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International Relations and Diplomacy

Masters Thesis

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Sustainable Development or Pollution Haven?

Analysis of BRICS Economic Growth

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Introduction

In June 1992 at the United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro, Brazil, the international community agreed upon a supposed new outlook to development. This being that it was no longer viable for nations to forsake environmental protection in favour of economic growth and industrial output. Over 178 nations signed Agenda 21 in Rio and agreed to its plan of sustainable development. A concept brought to the world's attention in 1987 by the Brundtland Report. It is the aim of this thesis to investigate whether sustainable development has been achieved by analysing the growth of the BRICS (Brazil, Russia, India, China and South Africa) over the last 20 years.

These 5 nations represent the growing economic strength of previously poor nations taking full advantage of globalisation. Becoming influential players on the international economic stage and a lot of this growth has occurred over the last 20 years. Have the ideals of sustainable development and the policies of Agenda 21 played a part in their meteoric rise? Or have the BRICS forgone the environment in order to strengthen their economies, like their western counterparts before them? I hope to have shed light on this answer by the end of my thesis. Though before I can begin to formulate an answer it is necessary to show the design by which I will go about it.

Literature

Gro Harlem Brundtland was commissioned by the UN in 1983 to chair an independent committee designed to produce a report on the challenges that faced the world concerning economic development and environmental development. Brundtland and her team's work culminated in October 1987 with the publication of "Report of the World Commission on Environment and Development: Our Common Future"[1], also referred to as the Brundtland Report. Within it were the beginnings of the goals and policies that would be introduced and agreed upon at the UNCED in Rio 5 years later after, including the aim of sustainable development for all nations, irrespective of political make up or financial standing.

The Brundtland Report saw sustainable development as;

[1]"Report of the World Commission on Environment and Development: Our Common Future", October 1987, taken from http://www.un-documents.net/wced-ocf.htm

"development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts:

- the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and
- the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs."[2]

From this we can see that sustainable development is about reaching the 'needs' of modern day society without risking those same 'needs' for future generations to come, though this is not the only definition of sustainable development as we shall see later. The idea of 'needs' within sustainable development is built upon later in the text with the statement "Sustainable development requires meeting the basic needs of all and extending to all the opportunity to satisfy their aspirations for a better life."[3]

These basic 'needs' are those such as food, shelter, clothing and the like but what is important to note here is that the report does not stop at the requirement of meeting such needs but also that sustainable development should give people the chance to better their lives. This is the desire for growth; to be able to achieve and attain a better quality of life requires people and nation states to grow their economies.

In the past growth came at the expense of the environment, vast amounts of non-renewable resources were mined and massive swaths of land were stripped bare of its natural inhabitants to make room for the products that now dominate our lives, irrespective of any environmental damage that may have been caused. The desire for growth would mean that any ever increasing amount of land and resources was used to fill the ever burgeoning coffers of national economies. This exponential growth and resource use can be described as the treadmill of production[4]. The treadmill of production formed by Allan Schnaiberg in 1980 states that as economies grew, traditional labour production was replaced by more technology-based methods of production. This required investment in research and development and higher levels of energy usage to sustain production from these new

[2] "Report of the World Commission on Environment and Development: Our Common Future", Chapter 2, Paragraph 1, October 1987 taken from http://www.un-documents.net/wced-ocf.htm
[3] "Report of the World Commission on Environment and Development: Our Common Future", Chapter 2, Paragraph 4, October 1987 taken from http://www.un-documents.net/wced-ocf.htm
[4] Robert J. Brulle1 & David N. Pellow, 'Environmental Justice: Human Health and Environmental Inequalities', *Annual Review of Public Health*, 27, (2006), pp. 103-124

technologies. To increase profits, companies would have to increase the output of this new production method to cover the costs that were lost in its creation. Greater levels of production invariably meant the use of increased levels of resources and "For ecosystems, each level of resource extraction became commodified [sic] into new profits and new investments, which led to still more rapid increases in demand for ecosystem elements"[5]. The treadmill of production is "a self-reinforcing mechanism of ever more production and consumption"[6] designed to generate wealth for its patrons at the cost of growing environmental damage.

