Sustainable Development Through Resource Extraction

Can Nonrenewable Resources Lead to a Sustainable Future?

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Abstract

The long-term viability of an economic system that relies on the extraction of nonrenewable resources is prone to be questioned and criticized. In a relatively short period of human history the economy has reached a global scale, resulting in increased demand for natural resources as well as greater impacts from these activities. An underlying assumption of this research paper is that an immediate or near term decline in extractive activities is an unreasonable expectation, as demand for nonrenewable resources will continue to grow based on the emergence of developing economies. Recognizing this reality and responding to increased public pressure to account for the impacts of mining, the industry has embraced the concepts of sustainability and sustainable development as a means to improve its performance and reputation. The purpose of this paper is to review the validity of such an approach and determine if the extractive industry can make a legitimate contribution to sustainable development.

Foreword

The purpose of this Masters Research Paper is to evaluate the validity of a sustainable development approach to non-renewable resource extraction. The focus is predominantly centered on the ability of mining to make a contribution to long-term development goals, while ensuring that options for future generations are maintained. Through researching and writing this paper I have gained a deeper understanding to the political history that has led to the development of a global economy, the value of developing and maintaining stakeholder relationships in reducing risk and uncertainty, as well as various theoretical approaches and concepts of sustainability and sustainable development.

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Introduction

As global population continues to grow, it is only natural that consumption will increase as a result. Another factor driving global consumption is increases in living standards, which result from economic development and growth. This link raises concerns regarding the management and distribution of natural resources, as the resources are limited in their availability, but at present we continue to see growth in the areas that will drive increased demand for their consumption.

Accepting the basic understanding that all economic activity is dependent on natural resource inputs, as well as the fact that many of our natural resources on which the economy is reliant are nonrenewable, it is understandable that opinions are quite varied with respect to their consumption. Concerns regarding the impacts that economic activities undertaken today will have on future generations have been expressed with seemingly increasing alarm. Operating on the frontlines of nonrenewable resource extraction, mining and other extractive firms have become the face for an increasingly contentious issue. Subject to scrutiny and criticism for not just the direct impacts of their activities, but the broader and indirect impacts of bringing a resource into the economy, the extractive industry has had to adjust their practices and adapt to evolving social expectations. From where the resources are extracted, the means by which they are extracted, how the resources are consumed or used in the production of another product, as well as how the impacts and benefits are distributed, are just some of the issues that have been the subject of debate in many professional

and academic fields. Recognizing the need to address these concerns, the industry has embraced the concepts of sustainability and sustainable development as a means to ensure that their interests are balanced with those impacted by extraction, whether directly or indirectly, as well as with society at large.

Undoubtedly, opinions regarding the validity of exploiting nonrenewable resources can be emotionally driven due to the magnitude of the potential benefits and impacts at stake. While there are calls to end our reliance on nonrenewable resources, such an approach would be unrealistic at this time. Instead, this paper is based on the assumption that economic growth will continue to be a universal objective and that the human population will continue to increase for some time, therefore the exploitation of nonrenewable natural resources will continue. A more realistic expectation based on these assumptions, is that improvements can be made to ensure that extractive activities are undertaken in such a way to maximize the benefits generated, while striving to eliminate the impacts.

The purpose of this report is to explore if the extraction of natural resources can be aligned with the concepts of sustainability, and if the extractive industry can genuinely contribute to sustainable development.

This paper includes a brief overview of the political economic developments that have led to a global economy, as well as some of the social theories that have been

presented to explain the uneven development that resulted. This will be followed by an in-depth look at the concepts of sustainability and sustainable development, including the some of the earliest works that contributed to current understandings of the concepts, definitions of the terms, and an assessment of their validity as applied to nonrenewable extraction. To begin, a basic understanding of the extractive industry is provided.

Resource Extraction

The mining life cycle can be divided into seven phases: exploration, discovery, resource definition, preliminary environmental assessment to feasibility, engineering and construction, mine production, closure & post-closure. While much of the focus has typically been in regards to the mine production phase, this is generally a very stable part of the mine life cycle. The most disruptive phase occurs during construction, as it is during this time that all required infrastructure for the project is brought to site and installed. This also coincides with the greatest employment levels, meaning that there is potentially a large influx of employees at site. The longest lasting phase is post-closure, as this requires ongoing monitoring of such things at water, air, and soil to name a few.

Typical extraction projects are capital and energy intensive. Permanent changes to the landscape are common, particularly with open pit operations, as large quantities of soil and rock need to be removed to access the desired resource. The physical impact created by mining is just one aspect of many that need to be taken into account. If

managed properly, the overall contribution of the project to all stakeholders will be seen as worthwhile.

The challenges and complexities involved in nonrenewable resource exploitation go far beyond the technical requirements of physically accessing a resource that can then be brought to market. Unlike the majority of other industries, mining companies must operate where the resources are located. This forces extractive firms to look towards increasingly remote locations all over the world. Additionally, extractive operations will typically last for a short period of time, until the reserves are depleted. Understanding that the extraction of nonrenewable resources is often the only source of capital to fund development in many parts of the world, it is critical that all efforts are made to ensure that the project can be successful for all stakeholders.

The shift in public opinion towards mining began during the 1960s, as awareness surrounding the scale of environmental impacts came to the forefront. This led to the formation of environmental legislation and stricter standards of care for the industry in many developed countries. The environmental focus expanded to include social and economic impacts that stem from mining by the 1990s (Thomson & Joyce, 2006). While there is still much progress to be made, today the industry has taken steps to address the environmental impacts of mining into their operations, suggesting that the industry is further prepared to make changes to their common practices.

Stakeholders

Through every stage of the project lifecycle, extractive companies will be required to engage with various stakeholders to the project. Stakeholders can be broadly defined as any individual, group, organization, or entity that has an interest in the project or will be otherwise be impacted by it. As such, each project typically includes a large collection of diverse stakeholders, each with their own interests, concerns, and objectives. Stakeholders can include local communities, indigenous groups, local civil society organizations, NGOs, investors, various levels of government and relevant departments, just to name a few (Kemp et al., 2010). While the actual number and types of stakeholders can be quite extensive, for the purpose of this report the focus will be on local communities and their interactions with the other identified groups mentioned above.

The proposed development of a deposit, and the associated impacts and benefits to the nearby environment, communities, and economies are:

> Experienced differently by different stakeholders and this creates the potential for conflicts when costs and benefits are inequitably experienced or when developments are not compatible with interests and values – or when they are perceived as incompatible. (Davis and Franks, 2011, p2)

It is no longer sufficient for the extractive industry to assume that the economic and development benefits will be sufficient to appease local discontent regarding real or perceived impacts which are left unaddressed. The reliance on the economic and

infrastructure improvements associated with the project have proven to be part of an approach that has become well established but cannot replace meaningful relationship building. This sentiment is expressed by Boutilier & Thomson (2003) who point out that:

> Companies have a strong tendency to invest preferentially in infrastructure because, unlike relationships, infrastructure is tangible, familiar, and easily managed. [6] This preference for infrastructure tends to lead to paternalism and dependency, and is not likely on its own to create strong, collaborative, trusting relationships. A more holistic approach is required to earn a lasting, stable social licence to operate. (p.14)

Furthermore, the absence of visible community tension does not necessarily imply that the community is in support of the operations, but may rather indicate that the company's relationship with the local community is weak. In the case that the local community is not satisfied with the proposed or ongoing operations, the company may be caught by surprise at what they perceive to be a sudden reaction to an issue they were unaware existed. The risk of failing to adequately develop positive relationships with key stakeholders can be summarized thusly:

