of sand mining in the U.S. motivated sand producers to seek sources in Baja California. The proximity of Baja California to the

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194. *Id.*

195. *Id.*

196. Telephone interview with Benny Wright, *supra* note 9.

197. *Id.*

198. *Id.*

199. *Id.*

200. *Id.*

201. See, e.g., SPG Media PLC, *Termoelectrica de Mexicali CCGI Power Plant, Baja California, Mexico*, at <http://www.power-technology.com/projects/mexicali/> (discussing power plant built by Semptra Energy near the border, designed to export energy to southern California).

San Diego area sand users is an important consideration because the cost of transportation is a determinative factor in the cost of the sand.

Likewise, Southern California has a growing need for electrical power production. The high cost of land (power plants require a lot of room) and regulatory requirements (such as air pollution control equipment) in Southern California motivated power generators to build facilities in northern Baja California to produce electricity for export to Southern California.<sup>202</sup> These include natural gas powered electrical generating plants in Mexicali Valley and planned facilities to receive liquid natural gas from ships on the coast near Ensenada.<sup>203</sup> Proximity to the Southern California market is again critical because the cost of power transmission lines is a large fraction of the total power station cost.<sup>204</sup>

There are also corresponding environmental impacts. Sand mining can produce riverbed damage, as discussed above. Electrical production entails air pollution and opportunity costs of land tied up in fuel facilities and transmission lines.<sup>205</sup> U.S. regulators attempted to mitigate the air pollution problem by requiring the Mexicali Valley power plants to install air pollution equipment, which meets stringent California standards, as a condition for permits to connect to the U.S. transmission grid.<sup>206</sup> Enforcement was lax, however, and U.S. regulators did not realize that the air pollution control equipment had not been installed until the plant was completed and transferring electricity across the border.<sup>207</sup>

There are thus parallels in the regulatory pressures and environmental impacts of sand and electricity production. Demand for both commodities is driven by population growth and increasing economic activity in the respective countries. Recall the discussion above of the two phases of sand mining activity and regulatory enforcement. There, stricter enforcement of mining regulations (the second phase) by Mexican authorities was motivated by the perception that increasing environmental

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202. *Id.*

203. BORDER ENERGY STRATEGY COMMITTEE, ENERGY ISSUES IN THE CALIFORNIA-BAJA CALIFORNIA BINATIONAL REGION: DRAFT (2002), available at <http://www.scerp.org/BESC.pdf> (last visited Feb. 6, 2005).

204. *Termoelectrica de Mexicali CCGI Power Plant, Baja California, Mexico*, *supra* note 201.

205. *Newshour with Jim Lehrer* (PBS television broadcast, Jan. 3, 2003) (statement of Jeffrey Kay) (stating that effectiveness of air pollution control equipment on different new plants varies and that LNG terminals would occupy prime tourist coastline), available at [http://www.pbs.org/newshour/bb/business/jan-june03/power\\_1-2.html](http://www.pbs.org/newshour/bb/business/jan-june03/power_1-2.html) (last visited Feb. 6, 2005).

206. This attempt apparently was motivated by two factors. First, officials wanted to avoid the appearance of dumping the pollution problem on Mexico. Second, Mexicali Valley is part of the same airshed as the Imperial Valley in the United States, so the pollution control actually benefits both countries.

207. Diane Lindquist, *InterGen Gives In, Unplugs Turbine*, SAN DIEGO UNION TRIB., Jan. 17, 2004, at C-1.

damage was occurring as a result of shortcuts taken by sand miners to feed the export market.

The same problem is becoming evident in the electrical export market. A major electrical producer, headquartered in the United States, built a plant in Baja California without the pollution control equipment promised to federal regulators.<sup>208</sup> That is, the producer of an export commodity apparently took a shortcut that, had it not been caught, would have produced greater air pollution in Mexico in order to feed the export market. There is no reason to think that residents of Baja California will bear the environmental cost of energy production<sup>209</sup> any more than they did in the case of sand mining. Given the far higher capital costs of power plants relative to sand mines, it behooves the international partners to adhere to existing environmental regulations.

## XII. SUGGESTIONS FOR SUSTAINABLE SAND MINING

Sand is required to sustain an industrial economy. At the same time, there are valid environmental concerns associated with riverbed sand mining. Those concerns can be addressed by appropriate regulations, under the respective national standards, that are tailored to the local environmental situation. Sand is continually produced by the weathering of rocks and transported by rivers, so careful mining can ensure that sand remains a renewable resource.

