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Environmental Racism in South Africa:

A Sustainable Green Solution

Danielle Darmofal

5/11/2012

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INTRODUCTION: Definitions and Environmental Conditions

Environmental racism and environmental justice are relatively new terms used to describe inequalities that have existed for centuries. Environmental racism is a pervasive problem that can be identified in many countries, even the world's leading nations. The acknowledgement of the prejudice began with the Civil Rights Movement. Greater attention to equality caused citizens and policy makers to consider the relationship between human rights and environmental rights. The Environmental Protection Agency formulated a definition of environmental justice that states, "no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental and commercial operations or policies" (Bryant 2006). Environmental justice requires long-term policy creation and will not respond to short-term measures. Another, perhaps more useful, definition states, "environmental justice are those cultural norms and values, rules, regulations, behaviors policies, and decisions that support sustainable development, so that people can interact with confidence that their environment is safe, nurturing, and productive" (Bryant 2006). This moves beyond the basic numerical evaluations of the previous definition and considers the impact on the human communities. Consideration of the human being in relation to the environment and survival must include culture and society as well as more concrete features. The term environmental racism is used to describe injustices committed in relation to the environment because of race. Environmental inequalities due to race require political attention and policy measures. Communities that receive unfair environmental consequences due to their race or economic status deserve legal attention to prevent future issues.

The level of sustainability in the developments is important for longevity. If the developments are crude, sporadic, or rushed, they will not bring the highest level of benefits.

Development in an unsustainable manner is just as useless as little to no development at all. Unavoidably, the West developed in what could be seen as unsustainably in the 19th and 20th centuries; however, there are now new and more innovative technologies to facilitate responsible development. There is no argument that lesser developed countries deserve the same chances for industrialization as countries that revolutionized a century ago. Instead of denying and limiting progress with rules and regulations, western nations should encourage and support new developmental frameworks. My argument rests heavily on the presence of sustainable development and I view this as modernization, industrialization, urbanization, and globalization that occurs with conscious efforts to retain the health of the environment and the people. Also, to be sustainable, the changes must be progressive and built on a strong foundation.

The Millennium Ecosystem Assessment (MA), an "international initiative to evaluate the state of Earth's ecosystems across multiple scales and the current capacity and future potential of ecosystems to deliver services of value to people", has assessed the current environmental conditions of South Africa (SAfMA 2004). From 1993 to 2003, the Gariep Basin was researched and evaluated. The study recognizes that the area has problematic environmental conditions such as aridity as well as disproportionately distributed rainfall runoff. The inequity of the human population is also important to recognize; households are poor with high unemployment and little opportunity for economic mobility. Many depend on agriculture and food production for their livelihoods, relying on the natural ecosystems and biodiversity for survival. This indicates the extreme importance of sustaining the environment

Above: Highlighted in blue is the Gariep Basin (SAfMA 2004)

and combating degradation. It is understood that fertilizers and pesticides can negatively contribute to the situation and GMO crops are beneficial for their ability to survive and produce, but present controversies of their own. In light of the food security problems and the HIV/AIDS epidemic that has left many people in the care of others, any efforts for higher productivity look to be positive. About 70% of South Africa has electricity, and the number decreases to only 50% in rural areas. Since many rural populations use fuelwood and other biofuels for energy, forest depletion becomes a concern as the population increases. Even though coal is abundant, it is creating high levels of pollution and degrading the environment rapidly. The study indicates that solar power would be plentiful and efficient, but the country lacks the resources and capital to invest in such alternative energy projects. Minerals are an important resource in the Gariep Basin because they boost the economy and aid in job opportunities. However, the mining practices degrade the environment, harm the biodiversity, affect the water and air quality, and pose consequences for miner's health (SAfMA 2004).

The MA has deemed the ecological integrity of the Basin to be in "reasonably good condition". About 84% of the Basin remains in its natural state, but still requires increased protections because of the important areas of biodiversity. The grasslands are the more threatened area and are about 30% transformed. As a hotspot for biodiversity, it is crucial for more conservation to occur in the area. Urbanized areas such as the Gauteng Province rely on the natural resources derived from outside the Province. For example, citizens of Gauteng consume almost 30 times the amount of wheat produced locally. This increased burden on already jeopardized areas increases the environmental risks of loosing biodiversity. An important point the study mentions is, "building capacity to understand, manage, and communicate the value of ecosystem services in the Gariep basin must target both new and

established managers and scientists from all backgrounds to think in inter-disciplinary, multi-sectoral, multi-cultural, and cross-scale terms" (SAfMA 2004). Ecosystem services are a crucial part of South African livelihood and should not be ignored in the policy making process, human as well as non-human needs must be properly evaluated and balanced (SAfMA 2004).

Thomas Homer-Dixon and Valerie Percival wrote a paper on environmental scarcity in South Africa in 1995. It is important to note that the environmental challenges, inequities, and degradation are not only recent episodes; there is a deep history. On average, 65% of South Africa receives less than 500 millimeters of rainfall annually; this increases water scarcity as well as soil erosion due to a lack of water absorption. About 60% of the land is categorized as having "low organic matter content" and cultivation progressively decreases the fertility and productivity of the land. Only about 16% of land dedicated to crops and pastures is actually employed for crop cultivation. Many rural South Africans rely on subsistence farming for their livelihoods. However, in the 1980s, under apartheid, 95% of Blacks made less than $100 a month and averaged only $150 of disposable income per year. These financial limitations denied farmers the ability to maintain their land and reduce degradation caused by repeated cultivation. Therefore, the lands were further degraded and the people suffered immensely. According to a 1991 survey, Blacks in former homelands possessed on average .92 hectares per person while individuals in white areas possessed on average 16.22 hectares per person. In addition, the limited hectares the Blacks were relegated were of lesser quality with lower productivity; townships were constructed on lands that were otherwise useless to the White population. Population has increased (more rapidly in the Black population than the White population), food production has decreased, and South Africa's rate of topsoil erosion is 20 times the global average. South Africa has had a 25% loss in topsoil since 1900, greatly impacting food

production. Wood used as fuel has contributed heavily to deforestation in KwaZulu-Natal; 200 of the 250 forests have been eliminated. In addition to deforestation, water resources are problematic as well; 12-16 million people lack potable water and about half the population lack access to decent sanitation. This causes environmental concerns as the few water sources can easily become contaminated, and public health issues (Homer-Dixon and Percival 1995).

EVALUATION AND PROPOSAL

Southern Africa's history with environmental issues and concerns has revolved around the desires of the colonists and then the apartheid government. Racism was involved in all environmental decisions and the black/colored populations were largely disadvantaged in the process. A green movement would bring beneficial results in merging environmental policy with human rights concerns. Historically, environmental determinism caused the best lands to be relegated to a powerful few, leaving many others destitute and landless. The repercussions of these actions continue today and can be considered environmental racism and injustice. Environmental justice is essential for South Africa to truly have racial and socio-economic equality. The segregated and arid landscape in South Africa poses problems for agriculture and sustainable development. A sustainable green revolution is essential for human rights and would mitigate environmental decline.

The South African Environmental Justice Networking Forum eloquently defines environmental justice with the following statement:

> *"Environmental justice is about social transformation directed towards meeting basic human needs and enhancing our quality of life—economic quality, health care, housing, human rights, environmental protection, and democracy. In linking*

environmental and social justice issues the environmental justice approach seeks to challenge the abuse of power which results in poor people having to suffer the effects of environmental damage caused by the greed of others. This includes workers and communities exposed to dangerous chemical pollution, and rural communities without firewood, grazing and water. In recognizing that environmental damage has the greatest impact upon poor people, EJNF seeks to ensure the right of those most affected to participate at all levels of environmental decision-making. (EJNF 1997)" (McDonald 2002).

I consider this the most relevant definition for my discussion; it succinctly elaborates on the broader definitions previously mentioned and refers specifically to the country of South Africa. Environmental racism has historical roots in South Africa with widespread consequences that require social, legal, and political action. In order to fully comprehend the issue, historical information is essential. The body of this paper will begin with a discussion of South African history as it relates to environmental racism and justice. I will then move into a deeper discussion of the establishment of national parks and reserves as well as the construction of the Cahora Bassa Dam and the Mohale Dam. After, I will mention present inequalities and the progress that has been made post-apartheid. I will end with an in depth analysis of a sustainable green revolution in South Africa, how it can be attained, and what effects it would have on environmental justice.

