Vietnam, China, and the United States: The Regulatory Framework of Mining Pollution and Water Quality

Heather Whitney, Vermont Law School
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INTRODUCTION

Water has been called “mining’s most common casualty.”¹

This paper compares the environmental, mining, and water quality policy and regulatory framework of three countries: Vietnam, China, and the United States. There are many similarities between China and Vietnam’s legal framework and environmental protection mechanisms, simply by virtue of the fact that they are both socialist countries, both authoritarian governments, and both in the midst of an industrial revolution. The United States intersects in some areas of water quality standards and technological controls of effluents with both countries, as well as certain enforcement measures. This is true especially in China, where the EPA has actively consulted the Chinese government in water resource and water quality matters.²

Research revealed significant intersections between each country in terms of the lack of effective enforcement measures either in reality, or in practice, to address mining pollution in surface water. Research also showed that all three countries have degraded surface water quality despite implementation of regulations. Likewise, mining pollution that affects water quality is increasing, and water quality is worsening as a whole in each country. This is due, in part, to policy and statutory declarations that simultaneously

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strive to foster clean water and a clean environment and socioeconomic growth. It is also
due to corruption and “crony capitalism” that places personal relationships and
advancement through bribery over actual policy-making and enforcement. Thus, in each
country environmental laws, regulations, and water quality enforcement have not met
overarching conservation goals.

We see these discrepancies in the mining sector. Vietnam’s mining industry is
growing exponentially, and its waterways are showing signs of corresponding stress.
Legal and illegal mining in Vietnam has caused widespread pollution in watersheds and
aquifers, and industry in general is on a dangerous trajectory with regard to the
deregulation and lack of enforcement of pollutants. Over the past 25 years, Vietnam’s
efforts to regulate water pollution and water quality have been somewhat effective,
particularly in areas of the Mekong region and other watersheds that hold interest with
NGO’s and foreign aid.\(^3\) However, commitment to enforce water quality laws and
regulations has been weak, as the country lacks the resources and the political will to end
corruption that overrides necessary controls. Indeed, the World Bank has estimated that
Vietnam’s toxic intensity will increase 14.2 percent annually if adequate regulatory
pollution prevention controls are not implemented.\(^4\)

\(^3\) Dr. Sara L. Bennett, *Water Quality Management in Vietnam*, WATER ENVIRONMENT
be found at *Reaching the Unreached-Challenges for the 21\(^{st}\) Century*, WATER ENGINEERING &
DEVELOPMENT CENTRE CONFERENCE, New Dehli 1996, pp. 31-33. Also see: Vietnam Water

\(^4\) DANA O’ROURKE, COMMUNITY DRIVEN REGULATION: BALANCING DEVELOPMENT AND
China is among the top water polluters in the world, and water pollution is one of the country’s most pressing environmental problems. Due to China’s industrial revolution and push for economic growth, its rivers, streams, lakes and aquifers have been used as repositories for industrial waste, with little oversight. The country’s failure to adequately regulate pollution from its mining sector is partly to blame for discharges of toxic pollutants into waterways. Thus, there are many waterbodies that fall under the most toxic water quality index category, and that are unfit for human use. At the turn of the 21st century, China embarked upon a new development scheme called the “green strategy.” The strategy includes different targets for environmental protection and restitution, including developing a revolving economy, developing clean production, reducing pollution cost, developing green consumption, reducing ecological impact of consumption, and the implementation of new environmental laws. While the country continues down the path of industrialization, it will remain to be seen whether many of its environmental mechanisms, including water quality, will shift to a sustainable model.

The United States has a well-developed regulatory system that addresses pollution into waterways and water quality benchmarks, which have helped quell the effects of minerals exploitation on water quality, but they have not done enough. Surface waters in predominantly western and Appalachian states still experience a high degree of pollution due to legal and illegal mining discharges. For example, environmental groups in Kentucky initiated a lawsuit against two coal-mining companies in 2010 for committing

8 Id.
more than 20,000 violations of the Clean Water Act, and in March 2011, sued another mining company for violating the Clean Water Act 12,000 times and falsifying documents. Abandoned and inactive hard metal mines, such as gold, copper, and silver, have also contributed significantly to surface water pollution in the U.S. that affects both human health and biodiversity. Like Vietnam and China, enforcement of mining pollution in areas of the U.S. is inadequate, or nonexistent.

This paper will present relevant issues relating to mining and water quality protection, and will be analyzed in order to meet three purposes: 1) Provide an overview of each countries’ legal framework, so the reader will better understand all three countries’ legal processes; 2) Provide analysis for the most relevant laws and regulations of the mining sector, environmental law, and water pollution control and water quality protection; 3) Provide examples to underscore the legal and regulatory processes, and their effects, in the real-world.

Part I of this article briefly reviews mining pollution causes and their effects on water quality and human and animal health. Part II begins an overview of Vietnam’s mineral capacity, laws, and policy, its economic success, its environmental framework, and its water quality regulatory framework. Part III examines China’s standing in the world in terms of economics and fresh water network, its mining sector and regulatory

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framework, its environmental and water quality laws and policy, and various enforcement instruments. Part IV analyzes the United States’ surface water quality with regard to its longstanding regulatory framework, its mining policy and law, its water pollution regulatory instruments, and its enforcement mechanisms.

I. MINING POLLUTION AND ITS EFFECTS

Mining pollution poses a severe health risk for humans and watersheds in most regions of the world, including Vietnam, China, and the Untied States. Detrimental impacts of mining processes on the environment and water quality are caused by legal and illegal dumping of chemicals into waterways, faulty tailings ponds, leaching chemicals during the break-down process, poorly built roads during the exploration phase that disturb water bodies, mismanaged mine construction, contaminated waste rock that falls back into water bodies, tailings that are affected by weather and other acts of nature, and abandoned mines.12 Because the mining industry has become more mechanized, mines are able to process enormous amounts of low-grade ore and rock, culminating in unprecedented processed waste.

Processing of hard rock ores and minerals, such as gold, copper, and bauxite, requires toxic chemicals to extract the mineral from rock. Cyanide leach mining is now the most popular method used by industrial hardrock mines to extract gold due to its efficiency and cost-effectiveness.13 Cyanide is conducted into the environment from open-pit tailings that leach toxic chemicals into the water supply. Cyanide is extremely

12 Id.
toxic to humans: only a teaspoon containing 2 percent of cyanide solution, or the weight of a kernel of corn, will prove fatal to a human being. Further, aquatic species are vulnerable to cyanide death in the “microgram per liter” level (parts per billion), and bird and mammals are vulnerable to cyanide death in the “milligram per liter” (parts per million) level. In artisanal gold mining operations, mercury is used to extract gold from ore and evaporates into the air and onto flora and fauna. When mercury reaches the bottom levels of the food chain in algae and small aquatic animals, it increases in concentration as it passes from plant to human in a process called “bioaccumulation.” Toxicity levels peak in predator animals, such as tuna fish or stream-based trout, mammals, birds and humans. Moreover, chemical-laden animal scat contaminates surrounding habitat including land and aquatic plant species, creating a vicious cycle amongst ecosystems. As such, gold mining is considered one of Earth’s most toxic polluters.

Other toxic chemicals used for mineral extraction are: mercury, arsenic, sulphuric acid, and lead, when released into the environment eventually reach the food supply

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14 ENVIRONMENTAL PROTECTION AGENCY, TOXOLOGICAL REVIEW OF HYDROGEN CYANIDE AND CYANIDE SALTS 6-9 (2010). Also known as “prussic acid poison,” cyanide is conducted through eye or skin exposure, indigestion, and inhalation. See Cyanide Leach Mining Packet, (A Project of the Mineral Policy Center, Washington, D.C.) August 2000, p. 4.

15 Earthworks Mineral Policy Center, Supra note 13 at 5-6. The most dangerous situation involving cyanide is an accidental spill. Examples include the Zortman-Landusky Mine, Montana 1982: 52,000 gallons of cyanide spilled into Zortman, Montana’s water supply; Summitville Mine, Colorado, 1992: 17 miles of the Alamosa River were contaminated and all aquatic life was killed from dumping toxic waste consisting of cyanide and other mining chemicals into the river; the Aural Gold Plant, Romania 2000: 3.5 million cubic feet of cyanide-contaminated toxic waste spilled into Tisza River, a tributary of the Danube, poisoning the water for 250 miles downstream and killing thousands of tons of fish; Kumtor Gold Mine, Kyrgyzstan, 1998: a truck crashed and spilled 2 tons of sodium cyanide into the Barskoon River, causing 4 human deaths and 2,600 poisonings. (Id)

16 ENVIRONMENTAL PROTECTION AGENCY, REDUCING MERCURY POLUTION FROM GOLD MINING at: http://www.epa.gov/international/toxics/asgm.html


18 The Top Six Toxic Threats, THE BLACKSMITH INST., at: http://www.worstpolluted.org/
through water and air contamination. Negative impacts from mining chemicals are immediately evident, and can linger for hundreds, if not thousands, of years.

II. VIETNAM

Vietnam is a water-rich country with exceptional surface and groundwater resources, consisting of 2,372 rivers that are over six miles long and that deposit over a trillion cubic feet of water every year, and 109 of them are main avenues of transport. There are over 600,000 square miles of watershed basins, and 13 rivers whose basin area is over 6,000 square miles, nine of which are main avenues of transport.

In light of Vietnam’s vast aquatic network, its ability to mitigate ecosystem pollution and degradation due to mining activity, and to manage water quality and quantity, are major areas for concern. All watersheds throughout the country are polluted, and do not meet adequate drinking standards. Moreover, there are five major watersheds that are classified as severely polluted and at “alarm status”: the Mekong, Red, Dong Nai, Vu Gia, Thu Bon, and Ca. In light of these facts and the large volume of water that runs through Vietnamese watersheds, it is not surprising that Vietnam is ranked 127th out of 146 countries in terms of overall environmental health behind Laos, Cambodia, and Thailand, according to the Environmental Sustainability Index.

A. Vietnam’s Mineral Wealth and Corresponding Pollution

19 Safe Drinking Water Foundation, supra note 1.
21 See id.
23 See id., p. 23.
Vietnam has been characterized as having “amazing potential in terms of mineral wealth,” and undeveloped in terms of mapping and exploitation.\(^{24}\) At present, ten percent of the Gross Domestic Product in Vietnam is generated from mineral exploitation.\(^{25}\) Vietnam ranks number one in the world in titanium reserves (an estimated 650 million tons)\(^ {26}\), third in the world in bauxite reserves (the raw material for aluminum estimated at 5.4 billion tons), and possesses other notable reserves of gold and iron ores, rare earths, and pyrite.\(^ {27}\) There are over 5,000 documented mines in Vietnam, which hold 48 varying minerals.\(^ {28}\) Nine hundred of those mines are thought to actually produce mineral product for sale, but the true number of operational mines is not known.\(^ {29}\)

Notable gold reserves have been found in central, southern, and northern regions of Vietnam, but, the vast majority of gold mines in Vietnam are small, or artisanal, in size.\(^ {30}\) To emphasize the ubiquitous nature of gold in northern Vietnam, a natural resources official of Na Ri District is reported to have said: “A handful of sand in any river or stream in Bac Kan has some gold dust.”\(^ {31}\)

Gold mining activity in Vietnam has increased in the past decade, from both legal


\(^{29}\) VIETNAM BUSINESS FORUM, Supra note 25.


\(^{31}\) See id.
and illegal mining operations, which has resulted in severe water contamination. For example, the largest gold mine in Vietnam, the Bong Mieu Gold Mine in Quang Nam Province’s Phu Ninh District (located in the center of the country) is rumored to contain over five tons of gold, and is in full operation. Located nearby is the Bong Mieu River, which supplies water for the mine, fishing, and domestic and riparian use to thousands of residents. Since the mine was constructed in 2006, there have been repeated reports of river-related maladies: large numbers of dead fish, livestock illness, and human skin diseases. The toxic chemical that is causing these impacts is cyanide. Cyanide use for gold mining in Vietnam is a popular method of ore extraction; nearly two tons of the chemicals were seized in May of 2010 in the northern district of Vietnam, and over three tons were seized in December of the same year.

