“South Africa performs dismally in a global environmental public health and ecosystem vitality assessment. A report which has just been released by Yale University and Columbia University in collaboration with the World Economic Forum and the Joint Centre of the European Commission has painted a very disturbing picture of the effectiveness of environmental management in South Africa. South Africa was ranked 128 and was recognized as one of the countries with the fastest rate of environmental decline. The twenty two indicators that were used in the assessment highlight glaring concerns.” G. Barns (Director of Conservation: WESSA ~ Wildlife and Environment Society of South Africa, 2012)

Consider the respective contributions of climate change, tropical environment characteristics and culture, politics, economics and society to this situation ~ and to what extent may it be mirrored elsewhere in Africa?

Much current political discourse surrounding South Africa concerns the existential threat posed by continuing mismanagement of the environment (strong legislation/poor implementation) coupled with abrupt, regional climatic shifts (drought/sea-level rise), wherein the institutional capacities and interactions of state and non-state actors to manage the country’s ecosystems are evolving more slowly than the overuse of those same systems (Folke, 2007). South Africa is thus in many ways ‘a microcosm of the world’ (Khan, 1990) with a fragile, environmental base - naturally arid, water stressed - marked by political paralysis over its management and a complicated history of environmental injustice (a wealthy minority of people over-consuming, and an impoverished majority under-consuming). The existence of this fragile environmental base is manifest in the declining air quality and water quantity of South Africa’s cities, the frightening rates of soil erosion, bush encroachment, overgrazing and overcropping in its agriculture, the loss and extinction of its rare flora and fauna and the increasing siltation and over-irrigation of its rivers. Ramphele (2009) traces this fragile environment back to apartheid: ‘South Africa experiences many of the same environmental problems as the rest of the world...but apartheid has severely increased the damage. It has been a profoundly unnatural system; a system of removal and separation. It has forced large numbers of people into unsuitable environments, putting disproportionate pressure on natural resources and carving deep fissures into valleys and hillsides. It has broken urban areas into fragments: some green, spacious and healthy, others - occupied by the black majority - cramped, unwholesome and degraded’ (Ramphele, 2009).

Fundamentally, this essay argues that the representation of South Africa as faltering (‘one of the fastest rates of environmental decline’) and evolving/reflexing too slowly to decline (ineffective inter-actors at state, civil and lay level) emerges because it exists at the debilitating quandary of having to simultaneously: (i) cure an unnatural (weak) past and (ii) administer a natural (strong) future. Such a predicament - “the patient is a physician is a patient” - is recognised in a recent Green Paper (2009) produced by the South African Government: the difficulty at the present lies in ‘decoupling growth rates and poverty eradication from rising levels of natural resource use and waste.’ South Africa thus shares, along with many post-colonial African states, the complicated procedure of having to birth a democratic, ‘environmental justice’ movement that sites the issues of its ecological damage (environment) within a socio-political (poverty) context first and foremost, and then poses firm moral and distributional questions about that context. The long timeframes and bureaucratic politics involved - as the Cape Town housing crisis (1998) suggests - unveil, however, the difficulties of implementing such a movement, particularly in an unequal society wherein the poorest 20% of the population earns only 3% of the national income, while the income share of the top 20 % exceeds 60 %.

Creating this framework of effective, democratic 'environmental consciousness' in South Africa is hampered by the collective memories of apartheid etched viscerally into the landscape and its inhabitants. As such, coordinating social and environmental redistribution is complicated by the "unnatural" fragmentation - spatially (Homelands policy; 'wildlife conservationism', land dispossession) and psychologically (Bantustan education system; black alienation) - of the South African polity during apartheid, such that 'two distinct countries emerged - *nature(s) divided* - out of one' (Ramphele, 1994): (i) the west/south, and the traditionally white-owned commercially farmed land, recipient of adequate inputs of investment and resources and (ii) the east/north, and African-occupied land farmed under a communal land tenure system, marginalised over a long period with respect to investment and resources. Furthermore, such imposition, or political fragmenting did not occur upon a static slate but on a landscape itself naturally fractious, as Nicholson (2011) writes: 'South Africa, influenced by multiple ocean currents - the warm-southward Agulhas on the east, the cold-northward Benguela on its west - experiences various regimes of rainfall' between its regions.