In order to have a through and detailed analysis, I employ the use of three academic disciplines, Environmental Justice (in respect to ethics and politics), Environmental History, and Anthropology. Environmental Justice is employed to evaluate and discuss the inequities in the use and distribution of land and natural resources. History includes the roots of the

environmental racism in South Africa and provides important insight into the formation of discriminatory ideologies. Anthropology in used to describe the importance of the land to the native people and acknowledge the deep ancestral and cultural roots that were disrupted during the periods of heavy environmental racism.

HISTORICAL INFORMATION

Environmental racism in South Africa is the product of colonialism that grew in influence during the early 20th century. The effects continue to resonate strongly in the country today. European interest in South Africa began with the spice trade and increase in sea travel. The British acquired the colony in 1795 but returned it to the Dutch government eight years later when the countries were more amicable. In the interest of protecting their access to the sea routes, the British re-seized the colony in 1806 in light of the Napoleonic Wars (Country Studies). Traders utilized the area of Cape Town as a stopping point in sea voyages and soon they discovered the environmental riches the land had to offer. The proximity to the ocean provided a wide array of seafood products and a more temperate climate than other parts of sub-Saharan Africa. Reliable, seasonal rains made the landscape lush and fertile. Mining proved to be another lucrative venture for the colonists. Exotic, wild creatures inhabited the landscape, roaming freely until settlers developed an avid interest in game reserves and conservation. Environmental determinism has shaped the way conservation has developed in South Africa and Southern Africa (Van Sittert 2011).

Slavery was accepted and widely practiced in the colony until 1828 when missionaries objected to the mistreatment of the indigenous people; however, this respect was short lived. An influx of new European settlers created land shortages and increased tension between the Boers,

British, and native people (Country Studies). In the beginning of the 20th century, large numbers of Europeans settled in South Africa and began appropriating land and resources from the native people. J.C. Smuts and other Afrikaners in power led the conservation movement, which largely disadvantaged native people such as the San and KhoiKhoi (Smuts 1918). Colonists asserted that Europeans were predestined to possess the most fertile and temperate regions in Africa because of their superiority and heightened need for such lands. It was also argued that the Europeans were not accustomed to the sub-Saharan climate and needed the most temperate lands for health reasons. They asserted that the native people should be capable of living under more harsh conditions (Walker 1929). According to concepts of human survival in native environments, the Africans were physically better suited to the desert conditions. Darker skin pigments, lean bodies, and adapted sweat glands, along with more experience with the terrain and weather, made native Africans more comfortable. Therefore, the association between race and the environment was born and disseminated. These differences did not make the native people any less entitled to the more hospitable lands, yet this was the mindset the settlers developed. Deep prejudices that Whites were more deserving of the land seeded and sharply divided the population. The European settlers used the environment to place a massive divide between Whites and non-Whites (Walker 1929). The racial divide increased through the century, peaking under apartheid, and its consequences are still witnessed through stereotypes and skewed mindsets of environmentalism and conservation policy today.

Southern Africa's history with environmental conservation and concerns has revolved around the desires of the colonists and then the apartheid government. Racism was involved in all environmental decisions and the Black/Colored populations were largely disadvantaged in the process. The colonists viewed the native San and Khoi as uncivilized people unintelligently

consuming the natural resources. The Europeans saw themselves as better able to appreciate and most prosperous lands and therefore more deserving of them. With these presumptions, the colonists forcibly removed the native people from their homelands, sometimes providing very small alternate plots and sometimes providing nothing at all. The San (hunter/gatherers) and Khoikhoi (pastoralists), who had inhabited the land for thousands of years hunting and gathering in a peaceable and sustainable manner, were cast away for the profit of the White man (Van Sittert 2011). A hunting and gathering lifestyle delicately balances human sustenance with environmental sustainability. The native people were simply using the natural resources to survive and it was in their own best interest not to abuse or exploit the land. They understood what the land could produce and how long it took to replenish, being careful not to render the land barren. However, the settlers did not appreciate the symbiotic relationship the native people had with the land. They viewed the hunting and gathering lifestyle as destructive to the environment and felt the need to protect the ecosystems from communities that had been harmoniously living for thousands of years. The importance of San and KhoiKhoi knowledge will be in further in subsequent sections.

NATIONAL PARKS AND RESERVES

The colonist government used their political power and strength to force the native people off their lands. The commandeered areas were transformed into parks, reserves, and private game farms. Policies were created banning the native people not only from living in the perimeter of the acquisitions, but from hunting or gathering in the area as well (Van Sittert 2011). This forced the San to dramatically alter their lifestyles and created an enormous racial divide between the whites and people of color. Kruger National Park, established in 1913, was

one of the primary conservation endeavors that in turn spurred other environmental efforts. The settlers were very interested in protecting the landscape and creating reserves for the exotic ecosystems. The Prevention of Illegal Squatting Act, Act No. 52 of 1951 allowed the Minister of Native affairs to remove people from public or private lands (About.com 2011). When the apartheid government gained power, distinct laws were made and strictly enforced excluding Blacks from conservation areas. This morphed a benevolent cause into a shameful example of division in a human population. A cause that impacted people and their relation to the earth transformed into a way for humans to invalidate other humans. Conservation became a predominately White objective and land devoted to game farms remains a symbol of status among white South Africans. Parks and reserves were created under the guise of land and species preservation, yet it is arguable how selfless the intentions were. Wealthy White colonists enjoyed the beautiful and pristine landscape, while denying others the same enjoyment, and established game farms for their personal hunting jaunts. Through actions such as these, conservation gained a negative reputation in South Africa as largely racist, biased, and corrupt. During apartheid, reserves and game farms became hobbies for wealthy Whites, despite the lack of equality among human beings. Apartheid created a situation that lowered Blacks even below faunal species (McDonald 2002).

The government allocated some land plots for displaced people, however, this proved to have harmful effects on the environment, as well as on the battle for human rights. In an attempt to relieve the land of hunters and gatherers, the government removed the people in the Northern Cape and allocated the area of Namaqualand for these people. Families were forced to subsist on what they could produce on a confined piece of land, a challenge to the hunter/gatherer populations accustomed to moving and adapting with the food sources (Benjaminsen et al.

2008). The land they were sequestered to was more arid and less fruitful than their original habitations; the government had seized the most profitable lands for their own. The cyclical and foraging nature of the hunter/gatherer lifestyle was destroyed and the people were forced to find other ways to survive. Mike Davis uses the term "national sacrifice zone" in reference to areas of nuclear weapons testing in America; this term can be effectively applied to this situation as well (Davis 1993). The unforeseen and disregarded consequence to relocating people was the creation of a "national sacrifice zone" in which the land and environment of Namaqualand was sacrificed for supposed conservation. In other words, to save and conserve the area the people previously inhabited, the government segregated people and deemed Namaqualand less worthy of conservation. By creating an overly dense population in an area with limited options for sustenance, the land became overused and exhausted (Benjaminsen 2008). The Namaqua people were disadvantaged and the environment harmed, all under the guise of conservation.

CAHORA BASSA DAM AND MOHALE DAM

Environmental racism also manifested itself in the harnessing of water energy in Southern Africa. As South Africa became more populated and urbanized, the demand for power and electricity in major cities increased. Cape Town and Johannesburg were rapidly growing and developing and many whites were constantly seeking ways to improve their standard of living, at any cost. Constructing dams became a seemingly useful way to obtain less expensive energy. If done respectfully and with proper consideration for the people and the riverine ecosystems, this would have been an exceptional movement towards clean, green energy. However, the Mohale Dam, Cahora Bassa Dam, and the Lesotho Highlands Water Project all caused disastrous environmental change and social injustice in a multitude of ways. The dramatic alteration of

water flow that occurred when the dams were created was not beneficial to any of the rural or indigenous communities in South Africa, Lesotho, or Mozambique. The diversions of the rivers were seen by urbanites as advancements as people learned to conquer nature (Thabane 2000, Isaacman 2005). As Donald Worster writes in "The Flow of Power in History", the people that have control over water and water systems, have control over the masses. In small, rural communities irrigation systems were simple, easy to maintain and in accordance with nature. Everyone had a sufficient knowledge of the system and was able to work within it. However, when larger, more complex systems were constructed for power and water supplies to be directed to urban centers, the knowledge became only accessible to the elite. These people become the "managerial elite" and possess power through their knowledge and ability to distribute or withhold valuable resources (Worster 1985). In almost all cases, the people in charge of the water systems choose to benefit the wealthy urban dwellers and allow the rural peoples to suffer the consequences without proper reparations. Governments justify the mistreatment of the peasants because they decide that the sacrifices made by them are for the overall benefit of the population (Worster 1985). The economic future and modernization take precedence over the well being of rural populations because of the potential for monetary benefits and progress.