Bauxite is usually mined through open-pit mines, and its refined component produces a toxic red sludge of chemicals, including arsenic, that leach into streams, rivers, and aquifers. Arsenic is a naturally occurring substance in nature, but also is a common byproduct of the bauxite mining process. The most famous case of arsenic-sludge pollution to date is the tragedy in Hungaria on October 4 of 2010. There, a

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35 See id.


reservoir of 1 million cubic meters of aluminum red sludge burst and covered 15 square miles, including whole villages, killing at least nine people.\textsuperscript{39} In 2006, China and Vietnam signed an agreement that will allow a Chinese-government-owned company to mine bauxite and refine aluminum in the Central Highlands, which would be exported in total to China.\textsuperscript{41} An arsenic spill in the Central Highlands of Vietnam would be devastating, as the area is composed of hundreds of ethnic villages, beautiful scenery, wildlife, and coffee farms. Since 1990, several hundred coffee cooperatives and farms in the area have produced the world’s second largest crop of coffee behind Brazil, and exported the highest amount of robusta beans in the world.\textsuperscript{42} Just south of the Central Highlands lies Nam Cat Tien National Park,\textsuperscript{43} which is one of the most biologically diverse regions in Indochina. The region is so important that in October of 2010, several retired high-level officials, intellectuals, and scientists presented the government with a petition, requesting that it shut down any exploration or exploitation of bauxite in the area. The group warned that there may be a disaster like that in Hungary, and said that cancellation of the expensive project should occur “in the interests of ‘national destiny.’”\textsuperscript{44} In early 2009 health officials found systemic contamination of municipal tap and bottled water in the country’s capital Hanoi, which contained elevated levels of arsenic.

\textsuperscript{39} \emph{Hungary: Toxic Spill Factory Chief Executive Arrested}, BBC NEWS EUROPE, Oct. 11, 2010, at \url{http://www.bbc.co.uk/news/world-europe-11514951}
\textsuperscript{41} Helen Clark, \emph{Can Vietnam Greens Block a Bauxite Mining Project?}, TIME MAGAZINE, Jan. 18, 2011, available at: \url{http://www.time.com/time/world/article/0,8599,2041746,00.html#ixzz1FMroMACj}
\textsuperscript{43} Nam Cat Tien National Park: \url{http://www.namcatthien.org/}
\textsuperscript{44} HELEN CLARK, \emph{Supra} note 41.
and nitrates, and 6-18 times the normal level of ammonia, a chemical used in copper mining.\textsuperscript{45} While Vietnam works to gain a socioeconomic foothold partially through its mining sector, its surface waters, residents’ health, and biodiversity health are suffering.

B. Vietnam’s Place in the World

Vietnam is an emerging economic giant in Asia, and at the forefront of industrialization. Vietnam is now the fastest growing economy within the ASEAN group in both industry and tourism\textsuperscript{46} and is one of the fastest growing economies in the world.\textsuperscript{47} Vietnam’s “renovation,” to a market economy, or \textit{Doi Moi}, was formerly recognized in 1986.\textsuperscript{48} It has been characterized as the world’s third largest “transitional” developing country, or a country changing from a centrally planned economy to a free market economy, behind China and Russia.\textsuperscript{49}

Prior to \textit{Doi Moi} in 1986, the Vietnamese legal system was considered somewhat incomprehensible by legal scholars, and was based on a framework of ancient law and tradition.\textsuperscript{50} Moreover, environmental protection did not exist as a statutory or regulatory

\textsuperscript{49} Brent Doberstein, \textit{Environmental Capacity-Building in a Transitional Economy: the Emergence of EIA Capacity in Vietnam}, IMPACT ASSES. & PROJ. APPRAISAL, VOL. 21, NO. 1, 27 (MARCH 2003).
issue. Industrialization resulted in massive environmental degradation, and there were no real environmental legal mechanisms in place to stem the destruction. Pressure to protect the environment increased, and environmental safeguards were woven into the basic development plan of Vietnam.

C. Vietnam’s Environmental Law Framework

The Socialist Republic of Vietnam was legally established in 1976 during the Vietnam War, and is controlled by the Communist Party of Vietnam (hereinafter “CVP”). Vietnam shaped its constitutional framework from the United States and its Communist political party framework from the former USSR.

The 1992 Constitution fully embraced the market economy approach of Doi Moi, and also put significant emphasis on environmental protection by stipulating environmental protection as a “constitutional duty.” The Constitution addresses the “Protection of the Environment,” where all entities are to obey the law for the “rational use of natural wealth,” and, “all acts likely to bring about exhaustion of natural wealth and to cause damage to the environment are strictly prohibited.” (Emphasis the author’s)

Environmental legislation in Vietnam has three prongs, notwithstanding the

52 See id. at 46. In 1945, Ho Chi Minh proclaimed Vietnam’s independence from France before a crowd of 500,000 people, and used the words of the United States Declaration of Independence, with one significant word modification: “All people are created equal. They are endowed by their creator with certain inalienable rights; among these are life, liberty, and the pursuit of happiness.” Ho Chi Minh thus declared independence for Vietnamese women, who had been considered the property of their fathers, husbands, and sons.
54 See id. Article 29. There is no definition of “rational use” in the document, nor what constitutes acts that are “likely” to cause damage to the environment.
Constitution: the Law on Environmental Protection (hereinafter “the LEP”), sector-specific laws and regulations, and provincial-community environmental laws and regulations. The first LEP was passed by the National Assembly on December 27, 1993, and came into effect on January 10, 1994.\textsuperscript{55} Its corresponding agency, the National Environmental Agency, was established under the Ministry of Science, Technology and Environment (MOSTE) in 1993 to manage environmental protection.\textsuperscript{56} The LEP was subsequently amended in 2005, and like the Constitution, issues a sweeping responsibility on the part of all entities to protect the environment.\textsuperscript{57} The LEP also places remedial responsibility on the polluter.\textsuperscript{58}

The LEP frames water resource protection as a policy that must be managed in order to further economic development.\textsuperscript{59} Legislation that attempts to strike a balance between the business sector and environmental protection, including water quality protection, is often manipulated by business and governmental relationships: business stakeholders exert pressure on government officials to loosen environmental protection regulation, which results in tenuous legislative benchmarks.

As a result, the United Nations Environmental Development (UNEP) Programme reported that Vietnamese environmental management institutions do not match the


\textsuperscript{56} NGUYEN THI PHUONG LOAN, Supra note 50.

\textsuperscript{57} Supra note 55, Article 4(2).

\textsuperscript{58} See id., Article 4(5).

\textsuperscript{59} See id. Article 4(1). “Environmental protection must co-ordinate harmoniously with economic development and ensure social progress in order to achieve national sustainable development. Protection of the national environment must be associated with protection of the regional and global environment.”
number of tasks that are required, and in general are “weak” in terms of capacity. The United Nations Economic and Social Commission for Asia and the Pacific also stated that several problems contribute to ineffective environmental protection, including overlapping jurisdictions between ministries, inconsistencies between central government laws and provincial laws, and a lack of clear rules and regulations that delineate procedural requirements for each law. The UN states, “There is a crucial need for the LEP to be harmonized with other laws [that] have a direct or indirect impact on environmental protection.”


In accordance with the Constitution, in 1987 the Government of Vietnam enacted the Law on Foreign Investment to attract foreign investors to the mining sector. The Law on Minerals was passed in 1996, which replaced the 1987 Law on Foreign Investment and the 1989 Law on Mineral Resources. The Law has been amended twice since its inception, once in June 2005, and again in November of 2010, (hereinafter “New Minerals Law”) which supplanted the 1996 law and 2005 amendments entirely, and took effect in July of 2011.

62 See id.
63 Vietnam Law on Foreign Investment 1996, as amended June 9, 2000, found at: http://www.vietnamlaws.com/freelaws/LFIna12Nov96(aa9Jun00)%5B11%5D.pdf
65 Vietnam Mineral Law 2011, (No. 60/2010/QH12); Arthur Allen Robinson found at: http://www.vietnamlaws.com. An electronic copy of the new law was obtained through Vermont Law School on a trial membership basis.
The Ministry of Natural Resources and the Environment (MoNRE) is the central entity tasked with organizing mining and exports of minerals and the control and revocation mining licenses, especially those relating to: acreage, duration, processing, production, safety, and environmental protection.\(^{66}\) A local version of MoNRE, called DoNRE, or Department of Natural Resources and Environment, is present in each province, and is responsible for mineral resource management.\(^{67}\) Vietnam’s mineral policy is formulated within the Department of Geology and Minerals of Vietnam, which studies and proposes amendments to legislation and policy supplements to State management of minerals.\(^{68}\)

The 1996 Minerals Law articulated a policy for rational, economical, and efficiently managed mineral resources for the purpose of “satisfying” industrialization and modernization, sustainability, and to maintain national defense and security, as well as “protect the environment and ecology.”\(^{69}\) The mineral policy in the New Minerals Law of 2011 focuses on socio-economic and national defense and security concerns, with no mention of environmental protection.\(^{70}\) Despite this policy omission, environmental protection is mentioned several times throughout the New Minerals Law document. For example, mineral activities are to “be associated” with protection of the “environment, national landscape, historical and cultural sites, and scenic beauty spots and of other natural resources.”\(^{71}\)

The New Minerals Law calls for mining operations to use “environmentally


\(^{67}\) See id.


\(^{69}\) Vietnam Mineral Law, *Supra* note 65 at Forward.

\(^{70}\) See id. Article 3.1.

\(^{71}\) See id. Article 4.1
friendly equipment and materials” as well as taking measures “to prevent or minimize any adverse impact on the environment, and must reconstruct or rehabilitate the environment in accordance with the law.” Mining companies must pay for all expenses to protect, reconstruct, or rehabilitate the environment, and solutions and costs of protection, reconstruction or rehabilitation must be identified in the investment project, EIA report, and “written undertaking on environmental protection” that is approved by the relevant authority. Escrow deposits for rehabilitation and reconstruction of the environment must be arranged before mining commences. Water is mentioned only briefly in the New Minerals Law, where mining companies are “entitled to use water resources in accordance with the law on water resources.”

Vietnam’s shift away from specific environmental conservation language in its new Minerals Law is rooted in the processes of industrialization and geologic science. Since the relatively recent discovery of titanium and bauxite deposits in the Central Highlands, the government has embarked on a much more aggressive mining development trajectory. For example, Prime Minister Nguyen Tan Dung declared the government’s goal to bring in more than $15 billion in investment in bauxite mining projects and aluminum refining by 2025 “a major policy of the party and the state.”

### E. Law on Water Resources

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72 See id. Article 30.1
73 See id. Article 30.2
74 See id. Article 30.3.
75 See id. Article 32.1.
76 See id. Article 30.4.
77 See id. Article 30.5.
78 See id. Article 30.6.
79 See id. Article 30.7.
Pursuant to the Constitution, the Law on Water Resources (hereinafter “LWR”) was promulgated on May 20, 1998 and passed in January 1999.\textsuperscript{79} Its guidance decree was promulgated on December 30, 1999.\textsuperscript{80} The LWR was crafted by the Ministry of Water Resources, which is now part of the Ministry of Agriculture and Rural Development, or MARD.\textsuperscript{81} In December of 1999 the law’s corresponding agency, the National Water Resources Council, was created, which advises the government on national and international water policy issues, and settles water disputes among provinces, cities, and agencies.\textsuperscript{82}

The LWR focuses mainly on water resource management, ergo supply.\textsuperscript{83} The LWR begins by placing an extreme importance on the health of the resource: “Water is a natural resource of special importance, the essential component of life and the environment…” Water is “owned” by the people of Vietnam, under the management of

\textsuperscript{79} Vietnam Law on Water Resources (No. 08/1998/QH10), found at: http://www.vnwp.org/vanban/Law-on-Water-Resources.pdf. Over time, Vietnam has constructed various strategies and programs to protect water quality in addition to the LWR; for example, the National Target Program for Clean Water and Environmental Hygiene in Rural Areas. (Decision of the Prime Minister No. 237/1998/QD-TTg, Dec. 3, 1998) and Orientation for the Development of Urban Drainage in Vietnam up to the Year 2020. (Decision of the Prime Minister No. 35/1999/QD-TTg.) Additionally, the National Strategy on Environmental Protection till 2010 and orientation towards 2020, and the National Strategy on Water Resources to 2020 seek to end the exploitation and contamination of water resources, and the discharge of toxic chemicals from industry and agricultural production into waterbodies without permission by relevant authorities. (Decision of Prime Minister No. 256/2003/QD-TTg, Dec. 3, 2003, and Prime Minister’s Decision No. 81/2006/QD-TTg on April 4, 2006).