I suggest that the weak (strong) implementation of the right (wrong) policies in South Africa reproduces these "two natures" and the spaces of historical degradation in the veldscape and former homelands. I point to the subtle persistence of apartheid architectures in South African culture and politics, as Adams et. al (1994) write: 'the laws and regulations of the old regime constitute a form of scaffolding which, when removed, leaves a structure intact.' Primarily, I explore how these 'structures' of apartheid subtly pervade, complicate and ultimately erode the very foundations that the new South Africa was founded upon. Written in 1996, the Constitution of South Africa illuminates conflicting discourses that, on the one hand, promote environmental justice and social redistribution - 'everyone has the right to an environment that is not harmful to their health or well-being...to have access to health care services, including reproductive health care; sufficient food and water; and social security' - yet with the other hand incite economic growth above all else (environment as externality; people as labour input), Bond (2009) writes: 'tellingly, [it mandates] reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation, and secure ecologically sustainable development and use of natural resources while *promoting justifiable economic and social development* [his italics] '. Using South Africa's energy crisis as an example, I explore the delicacy of the balance surrounding economic/environmental tradeoffs, and how - in an attempt to sustain foreign direct investment for its poverty alleviation programmes - the incumbent African National Congress party (ANC) is strung into sating foreign, corporate interest and investing in large-scale centralised power from coal and nuclear rather than creating sustainable long-term solutions in renewable energy, public transport and urban agriculture.

In addition to the complexities of South Africa's political economy, I suggest how the climate and tropical characteristics of its flora and fauna emit their own agency into the quandary. Reiterating Wilson (2010) and how a 'structural, socio-political foundation to the land degradation problem should not lead to the underestimation of the potential role of physical environmental factors in its future development', I explore how the unnatural, sedentary system placed upon the homelands interacted with the natural systems of climate and tropical flora to (re)produce agricultural crises. The reasoning Gupta (2011) applies as such is that in the non-equilibrium grazing system (increasingly so under climate change) of the South African veld - characterised by dynamic variability in rainfall/drought and stochastic disturbance regimes (fire) - the costs of a sedentary production strategy are likely to be much higher than with a mobile, opportunistic strategy. Beinart (2009) frames it in more political language, suggesting that the transposition of this European, sedentary system or landscape onto the veld was a prime reason for 'the

overstocking by local farmers of livestock', who, thus rendered immobile, feared the ravages of the next drought. He furthermore locates the subsequent 'degradation narrative' of black farmlands in a critical context, as the means and evidence by which the apartheid state legitimised its view of the African as primitive. Such a deconstructive, critical impulse might be administered to the very opening statement of this question by Barns (2012) - 'a very disturbing picture...one of the fastest rates of environmental decline' - locating both his individual positioning (Director of Conservation; WESSA) and that of his rhetoric's within a dominant, crisis narrative of their own wherein: 'development experts and the institutions for which they work claim rights to stewardship over land and resources they do not own. By generating and appealing to crisis narratives, technical experts and managers assert rights as 'stakeholders' in the land and resources they say are under crisis' (Leach et. al, 1996)

The impact of apartheid on environmental degradation remains ever-present in its absence, the 'eroded hillsides of the once black 'homelands', the unsanitary and hazard-prone conditions in townships and shack settlements...the stark racial differences in statistics of morbidity and mortality relating to environmental health' (McCann, 1999). Such degradation is underpinned by poverty and its structural roots in colonial and apartheid political planning. The apartheid era (1948 - 1989) in South Africa was a period of extreme politicization of environmental conservation and the institutionalization of environmental racism. Khan (1990) traces environmental decline in the former homelands regions to apartheid and the 'cumulative effects of racially discriminatory laws and punitive conservation regulations' that served to place extreme stresses on the land and to alienate the black majority from wider environmental decision making. Under the Nationalist government's 'homelands' policy, black people were forcibly removed from cities and farms and placed in ethnically divided, rural areas.