> In more general terms, every society has anti-development, anti-change, and anti-outsider factions. These factions compete for the loyalty and support of as many additional neutral groups as possible. When they all have sufficient motivation to join forces, they pose a risk to any international company in the community, particularly when the neutral

> groups also have unaddressed questions and concerns about the development. They may worry about how fairly the benefits of development will be distributed. Sometimes they simply feel threatened by the arrival of outsiders who may not respect their traditions. (ibid, p.13)

In essence, if the company fails to engage the local community in a meaningful and culturally sensitive manner, with the intention of developing a mutually respectful and beneficial relationship that will allow them to work together towards identified goals and objectives, then the local community will be more receptive to those stakeholders that are opposed to the development. Waiting until this stage to begin attempting to engage the local community and developing an ongoing dialogue will, at the least, prove much more difficult and time consuming, and likely fail to attain the level of understanding and respect between the two groups that would have been achieved had the company's efforts commenced earlier. While it may be difficult for management to properly assess the overall value derived from investing in community relations, it is easier to quantify the economic losses associated with disruptions to operations from community protests. In fact, Davis and Franks (2011) have estimated that on a project with capital expenditure of $3 - $5 billion the company would lose $20 million every week that operations ceased. This could prove insurmountable for some companies to absorb, resulting in significant economic losses for the company and its investors, as well as uncertainty for local stakeholders. When compared to the potential losses that can arise through community conflict, it is clear that developing and maintaining strong

relationships should be viewed as a necessity in reducing some of the risk and uncertainty inherent in large projects.

It is important to note that while it is the company's activities that are precipitating the proposed changes, it is not solely the company's responsibility to ensure that local benefits are provided and realized. For this reason it is prudent that key stakeholders are included and informed regarding decisions that will have an impact on the overall outcome of the project. For example, local communities should be kept informed regarding agreements between the company and government concerning tax, royalty and community transfer agreements, as well as who is responsible for distribution of the revenue. Likewise, multilateral agreements can be made between the company, local community, and other stakeholders.

Brief History of the Political Economy

The global economy is a term that is used frequently to describe the increase of international trade and global production that seems to have touched nearly every part of the world. Along with making the world seem like a smaller place, the diffusion of services, manufactured products, technology, and resources that are transferred from one nation to another, serve to render national borders seemingly obsolete. This section will provide a brief overview of the political economic history from the mercantilism to economic globalization that served to shape the liberal trade environment as well as the global financial institutions operating today. We will then review some of the more prevalent development theories to understand in what capacities development is taking

place and why, despite increased trade, there is still a growing gap between the developed and underdeveloped countries.

Hoogvelt (2001) distinguishes between four periods of distinct structural relationships between the core and periphery, whereby surplus from the periphery is transferred to the core and invested. The first of these, the mercantile phase, roughly between 1500 and 1800, was marked by European merchant vessels sailing the coasts of Africa, Asia and Latin America in search of economic surplus that could be transported back to Europe. These transactions took place under the guise of trade, but more often took on the form of looting and plundering (Ibid.). The accumulated surplus would enter the European economy, and proceeds from these ventures could ultimately be invested in technological and industrial advancements. The effects of these trade expeditions served to advance European society, while simultaneously regressing the development of the areas targeted by European ships. As Europe moved towards industrialization, the diminishing returns coming from the mercantile system was insufficient to meet the input requirements of such a rapidly expanding economy.

The colonial period, from 1800 to 1950, was marked by European and American expansion into foreign territories to secure primary resources. By 1914, 85% of the Earth's land surface was made up of colonized or annexed jurisdictions (ibid.). The ensuing relationship between the colonial power and colonies came to be known as the colonial division of labour (McMichael, 2012), characterized by the flow of primary

products and raw materials from the colonies to Europe and America, and the flow of manufactured goods returning to the colonies. Such an arrangement compelled the colonized areas to undertake significant social transformations, the impacts of which have led to what has been referred to as underdevelopment. The unequal exchanges that took place during this time, and to a lesser extent during the mercantile phase, have gone on to inform and shape ongoing international divisions of labour today.

The periods following the Second World War is of particular interest, as it acted as a catalyst for future economic and political developments and laid the groundwork for the growth of transnational and multinational corporations. This period, which Hoogvelt (2001) calls the neocolonial period, set up what has also been termed the development project, which took place from the 1940s to the 1970s and eventually led to the globalization project from the 1980s and into the 2000s (McMichael, 2012). According to Hoogvelt (2001), the U.S. economy had reached a point in the early 1940s that in order to maintain continuous growth it would be necessary to expand into foreign markets. Being a late economic developer compared to its European counterparts, however, the U.S. did not have access to many lucrative foreign territories already secured through colonial rule, specifically in Africa and Asia. The Second World War would prove an invaluable opportunity for the U.S. to expand their influence. O'Brien & Williams (2007) identify four key factors that allowed the U.S. to assert their dominance as a result of the war. Firstly, the European Allies borrowed from the U.S. in order to fund their war efforts, leaving them indebted to the U.S. at the end of the war.

The second factor was the rise in popularity of labor parties and communism, which demanded a redistribution of resources and the growth of domestic economies, resulting in many welfare states in Europe. The third factor was the physical destruction left in the wake of the war, which also caused social problems and hampered production. Finally, the war weakened European rule over their colonies as they were financially drained. The conclusion of the Second World War, and its resulting impacts on the European colonizers, was an invaluable opportunity for the U.S. to gain access to many of the regions in which they had previously been prevented from fully competing.

The need for a stable economic system led to the creation of the International Monetary Fund (IMF) as well as what would be called the World Bank, through the Bretton Woods agreement between the U.S. and Britain. As a result of loans that the U.S. had provided to Britain during the war, as mentioned above, the U.S. was able to exert their influence in developing a more liberal and less regulated economic system than what was preferred by the British (ibid.). Through this agreement the U.S. dollar was fixed to the gold standard while other currencies were valued against the U.S. dollar, and would periodically be adjusted based on the productivity of their economies (ibid.). The purpose of this was to stabilize national currencies in order to expand international trade while reducing volatility (McMichael, 2012). The World Bank was responsible for providing loans to help fund large scale developments in national infrastructure. While the stated objective of the IMF and the World Bank was to foster Third World development, it is clear that the approach was unbalanced. In practice the two

organizations considered mimicking First World development through infrastructure projects to be the desired method of achieving this objective, as the types of projects that were funded generally focused on energy production and agricultural export, as opposed to more social infrastructure such as health care and education (ibid.). The reason for this is because the World Bank and IMF required that their loans be productive, meaning that they are able to expect a return on the investment. For this reason the World Bank was the authority on granting approval to specified projects. Also, as a condition of receiving a loan, the receiving country also had to adopt changes to their national economic policies that were in line with IMF requirements. The economic policies that developing countries had to adopt favored less government spending along with increased privatization of social services and infrastructure, as well as a more liberal and open economy.

Another relevant development in the growth of international trade since the Second World War was the General Agreement on Tariffs and Trade (GATT). The GATT is essentially a set of rules that govern international trade among participating nations. It was introduced in 1947 as a means to encourage international trade, which had failed to expand the way it had been expected to following the Bretton Woods agreement (O'Brien & Williams, 2007). The principles of the GATT trading system are "non-discrimination, reciprocity, transparency, and multilateralism" (ibid., p.154). In theory this framework was designed to reduce trade barriers through tariff reductions, as well as prevent the favoring of one country over another. One of the issues with this

framework, as mentioned by McMichael (2012), is the fact that it overlooks the effects that colonialism had on developing countries ability to compete fairly.