\textsuperscript{80} Vietnam Law on Water Resources Guidance Decree (No. 179/1999/ND-CP).


\textsuperscript{82} Vietnam: Water Law and Related Legislation for Implementation of IWRM (#112), GLOBAL WATER PARTNERSHIP—TOOLBOX FOR INTEGRATED WATER RESOURCE MANAGEMENT, 2008, at: http://www.gwptoolbox.org/index.php?option=com_case&id=68. At the same time, the River Basin Planning Management Organizations were created to help manage the Mekong, Dong Nai, and Red River basins.

\textsuperscript{83} Additional important laws were developed to strengthen environmental protection and water resources protection: the Law on Fisheries (2003), Ordinance on Exploitation and Protection of Irrigation Works (2001), the Law on Inland Waterway Navigation (2004), the Law on Land (2003), the Law on Tendering (2005), the Law on Dykes (2006.) NGUYEN THI LOAN, Supra note 50 at 13.
the State,\textsuperscript{84} or, the People’s Councils and People’s Committees.\textsuperscript{85} The law imposes a sweeping mandate to protect water resources by also protecting and developing forests.\textsuperscript{86} The LWR states illegal uses of water are “strictly forbidden,”\textsuperscript{87} and, those who cause harm shall be “disciplined” “fined” or suffer penal punishment.\textsuperscript{88}

In terms of long-range planning, the National Water Resources Strategy Towards the Year 2020 was signed in 2006 by the Prime Minister, and sets out recommendations to “strengthen the protection, exploitation, use and development of water resources, as well as the prevention and mitigation of adverse impacts caused by water.”\textsuperscript{89}

\section*{F. Discharges and Water Quality}

The LWR requires that organizations and individuals “must have permission of the competent State agencies” to discharge wastewater into a water source.\textsuperscript{90} Permits for water discharges, exploitation, utilization, and extraction originates from Government Decree and Circular.\textsuperscript{91} Toxic and wastewater dischargers acquire a permit by MoNRE,

\begin{footnotesize}
\textsuperscript{84} Law on Water Resources, Article 1.1.  \\
\textsuperscript{85} See id., Article 4.3.  \\
\textsuperscript{86} See id., Article 5.2.  \\
\textsuperscript{87} See id., Article 9.  \\
\textsuperscript{88} See id., Articles 71.1 and 71.2.  \\
\textsuperscript{89} VIETNAM WATER SECTOR REVIEW 2008, at Strategy Foreword, \textit{found at} http://www.vnwatersectorreview.com/detail.aspx?pid=104&kr=1. Recommendations include strengthening legislation, increasing investment in water quality improvement and pollution mitigation, and development of human resources and science technology in order to depart from inadequate industrial practices that harm water resources.\textsuperscript{89}  \\
\textsuperscript{90} Law on Water Resources Article 18.1.  \\
\end{footnotesize}
and People’s Committees manage the permits,\textsuperscript{92} which have the authority to cancel or invalidate permits based on violations of the permit, transfer of the permit without permission, or misuse of the permit.\textsuperscript{93} Surface water exploitation and utilization permits are valid for 20 years, and may sometimes be granted a 10-year extension.\textsuperscript{94} Wastewater discharge permits into water sources are valid for 10 years, and sometimes are granted a five-year extension.\textsuperscript{95}

Like both China and the United States, the use of wastewater in production requires a permit that is based on the water body’s discharge capacity.\textsuperscript{96} Industries such as mining operations “must not discharge” unprocessed wastewater, and processed wastewater must be up to the permissible standards for the waterbody.\textsuperscript{97} MoNRE is the ministry responsible for setting and publishing water resource standards, and formulating and promulgating national technical standards and regulations to protect and use water resources.\textsuperscript{98} Obligations on the part of dischargers are “to process wastewater in order to

\textsuperscript{92} NGUYEN THI PHONG LOAN, Supra note 50 at p. 60: citing Article 18 of the LWR and Govt. Decree No. 170/1999/ND-CP.
\textsuperscript{94} See id.
\textsuperscript{95} See id. Permits can be invalidated for violations of permit, transfer of permit without permission, or misuse of permit to include operations not in the permit.
\textsuperscript{96} Vietnam Law on Water Resources, Articles 18.1 and 18.2 respectively.
\textsuperscript{97} See id. Article 15.2. LWR Article 16 also address water quality protection in other activities, such as transport, sports, entertainments, tourism, medicine, scientific research, which “must not cause pollution of the water source.”
\textsuperscript{98} NGUYEN THI PHONG LOAN, Supra note 50 at 34-35: (Point 6, Article 2 of Government Decree Bo. 25/2008/ND-CP, March 4, 2008) A list of required environmental standards was furthered by Decision No. 35/2002/QD-BKHCNMT, promulgated June 25, 2002, and surface water quality standards TCVN 5942,1995. Agencies that manage water resources at the State level must inform related branches at lower levels the capacity of water resources based on river basins and actual potential, for the calculation of water uses. (p.33) Lower agency levels are responsible for adjusting the uses to the actual waterbody capacity. People’s Committees at provincial level organize inventories, evaluations, and surveys of water resources in their jurisdictions. (p. 59) Also see List of Laws and Regulations Related to the Environment in Vietnam found at: http://www.isgmard.org.vn/Information%20Service/Report/General/JICA/Annexes.pdf. The LWR orders industry and mining operations that exploit and use water to “save water.” (Art. 18) Such entities are encouraged to use running water, re-use water and “must not cause pollution” affecting the water resource,
reach the permissible criteria before discharging wastewater” into the waterbody, to pay for damage if they violate prescriptions on the discharge of wastewater, and to pay for the issuance of the permit, and for discharging waste into water sources. Polluters are given compensatory rights if the discharge location changes, and they can initiate lawsuits on acts that infringe upon their rights to pollute.

While a somewhat functional water quality protection infrastructure is in place, in reality, the Vietnamese government does not have the financial resources to build a fully functioning water protection framework, so has relied on international funding and partnerships with NGOs to achieve what it has so far.

G. Enforcement Mechanisms

Vietnam has not devoted sufficient resources and capacity to regulatory regimes with regard to mining pollution rehabilitation and reconstruction, thus has left it to the discretion of the investor-owner to know the law and self-regulate in many instances. Further, corruption is common in developing countries such as Vietnam, who are receptive to influence by industry. Economic development trumps environmental protection in many instances, as scientific studies and environmental initiatives are and must treat the water before returning it back to its source.

99 See id., citing LWR, Article 19.2(a).
100 See id., citing LWR Article 19.2(b).
102 See id. Article 19.1(b) and Article 69.
104 Brent Doberstein, Environmental Capacity-Building in a Transitional Economy: the Emergence of EIA Capacity in Vietnam, IMPACT ASSES. & PROJ. APPRAISAL, VOL. 21, NO. 1, 26 (March 2003).
commonly recalibrated to support investors and government profits. To underscore the problem, it was reported by the Vietnam Environment Administration that the Vietnam Environmental Crime Prevention and Fighting Police Department that the number of environmental violations increased 43 percent nationwide from 2009 to 2010 with more than 6,500 violations of the LEP, of which 88 of resulted in lawsuits. The government issued fines over VN 17 billion, or US$895,000.

Vietnam employs a Natural Resource Tax on all individuals and organizations that exploit natural resources, including water. Natural resources that are the subject of taxation are: natural water, including surface water and groundwater, natural aquatic resources, metallic and non-metallic minerals, natural mineral water and thermal water, petroleum, gas, and products of natural forests. This is facially similar to the Chinese system of resource taxation, and Vietnam may well have borrowed the idea from China.

In 2003 the Vietnamese government imposed an “environmental protection fee,” or fine, on entities that pollute waterways with wastewater. In addition to a fine, violators may be subject to license revocation and restitution of the environment. The fund that is the repository for fees is called the Vietnam Environment Protection Fund

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105 See id.
109 See id.
(VEPF), which is administered by MoNRE.\textsuperscript{112} The VEPF also takes deposits from permitted mining operations for environmental rehabilitation in mining exploration; and is a co-sponsor for soft loans for environmental projects.\textsuperscript{113} In March 2009, MoNRE requested the revision of the fee’s implanting instruments, to increase the fee for industrial polluters, such as mines.\textsuperscript{114} Later that year, the government responded by increasing the fine by Decree up to VND 500 million, or approximately $27,000, which is not a significant deterrent for huge mining conglomerates to stop discharging toxic waste into the environment.\textsuperscript{115}

In many cases it is financially beneficial to simply ignore the fines and pollute, rather than upgrade equipment and methods of extraction in order to protect water quality.

\section*{III. CHINA}

“To get rich is glorious.”\textsuperscript{116}

China has implemented many policy and regulatory mechanisms to prevent and manage water pollution, but the level of pollution throughout the country is still extremely high. In 2005, it was determined that 59 percent of China’s seven main rivers were graded Class IV or Class V (VI being “unusable”) and were declared unsafe for

\begin{footnotesize}
\begin{enumerate}
\item\textsuperscript{112} Vietnam Environmental Protection Fund at: \url{http://vepf.vn/Home}, Decree No. 67/2003/ND-CP.
\item\textsuperscript{113} See id., Responsibilities of Vietnam Environment Protection Fund, at \url{http://vepf.vn/Overview-TaskAndRole}.
\item\textsuperscript{114} \textit{Vietnam Proposes Higher Fines for Polluters}, INDUSTRY WEEK, Nov. 13, 2008, at: \url{http://www.industryweek.com/articles/vietnam_proposes_higher_fines_for_polluters_17795.aspx}.
\item\textsuperscript{116} ELIZABETH C. ECONOMY, THE RIVER RUNS BLACK, 59 (Cornell Univ. Press 2004), citing Deng Xiaoping’s early 1980’s call to arms.
\end{enumerate}
\end{footnotesize}
human consumption. In 2004, roughly 700 water pollution incidents were reported and documented. In 2006, 744 samples were taken throughout the country’s nine river basins, and one third of the samples were given a grade "V," or toxic for human and animal use.

Some of these pollution incidents originate from mining accidents, which have resulted in massive fisheries die-offs and, in some cases, resulted in human casualties. For example, in two separate incidents, on July 3 and 16 of 2010, 2.4 million gallons of acidic wastewater from a copper mine tailings pile seeped into the Tang River and Mianhuatan reservoir in Fujian Province. Approximately 2,000 tons of fish were killed, an amount capable of feeding 72,000 people for a year. China’s largest gold mining company, Zijin Mining Group, owns the mine, and did not report the accident for nine days, resulting in wastewater contamination miles downstream in the Guangdong River. In September of 2010, Zijin Mining Group was responsible for a tin mine tailings dam overflow during a typhoon in Guangdong Province, Xinyi City, which killed 22 people and destroyed 523 homes. The company placed blame on heavy rains that

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118 See id.
119 Heavy Fines Await Water Polluters, GOV.cn (Chinese Government’s official web portal), Feb. 27, 2008.
121 See id.
precipitated the dam collapse, but Chinese authorities said it was Zijin’s breach of dam construction regulations that caused the disaster.\textsuperscript{124}

In light of these tragedies, China has embarked on a mission to better control mining and industrial pollution, and to enforce corresponding laws and regulations.

\begin{itemize}
\item[A.] \textbf{China’s Place in the World}
\end{itemize}

The People’s Republic of China was created on October 1, 1949, and is the world’s fourth largest country, and is slightly smaller than the United States.\textsuperscript{125} China is the world’s most populous country, home to over 1.3 billion people.\textsuperscript{126} It is the world’s fastest growing economy and the world’s fourth largest industrial producer, after the United States, Japan, and Germany.\textsuperscript{127} China is called “the world’s factory floor,” and is the largest exporter to the United States, due in part to China’s capability for cheap labor; factory wages in China average out to approximately US \$ .40 cents an hour.\textsuperscript{128}

China is the world’s largest Communist country. Critics, such as a preeminent Chinese economist, Wu Jinglian, refer to China’s political and business apparatus as

\begin{flushend}
\textsuperscript{124} \textit{See id.} Four officials and 11 company managers face a criminal investigation that could lead to a trial and possible conviction by the courts. (Chris Buckley, \textit{China Authorities Accuse Zijin Unit Over Dam Collapse}, REUTERS AFRICA, Dec. 22, 2010, at: http://af.reuters.com/article/metalsNews/idAFTOE6BK08H20101222 )


\textsuperscript{126} \textit{See id.}


“crony capitalism,” which is a system of governance that is based on close relationships between the State and private sector business community, and the success of a business is determined by the favoritism it is given by government officials. These favors can be in the form of government grants, tax breaks, and other incentives, rather than by the free market and laws. It is also considered by some to be an “anti-trust,” system wherein the government itself participates to decrease competition to the detriment of economic growth.