As Coulter (2011) suggests, this system 'hastened environmental degradation through overpopulation such that by 1980 an estimated 10.5 million black people lived in the homelands that comprised less than 13% of South Africa's total land surface.' Seen as transient living 'spaces', and as a mode of creating total subordination, the apartheid government maintained the Homelands with minimal infrastructure (lack of electricity and amenities, poor farming tools/ techniques). The demographics - already divorced and bloated from their natural trajectories by dispossession and resettling - were further manipulated, as most men of working age were re-located to white farms in the productive, commercial 'Crown Lands'. The segregationist agenda of apartheid was furthermore not unique to South Africa, Leach et. al suggest that the political and economic context within which a ruling coloniser found itself was instrumental in the

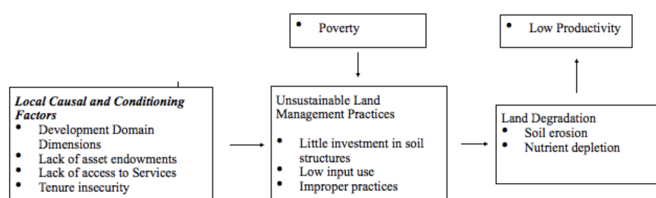
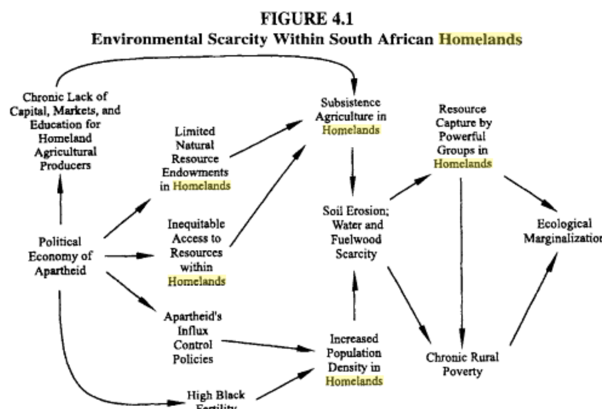


Figure 1. The Poverty-Environment Nexus in the Homelands (Alemu et. al, 2010) Note how local causal and conditioning factors affect poverty and land degradation directly. Local causal and conditioning factors imply development domain dimensions (such as population pressure, market access and agricultural potential), asset endowments (such as human capital, physical capital, natural capital, financial resources and social capital), access to services (such as extension) and property rights (such as secured land ownership). The Homelands in this sense might be regarded as the suffocation of asset endowments, access to services and property rights whilst artificially bloating population pressure.



type of conservationist policy it produced. As such, architectural differences emerge between the settler colonies of British East and southern Africa, and the trading colonies of British West Africa, Leach et. al (1999) write: 'an overt, social control agenda lay behind policies in East and southern Africa that placed physical restrictions on African farming activities, supposedly in the interests of conservation, because they directly threatened the interests of European settlers... the prohibition of farming on slopes claimed to be too steep for cultivation, the relegation of African farming to designated reserve areas, and restrictions placed on the (export) crops African farmers were allowed to grow. In all these cases, conservationist arguments were made to justify those policies. By contrast, in the trading colonies of West Africa where African cash-cropping and gathering were important to colonial economic interests, conservationist policies to restrict these activities [apartheid architectures] were much less prominent' (Leach et. al, 1999)

Alemu et. al (2010) posit that the poverty (cramped, squalid living conditions) and environmental degradation (overexploitation of wood fuel and top soil erosions) experienced in the Homelands and townships - the urban equivalent - formed a self-sustaining structure such that: (i) poverty led to land degradation through little or no investment in soil structures, low input use, and improper land management practices, and (ii) such unsustainable land management practices led to poverty through low productivity and little food availability (which was in turn a result of reduced capacity of the soils to sustain crops). Percival et. al (2009) suggest a causal link between the environmental scarcity experienced in the homelands and subsequent violent conflict and civil strife in the KwaZulu-Natal region (Figure 2), they write: 'the distribution of resources in the Homelands were inequitably distributed, as elites controlled access to productive agriculture and grazing land...thus populations had to sustain themselves through subsistence agriculture with added remittances from family members working in industry and mines outside the homelands.' Stressing the suppression-isolation praxis of apartheid, Percival et. al state that legislative restrictions - the Group Areas Act (1950) and Separate Amenities Act (1956) - boiled up into civil unrest and that, furthermore, such disquiet finds expression today - the Lonmin strike (2012) against the inhumane massacre of 44 miners by the South African Police service being one such. Observing the Homelands of apartheid they write:

> [black] agricultural producers suffered from a chronic lack of investment capital, were denied access to markets, and lacked knowledge of appropriate land-use management techniques - a product of discriminatory education and agricultural extension services. Opportunities to move into urban areas were restricted by influx control; these restrictions combined with high fertility rates to increase population densities. Soils were fragile and susceptible to erosion. Inadequate supplies of electricity and fossil fuels forced people to use fuelwood, which became more scarce. Rural poverty escalated as agricultural and grazing productivity declined from land degradation, and daily water and energy needs became ever more difficult to satisfy.

Such spaces of exclusion furthermore remain etched into the present South African economy with large disparities of income, social capital and land ownership, a government Green Paper (2009) reads: 'The Government owns half the economy and ownership of the remainder is highly concentrated in the hands of a small minority of the white population...Poor people in urban and rural areas have limited access to water, energy, land and other resources. Services such as sanitation, waste removal, transport and housing have either not been provided or have been of poor

quality. Infectious diseases due to lack of clean and/ or adequate water supplies, sanitation and waste removal services are a major cause of deaths in early childhood.'

Cock (2007) traces the environmental problems plaguing South Africa's cities to the Homelands Policy, and the mass rural-urban migration of marginalised people in the dying days of apartheid, both to escape the deteriorating economic, political and ecological conditions of the Homelands and to trail the labour opportunities of established heavy industries. Cock suggests that this mass, black labour movement - naturally suspicious of conservation - was pre-destined by its past to neglect environmental issues in favour of employment, what he terms the 'steel valley struggle'. Nonetheless, Cock recognises that energies between state (national) and civil society (local) have begun to emerge to resist the subtle presence of apartheid architectures *within* South Africa's current infrastructure. Jakopvich (2009) - in writing an ethnography and skirting between several Environmental Non-Governmental Organisations (ENGOS) placed around Durban - observed the growing sense of community and more specifically a "Climate Justice Movement" within the streets wherein 'the false dichotomy which portrays labour-environmental relations as a trade-off between jobs and the environment' is challenged and subverted.

The abandonment of the multi-billion rand Pebble Bed Modular Reactor

The abandonment of the aluminum smelter at Coega

Putting the SASOl coal-to-liquid plant on hold

Making future World Bank funding for coal less likely

Breaking the veil of secrecy around below-cost electricity pricing to multinationals such as BHB Billiton and Anglo –American.

Furthermore, he suggests that the movement has already found political traction in the trade unions with 'COSATU [endorsing] a climate jobs campaign, structured on the notion that a "just transition" to a low carbon economy using renewable energy instead of coal, will depend on the workers.' Harvey (2002) traces these flexings of civil society to a more general marxism gripping the developing world and delineates, in its agenda, what is possible and impossible politically; he writes, 'an ethical, non-exploitative and socially just capitalism that rebounds to the benefit of all is impossible. It contradicts the very nature of what capital is about.' Nevertheless, the Climate Justice Movement may signal the beginnings of an 'eco-socialist agenda [that] connects particular local struggles, generalises them and links

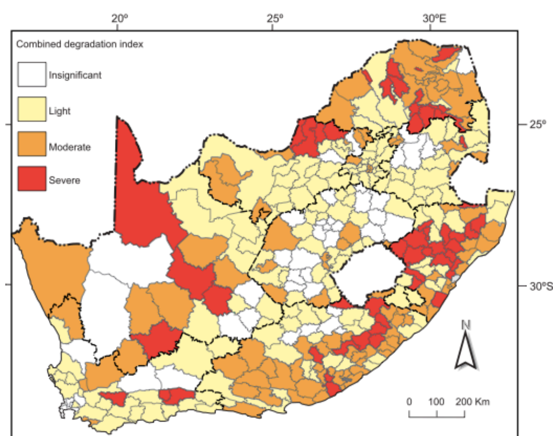


Figure 1 South Africa land degradation illustrated by Hoffman *et al.*'s combined degradation index. Darker shading indicates areas of greatest degradation