Beginning in the 1980s, the globalization project began to take shape as a new means of defining the course of development. Unlike the development project, which focused on national governments to manage their own growth, it was now time for the economy to lead development. The debt crisis that struck in 1980 due to rising US interest rates impacted many developing countries that had earlier secured loans to fund their development, and led to the debt regime. Hogvelt (2001) refers to this period as postimperialism, which uses debt peonage to claim economic surplus. In response to growing Third World debt, the IMF oversaw the implementation of structural adjustment policies, which were used to restructure national policies of debtor countries in order for them to secure a debt restructuring (McMichael, 2012). These measures served to shrink the role of government by forcing them to sell public assets and reduce social spending. The result of these initiatives was to provide an opportunity for foreign firms to enter developing countries which had previously restricted their entry through national protections. At this time, development was redefined as participation in the global economy, and global institutions such as the IMF and World Bank assumed more control of Third World national governance (Moghadam, 1999).

Today, The World Bank Group (WBG), comprised of The World Bank, The International Finance Corporation (IFC) and The Multilateral Investment Guarantee

Agency (MIGA) play a significant role in mining activities in developing countries. While providing project financing does make up part of their contribution, the WBG has transitioned towards a focus on sustainability, and has adopted a mission of poverty reduction (Liebenthal, 2005).

The relevance of reviewing these historical phases of the political-economy is not to simply demonstrate the growing gap in power and economic control between Western countries from the rest of the world. While contemporary relations today have been shaped by history, another important point to consider is that these power imbalances were often the result of and legitimized as attempts to civilize and develop the rest of the world. For this reason, apprehension towards foreign investment in harvesting and extracting primary resources, as well as talk about sustainability and sustainable development are to be expected. Regardless of the validity of a firm's commitment to implement sustainability within their operations, doubts will be prevalent.

Development Theories

Throughout the above described phases of political-economic history, a number of social theories have been put forward to explain the growing disparity between the wealthy and poor countries. The idea that those less developed would begin to catch up with their wealthy partners as they began to participate in the economy began to lose support. There was obviously something missing in the path to development, whether it

was an inherent quality within the underdeveloped culture or structural inequalities created by the capitalist system, a number of theories attempted to address the issue. The theories for the growing divide between developed and developing countries that will be reviewed here are modernization theory, dependency theory, and world systems theory.

Modernization theory posits that through continued economic exchanges between the more developed and less developed nations that the less developed nations will become developed. Proponents contend that underdevelopment is simply a stage that all nations must go through at some point in their history in order to achieve development. Many adherents of modernization theory consider the transition from a traditional society to a modern society as a linear process that every nation will go through at different rates, such as Huntington's (1971) nine characteristics of the modernization process as well as Rostow's (1960) five stages of growth. In this perspective, states are separated into two groups; the modern and the traditional. It is the traditional values and social systems that need to be modernized in order to align their development objectives, and any barriers to this modernization are caused by deficiencies within the traditional system (Shaub, 2004). Adherents to modernization theory are strong proponents for TNCs in their role of assisting in development.

Common criticisms leveled against modernization theory is that it often portrays traditional cultures as barriers to development, and assigns responsibility for the lack of

development in many parts of the world on perceived deficiencies of those cultures. Furthermore, modernization theory fails to consider differences amongst underdeveloped countries with respect to their social and cultural structures, leading to a single path for the attainment of modernity (ibid.). Another criticism leveled against this theory is that underdevelopment is a necessary precondition to development, when in fact underdevelopment is relative to other states and must occur at the same time as development in other areas (ibid.).

Developed in Latin America in the 1960s as a response to modernization theory, the *dependentistas* sought to explain their relationship to the global economy as the prevailing doctrine of the time failed to adequately represent the state of underdevelopment that was being experienced (Rist, 2008). Dependency theory considers the gap between developed and developing nations to be the result of forces external to the developing nation, and rooted in colonialist histories and imperialism. This allowed the dominating economic powers to dictate the terms of trade to their own advantage. The developed economic actor is located at the center, while resources are taken from the less developed economic area, or periphery (ibid.). According to this theory, TNCs are representatives of the centre regardless of where they are located, as their profits undoubtedly return to the centre instead of being reinvested in the periphery. Frank (1969) draws attention to the fact that even in developing countries there are often at least one metropolitan area that is the center for production and trade, and draws resources out of the surrounding areas, just as the global metropolis

draws resources from developing countries. The idea that developed nations are able to maintain this system through unequal distribution of labor and access to more technologically advanced modes of production is considered to be the Marxist point of view in dependence theory (Schaub, 2004). As a result the developing nations are forced to sell their natural resources to the developed nations at low prices and import goods manufactured from those resources at higher prices. This theory has been shown to warrant some merit as during eras of crises for the global metropolis, such as the Second World War or the great depression, many South American countries were able to grow their economies (Frank, 1969). This period of self-sustained growth ended however once the global metropolis or centre was able to re-enter the market.

Another strain of dependence theory is the structuralist view. This view maintains that the economies in the periphery are aligned to meet the needs of the more powerful economies in the centre, but only the sectors that are of benefit (Schaub, 2004). This means that the economic sectors of the periphery that are not deemed to be of value are subordinated and fail to modernize. This is very similar to the circumstances described to explain the phenomenon of Dutch Disease, whereby a nations real exchange rate increases, rendering domestic manufacturing uncompetitive in comparison to imports.

Some of the criticisms of dependence theory are that it focuses too heavily on the accumulation of capital, ignoring the role of class structures (Rist, 2008). Also, the

only solution provided is to leave the world market through a socialist revolution, but no framework for how or to what end has ever been agreed upon (ibid.).

In response to the criticisms against dependency theory, a new theory of development began to emerge, known as world systems theory. This theory still relies on some of the framework from dependency theory; however it expands on the social, political, and economic factors that impact development. The role of transnational and multinational firms is expanded as they are considered to be the leaders of the international economy, and therefore promote the continuation of capitalism. Economic decisions of the TNCs supersede political decisions, and therefore TNCs are seen as the drivers of development and underdevelopment. There is still a focus on the centre, semi-periphery, and the periphery, but in this model it is possible for countries to move up or down within the hierarchy (Schaub, 2004).

The theories presented above are clearly the products of a particular time and place. The modernization theory for instance, by considering traditional culture a hindrance to development would not have gained support by those considered to be underdeveloped. Nor would it be considered an acceptable assertion at this time. The dependency theory obviously has its origins among social theorists from the dependent regions. What is important to keep in mind about the theories is that they expand our considerations going forward. For instance, while foreign direct investment was intended to provide a return on investment to the investing firm or country, it is unlikely

that increasing the level of underdevelopment of a particular region was ever an intended consequence. Today, consideration is paid to the capacities of the public institutions of a host country and seen as important to sustaining any local gains that are to be made. The following section will provide a brief overview of sustainability and sustainable development, beginning with the emergence of ideas that can be considered early predecessors of modern sustainable thought.