B. The Law on Environmental Protection

The Environmental Protection Law (hereinafter LEP, “law”) of the People’s Republic of China was adopted and effective on December 26, 1989 and promotes the development of a legal foundation to protect the environment. The Draft Law was amended to its present form in December of 1989, and sets forth four main policy objectives: “…protecting and improving People’s environment and the ecological environment, preventing and controlling pollution and other public hazards, safeguarding human health, and facilitating the development of socialist modernization.”

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131 Id.
133 People’s Republic of China Law on Environmental Protection (1989), By Order No. 22 of the President of the RPC http://english.sepa.gov.cn/Policies_Regulations/laws/environmental_laws/200710/t20071009_109928.htm
134 See id., Article 1.
end, the National People’s Congress and the State Council have furthered over 30 regulations on environmental protection as a whole.  

Under the LEP, China calls for a balancing of environmental protection and social and economic development, as environmental protection plans “must be incorporated into the national economic and social development plans; the state shall adopt economic and technological policies and measures favorable for environmental protection so as to coordinate the work of environmental protection with economic construction and social development.”  

C. China’s Mining Sector

1. Mining Policy


China now ranks among the most productive in the world in minerals output and consumption, and at the most recent estimate in 2002 is home to 489 large mines, 1,025

135 Regulatory Institutions Involved in Water Management, ASIA WATER PROJECT (2003), at: http://www.asiawaterproject.org/regulatory-trends/regulatory-institutions/
136 PRC LEP, Article 4.
medium-sized mines, and well over 140,000 small mines. There are 158 minerals with proved reserves, 138 of them found in western regions. China is the world’s top producer of gold, and increased its production in 2007 by 12 percent over 2006. China is also the world’s leader in rare earth’s mineral production—minerals vital to information technology, engines, and aluminum baseball bats—and currently produces 97% of such minerals.

The Minerals Policy addresses the desire for the regulatory improvement and stricter enforcement of environmental law, and increased publicity and education for environmental protection. The Constitution articulates this more broadly; “The state protects and improves the living environment of the people and the ecological environment. It prevents and controls pollution and other public hazards.” But, in order to carry out this policy, mines, not the government, are tasked with strengthening investigation, monitoring, forecasting and disaster early warning measures, to prevent and control them, and the submission of monitoring reports to appropriate departments and governments. Under China’s Constitution, industry has the primary responsibility to protect the environment and prevent pollution, and mining enterprises and individuals

138 See id.
139 See id. Section III, “Increasing the Domestic Capacity of Mineral Resources Supply”.
142 PRC Constitution, Article 26.
143 See id.
must economically use and reclaim land, and compensate the well being of other persons.  

The Constitution and mining policy document both address “serious waste and environmental pollution,” as well as several problems, including the layout and location of mining areas, antiquated prospecting and mining technologies, and wasteful resource consumption. To protect and “rationally utilize mineral resources” and improve the “ecological environment of the mines,” the government calls for sustainable development as a comprehensive strategy. Methods of sustainable development identified in China’s Constitution include reducing and controlling pollution and damage to the environment caused by “production links” of mining, and to “bring about a benign cycle” in exploiting minerals and protecting the environment. Moreover, the Constitution addresses the “great importance to environmental protection and the prevention and control of pollution” in mining activities, and vows to “strengthen the control of poisonous and harmful waste water and other pollutants produced in mines.

Policy statements sometimes do not mirror the regulatory and enforcement reality. For example, Inner Mongolia is one of China’s most prolific coal mining regions, and the State has invested over 20 billion yuan beginning in 1990 (as of 2004) into coal mining development. The impact of coalmines on the local ecology and water quality has

144 See id. Article 32
146 See id. Section II “Targets and Principles for Mineral Resources Protection and Rational Utilization”. Sustainable development is listed as one of the Constitution’s “General Principles.”
147 See id.
148 China’s Policy on Mineral Resources, Supra note 145, Section V “Achieving the Coordinated Development of Mineral Resources Exploitation and Environmental Protection”.
149 MA JUN, CHINA’S WATER CRISIS 29 (Eastbridge Press, 2004).
been “devastating.”\textsuperscript{150} One investigation of the area found that a single mine had discharged 3.3 million tons of slag annually (a mixture of chemicals, soil, sediment, and mining byproduct) into its surroundings.\textsuperscript{151} To address these problems, the Chinese government suggests that it place equal importance on environmental protection and mineral exploitation by “putting prevention first and combining prevention with control.” Environmental Impact Assessments, land rehabilitation, imposing fees for pollution, exploitation restriction of minerals that cause considerable ecological impacts, and the requirement of a master plan for water and soil protection and other measures, are suggestions put forward by the government to begin a path of water quality protection.\textsuperscript{152}

While China’s mining policy embraces environmental protection, its Mineral Resource Law does not articulate the same commitment.

\section*{2. The Mineral Resources Law}

The Mineral Resources Law (hereinafter Minerals Law) was adopted in March of 1986 and amended August 29, 1996, and is China’s principal mining legislation.\textsuperscript{153} It is structured to direct the mining industry toward sector-driven objectives. In tandem with China’s Constitution\textsuperscript{154}, the Minerals Law declares the State as the owner of mineral resources.\textsuperscript{155} The State does not have an overarching statutory framework to protect the environment and waterbodies from \textit{mining} pollution per se, but places certain areas off limits to mining, including “nature reserves and important scenic spots designated by the

\begin{footnotesize}
\begin{enumerate}
\item See id.
\item See id. at 30.
\item China’s Policy on Mineral Resources, \textit{Supra} note 145.
\item PRC Constitution, Article 9.
\item Law on Mineral Resources, Article 3.
\end{enumerate}
\end{footnotesize}
State, major sites of immovable historical relics and places of historical interest and scenic beauty that are under State protection and other areas where mineral mining is prohibited by the State.” In terms of mining closure, the Minerals Law addresses it briefly: “Upon mining closure, a report must be submitted to the relevant authority and must contain information about environmental protection and land reclamation and utilization.

D. China’s Water Pollution Regulation

1. Water Quality Policy

The Ministry of Environmental Protection (hereinafter “MEP”), formerly SEPA, is the central agency that formulates environmental policy, and drafts laws and regulations. The agency is mandated to protect surface water bodies and issues pollution permits, sets water quality standards, monitors water bodies, protects drinking sources, and sets parameters for waterbody characteristics in order to make these decisions. Environmental Protection Bureau’s (EPB’s) are the local counterparts to the MEP and carry out its mandate. The Ministry of Health sets drinking water standards and monitors drinking water quality.

Since 1972, China’s central government has embarked on an a strategy to manage water resources and to control water pollution, by partnering with the United States Environmental Protection Agency (hereinafter “EPA”) in a collaborative effort to

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156 See id. Article 20(5).
157 See id. Article 20(6).
158 See id., Article 21.
161 See id. and Article 4 of the Law on Water Resources.
incorporate water pollution and water quality regulations.\textsuperscript{162} In its early phase, command and control measures such as permit systems and corresponding control programs were developed to implement pollution control.\textsuperscript{163} Gradually, legislation, effluent standards, fee and levy systems, discharge permits, Total Load Control, and investment plans in the traditional five-year plan process were added to China’s water quality framework.\textsuperscript{164} Recently, voluntary approaches such as ISO 14000 and cleaner production methods have been incorporated.\textsuperscript{165}

China’s current water quality policy has attempted to lower overall industrial water pollution from previous levels, and raising the percentage of industrial wastewater that meets standards from 67 to 91 percent in 2004.\textsuperscript{166} However, critical water pollution reduction goals were not met from 2001-2005, and despite these efforts, the water quality has worsened in most areas of the country.\textsuperscript{167} Overall water quality in China was characterized as “seriously degraded” or “poor” by the World Bank as recently as 2006.\textsuperscript{168} Water quality in rivers that has been classified in the best categories has improved, but those classified in the worst categories have worsened.\textsuperscript{169}

\textsuperscript{162} EPA-China Environmental Law Initiative, US ENVIRONMENTAL PROTECTION AGENCY (2011), found at: \url{http://www.epa.gov/ogc/china/initiative_home.htm}
\textsuperscript{163} THE WORLD BANK, WATER POLLUTION EMERGENCIES IN CHINA: PREVENTION AND RESPONSE, (June 2007), found at: \url{http://siteresources.worldbank.org/INTEAPREGTOPENVIRONMENT/Resources/Water_Pollution_Emergency_Final_EN.pdf} at 19. Command and control measures are mechanisms to regulate damage to the environment that are caused by economic activities, such as prohibitions, standards, issuance of permits, limits, and licenses to perform and/or operate an activity. Non-compliance is met with penalties and sanctions. (UN-ESCAP/DRPAD Publication: \url{http://www.unescap.org/drpad/publication/integra/volume1/philippines/1pl03a.htm})
\textsuperscript{164} See id.
\textsuperscript{165} See id. (ISO 14000 addresses aspects of environmental management, helps organizations identify and control their environmental impacts, and helps improve their environmental performance, at: \url{http://www.iso.org/iso/iso_catalogue/management_and_leadership_standards/environmental_management/iso_14000_essentials.htm})
\textsuperscript{166} See id.
\textsuperscript{167} See id.
\textsuperscript{168} THE WORLD BANK, CHINA WATER QUALITY MANAGEMENT: POLICY AND INSTITUTIONAL CONSIDERATIONS, xiii , 9 (September 2006), found at:
As is the case in Vietnam, a large problem, according to the World Bank, is that water quality legislative and policy instruments do not operate sufficiently due to “severe flaws” in their coordination systems with each other, as well as poor inter-agency communication. Moreover, regulations were found to be redundant and disorganized, causing inconsistencies with management and data. There is a general lack of consensus as to the roles and responsibilities of various agencies, especially with regard to policy plans such as river basin management and agricultural non-point source management.

The National People’s Congress has passed numerous laws with regard to water quality protection. The three laws that are most relevant to our purposes are the Law on Environmental Protection, the Water Law, and the Law on Prevention and Control of Water Pollution.

2. The Water Law

China’s Water Law (hereinafter “Water Law”) was promulgated in 1988, and amended on October 1, 2002. The Water Law sets out general policy goals for the development and protection of water resources (surface and groundwater), to preserve natural flora, and to prevent and control water pollution, flooding, and water scarcity. The Water Law protects the rights of people who may be affected by
polluters and other water users, and directs industry and other entities that discharge pollutants to not infringe upon “the public interests or the lawful rights and interests of other people.”

Water quality issues are addressed broadly: Total pollution discharge limits are to be compiled by local governments or basin management agencies and submitted to environmental protection departments, and water quality is monitored according to these limits. Unacceptable levels of pollutants are then reported to relevant officials. The Ministry of Water Resources and Water Resource Boards affiliated with the State Council are responsible for both the supervision of technical portions of water resource management, such as hydropower projects, as well as water basin management.

### 3. The Water Pollution Prevention and Control Law

The Law on the Prevention and Control of Water Pollution (hereinafter “Water Pollution Law” or “the Law”) was first promulgated in 1984, and then revised in 1996 and June 1, 2008. The law’s directive is the prevention and control of water pollution, protecting drinking water, and “enhancing the comprehensive, harmonious and

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176 *See id.*, Article 28. This provision could be interpreted as: freedom from pollution is a lawful right and interest of other people, expressing a core principle of environmental justice.
177 *See id.* Article 30
178 *See id.*
180 PRC Water Law, Article 12. Conversely, Article 4 of the Water Pollution Law stipulates that the MEP (formerly SEPA) and EPB’s should supervise and manage the prevention and control of water pollution. Such overlaps and conflicts undermine cooperation between both agencies, and have caused loopholes in surface and underground water resource management, pollution control, pollution prevention planning, water quality monitoring and protection, and water quality regulation and enforcement in general. (WORLD BANK, *Supra* note 390 at 24.)
sustainable development of economy and society.” It applies to surface and groundwater, but not marine pollution. The law defines the State Council and corresponding local Environmental Protection Bureau’s as the central entities for water pollution administration, and for the planning and oversight of industrial requirements. It is a document that it expresses a firm commitment to “rigorously control industrial pollution and urban domestic pollution” and to “vigorously promote” ecological management projects, and to reduce water pollution and ecological damage.