Allen Isaacman wrote an article discussing the effects of the Cahora Bassa Dam that was constructed in the 1970's to alter the natural flow of the Zambezi River. Officials falsely asserted that the dam would be a positive asset for the indigenous people because of its movement towards "progress". The project was seen to be in part a "civilizing mission" that would draw peasants away from their farming lives and introduce them to the modernizing world (Isaacman 2005). This was certainly not the case and peasants in Mozambique were very

negatively affected by the construction of the dam. A number of communities were required to relocate in order for the creation of a lake behind the dam. These people were severely disadvantaged and forcibly removed from their homelands, with no hopes of reaping the benefits of the dam. The dam was simply an energy supply for economic interests in South Africa and a statement to the world about the advancements taking place. South Africa wanted to be seen as a viable investment option to the rest of the world and development took precedence. The people and businesses in the urban areas were largely considered more important than the people in the rural lands and colonial thought caused the government to view the indigenous people as less valuable. The only way that people could remain in their homes on the highlands was as a part of the labor force. The highlands were cleared of indigenous people to build a company town made up of Europeans and the laborers who were horribly treated and housed in shacks with no amenities (Isaacman 2005). The native people were displaced and treated inhumanely because of environmental racism and an ideology of superiority and power.

Not only did the Cahora Bassa Dam displace people directly, it caused a multitude of farming communities to experience problems in their livelihoods. The free flowing Zambezi River contributed numerous benefits to the farming communities that lived in the area as well as in the flood plains. The river used to deposit rich sediments and soil into the fields, which acted as natural fertilizer and nourishment for the plants. The lands near the Zambezi were fertile and fruitful until the dam prevented the sediments and stopped the regular flood cycle. Now all that remains is the potential for disastrous floods when the dam malfunctions. Many native people worship the Zambezi River God, Nyami Nyami. They believe that this snake spirit was deeply angered by the dam construction, specifically the Kariba Dam, and his wrath will be felt. The natural resources the river provided were more than just for sustenance purposes, there is a

deeply spiritual component, which was also overlooked. Entire beliefs systems were devalued and ignored as the colonists exploited the land for urban energy. Because of the Cahora Bassa Dam, the riverine economy became exponentially less diverse and productive. The dam caused the decimation of fish populations and without the regular flood cycles, the animals typically found at watering holes disappeared. This combination of factors took a huge toll on the well-being of the peasants and destroyed their livelihoods. Many were forced to relocate as a result of their ruined farmlands. Many had no choice but to move to hamlets set up and strictly regulated by the colonists. In these hamlets, agricultural practices were regulated and not executed in the most natural ways because the colonists perceived them as "messy" (Isaacman 2005). The prospect of increased energy production entrapped so many people into forgetting the disadvantages that would come from the dam. The consequences that would be faced by the already most vulnerable were of grave human rights violations. The rural populations were not viewed as contributing to society; therefore, they were relegated to possessing leftover, damaged land and laboring on a project from which they would never reap benefits.

Like the displacements that occurred surrounding the Cahora Bassa Dam, the Mohale Dam left indigenous people dependent and forced into a commoditized society. Content with their egalitarian lifestyle and agricultural existence in their homelands, the peasants of Lesotho felt as if they were being "butchered and killed" as they were separated from their land (Thabane 2000). Entire community systems were destroyed this way with almost no consideration. The government of Lesotho was distinctly aligned with South Africa and its needs and was notoriously apathetic towards human rights (Thabane 2000). In the newly developing region of southern Africa, no hesitation was taken when opportunities for economic advancement were available. The colonists looked for ways in which they could control natural resources for the

purpose of economic development as well as to control the citizens. The construction of dams was seen as a way to increase economic worth and the positives would outweigh the negatives. Yet, the concept of what was positive and what was negative was skewed because the colonists had a racist perception of the indigenous people. The peasants were disadvantaged for the benefit of the urbanites because it was easy for the government to force the peasants out, as they were of no conceived benefit to the colonists.

PRESENT INEQUALITIES

In addition to removing people to build reserves, parks, and dams, all people were relocated according to their skin color under apartheid. Bantustans, or townships, were created for the blacks and coloreds; they received the worst plots of land with the most industrial pollution and were forced to work under similarly atrocious conditions. Environmental policy was used to promote segregation and increase the divide in the population. Under the auspice of environmental protection, the government created regulations and laws that stripped the native people of everything, including their ancestral lands. These areas were neglected in every way and lack basic necessities, especially clean water (McDonald 2002). The people in the townships are also in greater danger because their economic situations cause them to take jobs in the more polluted industries. The environmental racism affects the townships in more ways than just physical health; the segregation and lack of resources causes immense socio-political inequalities as well. The lack of basic amenities such as clean water and electricity can also increase the crime levels in the area, especially if there is a high rate of unemployment from people being displaced from their rural lifestyles.

Environmental racism in South Africa is not limited to the colonist and apartheid regimes;

there are also current examples of environmental injustices that harm individuals because of their skin color or economic situation. The industrial tree plantations are a prime example of corporation owners and government officials disregarding the best interests of native villagers for their own economic benefit. "Under South Africa's racist apartheid regime, black people lost all their rights, including rights to land. 'Timber plantations have forced thousands of people off the land in the past, and continue to do so in the present time,' explains Wally Menne of TimberWatch" (Lang 2006). The South African NGO, TimberWatch, discussed the issue with villagers who stated that the tree plantations brought them only harm, destroying their arable land and farms, causing unemployment, reduction in water supply, and the obliteration of native species (Lang 2006). The main corporation responsible for these injustices is Mondi, a paper production company from the time of apartheid, which has recently revived itself in the country. Not only does Mondi negatively affect the people living around the tree plantations, it creates issues of injustice in South Durban where the manufacturing plant is located. The production of paper is a toxic and chemical laden undertaking and Mondi takes advantage of cheap labor from people of color. The manufacturing plant emits extremely high amounts of pollution, causing health issues in the South Durban communities, especially with the individuals laboring at the plant (Lang 2006). As was with the construction of the Cahora Bassa Dam and Mohale Dam, the creation of tree plantations disregarded the negative repercussions for the native communities. At the expense of the villager's livelihoods, actions were taken to ensure financial success for the powerful. Because the village communities did not have the political power or financial support, they were largely unable to defend their lands and demand a stop to the environmental racism.

The South Durban Community Environmental Alliance (SDCEA) is the leading organization fighting for the right to clean air and a safe environment. South Durban has been

considered the toxic hub of South Africa and is in desperate need of attention (SDCEA 2004). Despite post-apartheid equality and democracy, the people of South Durban have continued to experience racism. This area in South Africa contains the Mondi manufacturing plant as well as two oil refineries that rank as the top three potent polluters (Lang 2006). These injustices seem to be taking place in spite of the South African Constitutions Bill of Rights "that grants all South Africans the right to an 'environment that is not harmful to their health and well-being' and the right to 'ecologically sustainable development' (section 24)" (McDonald 2002). McDonald states that post-apartheid regulations and more equitable environmental interests have taken hold in the government and minds of policy makers. However, there continues to be less attention for environmental degradation in townships where thousands of people live, than for expansive national parks and game reserves.

The governmental actions taken during the 20th century were appalling and concrete examples of environmental racism. It is even more shameful that the injustices continue to be present and are mostly ignored. The manner in which land was claimed was disrespectful and inhumane, but legal according to the colonist and apartheid governments. Racism in South Africa affected every aspect of society and generated exclusive policies regarding land use and the environment. The government and corporations have been able to unabashedly commit racist acts because of the lack of legislation protecting the under-served people and the residents of villages and small communities. Because the injustices have been taking place for so long, it is a long and difficult process to make amends. It is also financially expensive for the relatively new ANC government to meet the needs of every group. As McDonald writes, there is a general consensus of the definition of environmental justice (stated earlier), but there are many diverging ideologies from that similar point; the government is not capable of meeting every demand made

simultaneously. Some aspects of reparations have received more attention than others.