Sustainability and Sustainable Development

> *We have all known fathers and mothers, devoted to their children, whose attention is fixed and limited by the household routine of daily life. Such parents were actively concerned with the common needs and precautions and remedies entailed in bringing up a family, but blind to every threat that was at all unusual… Once the evil is discovered, there is no sacrifice too great to repair the damage which their unwitting neglect may have allowed to become irreparable. So it is, I think, with the people of the United States. Capable of every devotion in a recognized crisis, we have yet carelessly allowed the habit of improvidence and waste of resources to find lodgment. It is our great good fortune that the harm is not yet all together beyond repair… So the noblest task that confronts us all to-day is to leave this country unspotted in honor, and unexhausted in resources, to our descendents, who will be, not less than we, the children of the Founders of*

> *the Republic. I conceive this task to partake of the highest spirit of patriotism.* (Pinchot, 1910, p.130-1)

It may appear that the terms sustainability and sustainable development are rather recent constructs that have gained quick social acceptance to such a degree that they are now included within any discussion regarding visions for the economy, business strategies, and environmental protection. The most commonly cited definition of sustainable development today comes from what is often called the Brundtland Report. Published in 1987, *Our Common Future* considers sustainable development to be "development which meets the needs of the present without compromising the ability of future generations to meet their own needs" (p.9). Acceptance of these concepts among the public and private sectors can be seen by the various types of sustainability reporting and initiatives being undertaken by a wide range of organizations, from international electronics manufacturers, coffee shop chains, to municipal and federal governments. The seemingly recent popularity of sustainability may lead one to assume that the concepts are based on recently developed concepts and understandings; however this is not the case. The idea that many of our resource stocks are fixed or finite, and the concern for the significance this holds for future generations has been expressed by classical economists for the past two centuries (Tilton, 1996). While the terms are relatively modern, the concepts which inform them are not. The following section will highlight some of the work that has served to inspire and inform what we consider sustainability today.

The Origins of Sustainable Thought

Contemporary views and concepts of sustainability owe their origins to the writings of economists, philosophers, and social theorists, beginning in the late eighteenth century. Interestingly, many of the current concerns regarding the environment, including the physical limits to growth, economic dependence on nonrenewable resources, and human domination over nature for the purpose of economic growth were expressed long ago.

The earliest writing to raise concerns about the impacts on the wellbeing of future generations due to resource scarcity is often attributed to Malthus' 1798 Essay on Population (Dresner, 2008 & Tilton, 1996). In this essay, Malthus contends that while populations grow geometrically, commonly called exponentially today, farmland grew arithmetically (Tilton, 1996). This meant that the eventual demand would exceed the food supply, and lead to food shortages and famine. Essentially, productive agricultural land would become a limiting factor if we were unable to control the growth in population through 'moral restraint' or 'vice', such as the use of contraception (Dresner, 2008).

Malthus' position relied on the belief that any improvements in the general wellbeing of the poor, or laboring class, would be quickly squandered as population

growth would be an inevitable repercussion. In turn, the increased benefits would be diluted as they would be redistributed amongst more people. This perceived futility in creating prolonged improvements for the poor can be seen today as being at the least misguided, with its moralistic underpinnings, if not elitist and deterministic. By suggesting that the wealthy classes were able to demonstrate restraint with respect to population growth, while the poor were not, it leads to a very narrow public policy position. In this case, the conditions of the laboring classes should only be improved to a level that will provide the optimal population size. While Malthus is credited with raising the issue of limited resources on a growing population, many of his assumptions have been shown to be incorrect in the 200 years since his writing. While Malthus did eventually concede the fact that the poor could potentially learn restraint as exemplified by the wealthy, we can clearly see that conditions in developed countries have shown that improvements in living standards among all classes have improved over time (ibid.).

In 1848, John Stuart Mill conceived of the idea of a stationary state economy, that is, one that did not grow nor sought to. The philosopher was essentially asking the question of what the ultimate purpose of the economy was. Classical economics at the time subscribed to the view that population growth would steadily continue, and therefore economic growth would have to maintain or exceed this growth rate if hardship was to be avoided (ibid.). Conversely, because Mill's contended that population growth would inevitably have to be curtailed; the concept that the economy

could remain stationary appeared as a viable option. In his estimation, the current state of economic and population growth was simply a step closer to the stationary state, while wealth accumulation was simply a postponement. It is important to note that Mill's did not consider all countries to be at the same stage of development, as he acknowledges that:

> It is only in the backward countries of the world that increased production is still an important object: in those most advanced, what is economically needed is a better distribution, of which one indispensable means is a stricter restraint on population. (Mill, 1848, IV 6.6)

Clearly, Mill's was of the mind that the economic development achieved in developed countries at the time of his writing was sufficient, and the failure to seek such a state voluntarily would result in it being thrust upon us eventually. We can see that the conditions of limiting population growth as well as a more equitable redistribution of capital are key to Mill's concept of a stationary economy, and still relevant in today's conceptions of sustainability. In order to put to rest the concerns many must have had at the first mention of a stationary state, Mill's offers reassurance that this would not entail an end to human development, but actually provide the conditions to improve it. As Mill's states:

> There would be as much scope as ever for all kinds of mental culture, and moral and social progress; as much room for improving the Art of Living, and much more likelihood of its being improved, when minds ceased to be engrossed by the art of getting on. (ibid., IV 6.9)

While such a notion was most certainly radical at the time, we can also see that it was rather utopian in nature. The notion that people would be more content if they were not laboring merely to survive, nor gain some sense of superiority over others, appears novel but unlikely to occur in the absence of necessity. While Mill's does mention institutional oversights that would aid in securing capital redistribution, such as the prevention of large fortunes from being inherited in full, he does seem to rely on the need for people to be content being more or less 'equal'.

William Jevons is often credited as the first to apply Malthus' concerns of an exponentially growing population and the corresponding increase in demand to a nonrenewable resource. Released in 1865, *The Coal Question* raised the issue that due to an ever increasing population, the demand on Britain's coal reserves would hasten their depletion, making domestic coal more scarce and expensive compared to coal from other areas. As a result, those countries with more abundant and accessible coal reserves would economically surpass Britain (Dresner, 2008).

It can be debated whether Jevons was correct in his assessment of the future of British coal production facing a decline in the 20th century and the resulting impacts to its political and economic position. Coal production in Britain peaked in 1913, which coincides closely with the height of British power leading up to the First World War (ibid.). The counter argument can be made however that in 1913 Britain's share of global manufacturing had fallen to 14 per cent, compared to 31.8 per cent in 1870 (Victor, 2008). Clearly the decline in economic power relative to other countries began prior to peak coal production, and was therefore precipitated by a variety of factors beyond those identified by Jevons. Regardless, Jevons' work "remains relevant to understanding the dependence of economic growth on abundant and cheap supplies of energy" (ibid., p.50). In fact, the relevance of Jevons can be extended to the dependence of economic growth on any nonrenewable resource. While the decline may not coincide precisely with the decline in production, if an economy is dependent on a single nonrenewable resource, then economic decline is inevitable once it is no longer competitive with other suppliers of the same or similar commodity. This is an area that will be further explored in this report.

The concept of 'sustained yield' was introduced by the conservationist approach to natural resources management, advocated for most strongly by Gifford Pinchot. This approach was adopted by the United States as Pinchot was appointed as the first director of the newly created US Forrest Service. The idea of sustained yield was to manage natural resources in such a way as to more economically exploit them.