"Sustainable development involves more than growth. It requires a change in the content of growth, to make it less Material and energy intensive and more equitable in its impact."[7] If the treadmill of production is to be believed, coupled with the general consumerist nature of most capitalist societies there is an insatiable thirst for the continued production and purchasing of goods. As the demand for goods increases so does the demand for the natural and chemical resources that are used to produce them. This consumption of resources and the energy needed to harvest, produce and distribute these goods damages the natural environment greatly when it is achieved with classical development methods. Sustainable development is the idea that individuals and nations should find alternative routes to growth and economic success that do not put the environment at such great a risk that future generations welfare is irreparably damaged. The Brundtland Report in its call for sustainable development was not discussing the lowering or dissolution of economic growth, far from it. It was calling for future growth to move away from practices that endangered the world that we live on; it was calling for economic growth paired with environmental responsibility.

In 1992 at the UNCED after 5 years of deliberation and negotiation more than 178 nations signed Agenda 21 which has been described as "the sustainable development bible"[8]. Agenda 21 transformed the Brundtland report into a codified UN document palatable to the majority of governments party to it. It is not, however, a legally enforced international treaty but

[5] Kenneth A. Gould, David N. Pellow & Allan Schnaiberg, 'Interrogating the Treadmill of Production : Everything You Wanted to Know about the Treadmill but Were Afraid to Ask', *Organization Environment*, 17 (3), (2004), p. 297

[6] Robert J. Brulle1 & David N. Pellow, 'Environmental Justice: Human Health and Environmental Inequalities', *Annual Review of Public Health*, 27, (2006), p. 108

[7] "Report of the World Commission on Environment and Development: Our Common Future", Chapter 2, Paragraph 35, October 1987 taken from http://www.un-documents.net/wced-ocf.htm

[8] Timothy Doyle, 'Sustainable Development and Agenda 21: The Secular Bible of Global Free Markets and Pluralist Democracy', *Third World Quarterly*, 19 (4), (1998), p. 771

instead a non-binding resolution and "Its successful implementation is first and foremost the responsibility of Governments"[9]. Agenda 21 is an international call to national governments to implement measures that would ensure the security of development for all.

"Prevailing systems for decision-making in many countries tend to separate economic, social and environmental factors at the policy, planning and management levels."[10] Economic growth has largely been separated from environmental responsibility within many governments. Economic growth has been one of the driving factors for both developed and developing nations. Without a strong economy it becomes harder to fund domestic welfare projects, civil services and the military. Yet as the environmental repercussions of years of industry were coming to light it was deemed necessary to look beyond the profit margin and introduce environmental protectionism into economic rationale. "The overall objective is to improve or restructure the decision-making process" Agenda 21 states "so that consideration of socio-economic and environmental issues is fully integrated and a broader range of public participation assured."[11] Economic growth is the lynchpin for state success and the ability to provide its populace the opportunity for a better life yet financial gain could no longer outweigh the environmental peril that had come because of it. A shift to policy that promoted growth but ensured said growth was as harmless to the environmental as possible was needed. Not, however, in a few nations but for this to have the desired impact nations the world over would have to reform.