POST-APARTHEID PROGRESS

A White Paper on Environmental Management Policy for South Africa, written in 1997, details the plans for future environmental policy and addresses the key problems faced in the past. As previously discussed, there were prominent issues of racism and inequality. Also targeted as difficulties are "fragmented policy and ineffective legislation", "ineffective enforcement and regulations", and "limited capacity and resources in government and civil society." (CONNEPP 1997). The construction of the White Paper indicates the interest in the issue and the purpose of creating more comprehensive and equal policy and management. The Vision section of the paper states that "The policy seeks to unite the people of South Africa in working towards a society where all people have sufficient food, clean air and water, decent homes and green spaces in their neighbourhoods that will enable them to live in spiritual, cultural and physical harmony with their natural surroundings" (CONNEPP 1997). These are beautiful and ambitious goals that are finally being created, however, the limitations have been severe and 15 years later there continue to be massive inequalities. Bantustans and townships still exist with minimal improvements, but even worse off are the informal settlements, which are vast and expanding. These areas fall below the radar of governmental aid and support because they are not legal dwellings. They often do not have reliable electricity or toilet facilities, creating huge sanitation issues (Napeir 2002). Governmental organizations have not reached out to these people to assist, but have not eliminated the neighborhoods because of a lack of relocation possibilities. The burning of garbage creates air pollution issues as well as enormous fire hazards; a fire in such a community has the ability to destroy hundreds of informally built

homes. The lack of plumbing and running water creates sanitation problems and high morbidity. Shockingly close to metropolitan cities, these citizens are left destitute with a lack of access to essential resources. Therefore, the White Paper along with the Bill of Rights and post-apartheid legislation has not yet been able to implement much progress in the most necessary places.

In his 2002 paper, Mark Napeir extensively discusses the environment and sustainable livelihoods in informal settlements. He begins by noting the extraordinary disadvantage the people and dwellings face in the event of a natural or man made environmental disaster. He includes Figure 1, which succinctly describes the issues. In order for the informal settlements to be environmentally friendly, some changes need to be made towards sustainability. Preferably, people would all be able to live in formal housing that is safe and secure. However, without the space and resources, the people are essentially bound to the areas of informal housing. With limited access to transportation and jobs, the residents must live close to a source of income; relocating the people could jeopardize this.

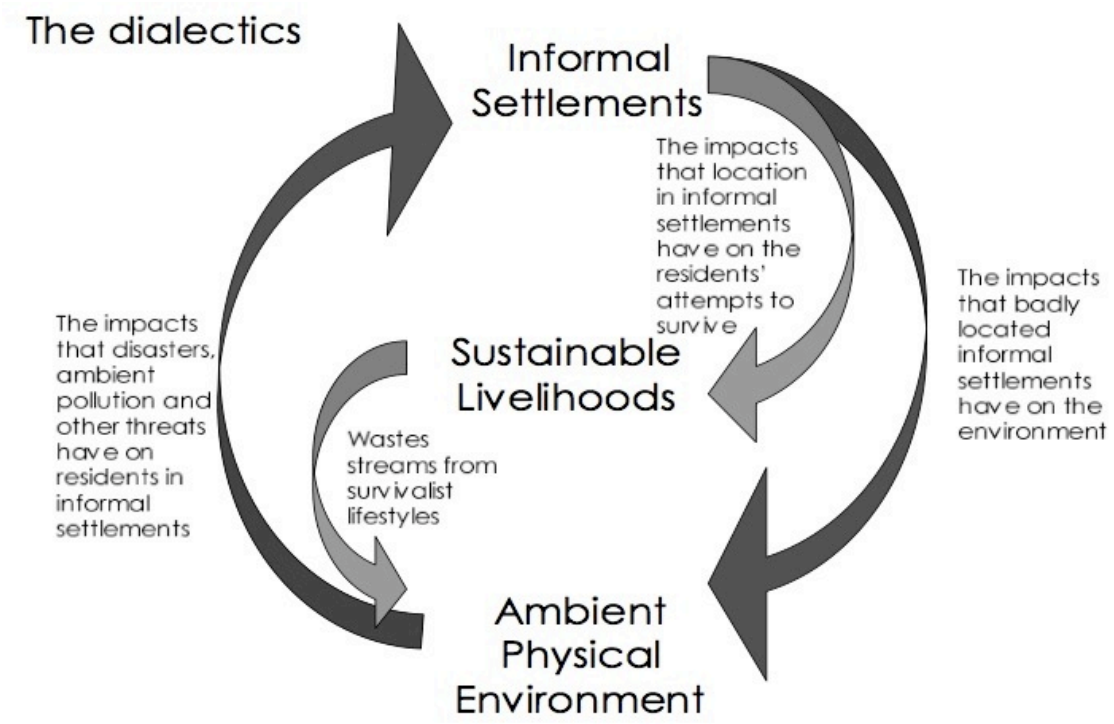


Figure 1: Informal Settlements and Environmental Impact (Napier 2002)

Giving non-governmental assistance to families in low-income neighborhoods is also not a productive solution. The aid may increase the standard of living for the family, however I have witnessed the harm it can do as well. In the time I spent in Guguletu (a township near Cape Town), I discussed aid with some of the women who shook their heads and sadly told me stories of NGOs rebuilding and renovating houses in the area for certain families. Afterwards, those families were robbed and harassed because of their visible increase in wealth; leaving them feeling afraid and insecure in their own homes. The model is also not practical because it does not reach the majority of people and is not sustainable if the residents remain unemployed. Change to lift these individuals out of poverty must include increasing the number of jobs and amount of viable land. After having been removed from their ancestral lands, the people deserve the opportunity to have land to call their own.

Fortunately, there have been some efforts to reunite native people with their ancestral land. In light of the injustices that occurred under apartheid and colonialism, South Africa has begun to make amends with the displaced native people. Although nothing can mitigate or erase the pain and devastation caused by the displacement, the national government is currently attempting to improve relations and apologize to the best of their ability. Unfortunately, the efforts are generally isolated to the people affected by removals from desirable park and reserve land; current environmental racism has not been widely recognized and mitigated. The South African National Parks may be the only organization with the resources and power to restore land. A recent effort that has been made is the Makuleke Concession in Kruger National Park on the Northeastern edge of South Africa. The land had been taken from the native people in the 1960's and was only recently returned to them after a long and fierce legal battle. It is regrettable that such a reasonable demand was met with so much contention. The park system

has now decided to merge conservation and habitation in some areas. They continue to allow tourist activity and committees of natives were formed to regulate the use of the land. This is an example of how changes to the law have brought about positive change for the people as well as the environment. Giving the land back to the people has not harmed conservation and the people are able to generate a livelihood sharing what they know and love in their ancestral homeland (Going Africa 2011). Kruger National Park has also taken other initiatives for increased community involvement. Since the dawn of democracy in South Africa, displaced people have sought to be reunited with their ancestral land. Kruger has projects that involve native peoples and revive indigenous knowledge, exhibiting a conscious effort to reconnect. Kruger National Park has invested itself in the national heritage of South Africa and encourages visitors and tourists to speak with the community members (SAN Parks 2011).

In addition to incorporating oral histories and indigenous knowledge into Kruger, the South African National Parks (SAN Parks) aim to communicate better with surrounding communities about conservation (SAN Parks 2011). Because conservation earned such a poor reputation among the native people, new information needs to be disseminated and intentions must be clarified. The native people have a negative perception of conservation efforts as a result of prior injustices inflicted upon them in the name of the environment. It will be a long process and the trust of the people must be earned back slowly (Erasmus 2011). The native people grew up in a time when it was impossible to trust Whites and Europeans and stereotypes were immediately applied according to skin color. The people of color had been negatively affected and hurt by the Whites so frequently and with such severity that the ability to trust and cooperate was greatly tarnished. SAN Park management has confronted the issue by acknowledging that conservation efforts have a flawed history and they aim to create a positive rapport in the future.