There are reasonable ways to mine sand. One method is to calculate the volume of sand transported down a river system and limit the amount extracted to the replenishment rate.<sup>210</sup> The volume can be equitably distributed among the miners along the river system.<sup>211</sup>

Another method is to determine the level of the riverbed that can be tolerated after mining—that level is called the redline.<sup>212</sup> The redline is calculated by considering, for example, nearby infrastructure that may be undermined, the tolerance of any plant and animal communities to sand removal, and the depth to groundwater.<sup>213</sup> Infrastructure

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208. *Id.*

209. Diane Lindquist, *Energy Plants Face Baja Backlash*, SAN DIEGO UNION TRIB., Nov. 29, 2002 (discussing how communities were organizing to oppose energy infrastructure construction), available at [http://www.signonsandiego.com/news/reports/power/20021129-9999\\_1n29oppose.html](http://www.signonsandiego.com/news/reports/power/20021129-9999_1n29oppose.html) (last visited Feb. 6 2005).

210. Sandecki, *supra* note 22, at 47.

211. *Id.*

212. *Id.*

213. *Id.*

considerations may require sediment transport modeling; preserving plant or animal habitats may require the current riverbed level to be used as the redline—that is, no sand removal.

Specific sand removal techniques can minimize negative environmental effects. For example, a river meander (a bend in the river) naturally migrates by erosion on the convex side and deposition of sand deposits on the concave side of the bend. Sand removal from the deposits on the concave side will not cause negative effects, such as changing the course of the river or initiating anomalous erosion. Those kinds of negative effects would happen after less-thoughtful mining techniques such as, for example, the removal of sand directly out of the active river channel.<sup>214</sup>

The need for sand for construction purposes, the availability of mining techniques that minimize environmental problems, and the proximity of Baja California sand supplies to the San Diego area market suggest that it would be useful to develop a mechanism to allow continued responsible mining to feed the export market. The suggestion made here is to certify that sand mined in Baja California for export to San Diego (or elsewhere) was mined in an environmentally responsible manner in accordance with applicable regulations. The certificate would follow the sand load from the origin point to the border crossing to the final user.

The certification procedure could operate in the following manner: Mexican federal and state agencies issue mine operating permits under the standards of existing or pending regulations. If a sand miner wishes to produce sand for export, he would be subject to inspection of his production techniques with specific consideration of the local environmental conditions. He would then obtain an additional permit enabling his product to be certified for export. The certification could be general, so that any load from the mine would have automatic certification, or it could be specific, so that each production unit would be individually certified.

The environmental certificate would accompany the sand load to the border, and passage across the border would be conditioned on the possession of the certificate. Importers would receive the certificate with the sand shipment. The certificate would then follow the sand to retailers and be passed onto the final consumer.

The additional costs of such a scheme would be a small increment on top of the expenses of existing regulatory inspections and export paperwork. The benefits are several. First, Baja California miners would obtain income from the lucrative San Diego market. That income gives the sand miners a strong incentive to adhere to the tough environmental

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214. Ponce, *supra* note 2.



standards, which minimizes negative environmental effects; and retailers could command a price premium by advertising that the product is produced in an environmentally safe manner. Second, because transportation costs control sand prices, the entire border region would benefit by having an efficient supply and market pairing with minimal transportation costs.

### XIII. CONCLUSION

Sand is a useful product necessary for industrial construction activities. Thoughtlessly mining sand from riverbeds can cause severe environmental problems. U.S. federal and state regulatory enforcement, which began in earnest in the early 1990s, decreased the amount of riverbed sand mining in the San Diego area as mine operators were unwilling or unable to comply.

Mexican federal and state regulations address the same environmental concerns. The decrease of sand mining in the San Diego area fueled a rapid increase of mining in nearby northern Baja California to feed the export demand. This increase threw environmental concerns into sharp relief, and these concerns were coupled with a desire to preserve adequate sand resources for domestic consumption.

The evolution of the cross border sand trade with potential negative environmental impacts being placed disproportionately on Mexico may find a parallel in recent developments in the energy market. Power plants to serve the U.S. market have been recently built in northern Baja California with attempted shortcuts to bypass pollution control equipment. This may fuel a backlash similar to that in the sand mining situation.

There are environmentally sound methods to mine sand. It is suggested that sand exports be certified when there is compliance with existing and pending environmental standards, which would allow the sand market to function in a manner that minimizes transportation costs (a determinative factor in the cost of sand) while addressing the legitimate environmental concerns of sand-producing areas.

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