> "In order to meet the challenges of environment and development, States have decided to establish a new global partnership. This partnership commits all States to engage in a continuous and constructive dialogue, inspired by the need to achieve a more efficient and equitable world economy, keeping in view the increasing interdependence of the community of nations and that sustainable development should become a priority item on the agenda of the international community. It is recognized that, for the success of this new partnership, it is important to overcome confrontation and to foster a climate of genuine cooperation and solidarity. It is equally important to strengthen national and

[9] *Agenda 21*, Chapter 1, Paragraph 1.3, (1992) taken from http://www.un.org/esa/dsd/agenda21/res_agenda21_01.shtml
[10] *Agenda 21*, Chapter 8, Paragraph 8.2, (1992) taken from http://www.un.org/esa/dsd/agenda21/res_agenda21_02.shtml
[11] *Agenda 21*, Chapter 8, Paragraph 8.3, (1992) taken from http://www.un.org/esa/dsd/agenda21/res_agenda21_02.shtml

> international policies and multinational cooperation to adapt to the new realities."[12]

Earlier I wrote that Agenda 21 was not a legally binding treaty and that its successful implementation would be down to the national governments willing to introduce legislation within their own countries. Yet from the quote above, taken from Agenda 21, we can see that there was already an appreciation of the fact that sustainable development could only make a great impact on the environmental quality of this world if states worked together. With the rise of globalisation, states have become far more integrated with each other and reliant upon one another for growth and prosperity. Goods are sold on the other side of the world from where they were produced and financiers bankroll factories on other continents. This international trail of money and produce comes with the added burden of environmental damage that is caused by the global market we live in today.

> "2.3. The international economy should provide a supportive international climate for achieving environment and development goals by:
> (a) Promoting sustainable development through trade liberalization;
> (b) Making trade and environment mutually supportive;
> (c) Providing adequate financial resources to developing countries and dealing with international debt;
> (d) Encouraging macroeconomic policies conducive to environment and development."[13]

In Agenda 21 we see the dichotomy between the need for national governments to exert pressure inwardly to change the nature of their own economies while externally shaping the world economy to insure such changes are beneficial. Not only to the environment and their own economies but also to the economies of other nations as well. In one sense Agenda 21 can be seen as a self-policing policy which asks nations to adapt and change to more environmentally friendly economic behaviours while not legally binding them to any such commitment. It is self-policing because as economies change and the products they make go under reconstruction they will need to find new markets for such products. Products that will invariably have higher costs, at least in the beginning, to deal with the sunk costs and

[12] *Agenda 21*, Chapter 2, Paragraph 2.1, (1992) taken from http://www.un.org/esa/dsd/agenda21/res_agenda21_02.shtml
[13] *Agenda 21*, Chapter 2, Paragraph 2.3, (1992) taken from http://www.un.org/esa/dsd/agenda21/res_agenda21_02.shtml

overheads of new styles of production and new national dictates enforcing cleaner production methods. Without markets for these products to enter into and be competitive in it is unlikely that such sustainable production behaviours would survive as growth would stagnate or decline. For nations adopting such practices, therefore, it is preferable for other nations to behave in similar ways so as to provide market opportunities and assure other, competing companies face the same costs. Similar regulations within different nations would provide a more equitable market space within which to compete and greater similarities would also incentivise greater trade liberalisation between nations. As there are fewer risks of national companies risking the loss of market share in their domestic markets due to lower prices of foreign products that are not held to the same standard of sustainable production and do not face the same costs.

This belief in partnered sustainable development throughout the world would see nations enforce similar environmental laws on their own companies and products entering their markets from foreign businesses. Yet, if nations were to forgo the creation of environmental regulations and either actively encourage or merely turn a blind eye to heavily damaging production methods within its borders, then it can attract foreign firms and create new and/or reinforce 'dirty' business sectors for its economy and its workforce. Nations and areas such as this have become known as pollution havens.