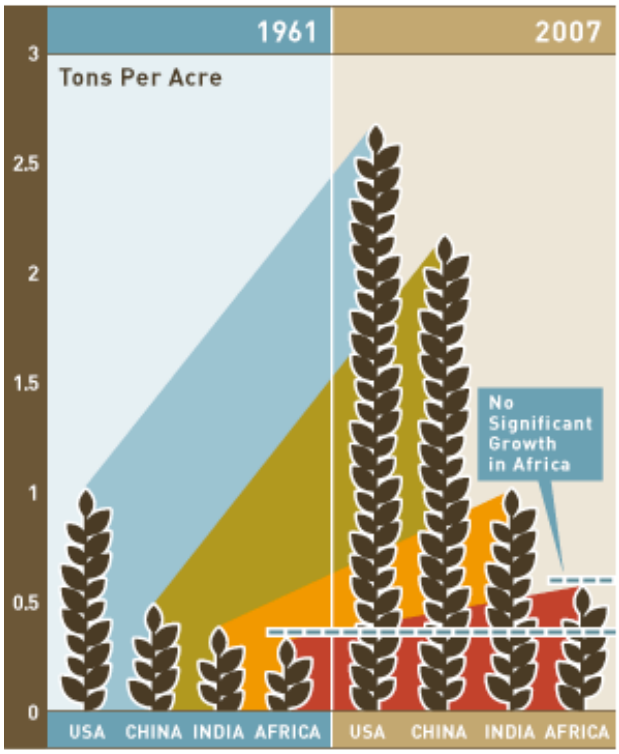
It is beneficial that the SAN Parks have recognized the situation because conservation of such stunning natural ecosystems should not be built on inequality or exclusion.

The revival of indigenous knowledge is positive for the communities as well as the environment. Despite what the Europeans perceived decades earlier, the indigenous people interacted with the surrounding environment with the utmost responsibility and sustainability. Today, South Africa can learn from indigenous practices that had sustained livelihoods for thousands of years. Cyclical systems were utilized to prevent destroying the arid land and natural resources were consumed on a reasonable scale. Native plant and animal species not only thrive in the environment, they work symbiotically with each other to flourish. Evidence shows that modern humans have resided in South Africa for over 100,000 years and Africa was the birthplace of human and pre-human existence. The two main ancestral groups of South Africa are the San and the Khoikhoi. Until about 3,000 years ago, all the populations in Southern Africa relied on hunting and gathering for sustenance. The 20th century brought pastoral, agricultural, and industrial influences that alter the hunter/gatherer lifestyle. The San were reliant on only hunting and gathering for thousands of years; more recently, remaining communities have had to adopt other practices to supplement their living. The Khoikhoi lived pastoral and nomadic lifestyles, moving through Southern Africa with their herds. Both groups lived in delicate balance with the environment, understanding when the resources were under stress and what measures should be taken to ensure the future existence of necessary resources(The Early 2010). When group populations became too large for one plot of land to support, there were fissures to create smaller, more sustainable groups. The native people had an acute knowledge of animal husbandry and behavior. Presently, individuals with native tracking and environmental knowledge can find employment as guides on safaris and animal tracking

expeditions. The perceptive connection the San have to the land remains and relatives continue to pass down indigenous knowledge. Currently, this knowledge can provide insight into the unique landscape and the people with such knowledge should be consulted about the future of the resources.

The lifestyles of the San and the Khoikhoi people were sustainable and had minimal impact on the planet. Even though this is ideal, it is not practical or even possible to revert to such early lifestyles. Colonialism, population growth, industrialization, apartheid, and urbanization have all caused hunter/gatherer and pastoral lifestyles to fade away. Even the small communities that have tried to retain their lifestyles in the Kalahari have faced enormous challenges in the present day. Because of this, there are very few societies functioning completely as they had thousands of years ago. Paul Collier urges readers in his book The Plundered Planet, to relinquish "romantic" ideas about the future of agriculture and sustainable living. He notes that western nations have a tendency to romanticize the idea of small, organic, sustenance based agriculture. In the current urbanized world, it is not possible to rely on peasant agriculture where each family produces their food organically; despite the pleasant image it brings to mind. Collier advocates a move towards commercial farming and the use of science to ensure the population can be nourished and sustained in the future (Collier 2010). It is regretful that the planet has lost many of its small, internally sustainable societies in exchange for large cities, corporations, and commercialized farming, but it is a fact of the evolving planet and population. It is crucial not to become trapped by nostalgia for these simpler times and understand the need for commercial, scientific, and technological advancements.

A GREEN MOVEMENT



Left: featured on the Bill and Melinda Gates Foundation webpage. Illustrates the relative lack of green progress thus far in Africa. May indicate that more specialist and individualized efforts are needed in African countries. There is no universal approach and time must be taken to create a sustainable model. (2009 Annual 2009)

Growth and development are both essential for South Africa and will hopefully bring greater human rights and eliminate inequality. Despite the massive growth and development in the major cities of Cape Town, Johannesburg, and Pretoria, other areas have been mostly ignored as the urban areas progress. Currently, South Africa has a $554.6 billion GDP, 26th in the world, and has a 3.4% growth rate (Republic 2012). Statistics show the growth and development in South Africa, especially in the GDP. Poverty rates have decreased at a decent rate, from 23.4% in 1993 to 13.77% in 2008, with the poverty gap decreasing from almost 7% in 1993 to 2.3% in 2008 (Summary Report 2012). However, this growth has not trickled down to the most in-need people. HIV/AIDS has ravaged the country and health of great concern. Informal living settlements combined with compromised health and poor environmental conditions decrease the ability for the country to truly progress. In order for the country to reach its full economic potential and ensure that all people are treated fairly and with equality, the country must assist its

most vulnerable in a sustainable manner. The White Paper on Environmental Management Policy for South Africa mentions the World Commission on Environment and Development report submitted to the United Nations in 1987, which voices the need for sustainable growth and development (CONNEPP 1997). Therefore, there is a common understanding that economic and environmental sustainability are essential, yet the application has been unsteady and requires improvement. This is not to say the country has not made colossal improvements post-apartheid. South Africa exited an oppressive and poisonous regime during a time of rapid global development and industrialization and was able to progress relatively well. The country legally accepts gay marriage, women are gaining in influence, and diversity acceptance is improving.

South Africa would be able to progress uniformly if the inequalities developed over the past century were addressed and mitigated. The poor people residing in informal settlements and townships are the same people the government removed from native lands, along with their descendants. The rural poor also fall into this category. Having been disadvantaged for decades due to racism and environmental racism, these groups more than deserve sustainable aid and representation. The stigma of environmentalism and land use efforts carries over into green revolution initiatives as well; therefore, it is crucial to enact a green revolution now in absence of the negativities from the past.

A green movement is a logical and sustainable measure to improve both environmental rights and human rights, simultaneously and in harmony. In this paper, the term green movement refers to a purposeful and strong shift towards environmental sustainability and productive environmental policy. A green movement would encompass many aspects of society, improving pollution levels, sanitation, clean energy, safe water, etc. Green revolution is also an essential term to understand. This refers more specifically to a shift in agricultural practices, which will

produce more crops and create more viable land. A wide spread green revolution would benefit the farmers, the economy, create agriculture jobs for the unemployed, and increase sustainability in terms of food production. Currently, farmers in sub-Saharan Africa face complications with every season and many are only able to produce enough for subsistence. Movements with green goals have benefitted many developing countries around the world and have the potential to benefit South Africa as well, given the availability of financial and technological resources. A green revolution as accomplished by other developing countries, requires agricultural technology (fertilizer, modified seeds, etc.) and widespread cooperation. South Africa exhibits small initiatives throughout the country that have the ability to expand. The foundation has been established and can take hold given a strong following and the establishment of trust. Multiple case studies will be referenced to understand how green revolutions operate and how it could work best in the context of South Africa. Most of the studies indicate that South Africa would need a general industrial revolution with regard to the agriculture sector. Modern machinery, planting, harvesting, and production techniques will ensure the highest level of efficiency for agriculture. In addition to this movement towards new industry, science should be employed in the form of genetically modified crops and fertilizers specially designed for the climate and conditions of South Africa. The GMO crops and fertilizers have a ability to prosper in difficult environments, making use of lands previously rendered unusable.