The Pollution Law was the first legal document to address the need for a national standard of water quality through the control of discharges, however there are several national rules and regulations that apply to pollution discharges by industries: Implementing Rules on the Law on the Prevention and Control of Water Pollution; regional regulations; and local regulations. Under the Pollution Law, the governments in each province, municipality, or autonomous region are tasked with the reduction and control of the total discharge of “important” water pollutants. County EPBs are directed to publish the provinces, autonomous regions and cities that fail to

\[182\] See id., Article 1. 
\[183\] See id., Article 2. 
\[184\] See id., Article 40. 
\[185\] See id., Article 3. 
\[186\] PRC Law on Prevention and Control of Water Pollution, Article 16. 
\[191\] See id., Article 18.
meet their “important water pollutants” reduction of total discharge targets, which gives localized management a means of control over larger government entities to comply with targets. 192

According to provisions in the Pollution Law, for any industry including mines, it is illegal to discharge “highly toxic waste liquids” into waters, 193 and it is illegal to “discharge or dump industrial solid waste, soluble highly toxic was residues containing mercury, cadmium, arsenic, chromium, lead, cyanide, or yellow phosphorous to waters, or directly bury them underground.” 194 Polluters must register at the local EPB or appropriate government office, and report facilities for discharging and treating water pollutants, and the category, quantity, and concentrations of water pollutants discharged under normal operating conditions, as well as provide the relevant technical data about the prevention and control of water pollution. 195

The 2008 Amendments to the Pollution Law intend that governments and officials above county level are evaluated on water quality levels in their jurisdictions, as well as GDP, 196 and water protection is included in social development planning. 197 Like the Water Law, amendments to the Pollution Law were structured to take a river-basin approach, include total mass loading benchmarks for water pollutants, and legal

192 See id., Article 19.
193 See id., Article 29.
194 See id., Article 33.
195 See id., Article 20.
196 See id., Article 5.
197 See id., Article 4. One such method of protection is in water treatment. Mines utilize water treatment plants to increase resource recovery and to extract chemicals from wastewater. The third plant in China is in the process of being built in a joint venture between an industrial wastewater treatment leader--Bioteq Environmental Technologies Inc. and Jiangxi Copper Company-- a State-owned copper company. Authorities anticipate that up to 6 million cubic meters of water per year will be treated in a “novel ion exchange process”, as well as 50,000 pounds of nickel and 60,000 pounds of cobalt. http://www.waterworld.com/index/display/article-display/1815928857/articles/waterworld/industrial-water/wastewater/2010/07/New-water-treatment-plant-to-treat-mining-wastewater-in-China.html Water treatment has not been fulfilled: http://english.gov.cn/2006-08/26/content_370620.htm
punishment for water pollution discharges that are not licensed. Best practices using technological and scientific research to prevent and control water pollution are encouraged, as the Law directs enterprises to adopt “clean technique[s]” that utilize raw materials at a “higher efficiency” and discharge fewer pollutants, and “strengthen administration” to reduce a “generation” of water pollutants. In other words, the Law calls on the government to improve water quality protection in order to reduce and eliminate the last generation of pollutants.

The Water Pollution Law created the water quality and pollutant discharge monitoring system for industry, including the mining industry. China’s water quality is based on an “Environmental Quality Standard” that divides water quality into grades I-V+. The most polluted water bodies are in the north of China, coinciding with large population centers, and early 45 percent of water bodies tested there were in the two worst grades.

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198 PRC Law on Prevention and Control of Water Pollution, Article 6 and Article 40. Also see: ASIA WATER PROJECT, http://www.asiawaterproject.org/regulatory-trends/water-regulations/ (Copy of the law can be found in the Index of Key Water and Related Laws).

199 See id., Article 43. The Pollution Law also articulates several pollution preventative measures: for places storing highly toxic waste residues, such as tailings piles, corresponding “waterproof, anti-leakage and anti-loss measures must be taken.” (Article 33) Stockpiling or storing solid wastes and other pollutants at bench land and banks below the high water mark of rivers, lakes, canals, channels, and reservoirs is strictly prohibited. (Article 34) Moreover, it is prohibited to build or enlarge a project, such as a mining operation, near a protected drinking water source, and if construction has commenced, local officials are required to decommission it and tear it down. (Articles 58 and 59)

200 See id., Article 25.

201 China’s Water Quality Management: Policy and Institutional Considerations, THE WORLD BANK 8, (September 2008), http://siteresources.worldbank.org/INTEAPREGTOPENVIRONMENT/Resources/China_WPM_final_lo_res.pdf. Water Quality Standard QB3838-2003, Grade I applies to source of water bodies and nature preserves, Grade II applies to class A water for drinking, and rare fish sanctuaries, Grade III applies to class B water source protection for drinking, common fish species and swimming, Grade IV applies to industrial water supply and recreational waters not in direct human contact, Grade V applies to agricultural water supply and landscaping, and Grade V+ applies to water that is “essentially useless,” based on protection targets and purpose of use, and the worst pollutant monitored establishes the water quality grade.

202 See id. at 12.
The Pollution Law further directs spot inspections are to be carried out by relevant authorities, and if mines or other enterprises directly discharge pollutants into waters without treatment, they are charged a fee according to the category and quantity of the pollutants, which is then deposited into an account that is applied to prevent and control pollution. Discharge fees were raised substantially in the 2008 amendment from 100,000 (US$15,000) Yuan in the 1996 law to 200,000-500,000 (US$30,000 to $76,000). Executives of companies that are responsible for polluting waterbodies are fined up to half of their previous year’s income.

4. Water Pollution Discharge Permit System

A water pollution discharge permit system was adopted in China in 1988 through interim measures that gave local departments the authority to issue discharge permits, but it has not been a successful system to date. In most areas of China, the discharge volume of pollutants into waterways still exceeds the maximum carrying capacity.

In 1988 the former SEPA implemented a trial concentration of pollutants system nationwide through administrative regulation, and interim measures were passed that allowed EPBs to grant temporary permits to companies or individuals that would not

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203 See id. at Article 27.
204 See id. at Article 24.
205 See id. at Article 83, which imposes a 20 percent fine on direct losses caused by an ‘ordinary’ or ‘relatively serious’ water pollution accident, and a 30 percent fine on direct losses caused by a ‘serious’ or ‘extraordinarily serious’ water pollution incident; See: Jingyun Li and Jingjing Liu, Quest for Clean Water: China’s Newly Amended Water Pollution Control Law, CHINA ENVIRONMENT FORUM, The Woodrow Wilson International Center for Scholars (January 2009), http://www.wilsoncenter.org/index.cfm?topic_id=1421&categoryid=EF5B2D71-423B-763D-DB0B54DDAE395532&fuseaction=topics.doc_topics&doc_id=496229&group_id=233293#12
206 See id. at Article 83.
207 Li Zhiping, The Challenges of China’s Discharge Permit System and Effective Solutions, 40 TEMP. JNL. OF SCI. TECH. ENV. LAW 376 (2008).
208 See id.
exceed the total discharge targets. In the U.S., this is also called the “technology-based standard,” which has been improved upon by using a “water quality” standard, or the inclusion of the entire span of characteristics within a waterbody in order to make a discharge determination. Vietnam also uses the technology-based standard of discharge regulation.

Concentration control became ineffective as China’s industrial sector grew and more pollutants were released into waterbodies; thus, the total pollutant load control system was adopted in 1996 in the 9th Five Year Plan of National Economic and Social Development & the Outline of 2010 Long-Term Plan Targets. This was subsequently codified in Article 16 and Article 9 of the 2008 Pollution Law, which stipulates that “any water pollutant discharge shall not exceed the standards for water pollutant discharge and the total control target for major water pollutant discharge as specified by the State or local governments.”

The State Council in March of 2000 then conducted a trial of the pollution control permit system. Similar to the U.S. transition to a water quality-based standard and TMDL system from a technology-based standard, the implementation rule required total load control over major pollutants in waterbodies that achieve discharge concentration

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209 See id. The problem with this method of control is that many dischargers are given limits, but invariably discharge more than the waterbody can handle for its uses.

210 See id. The total load system is based targets of pollution reduction that are set by the Five Year Plan, and is a system where the State allocates pollution concentration amounts to provinces, who then allocate to cities and enterprises, and cities allocate to counties.

211 This is facially similar to the United States’ Total Maximum Daily Load (TMDL) program under S. 303(d) of the Clean Water Act, where impaired waters that are too polluted to meet water quality standards are given a total amount of pollutant that a waterbody can receive per day to maintain its designated uses. The TMDL is then allocated to point sources and nonpoint sources, where point sources to discharge pollutants require a §402 permit.

212 LI ZHIPING, Supra note 207 at 378.
limits, but do not achieve national water quality standards.\textsuperscript{213} During the course of the year, over 80,000 permits were issued around the country, which illustrates problems with the current permitting system: too many permits issued for a region and for a waterbody, overlap of administrative functions, and lack of enforcement.\textsuperscript{214} To address these problems, the State Council amended the Pollution Law in 2008 and included the broad rule that makes it illegal to discharge without a permit.\textsuperscript{215} Under the law, the State Council is authorized to formulate standards and regulations for permits, and the central government determines the baseline pollution amount to be discharged for permitting allocation.\textsuperscript{216}

Although the law for discharge permitting is set in place, it is reported that the Chinese government nullified interim measures of the permit system in 2007, effectively putting the system on hold, and there is no present timetable for reinstatement of the program.\textsuperscript{217} It is believed that the State Council drafted a regulation to institute a pollution permit system that was expected to have been ready last year.\textsuperscript{218} The MEP (formerly SEPA) proposed rules on pollutant discharge licensing for public comment on October 25, 2007, but there does not appear to be any follow-up activity.\textsuperscript{219}

\textbf{E. Enforcement Mechanisms}

\textsuperscript{213} \textit{See id.}
\textsuperscript{214} DAWN WINALSKI, \textit{Supra} note 187 at 189.
\textsuperscript{215} PRC Pollution Law, Article 20.
\textsuperscript{216} \textit{See id.}, Article 9.
\textsuperscript{219} (Text of proposed rules is in Chinese, but can be found at http://www.epa.gov/ogc/china/recentadditions.htm )
A common theme throughout environmental and water quality protection scholarship is China’s lack of enforcement of its environmental laws and regulations. Prof. Wang Canfa, director of the Beijing-based Center for Legal Assistance to Pollution Victims guessed that MEP (SEPA) alone “can never guarantee the full enforcement of environmental laws and regulations.” In fact, the rate of China's environmental laws and regulations that are actually enforced is estimated to be barely 10 percent.”

Zhou Ke, professor of law at Renmin University in China, believes the legislative emphasis on pollution prevention, rather than on the protection of natural resources, is partially to blame for the gap in enforcement due to the lack of coordination and overlap of duties between agencies and environmental protection bureaus.

Some believe the most pressing problem with regard to enforcement is caused by the absence of public knowledge and participation in the environmental protection process. Ma Jun, arguably China’s preeminent civilian leader in water protection, has called for “orderly participation” and an informed public in developing a healthy environmental-economic system, and stresses the Communist Party’s desire to build a “harmonious socialist society between man and nature” depends upon participation by a broad range of interest groups.

Pan Yue, deputy director of the MEP, shares this

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222 See id.

223 See id. For example, residents affected by polluted water are not informed of pollution in the waters they are dependent upon, but now there is a mechanism for citizens to view the results of EPB water quality monitoring around the whole of China: China’s Water Pollution Map, which was created by Ma Jun, and is part of the Institute of Public and Environmental Affairs in Beijing (also created by Ma Jun). Pollution
sentiment and has embarked on a mission to revise the Environmental Protection Law. Pan hopes revising the LEP will clarify the duties of agencies and local governmental entities that are connected with environmental protection, and will hold those entities responsible for abusing their duty to enforce environmental law. Pan states, “…public participation is the right and interest of the people endowed by law. The government has the obligation to respond to and to protect this right.”