According to Toman (1992), this sustained yield approach informed the original definition and conception of sustainability within academia. This approach is still relevant today with respect to the maintenance and sustainability of renewable natural resources, including fisheries, forestry, and game. A major distinction between the Conservationist perceptions of the role of nature compared to a more balanced view, is that they considered it wasteful not to use natural resources if they were available. In other words, nature held no intrinsic value if left undisturbed, and in fact contributed to "the huge bill of particulars of national waste" (Pinchot, 1910, p.125). The Conservationist ideal clashed with that of the Preservationists, led by John Muir. Muir founded the Sierra Club, credited with designating Yosemite a National Park. Muir considered nature to be of value in its own right, and lamented any process that would lead to its destruction (Dresner, 2008). It should be pointed out that, while getting the most value for the most people for as long as possible was the mantra of the conservationists, Pinchot did express concern for the depletion of nonrenewable resources. Recognizing that many of the essential materials for civilization were nonrenewable, Pinchot did raise the alarm on poor management practices that led to waste. The root cause for such a wasteful approach to resource management, as identified by Pinchot, is:

> [A] well-marked national tendency to disregard the future, and it has led us to look upon all our natural resources as inexhaustible. ..It is this national attitude of exclusive attention to the present, this absence of

> foresight from among the springs of national action, which is directly responsible for the present condition of our natural resources. (1910, p.126)

In order to overcome such a destructive attitude, Pinchot believed that the economic value of natural resources was overshadowed by their value to the national interest. This sentiment can be gleaned from the quoted passage at the beginning of this section, and again when he states that "the law of self-preservation is higher than the law of business, and the duty of preserving the Nation is still higher than either" (ibid., p.127). Such a view is representative of even current policies to nationalize strategic resources, and issue that will be explored further, later in this paper.

While the Conservationist approach informed American policy, it clearly possessed some shortcomings. In an attempt to 'economically maximize' the use of natural resources, a resource management approach to replace natural forests by planting a single species of tree resulted in a severe lack of biodiversity. As a result, many animal populations were destroyed due to the loss of habitat and food sources. Dresner (2008) credits this approach, and the resulting impacts, with the eventual development of ecology as a science.

As a result of the shortcomings of the conservationist approach, Leopold did not consider humans to be separate from nature or the environment. Rather, he considered each species of flora and fauna part of a community that comprised a larger living being. This informed his concept of a 'land ethic'; that each component made up the whole and could therefore not be separated completely. The concept states that 'A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise' (Harlow et al.,2013, P.276). Leopold's justification for the land ethic was that short-term economic benefits were outweighed by the long-term benefits in human wellbeing that a healthy and robust ecosystem can provide (Dresner, 2008). This is a similar justification to that currently being used to justify the adoption of 'sustainability'. Leopold also helped to inform what is currently known as the precautionary principle, by pointing out the recklessness implied in the removal of a species from the ecosystem without understanding the consequences that could arise (Harding et al., 2013 & Dresner, 2008).

Rachel Carson is credited with setting off the new environmental movement of the 1960s with the release of *Silent Spring*, which focused on the impacts that resulted from the use of DDT as a pesticide. While DDT was marketed as safe for use on crops and beneficial in reducing the infection rates of illnesses transmitted by mosquitoes, the chemical agent also posed a significant threat to other wildlife. The work, as Dresner (2008) explains:

> …criticized a technology intended to better the condition of the human race, rather than a specific development, and that her book revealed *unintended and unpredicted* consequences of this technology. (p.23, italics in original)

This could be considered a watershed moment for gaining awareness in environmental issues. Not only did Carson demonstrate that human activities could have large scale impacts that could cause more harm than good, but also that the culprit was originally heralded as a technological improvement. This revelation cast doubt on the ability of science and technology to provide a solution to our problems.

In 1972, a group of researchers from MIT released *The Limits to Growth*, which quickly gained an audience and significant media coverage. The report was based on a series of computer models, designed to simulate global economic subsystems, through various scenarios. The subsystems considered were: population, food production, industrial production, pollution, and the consumption of nonrenewable natural resource (Turner, 2008). Based on the results of the models, the report concluded that with current trends of exponential population growth and increased demand for nonrenewable resources, severe food shortages and resource scarcity by the mid 21st century.

According to this business as usual scenario these shortages would lead to a collapse of the global system (ibid.).

The Limits to Growth was not without its critics, most leveled at the inherent assumptions that were made in developing the model. While the idea of limits to physical growth on a finite planet were never denied, the Malthusian pessimism of the assumptions was heavily critiqued (Dresner, 2008). The assumed rates of technological innovation and availability of resources were considered too low, and failure to account for resource substitution and human adaptability were ignored (ibid.). In essence, the critics argued that the model had been designed to fit a predetermined outcome. Regardless of the validity of the model, the result was to bring the concept of limits and the environmental movement to the forefront of the public conscience.

As we can see, the concepts of sustainability and sustainable development did not emerge fully formed, but are rather the product of many theories, observations, and concerns of an eclectic collection of writers from variety of disciplines. Themes that emerged in these early writings that are still relevant today include: a concern for the welfare of future generations, the sense that consumption could lead to the exhaustion of a finite supply, skepticism towards the ability of technological improvements to overcome environmental impacts, and the idea of limits to the scale of the economy. According to Dresner (2008),

one aspect of our current outlook that has changed is our perception of the future, as today we no longer have the same optimism of the possibilities that the future can bring in improving the world.

Emergence of the Terms

The earliest use of the term sustainability in a form that would be recognized today came from a conference on Science and Technology for Human Development in 1974. The concept that was proposed was for a 'sustainable society', and called for equitable distribution, democratic participation, management of exhaustible natural resources, and protection against environmental destruction (ibid.). Response to the new concept was unremarkable, as it failed to capture the imagination or interest of business or government as a desirable objective. As Gibson (2005) points out, sustainability was initially met with skepticism by governments and business, for it is a critique of current practices, as "the concept … would spur no interest in a world generally confident that its current approaches will resolve looming problems and ensure a viable future" (p.38).

The concept of sustainable development is a comparatively more recent construct, with the term first being published in 1980 by the International Union for Conservation of Nature and Natural Resources. The original intent was to merge conservation with development, where development was seen as the modification of the biosphere to satisfy needs and improve living standards (Dresner, 2008). While this incarnation of sustainable development did share many ideas that would also be

expressed in the Brundtland report, overall the focus was on environmental protection, which was not as applicable or pertinent an issue in development discourse at the time (ibid.). Contributing to the lack of interest at the time is the fact that practical political and economic changes that could serve to bring about sustainable development were not provided.

The report *Our Common Future* (1987) was the result of World Commission on the Environment and Development held in 1983. The concept of sustainable development that emerged from the report, and quoted at the beginning of this section, was able to gain political traction. By the early 1990s sustainable development had already become a popular term and something many nations were publicly endorsing as a desirable objective (Neumayer, 2010).

At the time, and even to this day, the idea of sustainable development was met with criticism regarding the value of the term. As Redclift & Woodgate (2013) explain, it was introduced as a means to "[facilitate] the management of divergent policy objectives, in this case environmental protection and economic development" (p.92).

The idea that the depletion of a finite resource can be reconciled with the concept of sustainability may initially seem to be an absurd claim. We can overcome some of the initially perceived contradictions that come up when attempting to demonstrate the sustainability of any activity by properly defining what sustainability is,

the scope of focus, as well as the timeframe being considered. For instance, if we define sustainability as being able to maintain current production trends, limit our scope to one defined deposit, and apply an infinite timeframe, it is easy to conclude that mining is unsustainable. Such an assessment fails to account for the contributions that are made not just by the resources, but the revenues generated from their extraction, and later production. While this remains to be a very simplistic illustration, it does serve to demonstrate that what may initially appear as an obvious conclusion to reach may simply be the symptom of too narrow a focus. For this reason a useful definition for the terms is imperative if they are to serve any good.