An article in *Seedlings* entitled "Lessons From a Green Revolution in South Africa" makes many valid arguments about the prospects of a green revolution, socially and politically. Historically, the apartheid government recognized the high amount of rural poor with food insecurity and forced heavy handed, top-down measures thought to mitigate this problem. The result in the 1940s was massive animal and crop losses; further tainting the faith the people had

in the government's intentions. The governmental policy was viewed as another way to increase inequality and obtain land once the farmers were indebted to the people providing aid (Lessons 2008). After apartheid and examples of such inhumane racism, the green revolution must take a dramatic turn in order to present a viable solution that in no way involves a plot to gain power and influence. The Eastern Cape has two distinctly different agricultural approaches, the large-scale commercial lands and the former apartheid homelands, much of which is communally owned. Of the rural population, 70 percent are food insecure and in need of a comprehensive solution to the problem. The Massive Food Production Programme (MFPP) was created in 2002 by the Eastern Cape Department of Agriculture. The program was viewed as yet another way for the government and wealthy to disadvantage and further indebt the rural poor (Lessons 2008). The article in *Seedlings* describes the problem of deepening poverty with the supposed solutions in a green revolution. The high-yield and GMO seeds along with fertilizer, equipment, and marketing assistance are liable to indebt the farmers to the wealthy and the government. Once the cycle of dependence in created, the farmers will find themselves unable to pay their debts—seen as part of the master plan of the government (Lessons 2008). Equitable and trustworthy policies must be enacted and followed meticulously in order to avert such consequences. Organizations must be cautious not to encourage loans that may be difficult to repay and trust in governmental practices must be re-earned. The green revolution may be lagging because of the structural instability caused by distrust. NGOs will be useful as they remain concerned with the individuals, however, it will be difficult to run wide spread, sustainable programs without the financial and political assistance of the government. Another issue with previous efforts is that people were not given a legitimate voice or choice in the measures. As small land holding farmers, wary of governmental involvement, they were already predisposed to reject the

programs. When they were forced into compliance, they experienced negative results that ruined many livelihoods (Lessons 2008). Therefore, many in the Eastern Cape remain concerned about the intentions and outcomes of such a green revolution. Understanding the historical lies and injustices, retaining the status quo becomes the most logical and secure choice for many farmers. The MFPP is criticized as being an unequal representation of an efficient program because it has chosen to assist only the communities showing the most potential for improvement with the most agreeable land (Lessons 2008). Future programs should aim to assist all communities, especially the most destitute who are in the most need. The green movement should surpass political desires to have the most statistically successful program and reach out to the wider population. In the present green revolution efforts, people should be encouraged to participate by exhibiting proven positive results and models for success. Evidence should be given of how the programs can reduce poverty and increase food security. Anecdotes should also be used, connecting real African farmers to the examples, instead of only government generated studies. Leaders should be determined to build policies that address the concerns of the farmers and their advocates, avoiding the creation of deeper cycles of poverty.

When formulated and applied appropriately, green initiatives have the ability to lift communities out of poverty, bring agency to women, employ the previously unemployable, improve environmental conditions, create a base for a sustainable future, and most importantly, advance the human rights cause. Environmental policy and regulations have the ability to advocate for or require the use of green energy, decreasing air and water pollution. South Africa has a wealth of resources, which bring manufacturing plants and destructive environmental practices. Using a previously discussed example, the corporation Mondi planted vast tree plantations for their production of paper. The trees are not native to South Africa and therefore

have replaced native, more suitable species that were making a positive impact on the environment. Non-native tree species essentially destroy the natural ecosystem of an area because they are inhospitable to other native floral and faunal species. This ironically creates an environmental desert that contains nothing except for the transplanted trees. Such plantations also harm the environment by effecting the natural water absorption and flow through the soil. This in turn negatively affects the people living in the area who previously relied on the riches of the land. In addition, the paper manufacturing process is a highly toxic one (Lang, 2006) and uses sulfur dioxide among other chemicals to convert the wood pulp into usable paper. The plant is located in the middle of a residential community in South Durban and contributes to a great deal of the pollution. The chemicals harm the riverine ecosystems and leach into the soil, in addition to creating monstrous air pollution. The air pollution has exacerbated the asthma rates in the area; one in four people in South Durban experience the symptoms of asthma. This takes a toll on the environment, public health, and represents environmental abuse and racism.

Oil refineries and mining also pose a threat to environmental conditions. In the last year, serious debates were occurring with regard to oil fracturing techniques. Corporations want to take advantage of the rich oil reserves in the country, but they have shown little regard for the preservation of the desert ecosystems. Financial rewards have come to outweigh environmental concerns as South Africa rapidly develops and races to catch up with the world's top countries. Oil refineries devastate the landscape and stand to pollute the already scare water sources. Mining is one of the largest industries in the country, and South Africa leads the world in platinum, gold, and chromium production (Republic 2012). Coal consumption has steadily increased over the past 30 years and South Africa now ranks fifth on a global scale. Coal production has also increased to meet the growing demand and the country is the seventh largest

producer of coal (EIA 2010). The growth in the industries and heightening global influence, the South African Petroleum Industry Association (SAPIA) has made statements about their intentions for cleaner industries. Some progress has been made and the association claims to be assertively working towards cleaner fuels. Paths to success used by other countries are not necessarily applicable in South Africa and time must be taken to formulate an effective plan. SAPIA claims the framework of the European Union is suitable with some changes for a South African context (SAPIA 2012). The country has ambitious goals and a clear understanding of what needs to be accomplished. The manner in which the goals are reached in highly debated and specific attention must be paid to the South African situation. Such valuable resources have been exploited due to the past governmental instability. While natural resources are typically a positive asset for a country, they can also be harmful for development if the politics become misguided. Paul Collier writes in The Bottom Billion about how democracy can be led astray in the presence of vast natural resources. Politics influence and are heavily impacted by an abundance of resources. Collier goes as far as to say that natural resources can dramatically sway electoral votes, and therefore the outcome of the election (Collier 2007). With this in mind, it is crucial that environmental policy enables the new democracy to flourish and not crumble with corruption.

Policy must not only be implemented to prevent environmental destruction, it must actually be monitored and enforced. Financial profits should not be a reason to turn a blind eye to the environmental injustices. In order to retain economic growth and development, alternate forms of energy must be made available and promoted. Incentives should be used to encourage companies to utilize green energy, making it more profitable to not pollute. If this does not make a large enough impact, sanctions and punishments can be placed on uncooperative, polluting

companies. By increasing the amount of green energy, environmental injustice to the human populations decreases. Less people will be affected by the symptoms of asthma and less pollution will lead to cleaner water and ground conditions. Every person deserves to live in a clean area free from sewage, pollution, and land degradation. Research and development efforts should focus heavily on making clean energy available and inexpensive; less expensive energy would also raise the number of people with access to essential amenities.

It may not be possible to remove Mondi and their tree plantations; however, planting native tree species would benefit the landscape and increase human agency. Native trees have the ability to rejuvenate the environment and make a positive impact. Wangari Maathai started a magnificent movement in Kenya which employed women to plant and care for native trees. The Green Belt Movement was created in 1977 and identifies its goal as "to mobilize community consciousness- using tree planting as an entry point- for self-determination, equity, improved livelihoods and security, and environmental conservation" (The Green, 2012). This initiative increased women's agency and rights by encouraging them to earn an income and gain some financial independence. Simultaneously, the environment prospered from the rebuilding efforts. The trees increase water absorption and cause the soil to retain more nutrients. Ms. Maathai's memoir, Unbowed, details the progress of the initiative and gives evidence of positive change due to the tree planting movement (Maathai, 2007). All countries can stand to benefit from such exemplary projects that merge human rights initiatives with environmental benefits. South Africa has the capability to emulate the Kenyan model with modifications made specifically for the ecology on the country. The Green Belt Movement could create a dynamic community environment, uniting members with similar interests and ideals.

A green revolution has the ability to increase agriculture in South Africa, allowing the

country to produce more of its own food. Currently, agriculture makes up the lowest percentage of the GDP at 2.3% with services as the highest at almost 66%. Only 9% of the population is employed in agriculture and 50% of the population is below the poverty line. With a 23.9% unemployment rate, many people could benefit from more agricultural employment opportunities (Republic 2012). The main agricultural products are corn, wheat, sugarcane, fruits, vegetables, beef, and dairy. The country can greatly benefit from an updated, modernized agricultural revolution. Nearly two-thirds of the South African population resides in rural areas, living mostly on subsistence farming (Sachs 2008). Their isolation and relative lack of knowledge about market conditions harms their potential to participate in the formal economic sector. Another Kenyan model that may be useful with amendments for South Africa is the DrumNet program launched by PRIDE AFRICA, an American NGO. The NGO aims to be sustainable by allowing the recipients of assistance to earn enough revenue to cover the cost of the microfinance loan. DrumNet understands that there are multiple barriers in creating sustainable agriculture in Africa and hopes to tackle them simultaneously in order to benefit the farmers. The program aids farmers in the multi-step process of deciding, growing, harvesting, marketing, and selling products (Karlan 2011). This type of program is useful because loans make the practice more sustainable and people have a greater incentive to accept the guidance and recommendations.