The Chinese government has begun to open up dialogue between industry, the government, and the public. On September 1, 2003 the legislature passed the Law on Evaluation of Environmental Effects, which requires authorities to hold public hearings before approving a project that may affect the environment. The Law also allows Chinese citizens the right to be informed of, and lead, political decisions that relate to the environment, and forbids interference by anyone of these rights. The Chinese government has passed a trial of Measures on Open Environmental Information, has implemented a decree for governmental transparency in environmental protection and other issues, and has created the All-China Environment Federation (hereinafter

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225 See id.


228 See id.

229 Measures on Open Environmental Information, STATE ENVIRONMENTAL PROTECTION ADMINISTRATION, Effective May 1, 2008 at: [http://www.epa.gov/ogc/china/open_environmental.pdf](http://www.epa.gov/ogc/china/open_environmental.pdf)

“ACEF”) under the Ministry of Environmental Protection.231 The ACEF is a nonprofit that aims to implement sustainable development strategies, achieve goals set by the State for the environment, and safeguard environmental interests of the public and society.232 The ACEF aims to inspire citizens to get involved in the environmental process, and to collaborate with fellow stakeholders in devising plans and enforcement measures to protect the environment.233 Its partners include government officials, environmental organizations, scientists, and other people, who serve as a conduit between the Chinese public and government in order to build capacity and interest.234

Although the list is not conclusive, there are a few enforcement mechanisms that are important, including legal assistance for environmental actions, China’s Tort Liability Law, and Administrative Penalties.

1. Legal Assistance for Environmental Actions

The Chinese government has legalized the right of victims of pollution to bring

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ACEF was the representative entity for a law suit against the Chinese government, for water pollution of nearby lakes by an incomplete construction project; see Tania Branigan, *Chinese to Launch First Ever Green Lawsuit Against Government*, GUARDIAN, July 31, 2009, at: http://www.guardian.co.uk/environment/2009/jul/31/china-residents-prosecute-government-environment.  
Note: the headline was challenged as inaccurate by one Alex Wang from the National Resources Defense Council, who stated, “Chinese courts have accepted many environmental lawsuits against the government in the past…typically against EPBs for failure to enforce against an alleged violation of China’s environmental laws…this case…was indeed the first lawsuit filed by an environmental group against the government to be accepted by a Chinese court.”  

232 See id.

233 See id.

234 See id.
suit against polluters, and the Center for Legal Assistance to Pollution Victims (hereinafter, “CLAPV”) hears such cases. The Center is China’s first public interest environmental law firm, and has been in existence since 1999, although was officially launched March 25, 2011 with help from Vermont Law School and its U.S.-China Partnership for Environmental Law program. To date, the CLAPV has handled over 70 cases and has won over 50 percent.

2. Tort Liability Law and Private Party Enforcement

On 26 December 2009, the China Tort Liability Law (hereinafter “Tort Law”) was promulgated and took effect on July 1, 2010, and brought about major changes to liability standards for hazardous substance issues. The Law addresses Liability for Environmental Pollution, and asserts a strict tort liability on a polluter when there is harm caused by environmental pollution. The law requires that the burden of proof lie on the polluter in a dispute, and where two or more polluters are involved, the seriousness of

235 PRC Law on Environmental Protection Articles 6 and 41, and the basis for compensation is the General Principles of Civil Law is Article 124 which states “Any person who pollutes the environment and causes damage to others in violation of state provisions...shall bear civil liability in accordance with the law.”

236 China Opens First Public Interest Environmental Law Firm With Help from Vermont Law School, Vermont Law School (March 25, 2011) at: http://www.vermontlaw.edu/News_and_Events/Press_Releases/ChinaOpensFirstPublicInterestEnvironentalLawFirmWithHelpfromVermontLawSchool.htm. The CLAPV is part of the China University of Political Sciences and Law, and its purpose is to provide legal services to pollution victims and perform citizen lawsuits that focus on enforcing environmental laws and regulations. (See water pollution case Yuan Chun Yu v. Tianjin Hong at: http://www.clapv.org/english_lvshi/ZhiChiAnJian_content.asp?id=45&title=Support%20cases&titlecontent=PD_zhichianjian&lei1=20, the first case brought in China of its kind.)

237 See id.

238 CLAPV Supra note 236.


240 See id., Article 65.

241 See id., Article 66.
liability of each polluter will be assessed according to the type of pollutant, emission volume, and other factors. Likewise, third party polluters can also be liable to the victim of pollution. There are several problems with the law, including: the term “polluter” is not defined, and there is no clear liability demarcation between the polluting entity, such as a mine, and the entity that creates the pollution, such as a processing plant.

By imposing tort liability on polluters, the Chinese government has mirrored the US Comprehensive Environmental Response, Compensation, and Liability Act, or CERCLA, also known as “Superfund.” CERCLA imposes a liability of persons (also corporations) that are responsible for hazardous waste releases from such closed and abandoned waste sites. It is encouraging that China has taken on tort liability as an enforcement mechanism, especially since its water pollution problems are increasing in many parts of the country. Vietnam has no such mechanism for redress in their environmental framework.

3. Administrative Penalties

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242 See id., Article 67.
243 See id., Article 68.
244 CERCLA, 42 U.S.C. §9601-9675, enacted by Congress on December 11, 1980, and amended by the Superfund Amendments and Reauthorization Act (SARA) on October 17, 1986 (26 U.S.C. §59A) and by §311(d) of the Clean Water Act (33 U.S.C. §1251 et.seq 1972). SARA required the EPA to revise the Hazard Ranking System to ensure an accurate assessment of human health and the environment as affected by uncontrolled hazardous waste sites placed on the National Priorities List. See EPA SARA Overview: http://www.epa.gov/superfund/policy/sara.htm. CERCLA’s tort liability system has been effective in the US, although it has been criticized for being underfunded, especially with regard to mining accidents and post-mining operation cleanups. (Patrick E. Tolan, Jr., Natural Resource Damages Under CERCLA: Failures, Lessons Learned, and Alternatives, 38 N.M.L.R., 409, 413 (Spring 2008). For a science-based analysis of CERCLA see: The National Academy of Sciences Report on Superfund and Mining Megasites: Lessons from the Coeur d’ Alene River Basin, NATIONAL RESEARCH COUNCIL OF THE NATIONAL ACADEMIES (2005), http://www.epa.gov/superfund/accomp/coeur/index.htm.) At its inception, CERCLA created a tax on chemical and petroleum industries that went into a trust fund, which is applied to clean up abandoned or uncontrolled hazardous waste sites, many of them mines. (CERCLA Overview, at: http://www.epa.gov/superfund/policy/cercla.htm)
245 CERCLA Overview, at: http://www.epa.gov/superfund/policy/cercla.htm
In China, penalties are administered both statutorily and by agencies, the latter being less punitive. China’s Decree Measures on Administrative Penalty for Environmental Protection, promulgated on August 6, 1999 (Decree No. 7) imposes administrative penalties on entities that pollute or otherwise violate the environment and environmental laws.\textsuperscript{246} The measures include “disciplinary warnings, fines, confiscation of illegal gains, suspension of production or use, rescission of permits or other certificates of similar character, and other types of administrative penalties according to law.”\textsuperscript{247} According to the Decree, the penalties are imposed with the principles of “fairness and openness,” and include education.\textsuperscript{248} EPB’s have the power to impose administrative penalties.\textsuperscript{249}

As we have seen, China has imposed several mechanisms to regulate and control pollution, but water quality protection has not been given serious attention and effort in terms of regulation. Until China seizes upon its policy goal to reduce its water pollution through regulation and enforcement, its waters, and by extension its population and biodiversity, will continue to suffer from myriad effects caused by pollution.

\textbf{III. THE UNITED STATES}

“In practice, most mine sites generate relatively modest quantities of hazardous wastes.”

The EPA 1994\textsuperscript{250}

\textsuperscript{246} Measures on Administrative Penalty for Environmental Protection, MINISTRY OF ENVIRONMENTAL PROTECTION, July 8, 1999 at: http://english.mep.gov.cn/Policies_Regulations/regulations/Environmental_Enforcement/200712/t20071203_113699.htm
\textsuperscript{247} See id., Article 2(1)-(6).
\textsuperscript{248} See id., Article 5. Despite the effort to incorporate another enforcement mechanism, the law seems to give polluters the benefit of the doubt before penalizing, as “attitude” and “measures taken” by the violators to correct the illegal act are assessed before a decision is made for penalty, (Article 7(3)) and whether the violation was a first offence or recidivism. (Article 7(4)).
\textsuperscript{249} See id., Article 10.
The United States has undergone significant changes in environmental and water quality policies, regulations, and laws in the past 40 years, which have helped shape mining practices that affect water quality and biodiversity. One such advancement is the development of the Environmental Protection Agency in 1972 (hereinafter “EPA”), which has improved the quality of our waterways to some degree, by implementing numerous regulatory mechanisms for mining and other industrial polluters. Moreover, Congress has declared the utmost importance to protecting our nation’s waters and biodiversity in the Clean Water Act (hereinafter “CWA”) \(^{251}\) and the Endangered Species Act (hereinafter the “ESA”).\(^{252}\) Congress has also implemented other tools to predict environmental degradation such as the National Environmental Protection Act (hereinafter, “NEPA”) \(^{253}\) to mitigate and rehabilitate mining sites that have polluted the environment and surrounding waterways such as the Comprehensive Environmental Response, Compensation and Liability Act (hereinafter “CERCLA”)\(^{254}\) and to control hazardous wastes “from the cradle to the grave,” in the Resource Conservation and Recovery Act (hereinafter “RCRA”).\(^{255}\)

A. Water Quality in the United States

The United States (hereinafter “U.S.”) has nearly 3.5 million miles of surface water streams and rivers, 42 million acres of lakes, ponds, and reservoirs, 107 million acres of wetlands, 88,000 square miles of estuaries and bays, and 54,000 square miles of

\(^{252}\) Endangered Species Act, 16 U.S.C. §§ 1531 et seq.
\(^{253}\) National Environmental Protection Act, 42 U.S.C. §§ 4321 et.seq
\(^{254}\) Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et. seq.
ocean and near ocean coastal shores within its borders. Approximately 80 percent of the total freshwater we depend on in daily life in the U.S. comes from surface water: in 2000, the estimated surface water withdrawal in the U.S. was 323 billion gallons a day, which are mostly used in irrigation and public utilities.

Despite 30 years of regulation, U.S. waterways, particularly in the west, remain dangerously polluted from active and inactive mining discharges and runoff. The US Forest Service estimated in a 1993 survey that 5,000 to 10,000 miles of rivers and streams are negatively impacted by acid runoff from mines just in national forests. Disturbance areas caused by hardrock mines in the western U.S. span from 100 acres to 10,000 acres, and have polluted whole watersheds.

EPA Administrator Lisa Jackson said in a 2009 New York Times (hereinafter “the Times”) interview that the nation’s water “does not meet public health goals, and enforcement of water pollution laws is unacceptably low.” The Times investigated water quality in the U.S. by interviewing more than 250 scientists, state and federal regulators, environmental advocates, and water-system managers, and found that approximately one tenth of Americans, roughly 36 million people, have been exposed to toxic chemicals in their drinking water. At least two thirds of Americans live within

261 See id. Wells are usually not under the Safe Drinking Water Act, which regulates water quality for municipal waters, 42 U.S.C. §300f et seq. (1974).
10 miles of a polluted lake, stream, river, or coastal area.²⁶² States have documented nearly 5 million acres of lakes and 300,000 miles of streams and rivers that do not meet state water quality targets, and many of these are unable to support aquatic life and are not safe for swimming and fishing.²⁶³

It is undetermined the exact percentage that the mining sector is responsible for, however, metals mines have contributed 50 percent of total toxics disposals into the US environment since 2001, making them the largest toxics polluters in the US.²⁶⁴ In just one example, in 2009 the EPA found that 79 percent of wells tested near a World War II era copper mine in Nevada carried dangerous levels of arsenic and uranium.²⁶⁵ There are so many western watersheds that have been contaminated by toxic chemicals originating from hard rock mining operations over the past 150 years, that the United States Geological Service (USGS) has set up a special task force to research the effects of mining in watersheds, (for example the Rocky Mountain Terrain and Upper Arkansas River, Colorado) to provide information and tools to agencies for decisions in management, risk assessment, remediation planning, and other related measures.²⁶⁶

B. The U.S. Mining Policy and Mining Law of 1872

²⁶³ See id.
Regulation of the mining sector requires involvement from every major EPA program,\textsuperscript{267} as mining operations discharge more waste\textsuperscript{268} and toxic substances into surface waters and the environment than any other industry.\textsuperscript{269} States differ in controls, land use issues, environmental issues, and the type of mining proposed, which makes every mine and its particular set of regulations, unique. Since there is no federal law that addresses mining impacts per se on the environment, many states have promulgated statutes that do.