Defining the Terms

Despite the prevalence of the terms, there is still no single definition for either sustainability or sustainable development. Understandably this has led to some confusion regarding what is meant by sustainability and sustainable development, with the potential to lead to misunderstandings, and even mistrust of those using the terms as they may be applied to conceal other motives and interests. While there is criticism regarding the validity of sustainability and sustainable development as a corporate and political objective, much of the debate centers on how the terms are being defined and who is using them. Part of the criticism leveled at corporate acceptance and pursuit of these concepts is that that companies may be attempting to distract from the real impacts of their business operations, and simply employing the terms as a public relations initiative. The sustainability debate becomes even more strongly contested

when it is applied to the extractive industries, particularly with respect to the extraction of nonrenewable resources.

What is important to point out is that the terms themselves convey different meanings depending on the background, discipline, or industry of the individual, organization or entity using them. Springett (2013) considers the variety of definitions by different disciplines and interests to be the result of a fight for legitimacy and control of the term. These contestations of the terms and resultant lack of an agreed upon definition only serve to limit productive collaboration that can lead to a valid course of action in achieving desirable outcomes. In order to achieve any valid progress going forward with these concepts, it is critical that the terms being applied are further clarified and elaborated. Joyce & Thomson (2002) address the concerns and potential complications that can arise from the extractive industry adopting the terms, as they state:

> There is, however, a risk that this adoption of a common nomenclature could serve as a façade, a false front, unless there is common understanding of what is meant by sustainable development. Most critically, this understanding needs to be shared by civil society and those groups particularly critical of mining. If real change is to take place within the mining industry, and between it and society as a whole, it is essential that all involved are pushing or pulling in the same direction.

For some, sustainability is an unachievable ideal that requires that all components of the ecosystem must remain undisturbed or unchanged. A hard-line stance such as this does little to move the discussion about bringing current economic, political and social practices in line with a more balanced or equitable approach. Rather, such an orthodox perspective of sustainability would require that current practices come to an abrupt halt if it is to be achieved. Such a position, understandably, closes off the potential for an inclusive discussion where many stakeholders are required to collaborate or reach a mutually agreed upon understanding. More commonly, the concept of sustainability is associated with the tenets of resource conservation. Within academia "the term sustainability originally referred to a harvesting regimen for specific reproducible natural resources that could be maintained over time" (Toman, 1992, p. 16). Put simply, if a particular resource is to be used in a sustainable manner, it cannot be consumed at a greater rate than it can be regenerated or replaced. Failure to meet this basic standard will invariable result in the loss of the resource, at least within a specific period of time and geographic area that the harvest is taking place. Ecologists take a broader view of sustainability, and consider not just the resource itself, but also the function of the resource within the ecosystem (ibid.). This further complicates the sustainable harvest perspective due to the fact that many of the primary resources we rely on as inputs to feed our production requirements, also happen to provide vital ecosystem services. Therefore it is not theoretically sustainable if we manage to consume a resource at a rate equal to or less than the rate at which it will be

regenerated, if the remaining resource stock is unable to provide the ecosystem services at a level required to maintain ecological equilibrium.

Further complicating the issue is the question of whether sustainability and sustainable development are synonymous, or if they are individual concepts. It would seem logical that the terms sustainability and sustainable development would possess distinct definitions and represent different values, or at the least different valuations of the same values. However, it is not always the case that a distinction between the terms can be assumed. For instance, Agenda 21 applied the terms interchangeably, to which Dresner (2008) acknowledges that this lack of distinction can be politically motivated.

For the purposes of this report, a strict definition of sustainable development is unnecessary, provided that the following elements are included: the concept of needs, generational equality, and that the environment is limited in what it can provide and absorb. In its simplest form, "sustainable development requires that human activities are undertaken in such a manner that they do not eliminate options for future generations" (Amezaga et al., 2011, p.21). Some of the ambiguity inherent in such an approach, such as how needs are defined and what the needs of future generations will be, is intentional. This will be addressed and resolved below.

Adding to the possible interpretations of the terms is the meaning of the word development, as defining development has been open to many interpretations, and of

course competing theories on how it can be achieved. In many cases development is seen as an increase in national GDP as well as an increase in average incomes (Schaub, 2004). It is for this reason that a distinction between growth and development is necessary. Costanza et al. (1991) resolve any confusion in their assertion that:

> Economic growth, which is an increase in quantity, cannot be sustainable indefinitely on a finite planet. Economic development, which is an improvement in the quality of life without necessarily causing an increase in quantity of resources consumed, may be sustainable (p.9)

From this explanation, it would appear appropriate to consider that development in this context signifies positive change that will lead to overall improvements in outcomes. For the purposes of this report then, economic growth would not be considered development if it is achieved by simply replicating current trends. Development would require that the process was improved, such as by increasing efficiency whereby less primary resources are required to achieve the same level of production, or waste reductions are achieved in the production process.

Based on the above assumptions, it would make the most sense if sustainable development were viewed as a guide to aid in development decisions. As such, stakeholders involved in a project can work together to forge a shared idea of the most desirable outcomes, and make decisions that will best help to reach that goal. The

objectives and approaches can be continuously reviewed to ensure that the most current and/or relevant practices are being employed. In short, sustainable development should be considered an agreed upon strategy of working towards sustainability, where sustainability is the state of harmony in which the economy and society function within the limits of the Earth's biosphere. The agreed upon strategy of such a framework will need to be achieved through stakeholder agreements. Applying such an approach to sustainable development will lead to unique approaches to achieve sustainability based on the specific project, and even industry. It is for this purpose that there is some ambiguity in the definition of sustainable development. A more rigid definition would not allow the stakeholders for the individual project to assess how the project may contribute to meeting current needs. Additionally, the idea of future generations meeting their needs as well is in line with this approach through regular reassessment of the sustainable development strategy that is undertaken. Under such a scenario, Tilton's statement that "sustainable development based on the continued exploitation of exhaustible resources is thus at best a difficult challenge, and may in fact be impossible" (1996, p.96) ignores the bigger picture, which is that exploiting exhaustible resources is intended to contribute to sustainable development, not be the basis of it.

Following the above conceptualization of sustainable development, it is relevant to review the different paradigms and perspectives of sustainability in order to assess the overall contribution that the extractive industry can make.

Sustainability Paradigms

Nonrenewable resources can only be extracted once, after which time they are no longer available for future generations. Amezaga et al (2011) point out that this excludes mining from qualifying as sustainable in sensu stricto. If, on the other hand, it can contribute "such that it gives rise to long-term benefits that equal or exceed the values that existed prior to exploitation" then it is compatible with sustainability sensu lato (ibid.,p. 21).

According to Tilton (1996), there are two opposing views regarding the use of nonrenewable resources; the fixed stock paradigm and the opportunity cost paradigm. In the former, adherents are concerned about the eventual depletion of a nonrenewable resource. As Tilton notes, the stock of available nonrenewable resources on Earth is fixed for all practical purposes. Demand however is considered a flow variable, which will continue regardless of the fact that the stock is forever declining.