Because South Africa already produces essential foodstuffs, there is the possibility to increase the yields of agriculture. Despite the extensive coastline, the interior of South Africa is rather arid and seawater is of minimal use. The coast benefits from the seasonal rains, but the desert has little ability to capture and retain the rainfall. When aridity along with reserved parkland and private reserves are considered, there is significantly less available land for

agriculture. In the case of South Africa, it is important to use the land in the most efficient manner, working with the strengths instead of battling with the negative aspects. Uncultivated and unclaimed land is minimal and must be used with utmost efficiency. The decline in agriculture lies in the static farming practices. Farming techniques have remained rather unchanged relative to the number of advancements occurring worldwide. This lack of development combined with population growth caused first a plateau and then a decline in the sector (Otsuka 2005). Crops should be chosen for their productivity and usefulness to the citizens. A crop that is inexpensive to sell but cooperates better with the environment will be more sustainable and economically responsible in the long term. Over time the land will suffer less degradation, lengthening the number of seasons the crop can be grown without rendering the landscape barren. Also, if the crop can be produced and sold more reliably, long term profits increase due to the stability.

Once the most logical crops are chosen, agricultural technology should be applied in an environmentally friendly way. Non-toxic fertilizers should be used to nourish the crops and ensure a healthier yield. It is important to stay conscious of the effects of the fertilizer on other aspects of the environment. Only non-toxic fertilizers should be used; run-off of toxic fertilizers casts chemicals into waterways, destroying riverine ecosystems as well as potentially tainting the water people are consuming. The Kenyan studies showed that farmers were hesitant to use the fertilizer despite the known benefits; the farmers would revert to the status quo. However, when they were presented with the opportunity to buy a fertilizer coupon directly after their harvest, 50% more fertilizer was sold. This was because farmers had extra cash to commit to fertilizer and yields were still fresh and prioritized in their minds. When they were offered fertilizer at the beginning of the growing season, more opted not to purchase it, maybe out of procrastination or

reliance on status quo (Karlan 2011). In a way, farmers need to witness the benefits of fertilizer in order to desire it; without first hand evidence, resistance of change is only logical. Another concern with fertilizer is the expense to the farmer; if funds are minimal farmers will typically opt to leave their crops unfertilized. In such cases, there can be opportunities to utilize manure from the dairy cow farms as well as agroforestry debris from the vast tree plantations (Otsuka 2005). This is a sustainable option that promotes recycling for the benefit of multiple industries.

Other agricultural technologies should also be employed given they are logical for the South African environment. More efficient harvesting and processing can decrease the cost of production, leaving larger marginal profits for the farmers. Instead of using manual labor to spread fertilizer, reap, and sow, machinery can aid in the process. Agriculture microfinance loans can aid in the obtaining of such equipment (Karlan 2011). If the interest rates are not exorbitant, the farmers will generate enough from their yield to repay the loan. These technologies have the ability to break the cycle of poverty in the agricultural sector while also stimulating the economy. The new technology will hopefully be welcomed in South Africa because of its general interests in development and its world GDP standing. An increase in information and distribution must accompany the implementation of technology. The scientific and technological efforts are meaningless if they are left unused or applied improperly. It can be difficult to reach the rural populations and small pockets of farmers because of the lack of transportation infrastructure. Yet it is essential that information be disseminated and farmers should be invited to discussions about new developments, market commodity prices, and efficiency techniques. Aid alone is not enough to fund the green revolution; education must accompany the advancements and willing participants made aware of new and innovative ideas (Sachs 2008). Access to knowledge about market commodity prices is crucial if farmers aim to

make the transition to commercial agriculture. It is important to understand what factors impact prices and well as what goods are most valuable or most necessary. Depending on the answers to these questions, the farmers can make more educated decisions about their yields.

Transportation infrastructure is another essential development. In order for the system to function smoothly, vehicular access is important. The transport of goods to market must involve safe and efficient roadways, reducing the chance of looting or vehicle issues that cause the goods to be delayed. Farmers should feel safe about transporting their goods to sell and have minimal hassle. Paved and maintained roadways into rural communities would also facilitate deliveries of fertilizer, seeds, and equipment. With easier access to and from cities and larger towns, rural farmers may be more inclined to network and communicate with other farmers via meetings. The transportation network would enhance the dissemination of information from urban to rural areas. On the larger scale, ease of international transport is also beneficial to the green revolution. In 2010 South Africa had 147 airports with paved runways and 431 with unpaved runways (Republic 2012). Increased and improved airports would be useful for the continental transport of resources and foodstuffs. South Africa has the advantage of multiple port cities, avoiding the issues of many landlocked countries.

Presently, small farmers are contributing to the best of their ability, but a greater number are needed to make widespread, sustainable changes. Nancy Witbooi of the Western Cape carefully tends to a plot of land provided by the municipality. A portion of the yields is donated to feed vulnerable groups, helping to support the community. These types of efforts increase food security because a person is ensuring the sustenance of many others (Phiri 2011). Even though it is a noble and upstanding task, such projects do not generate income and many are not able to commit to a volunteer job. In order to motivate people to be smallholder farmers,

government funding is needed. The farmers need the money to make the improvements and upgrades necessary to expand their operations (Phiri 2011). Indeed, the government cannot support the farmers forever, but once a new procedure is implemented, reliable, increased profits have the potential to fund the smallholder farmers.

South Africa is such a unique example because it possesses an ironic mixture of development and poverty, prosperity and decline. Currently, South Africa is in urgent need of a solution to their food insecurities. The population has over exploited its resources and faces a shortage that will only grow exponentially over time if not addressed effectively. Global climate change has changed the way that food is produced and world food prices are highly elevated. Therefore, South Africa needs to formulate a plan to feed their citizens before the economy is permanently harmed by the expensive imports. This being said, food aid is a greater evil than high import prices (Sachs 2008). Food aid from western countries floods the agriculture sector with incredibly inexpensive goods, discouraging the purchase of South African grown crops. Farmers suffer immensely in this scenario because they are unable to compete with the food aid, unable to sell their products, and unable to earn a living. Subsistence farming has been an important part of South Africa's hunter/gatherer and pastoral historical roots, but a move towards commercial farming can increase efficiency and revenues. The additional income generated from selling surplus yields can aid in supporting families, covering medical costs, and providing school fees and supplies (Ashton 2010). These types of improvements have the ability to benefit the entire society and economy. With more children obtaining an education and broadening their horizons, the country will enable its own upward trend.

Many developing countries have successfully increased their grain and crop yields by following the theory of a green revolution. Below is a discussion of some case studies of green

revolutions globally. There is always the possibility that motives can be lost in translation when successful models are replicated in different countries. However, it is worth understanding the principals behind the developments and therefore identifying the crucial aspects for South Africa.

Malawi, Kenya, and other countries in Africa have experienced positive results from their green revolution efforts. Sachs (2008) writes, "Malawi more than doubled its food output in just three years, following a bold government program to ensure that all farm households have subsidized access to fertilizers and high-yield seeds". This progress is commendable, but also more risky depending on the size of the country and number of farming households. It is uncertain whether there would be enough funding for South Africa to make such a brave step. In addition, for South Africa to implement such a policy, there would need to be a clear indication that farmers wanted fertilizer and would use it regularly and properly to gain desirable results. Such a measure could not be implemented without a South Africa specific fertilizer with promising results. South Africa may require an option that is more sustainable than fertilizer. With the initially low levels of irrigation and high soil aridity, prolonged use of fertilizers can deteriorate the land at a rapid rate. This could cause greater harm in the long run as climate change progresses. In a BBC article, Charlotte Ashton discusses the Malawi green revolution and interviews Edgar Bayani, a local agriculturalist, about the initiative. Mr. Bayani, as well as other farmers, was concerned with the negative aspects of fertilizer use. A project called Soils, Food and Healthy Communities advocates for the use of intercropping as fertilization. This is a process that involves planting legume seeds between crop rows. The legumes provide additional protein to the family or supplemental income as well as provide compost in the form of excess leaves (Ashton 2010). South Africa can learn from innovations such as these in order to tailor a

green revolution that fits the needs of the people and the environment.