The United States Mining Law (hereinafter “Mining Law”, or “law”) pertains to hardrock minerals, oil, and natural gas on federal land, and has remained unchanged since its inception in 1872.\textsuperscript{270} The law was written to encourage western U.S. settlements by allowing prospectors (including large corporations) who find minerals on federal lands, such as gold, to stake minerals and land claims and obtain a patent for a land title.\textsuperscript{271} Once these requirements are fulfilled, the prospector is granted the claims as private property.\textsuperscript{272} The US government essentially says to mining prospectors and companies, “Come and get it for free.”\textsuperscript{273}

\textsuperscript{269} EPA TOXICS RELEASE INVENTORY, Supra note 264; and EPA: Metal Mining Most Toxic Industry in America, EARTHWORKS, 2006, available at http://www.earthworksaction.org/04132006.cfm.
\textsuperscript{270} US Mining Law, 30 U.S.C. §22 et. seq
\textsuperscript{271} See id., 30 U.S.C. § 29
\textsuperscript{272} See id., 30 U.S.C. § 23; the provision states, “No location of a mining claim shall be made until the discovery of the vein or lode within the limits of the claim located.”. CHRISTINE A. KLEIN, FEDERICO CHEEVER, AND BRET C. BIRDSONG, NATURAL RESOURCES LAW: A PLACE-BASED BOOK OF PROBLEMS AND CASES 443 (Aspen Publishers, New York, NY 2005).
The US Congress, like both Vietnam and China, declares domestic mining, minerals, metal and mining reclamation industries as “in the national interest.” To underscore this, Interior Secretary Ken Salazar recently stated, “Our domestic gold mining industry alone creates more than 66,000 jobs and nearly $2 billion in annual earnings annually…. In my view, our own security depends on maintaining a viable domestic mining industry. Metals and minerals are also needed to support development of renewable energy.”

C. Water Pollution Regulation

The United States has a complex and well-developed legal and regulatory system that governs water pollution in the nation’s waters. A treatment of every important aspect of U.S. water protection is not conducive to this paper; however, there are several areas of law and regulation that will be addressed as they relate to mining pollution of surface waters.

1. The Clean Water Act and Water Quality

Due to the Mining Law’s antiquity and related problems, there have been calls to reform it to accommodate the environment, mandate a mineral royalty for hardrock mining companies, and eliminate the patent provision. In the same 2009 speech to the Senate, Interior Secretary Ken Salazar informed the panel that the Obama administration intended to reform the Mining Law. The revised form of the Mining Law is called the Hardrock Mining and Reclamation Act, and passed a U.S. House of Representatives vote in 2007, but has yet to pass a Senate vote and become law. (H.R. 2262 Hardrock Mining and Reclamation Act, GOVTRACK.US, at: http://www.govtrack.us/congress/bill.xpd?bill=h110-2262 )
When the Clean Water Act went into effect, the U.S. was in a period of environmental awakening, following Rachel Carson’s book *Silent Spring*, a seminal work warning of the dangers of toxic pollutants in our waterways and environment, namely DDT, and the results of the uncontrolled expansion of the American economy post WWII.  

In response to pressure to reform environmental laws, the Clean Water Act was born, and “establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters.”

The US government, through the CWA, (regulated by the EPA), states its goal is to “restore and maintain chemical, biological, and physical integrity of the nation’s waters” and to eliminate pollutants into the navigable waters by 1985.

There are four sections of the CWA that are related to water quality: (1) water quality standards for all contaminants in surface waters, (2) minimum national effluent standards for each sector of industry, (3) a discharge permit program that coordinates water quality standards into enforceable limits, (4) toxic chemical regulation, including those generated by mining operations.

### 2. Discharges and Water Quality Standards

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276 RACHEL CARSON, SILENT SPRING (Houghton Mifflin Co. 1962).
278 See id., CWA §101(a)
279 See id., CWA §101(a)(1). Although the CWA’s main focus is to maintain and improve water quality for human use and consumption, it also helps protect biodiversity, namely endangered species, in several different ways. The first is setting water quality standards the meet Endangered Species Act instream flow requirements for endangered species, (CWA §303) and the antidegradation policy requires existing uses of a waterbody be protected, such as threatened or endangered species. The CWA also limits discharges and fill into wetlands, which are hotbeds of biodiversity. (CWA §404) And, finally, the CWA issues NPDES permits to discharge in waters containing biodiversity, which is based in part on criteria to maintain current or higher levels of aquatic life. (CWA §402)
In trying to achieve the goal of the EPA to “restore the nation’s waters”, the CWA mandates that “a discharge without a permit by any person of any pollutant into navigable waters from a point source shall be unlawful.”\textsuperscript{280} Discharges of pollutants are not defined per se, but the CWA categorizes them as “conventional,”\textsuperscript{281} (total suspended solids, pH, fecal coliform, oil and grease) “nonconventional,”\textsuperscript{282} (ammonia, nitrogen, phosphorous, BOD, effluent toxicity) or “toxic”\textsuperscript{283} (metals and manmade compounds). Mining pollution can fall into any category. All toxic and nonconventional pollutants must be controlled through the use of best available technology in an industrial category, or BAT\textsuperscript{284}, and the EPA must consider core factors listed in the CWA, such as the age of equipment and facilities, the engineering aspects of the application of different control techniques, the process employed, non-water quality environmental impacts and energy requirements and other factors that the Administer “deems appropriate.”\textsuperscript{285}

\textbf{i. Technology-Based Regulation}

There are two levels of water quality standards within the CWA framework: a “technology-based” standard, which is the lowest possible standard a navigable waterbody can have and meet national pollutant requirements, and a “water quality standard,” which is a higher and more exacting standard. Technology-based effluent limits,\textsuperscript{286} or the technology-based standard, is the baseline standard used in the U.S. to determine the highest acceptable level of pollutants allowable in each waterbody in order to meet its designated uses, without regard to individual specifications of each waterbody.

\textsuperscript{280} CWA §301 and §303.
\textsuperscript{281} CWA §304(a)(4).
\textsuperscript{283} CWA §307(a)(1).
\textsuperscript{284} CWA §304(b)(1)(A).
\textsuperscript{285} CWA §304(b)(2)(B).
\textsuperscript{286} CWA §304(b).
A discharging entity must use effluent guidelines ⁵⁴ that are economically achievable to adhere to effluent standards as set out by the EPA or by States’ water quality policies ⁵⁸ while using “any available control technique” to meet the limits ⁵⁹ For industrial facilities such as mines, technology-based effluent limits are obtained by using effluent limitation guidelines and standards from the EPA, and/or using the best professional judgment in each discharge case, when there are no national guidelines or standards. ⁶⁰ The EPA Office of Science and Technology is responsible for developing and updating effluent limitations guidelines and standards. ⁶¹

China currently employs a technology-effluent-based standard of pollution control, as does Vietnam. Of the two countries, China’s system is more developed and organized and better funded. Vietnam’s policy statements and work with international organizations in some of its larger watersheds suggest more dedication on the part of Vietnam to incorporate an integrated watershed management mechanism with water quality-based international cooperation for its major surface waterbodies.

ii. Water Quality-Based Regulation

When technology-based effluent limits do not meet State water quality standards, or when toxic pollutants are found in a waterbody, ⁶² a water-quality based effluent limitation must be imposed that protects state water quality standards. ⁶³ Water quality-based standards are more exacting than effluent limitations in that the permit writers must

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⁶¹ CWA § 306(a).
⁶² 40 CFR 122.44(d).
⁶³ CWA §303(b)(1)(c) and 40 CFR 131.15.
take into account the potential impact of each possible surface water discharge on the water quality of that waterbody.\textsuperscript{294} The water quality-standard takes a holistic view of the uses and value of the waterbody, and is the basis of the water quality-based pollution control program, which is mandatory under the CWA.\textsuperscript{295} Water quality standards define water quality goals,\textsuperscript{296} and are based on designated uses,\textsuperscript{297} water quality criteria to support the designated uses,\textsuperscript{298} and an anti-degradation policy.\textsuperscript{299}

The CWA directs the EPA to publish water quality criteria guidance documents to help States develop their own water quality standards.\textsuperscript{300} Criteria for water quality, or data and scientific assessments on concentrations of pollutants and human health and environmental effects, are required and must be scientifically up-to-date.\textsuperscript{301} The State assesses waterbodies to determine whether they have reached federal standards, and submit it to Congress.\textsuperscript{302}

When standards are set, the CWA requires states and Indian tribes to assess and develop a list of impaired waters, or waters that do not meet water quality standards

\textsuperscript{294} EPA \textit{Supra} note 287 and 289.
\textsuperscript{296} Code of Federal Regulations (CFR) 40 §131.2; and Overview of the Water Quality Standards-to-Permits Process, US ENVIRONMENTAL PROTECTION AGENCY, found at http://cfpub.epa.gov/npdes/wqbasedpermitting/wqoverview.cfm
\textsuperscript{297} CFR 40 §131.10.
\textsuperscript{298} CFR 40 §131.11.
\textsuperscript{299} CFR 40 §131.12.
\textsuperscript{300} CWA §304(a)(1) and 33 CFR §1313(b)(1). (The 1987 Water Quality Act (§. 304(m) requires that the EPA publish a biennial plan for developing new effluent guidelines and a schedule for the annual review and revision of existing promulgated guidelines. http://cfpub.epa.gov/npdes/techbasedpermitting/effguide.cfm)
\textsuperscript{301} CWA §304(a)(1), and Surface Waters Standards and Guidance, US ENVIRONMENTAL PROTECTION AGENCY, available at http://water.epa.gov/scitech/swguidance/
\textsuperscript{302} CWA §305(b). Once a State has incorporated federal water quality standards, or stricter standards, into their water quality framework, it will receive certification from the EPA to issue permits for entities wishing to discharge into waterbodies. If the water quality for that waterbody is consistent to, or better than, federal requirements, then the applicant is granted a permit by the State (S. 401 NPDES, fully treated below), to submit to the agency for a final permit (S. 402 NPDES).
because they are too polluted or degraded, within its jurisdiction. The impaired waters are ranked in order of severity of pollution. For more severely impaired waters, the CWA requires the application of Total Maximum Daily Loads (or TMDL’s), which is the amount of a pollutant from point, nonpoint, and natural sources that can be safely discharged into a waterbody without affecting it’s designated uses. TMDL lists are required every two years for impaired water bodies. Pollution exceeding the TMDL will usually cause waterbodies to exceed water quality standards. States or tribes must allocate loads and waste loads for point and nonpoint sources under each TMDL, taking into account water temperature, flow rates, seasonal variations, heat sources, and dissipative capacity of identified waters. If the water body meets the State water quality standards, it may be removed from the 303(d) list of impaired waters that require TMDLs. If the water quality standards are not met, the load and waste load and TMDL must be modified. To ensure compliance with the TMDL, the EPA conducts