The opportunity cost paradigm on the other hand considers the finite nature of exhaustible resources to be of less concern, as it will in fact be the costs of extracting more remote and lower grades that will shift demand towards more economical resources. In support of this view, adherents draw attention to the fact that assessing the resource stock based on current reserve estimates is too pessimistic, as well as the fact that many nonrenewable resources are not destroyed through their consumption. With regards to the first point, current reserves are calculated by the known deposits of

a resource that are technologically and economically feasible to extract. As the price of a resource fluctuates significantly, so too will the current reserve estimates. Likewise, the introduction of new technology can also increase the reserve estimate. Addressing the issue of resource exhaustion, it is true that many nonrenewable resources are not in fact destroyed, and reuse and recycling of these resources is possible. Therefore, estimating the time that a particular resource will be exhausted based on assumed trends in demand are irrelevant, as it is likely that a real decline in deposits will also bring about improvements in recycling.

The weak sustainability paradigm is essentially predicated on the assumption that the three factors of production or forms of capital, be they natural, produced, or social, are substitutable for one another (Neumayer, 2010). This paradigm therefore dictates that the depreciation of one form of capital can be considered sustainable provided that investments are made in another form of capital that is greater than or equal to the depreciation of the original capital. To illustrate this point, if we invest the proceeds from the extraction of oil into the constructing of built capital, the value of which is greater than the oil that was extracted and assuming maintenance costs are included, then the principles of this particular paradigm have been met. Therefore all that is required to meet the weak sustainability test is to ensure that production and consumption are greater than the disinvestment of natural resources. There are clearly a number of assumptions embedded in this approach to sustainability, opening the door for criticism to the overall benefits that this approach would provide. Waye et al. (2009)

consider this to be an economic approach to sustainability, as the focus is on capital development to be sustained. Neumayer (2010) points out that the following primary assumptions held by proponents of this paradigm: there is an abundance of natural resources available, that the substitutability of natural resources for built and/or human capital has a positive return, and that innovation and technical progress will provide a solution to overcoming the depletion of natural resources. Along with these assumptions it is also important to note that while this paradigm does acknowledge that natural resources are a provider of direct utility, that is, it provides benefits in its original state, it assumes that this utility can be overcome or compensated with increased consumption (ibid.).

It is evident from this brief overview of weak sustainability that it is clearly attempting to incorporate the environmental and natural inputs that enter the economy into development considerations, especially compared to the traditional neoclassical economics approach heavily favored in the past. This approach is clearly compatible with the extraction and use of nonrenewable resources provided that there are appropriate investments made into other forms of capital. It is also evident, however, that it fails to adequately address the concerns of those who place more emphasis on the environmental consequences related to economic and human activity, and do not share the same optimism in the general assumptions required for this paradigm. In order to counter this approach, more environmentally concerned proponents of sustainable development stress the need to strive for strong sustainability.

While weak sustainability allows for the substitution of one form of capital for another, the strong sustainability paradigm in essence does not allow for this type of substitution. In the field of ecological economics, this paradigm of sustainability is the one that is more heavily favored as it considers the economy to be one system within the larger biosphere, and therefore does not earn any greater consideration than the other systems. In fact, Waye et al. (2009) contend that under the strong sustainability paradigm "the environment takes priority in all policy decisions, and biodiversity and ecosystems are not considered substitutes for other forms of capital that might be produced" (p.154). As a result, this paradigm stresses the concept of complimentary forms of capital as opposed to substitutable ones. As has been demonstrated earlier, weak sustainability aims to maintain or increase total capital, regardless of the overall composition of the various forms of capital. Strong sustainability on the other hand, recognizes that all economic production requires inputs from all three forms of capital, and therefore they complement each other (Prugh, 1999). While the composition of how much of each form of capital is required for production can vary over time, it is implicit in this approach to sustainable development that one form cannot be completely expended and compensated with increased levels of inputs from another forms of capital. To illustrate this point, natural capital that is critical in providing valuable ecological services is not substitutable with another form of natural capital, such as replacing fresh water with trees, however physical labor can be reduced with increases in automated machinery.

Another distinction between the two paradigms seems to arise from the fact that, unlike weak sustainability, strong sustainability does not define the resource stock in terms of its economic value, but rather in its physical value (Neumayer, 2010). That is to say that if a portion of the mineral stock in a mine has been extracted, yet the economic value of the mineral has increased to such an extent that the value of the remaining stock is greater than the total stock was prior to extraction, it is still considered a decrease in the natural capital as the physical amount of minerals remaining has decreased. It is important to stress here that this paradigm does not exclude the use of natural resources however, but simply calls for the use of the resources not to exceed their capacity to regenerate (ibid.) It would therefore satisfy this paradigm if lumber is harvested from a forest at a rate no greater than is required for the trees to grow back. As for the use of nonrenewable resources, this paradigm would require "that the current generation needs to compensate the future for its use of non-renewable resources with investment into replacement renewable resources that are functionally equivalent" (ibid., p.25). It is also important to clarify here that the extraction of a nonrenewable resource is not the same as expending or exhausting the resource, but in fact the opposite, as it is through extraction that the resource becomes available for use in the first place. Therefore, going back to our above example of the minerals being extracted from a mine, the profits earned from the extracted portion of the stock would have to be invested into developing ways for renewable resources to be able to meet the same needs in the future as what the minerals are meeting today.

The final tenet of the strong sustainability paradigm is that the wastes that are generated as a result of economic processes cannot exceed the planet's biophysical capacity to absorb those wastes (Prugh, 1999). Failure to meet this requirement leads to people being forced to live with the effects of pollution which can have serious detrimental impacts on human wellbeing. While the importance of this requirement is open to little debate, determining how much waste can be absorbed and achieving a consensus regarding threshold levels is a contentious issue. Making the task of determining an acceptable level of waste more complicated is the fact that all economic production generates wastes through the transformation of energy (eventually the product itself will also become waste), as well as the fact that natural resources used to absorb wastes (sinks) are also consumed in the production process.

As we can see from this examination of sustainability, the more stringent paradigm, and the one we should be striving to achieve, is strong sustainability. In an effort to determine if the exploitation of nonrenewable resources can be justified within this paradigm it appears clear that it can, provided that investments are made into renewable substitutes.

The Resource Curse

A "paradox of plenty" exists in resource-rich poor countries, where recent history has demonstrated that extractive endowments, if not

> well managed, can disappoint. Common problems include lopsided, poorly diversified economic structures; disruptions to local economies and communities; environmental hazards; weakened accountability of the state to society; and even the risk of violent conflict. (Barma et al., 2012, p.ix)

As has been made clear, mining and other extractive activities will result in local environmental and social impacts that need to be managed. Impacts and mitigation strategies have been developed in a relatively short period of time, and real improvements have been observed. At this time, the more pressing issue is achieving real local and regional benefits from extraction rather than minimizing the impacts.

The long term benefits for impacted communities and society at large, is heavily influenced by political policies and regimes that determine how revenues are allocated. Based on the above understanding of the extractive industry's contribution to sustainability, one of the most relevant concerns today is how extractive projects serve to meet future generations. Because the extraction can only occur once, long term local benefits will be dependent on proper management of the resulting proceeds. As mentioned previously, capitalism has come into contact with nearly every remote corner of the world, and yet the resulting impacts have been unevenly experienced. For some the experience of capitalism has been an overall positive one, evidenced by their ability to improve their quality of life from previous generations. For many others

however, the effects of capitalism have led to greater struggles to acquire the basic necessities for survival. This juxtaposition of the haves and have-nots is all the more baffling when considering the experiences of those developing nations which are resource-rich and yet fail to achieve the level of development that would be expected.