Environmental revolutions in Kenya and Zimbabwe have received both praise and criticism. Otsuka and Kalirajan state that chemical fertilizer initiatives were launched with minimal positive results. This could be attributed to resistance or incompatibility between the crop and the fertilizer or the manner in which it is used. However, it was discovered that natural fertilizers were more productive (Otsuka 2005), bolstering the evidence in Malawi that natural fertilization remains a viable option (Ashton 2010). The example of Kenya is important because initiatives were taken decades ago and have more recently plateaued. This may simply be an indication that once initiated, a green revolution requires constant attention and alteration when plants, fertilizers, soil, or climate changes. Kenya reached an impasse where the improved seeds were not yielding increased production, which is evidence of how specialized the process is, even between national communities (De Groote 2005).

Asia had similarly negative prospects for food production in the light of rapid population growth. Granted, the Asian countries studied had better infrastructure and irrigation/water systems than South Africa (Otsuka 2005). Their progress was remarkable and deserves acknowledgement. Otsuka and Kalirajan assert that it may be rational to use the base of the Asian model to mold the green revolution in Africa. Specific technologies would not be blindly copied and policies would be revised for the intricacies of South Africa. Fertilizers would have to be specially formulated for the soil composition, type of crop, and level of irrigation (Otsuka 2005). Before South Africa is able to reach the level of success of Asia, research and development is necessary to discover technologies, chemicals, and fertilizers best suited for the environment.

A unique challenge that South Africa faces is the cooperation, or lack thereof, of European

countries. Because many of South Africa's crops are exported to Europe, farmers must tailor the goods to the needs and demands of the European market. Since GMOs are banned from sale in many European countries, South Africa may be limited in its ability to use such measures. The main downfall of the previously mentioned program, DrumNet, was the inability of the farmers to export their goods. French beans and baby corn were produced but rejected from the European market; this created a surplus that cost the farmers a great deal of money. Along with the dislike of GMOs, Europe's EurepGAP regulations essentially made it impossible for African farmers to meet the quality standards. Using standard farming practices centuries old, the African farmers in the project lacked the resources and facilities to meet the EurepGAP standards. Loans to attain such equipment would cause huge debt traps, costing years worth of income. Therefore, not only must South Africa unite in the effort, countries around the world need to attempt to make it easier and not harder for African countries to experience a green revolution along with environmental and economic progress. The creation of a greener, healthier, more equitable planet requires global cooperation.

South Africa requires the support and cooperation of western countries in order to have a successful, sustainable, green revolution. However, the majority of the process should be left to the country of South Africa. The over involvement of western nations would jeopardize the sustainability of the revolution and undermine the South African government. South Africa is a rapidly evolving nation that possesses the ability to help themselves in many ways. A balance should be reached that allows the country to capitalize on opportunities but avoid dependence. A dependence on foreign countries is problematic to any nation, especially South Africa. With the history of distrust with colonialism and lack of control, the South African people would probably not appreciate over involvement of foreign nations with potentially ulterior motives. A White

Paper on the Ethical Dimensions of Climate Change references the responsibilities of national and international governments in dealing with climate change. The ethics of who should be involved and in what way is addressed in the paper. The Rio Declaration, as well as the United Nations Framework Convention on Climate Change (UNFCC), asserts that nations have a responsibility to reduce their emissions, polluters must internalize the costs of pollution, and developed countries should lead the movement towards reducing climate change. According to the United Nations, developed countries have an obligation to aid in environmental efforts to the best of their abilities. Nations have the ethical duty to ensure the planet is left in the best condition possible for future generations. It is up to present generations to ensure that future generations and ecosystems have the opportunity to live and survive without suffering from the damages that the current population has caused. The Rio Declaration and the UN Charter state that in accordance with international law, counties have the right to use their resources and pursue their own environmental goals as long as those decisions do not have consequences extending beyond the national borders. Therefore, the international community does not necessarily have the ability to forbid certain environmental harms that are occurring in South Africa, but does have the responsibility to lead the movement and provide good examples and as much assistance as is suitable (Brown, 2008). Because climate change is affecting every country around the world, especially developing countries, nations have a responsibility to cooperate globally to find a solution. The United Nations' Millennium Development Goals lists the eradication of poverty and hunger by 2015 as their first goal. Progress on this goal has been made in Asia, especially in East Asia, where the nearly 60% poverty rate fell to under 20%. This progress can in part be linked to the green revolutions that created jobs, brought light manufacture, and improved equality. Unfortunately, the UN states the little to no progress has

been made in sub-Saharan Africa. Southern Africa needs serious determination to achieve a green revolution in order to move closer to the MDGs. The UN created these goals with the understanding that global cooperation would be needed for them to be accomplished. Reducing hunger and poverty is number one and ensuring environmental sustainability is number seven (UN, 2012). The goals work together and progress in one area can often increase progress in another area. By increasing environmental sustainability, poverty and hunger can be reduced. Countries must respect the larger picture and understand that their actions have a wide range of consequences- nationally and internationally, in the present and in the future. By sharing new, green technologies and innovations, countries have the ability to benefit the entire planet; it is in their best interest to do this because climate change respects no national boundaries.

CONCLUSION

Colonialism and the growth of cities that began in South Africa in the early 20th century launched extensive conservation efforts. However, the word conservation takes on a different connotation than most western individuals imagine. While the Europeans were preserving land to ensure the safety and prosperity of the native floral and faunal species, they were also displacing native people and leaving them destitute. Environmental policy was used partially to create beautiful landscapes for the whites to enjoy, and partially to deny land and amenities to the black and colored population. Conservation and segregation were so closely linked that wildlife protection, national parks, and game reserves were considered White interests. As industry increased in major cities, a demand for inexpensive energy prompted the construction of dams. This process again disregarded the interests of the villagers living near the rivers and used the energy for the middle and upper class urbanites. Even though South Africa has removed the

apartheid government and denounced segregation, there are continuing examples of environmental racism. Apartheid laws and regulations created divides that cannot be mended overnight. People of color need agency and political influence to lift themselves out of the townships and regain their environmental rights. Communities of color should not be burdened with all the most polluting industries and equal respect and consideration should be given to all groups. Environmental conservation is a noble intention, but human rights and equality should not be compromised or neglected in the process.

A wide spread green revolution and green movement are achievable and would foster large benefits. Small, mostly localized efforts are underway and there is public interest in the cause. Creating and advocating countrywide shifts towards cleaner industry would increase human rights as well as create a more sustainable environmental policy. Polluting manufacturing plants and industries are harming the human population as well as the wider ecosystem. Just like during the 20th century, people are being negatively affected in relation to the environment due to the color of their skin. The sources of the most pollution are located in poor, Black and Colored communities. Not only do the people live surrounded by the pollutants, they often must take jobs in the plants because of their economic conditions. Colonialism and apartheid are the culprits for the putting the blacks and coloreds in such compromised economic situations. Therefore, as a part of the national plan to make amends and restore human rights, attention must be paid to the livelihoods of such communities. A green movement would bring better conditions to the urban poor and working class. A green revolution would more directly benefit the rural farmers and smallholder farmers who transfer from sustenance agriculture to commercial agriculture. A combination of fertilizer, technology, information, and innovation is needed to create a green revolution model suitable for the country as a whole. The basic formula

used in the successful Asian green revolution can be implemented with regard to South Africa, and perhaps sub-Saharan Africa, with alterations needed for greater efficiency. Proper environmental policy has the ability to reverse negative outlooks towards conservation and generate regulations that will bring widespread development. However, a few questions and complications still remain. It is uncertain if the environment of South Africa is capable of handling long term, commercial agriculture. The landscape is fragile and arid, which may not be conducive to a green revolution. A large difference between South Africa and the hugely successful Bangladesh is the level of irrigation and water supply. In order to keep up with the agricultural development, a successful and reliable irrigation system must be established. Financial logistics must be addressed in more detail and require further evaluation. The ethics debate will continue indefinitely because there are no solid conclusions about the responsibilities of foreign nations to aid green revolutions. Despite the universal conclusion that all nations should be responsible for ensuring a healthy planet in the future, it is inconclusive as to what measures should be taken. By using successful models as guides, the South African government has the ability to lift its people out of poverty and improve environmental conservation and sustainability in the country.

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