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303 CWA §303(d).
304 CWA §303(d)(1)(A); The Water Quality Handbook: The Water Quality Approach to Pollution Control, US ENVIRONMENTAL PROTECTION AGENCY, found at http://water.epa.gov/scitech/swguidance/standards/handbook/chapter07.cfm
305 CWA §303 (d)(1)(C).
306 Supra note 659.
307 EPA Supra note 653.
308 CWA §303 (d)(1)(D).
310 See id. In 2007, the Carolta Mining Company in Arizona proposed to build an open pit copper mine and discharge pollutants into Pinto Creek, an impaired waterbody. Carlota applied for an NPDES permit under section 402 of the CWA, which was issued by the EPA, and challenged by environmental groups. The Ninth Circuit ruled that no permit may be issued to a new source of pollutant or discharger if the discharge will cause or contribute to the violation of water quality standards. There is an exception if the TMDL permit applicant can show that a TMDL has been established and there are sufficient remaining permit load allocations to allow for the discharge, and the dischargers are subject to compliance schedules that bring the discharge segment into compliance with water quality standards. Friends of Pinto Creek v. United States Environmental Protection Agency, 504 F.3d 1007 (9th Cir. 2007).
inspections of facilities, which includes the review of discharge monitoring report, personnel interviews, and wastewater samples into navigable waters.\(^{311}\)

3. Discharges and the NPDES Permit Program

If any discharging entity, a mine for example, plans to discharge treated water or toxic chemicals into waters of the United States from a point source, it must apply for a National Pollution Discharge Elimination System permit (NPDES).\(^{312}\) The NPDES permit is considered both a State and a federal permit. Federal agencies cannot grant an NPDES permit until the State where the discharge will take place has granted or waived a permit.\(^{313}\) States may implement their own NPDES permitting plan with EPA approval, but the EPA can perform inspections and enforce compliance in addition to the State.\(^{314}\) The EPA, after consulting with the Corps of Engineers, can override a State’s authority and refuse a permit after the notice and comment period if it is determined that the discharge would pose a threat to fisheries, shellfish beds, city water supplies, wildlife, ore recreational uses.\(^{315}\) States issue mining permits per se, but the Office of Water of the EPA may review state-issued permits to ensure compliance with water quality criteria, and ensure effluent guidelines for ore/coal mining and processing are properly applied to wastewater discharges.\(^{316}\)

An NPDES permit applies to “point source discharges.” A point source is defined as a “discernable, confined, and discrete conveyance,” which includes a pipe, ditch,

\(^{311}\) EPA Supra note 304.
\(^{312}\) CWA §402.
\(^{313}\) CWA §401.
\(^{314}\) CWA §402(c)
\(^{315}\) See id.
tunnel, well, or a floating vessel that carries effluent to a navigable waterbody.\footnote{CWA §502(14).} The CWA requires point source discharges from mining operations to be authorized under an NPDES permit.\footnote{CWA §502(7).} Discharges from tailings piles and mining and mineral processing operations are regulated under Section 402 of the CWA, as well as Section 404.\footnote{Tailings piles and mining and mineral processing operations are considered ‘point sources’ under §502 of the CWA.}

In an attempt to expand the definition of point source, the EPA and private parties have been engaged in several lawsuits, the most recent in December of 2010, In Greater Yellowstone Coalition v. Lewis\footnote{628 F.3d 1143 (9th Cir. Dec. 23, 2010).}, where the Ninth Circuit held that “mining pits containing waste rock with engineered covers” do not fall under the point source definition of the CWA, and that “some type of collection or channeling is required” to be defined as a point source.”\footnote{See id., citing Trustees for Alaska v. EPA, 749 F.2d 549, 558 (9th Cir. 1984).}

4. Toxic Chemicals

Over time, the NPDES permitting system has expanded from the control of a small number of conventional pollutants to more complex analyses involving many sources and types of pollution, including toxic chemicals. There are 126 listed toxic pollutants\footnote{CWA §307(a).} in what is called the “EPA Gold Book”\footnote{EPA Gold Book, US ENVIRONMENTAL PROTECTION AGENCY, p.91 available at http://www.epa.gov/npdes/pubs/chapt_06.pdf} which can seriously degrade water quality. If toxic compounds are found in a waterbody, states must implement numeric criteria that are specific to the waterbody and its designated uses. Where mining sites are...
concerned, states may use the EPA Gold Book criteria or develop their own criteria to address toxic pollutants.\footnote{See id.}

5. NPDES Enforcement

There are several ways to enforce compliance of NPDES permits. One can seek temporary or permanent injunctive relief or initiate a civil action against a S. 402 discharge violation.\footnote{CWA §309(b).} The CWA may issue administrative compliance orders, forcing a mining operation, for example, to comply with a NPDES effluent limit.\footnote{CWA §309(a)(2)(A).} Criminal penalties of up to $25,000 per day and two years of imprisonment for negligent violations may be imposed, and up to $50,000 a day and 3 years of imprisonment for knowing violations may be imposed.\footnote{CWA §309(c)(1)(B).} The EPA may also enforce a restraining order against an operation that presents substantial and imminent harm to health or economic livelihood.\footnote{CWA §504.}

6. Dredge and Fill §404 Permits

Mines pollute navigable waters by “discharging dredge and fill” operations, (”land clearing, ditching, channelization, and in-stream mining”\footnote{CWA Section 404 Permits, US ENVIRONMENTAL PROTECTION AGENCY, available at http://water.epa.gov/type/ocelb/habitat/cwa404.cfm}) which are regulated through permitting by the Army Corps of Engineers (hereinafter “Corps”) with EPA oversight and input and evaluations by the United States Fish and Wildlife Service (USFWS). The CWA makes it unlawful to discharge dredged or fill materials into “navigable waters” without a permit.\footnote{CWA §404.} The term discharge in this context has been interpreted to include
additions and redeposits, which could include tailings piles into waterways. The Army Corps of Engineers must authorize anyone wishing to discharge dredge and fill material into waters of the United States. No permit to discharge dredged and fill material is allowed if a “practicable upland alternative exists that is less damaging to the aquatic environment, or the nation’s waters, including wetlands, would be significantly degraded.”

Mining operations recently were afforded much more leeway to pollute. In 2006 the US Supreme Court expanded the definition of “fill material” to include gold mining “slurry” (toxic byproducts of the gold mining process including arsenic and cyanide which are commonly called “tailings”), resulting in mines now having the ability to dump tailings sludge into navigable lakes. The case began in 2005, when the Corps issued a S. 404 permit to Kensington Gold Mine near Juneau, Alaska to discharge 4.5 million tons of mining slurry into a navigable lake (Lower Slate Lake) that runs off into Slate Creek and then to Berners Bay, located 25 miles north of Juneau. The tailings would increase the lake’s size from 23 acres to 60 acres, raise the lake’s bottom 50 feet, and kill all aquatic life within the lake. Moreover, in spring, hooligan fish spawn in Berner’s Bay

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331 33 CFR §232.2 and 323.2(d)2) National Homebuilders Assn. v. Army Corps of Engineers, 440 F.3d 459 (D.C. Cir. 2006), which invalidated the Tulloch II rule for violating the CWA because the rule used volume to determine “incidental fallback”.
332 EPA Supra note 329.
333 CWA §404(b)(1) and 40 CFR Part 230.10(a) and 230.10(c)
336 See id.
in the millions, which feed up to 600 bald eagles, nearly 900 Steller’s sea lions, hundreds of harbor seals, and bears.337

Several environmental groups challenged the plan, and the question presented was: Is the discharge from Coeur Alaska’s gold mine “fill material” under S. 404 which is regulated by the Corps, or is it a pollutant-effluent discharge under S. 402 regulated by the EPA? The Court held that the Corps could grant a permit to dump slurry into a lake despite the EPA’s jurisdiction over pollutants because the definition of “fill material” is ambiguous in both the CWA and CFR. The Court explained that the S. 306 limitation of effluents is ambiguous in that it forbids discharges that violate new source performance standards and halts S. 404 permits issued by the Corps. The Court deferred to an internal EPA memo of 2004, which said performance standards did not apply to an initial slurry discharge into a lake, in effect ruling that a mining company can pollute a waterbody that would have been regulated under the CWA’s effluent provisions.

As one can imagine, the Coeur Alaska case will have far reaching effects on mining pollution into navigable waterbodies, which affect downstream users and biodiversity.

D. Enforcement Mechanisms

Enforcement of the various statutes dealing with environmental and water quality involve a complicated and coordinated process between the EPA and Department of

Justice, tribal, State, and local governments.\textsuperscript{338} States are usually the dominant enforcing authority of federal statutes.\textsuperscript{339} Citizens are involved with enforcement process by reporting violations and bringing civil lawsuits against violators.\textsuperscript{340} Likewise, monitoring, evaluations, and inspections by authorized authorities play a crucial role in making sure mines comply with laws and regulations that apply to water quality and the environment.

Like China and Vietnam, the US does not assign adequate resources and commitment to enforce violations of environmental and water quality laws and regulations. The EPA has estimated that nearly 20 percent of mines inspected between 1990-1995 by the EPA and States were subject to enforcement actions, and approximately 20 percent of those actions were under the CWA, Clean Air Act, or RCRA,\textsuperscript{341} however, it has been reported that the EPA does not inspect mines to the degree they are called on within the EPA framework.\textsuperscript{342}

Where the EPA has failed in enforcing water quality measures in the mining sector, it also acknowledges that it can take numerous measures to improve


\textsuperscript{339} See id.

\textsuperscript{340} See id. The EPA reported 22,000 enforcement inspections in 2007 by the states, and 136,000 compliance inspections in 2003. These inspections are not conclusive, but show a marked decrease over a 4-year period, if we are to assume compliance and enforcement inspections are interrelated. The decrease in inspections could be due, in part, to federal funding to state program decreases during the George W. Bush administration, and continued decreases during the Obama administration.

\textsuperscript{341} \textit{Hardrock Mining Framework}, ENVIRONMENTAL PROTECTION AGENCY, p. 9, Sept. 1997, \url{http://www.epa.gov/aml/policy/hardrock.pdf} The EPA states it should use “targeted enforcement and compliance approaches as a tool to better focus resources on the highest priority mining operations,” and that compliance assistance should be a priority and include traditional enforcement mechanisms, such as fines and injunctive relief. The agency further states that it should promote standards of practice that achieve “risk based, long term, environmental protection goals.” The EPA suggests that regions with high mining activity should be staffed with “Regional Mining Coordinators and cross mining teams” in order to ensure EPA water quality program compliance, enhance technical operations, and serve as a staging area for program improvement.

\textsuperscript{342} Liquid Assets 2000: Americans Pay For Dirty Water, US ENVIRONMENTAL PROTECTION AGENCY, \url{http://water.epa.gov/lawsregs/lawsguidance/cwa/economics/liquidassets/dirtywater.cfm}
environmental protection. Such measures require funding from Congress, which has been an area of concern. The Environmental Council of the States found in 2004 a $1 billion gap in amount of funding needed by states to implement federal environmental laws. As mining in the US continues to develop, and the stressed U.S. economy calls for budgetary cuts, it will remain to be seen whether mining pollution oversight, regulation, and enforcement improve.

CONCLUSION

Although Vietnam, China, and the United States’ environmental, mining and water quality protection policies differ greatly, a basic underlying factor that is present in all three systems serves to undermine water quality protection: economic growth is considered on par with environmental protection in policy and legal instruments, yet in reality is given much more attention and resources from each government. Further, all three countries state the policy desire to both protect the environment and water quality, and to specifically depend upon their mineral resources for help in sustained economic growth.

For example, the United States has the most sophisticated permitting system for wastewater discharges out of all three countries, however mining industry growth and methods of mineral extraction that are harmful to water quality have trumped environmental protective laws, as seen in the Coeur Alaska case and Secretary of Interior Ken Salazar’s commitment to the mining industry. Vietnam and China have implemented an impressive array of environmental and water quality regulations in the past ten to twenty years, but regulatory mechanisms that address mining and industrial

pollution are applied inconsistently in different areas of the country. Chinese advocates for environmental and water quality protection, such as journalist Ma Jun and MEP Deputy Director Pan Yue, have recognized the importance for orderly participation and an informed public to develop a functioning and healthy system that puts proper emphasis on environmental protection, and legal measures have been promulgated to initiate this process. Vietnam is not as advanced in citizen involvement for making sound environmental policy, however community level enforcement is widespread. Citizens in the United States are able to comment on proposed federal environmental projects and their impacts, but States can usurp this right through their own regulations, or simply sidestep regulations for the mining sector’s bottom line.

Each country struggles with obstacles in reaching water quality and environmental protection policy goals, but with adequate political and financial will that includes active participation from the citizenry, each country has the ability to protect water quality as the highest priority. That this isn’t the penultimate priority in each country’s regulatory system speaks to the persuasive power of industry.