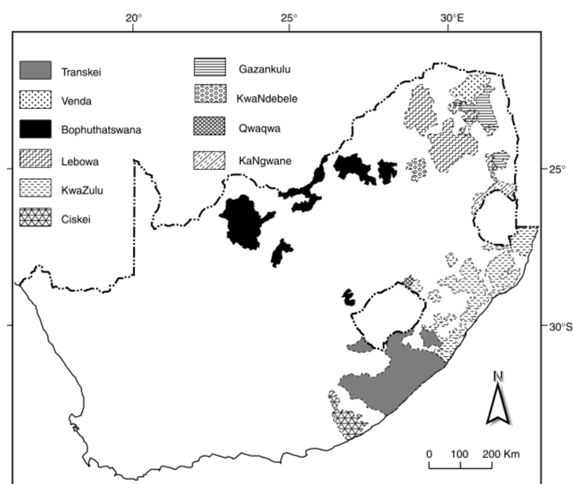


Figure 2 Map of South Africa showing the geographical situation of the former homeland states (after Christopher 1995)

them to a universal project of socio-ecological transformation, against the universalization of neoliberalism and capitalist markets as the regulators of nature and society.'

Such a thriving civil society appears to contradict Barns' opening statement of a South African environmentalism in disarray. However, Taylor (2008) - aligning with Barns - observes otherwise, beneath the hype a faltering diaphragm, he writes: 'the structural conditions that lie behind South Africa's environmental crises and the brown agenda (urban low-income ecological needs) are weakly addressed...[activists] preferring to label as environmentally racist merely the most obvious practices of differential pollution.' Furthermore he suggests that a 'popular resistance to ecological destruction' - a necessary condition for change - has not been stimulated, providing an anecdote in which 'an official from the government department of environmental affairs stood up before a group of environmentalists and NGO representatives and said, "Where is the environmental movement? Where are the placards? We can't change things without the pressure of citizens" (Taylor, 2008). The inefficacy of South African society as a whole to address its environmental decline might thus be traced to a lax tension in the riggings binding the centre (government) and peripheries (non-government).

Vavi (2011) in contrast locates the rot deeply within government and the constraints of coalition politics, he writes: 'routes out of urban environmental injustice are arduous, just as attempts to invoke ecological modernization themes — the internalization of externalities in infrastructure policy-making; cost- benefit analysis in the siting of industrial developments like the Coega zinc smelter; or demand-side management instead of an increased supply of Lesotho water — have not yet proven sufficiently convincing to overcome the orthodox economic insistence on GDP growth.' Focusing solely upon the political architectures and their detriment within South Africa often retracts from the non-human and very immediate influences of climate upon the landscape. As Hoffman's (1999) study suggests, there is much more interaction between the unnatural (apartheid) and natural (climate) that a pure political economy perspective would suggest. Postulating the future impacts of climate change, Hoffman observes that the several key areas of highest risk coincide with the Homelands, he writes: 'combining rainfall and geomorphological data with the historical and political circumstances [of apartheid], the communal areas of South Africa are likely to be rendered much more susceptible to future intensification of the land degradation problem, especially under the rapidly changing climatic conditions predicted under most global warming scenarios.'

Observing Limpopo Province at a finer scale, the climate model created by Hoffman suggests that its strong summer rainfall regime will be increasingly punctured by precipitation anomalies 'of potential significance to the degradation issue'. He posits several "mechanisms" through which further environmental decline might be reached: (i) bush encroachment, facilitated by optimal plant growth in conditions of rising temperature and CO_2; (ii) increased disturbance (fire regimes) and (iii) emergence of invasive r- species (woody plant cover), competitively adapted to high-disturbance non-equilibrial environments. In the case of grazing, Hoffman postulates that a drier spring and early summer 'could potentially impact on the germination of maize and sorghum crops' directly exacerbating food security in the impoverished region. The interactions of apartheid structures and climate "structures" in degrading the South African environment are further evidenced by Scoones et. al (2003). Studying the African veld, they suggest how the constriction of mobility associated with apartheid in such a semi-arid pastoral system increased the risk of degradation by concentrating grazing pressure on resources and reducing the opportunities for resting parts of the vegetation.