The “resource curse” is a phrase that has been attributed to Richard M. Auty to describe the experience of many resource-rich developing or underdeveloped countries which have failed to realize the initial potential that their resource wealth was projected to provide. In fact in many cases, resource-rich developing countries that rely on their resource wealth as a large contributor to their national economy have historically developed at a slower rate than their resource-poor counterparts (Barma et al.., 2012). Left unchecked, this can serve to erode the development potential that natural resource endowments represent. While this may seem counter-intuitive, akin to a “lottery curse” for those who have gone bankrupt after winning a large windfall. Frankel (2010) considers six of the primary factors that could explain the poor economic performance that has been documented in many countries. These include: commodity prices on the world market could be subject to decline; the crowding-out of other sectors, such as manufacturing or agriculture; price volatility; poorly developed government institutions; civil war; and Dutch Disease.

While national policies would seem appropriate in addressing many of these potential pitfalls, some governments have been adopting resource nationalism

strategies in an effort to exert greater, or even complete, control of all aspects of extraction. Resource nationalism can take many forms, all of which can have significant impacts on the extractive industry, particularly for foreign firms already operating within regions that adopt such an approach. The assertion that nationally controlled extraction operations are typically less sustainable than privately owned operations may appear at first glance to be counterintuitive. After all, it is in the state's best interest to ensure that their capital assets generate the greatest possible return, and the state has oversight into how the earned revenues are allocated, putting them in a position to ensure that investments made with the income derived from nonrenewable resources are in the best interests of the state. The issue often stems from the fact that the political leaders of a developing country are pressured into demonstrating the state's rapid and successful development, even if it does not account for future losses of income and the perceived progress being made is temporary. El Serafy (1989) considers this to be partially due to poor accounting practices, which consider:

> Revenue derived from the sale of natural resources as current income, or rent, which is available for consumption. If the revenue accrues to the public sector, it can be used just like revenue from any other source, such as the proceeds from income taxes. Given their short perspective, the politicians in charge of such economies often do not want to be reminded that the revenue derived from liquidating the countries assets is neither recurrent nor sustainable. (p.10)

This is not to suggest that nationalizing nonrenewable resources is destined to fail. Rather, governments that do not yet have the capacity to implement the necessary measures to avoid the resource curse, will find that they are susceptible to the same problems.

While government management of revenue from extraction does not fall under the purview of the firm undertaking the extraction, the resulting impacts can still contribute towards a negative perception of the industry. For this reason, it is important for the extractive industry to work with all stakeholders in addressing the causes and consequences of poor investment practices. Barma et al. (2012) provide a simple explanation of what should be expected:

> Natural resource rents are more reliably transformed into sustainable development riches when a government can make credible intertemporal commitments to both extractive companies and its own citizens, and when the political regime is inclusive such that the government faces incentives to use resource rents to provide public goods that enhance the collective welfare. (p.12)

Preliminary steps to overcoming poor resource management in developing countries involves the formation of partnerships with all concerned stakeholder groups,

including mining companies, governments, local communities, and civil society (McPhail, 2009). These partnerships need to be in place at least until local capacity has reached a level that can adequately manage the complexity involved (ibid.).

Policy Options

The development of policies, guidelines, and/or frameworks intended to aid in establishing greater sustainable development outcomes is well underway. Those that have gained the greatest level of acceptance so far appear to have been developed through multi-stakeholder collaboration with representatives from the extractive industry, governments, and civil society. For the purpose of this research paper, the two framework approaches that will be considered are the Extractive Industries Transparency Initiative (EITI) and the IFC Performance Standards. These two were selected as they have already become widely accepted as establishing a standard, while at the same time have been able to be tailored to meet the individual requirements of each project. In other words, they can act as guidelines without being overly prescriptive.

The IFC's Sustainability Standards on Environmental and Social Sustainability is a private regulatory framework that sets out the client's sustainability commitment. The Sustainability Principles are intended to aid in achieving desired social and environmental outcomes without being too prescriptive in how the ends are achieved. The IFC's influence on the mining sector through its financing and advisory services, coupled with the adoption of the Performance Standards by Equator Banks and national CSR strategies has led to their being considered one of the most important CSR

frameworks today. Currently, the IFC is the largest source of funding to private companies operating in emerging markets. Through these loans, the IFC is able to provide private corporations with several benefits, including; access to resources and knowledge related to the industry and the country of operation, engagement with host countries, as well as encourage investment from other sources due to their participation.

The Sustainability Framework consists of IFC's policies and procedures, as well as client resources which provide clear information and strategies which aid in adhering to IFC expectations. The environmental & Social Sustainability policy, and the Access to Information Policy describe the IFC's responsibilities, while the Performance Standards are intended for client use, and define the client's responsibilities and requirements to secure and maintain IFC support (IFC, 2014). These are supported with implementation tools, including Environmental and Social Review Procedures for the IFC, and Guidance Notes, EH&S Guidelines, and Good Practice Materials for client use.

To date the standards have been adopted by the equator banks as well as several national CSR strategies, including those of the Canadian mining industry. Also of note is the inclusion of the Performance Standards in Canadian bilateral trade agreements, including the Canada-Peru FTA. In this case, the standards are recognized and enforced, providing "an exception to the economic trade liberalization aspects of the FTA" (Torrance, 2012).

The EITI was established in response to calls for greater transparency regarding extractive industry's payments to governments, in order reduce the opportunity for resource revenues to be hidden from the public. Following an initial meeting in 2003

which saw the development of 12 EITI Principles, more than "40 institutional investors signed on to a statement of support for the EITI which argued that information disclosure would improve corporate governance and reduce risk" (eiti.org, 2014). Following a second round of meetings in 2005 and the establishment of six EITI Criteria, "It became increasingly clear that the EITI was not evolving, as some had anticipated, into a voluntary corporate social responsibility standard for companies, but rather into a disclosure standard implemented by countries" (ibid.)

Today there are 29 EITI compliant countries and 17 candidate countries who are monitored by an international secretariat (Barma et al., 2012). The implementation of the EITI is overseen by a national commission, which is "crucial to ensuring that the EITI is implemented according to the global standard and, at the same time, that the application of the standard is adapted, as relevant, to the specific needs of the implementing country" (Moberg and Rich, 2014, p.116-7). Just as the Performance Standards have been adopted by industry organizations and governments, so too have disclosure requirements similar to the EITI, such as those introduced in the U.S. under the Dodd-Frank Act (ibid).

As mentioned earlier, both the IFC Performance Standards and the EITI have recognized the need to allow civil society to participate in their early development and implementation. Furthermore, there was acceptance by the investment community of the value that such frameworks could have in reducing risk by establishing standards and disclosing information. Finally, each approach can be customized to fit the context of where it is to be applied as well as the expectations of those it is intended to serve.

Conclusion

The extractive industry has had to adapt its practices in the face criticism of the role resource extraction plays in society. Much of this concern is the result of historical practices and high profile cases of social and environmental impacts. In response, the industry has in large part embraced the concept of sustainable development, and made efforts to demonstrate meaningful change in their practices. Among the more notable developments towards these efforts are the development of standardized assessment and reporting frameworks, including those of the International Council of Minerals and Metals, the Equator Principles, and the Extractive Industries Transparency Initiative (EITI). While these initiatives certainly hold potential, time will tell if they have been successful. For now they are a good start.

As has been demonstrated in this paper, nonrenewable resource extraction can be made compatible with the concept of sustainability. This does not mean that each extractive project does meet such a threshold. In order to continue to improve, the industry must continue to work with external stakeholders, and find new and innovative ways to enhance the benefits their operations can provide.

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