"The main argument is that stringent environmental standards in industrial countries drive firms to close plants at home and establish them instead in developing countries, where standards are relatively weaker." Judith Dean explains "Since more pollution intensive industries will have a larger incentive to move, a haven of such industries will build up in poor countries. A corollary is that developing countries may purposely undervalue environmental damage, in order to attract more foreign direct investment (FDI)".[14] As the explanation by Dean et al sets outs; pollution haven occurs when industries leave nations and switch production to another state that has a lower level of environmental regulation in place. This allows companies to escape the pollution abatement costs that they would have been subject to in their original nation. This keeps the costs down, the profits higher and the environment at risk. It is thought that nations that have lower environmental standards will actively seek out companies that face abatement costs and will entice them to their own state

[14] Judith M. Dean, Mary E. Lovely & Hua Wang, 'Foreign Direct Investment And Pollution Havens: Evaluating the Evidence from China', *Office Of Economics Working Paper U.S. International Trade Commission*, No. 2004-01-B, (January 2004), p. 1

with the lure of lax environmental laws and some states may even be willing to scrap some of the regulation that they already have in place to insure the foreign direct investment (FDI) and the boost to their national economy. Jobs will be created, riches will be made and the environment will be sacrificed.

Pollution havens are born from the desire to appear attractive to domestic and foreign businesses that rely on production techniques that are pollution intensive. Countries can become pitted against one another in what is described as a 'race to the bottom' to land the jobs and wealth that come with mass production of numerous goods. Races to the bottom are where states will actively deregulate standards in multiple sectors, in this case environmental, in order to entice the corporations to set up in their country. As the completion between states increases to land tenders so will the level to which they are willing to go to decrease their regulations. This would force those nations that have more stringent environmental regulations to lower their regulations to remain competitive thus driving global environmental standards down "…confronted with interstate economic competition, states have incentives to adopt excessively lax environmental standards in an effort to attract mobile capital"[15]. While Konisky was discussing national level races to the bottom the same idea can be applied to the international level. States have the financial incentive to deregulate and with developing nations having relatively lower environmental standards to start with (in comparison to developed states) any deregulation can cause a higher level of damage on the state's environmental health.

Financial improvement and the desire for wealth creation is not solely the ambition of the state. Cole et al argue that a pollution haven is not necessarily the creation of the state but is actually driven by the corruptibility of the state's leaders[16].

> "The environmental policy effects of foreign direct investment are found to be conditional on the government's degree of corruptibility. Foreign direct investment leads to a higher (lower) stringency of environmental policy when the degree of local government corruptibility is low (high)."[17]

[15] David M. Konisky, 'Regulatory Competition and Environmental Enforcement: Is There a Race to the Bottom?', *American Journal of Political Science*, 51 (4), (2007), p. 854
[16] Matthew A. Cole, Robert J. R. Elliott & Per G. Fredriksson, 'Endogenous Pollution Havens: Does FDI Influence Environmental Regulations?', *The Scandinavian Journal of Economics*, 108 (1), (2006), pp. 157-178
[17] Matthew A. Cole, Robert J. R. Elliott & Per G. Fredriksson, 'Endogenous Pollution Havens: Does FDI Influence Environmental Regulations?', *The Scandinavian Journal of Economics*, 108 (1), (2006), p. 174

This would suggest that pollution havens are not created from the need to drive economic growth within the state but to line the pockets of the state's corrupt leaders. Leaders risk the environmental safety and future of their nation for the short term, personal gratification of financial gain. FDI and the benefit that it brings to the corrupt politicians seduces the latter into changing the former's environmental policy. This does not mitigate the advantage that the country receives from the FDI but it does question the motivations of its acceptance. Neither does this fact diminish the effect that the subsequent deregulation has on the environment (if a haven is present). What it does is add an extra dimension to the following investigation and the data that needs to be examined.

Method

Research Question

The research question for my thesis is;

Did the BRICS achieve their economic growth through sustainable development?

Through design the question is rather narrow in scope though one that will give more specificity to the broader question of sustainable development and its impact on the growth patterns of developing states. Prima facie evidence would suggest that the majority of the world's nations are, regardless of developmental status, supportive of the need for more sustainable growth patterns and less stress placed upon environmental resources. As stated, over 178 nations signed Agenda 21, many of these have gone on to sign legally binding international treaties enforcing environmental standards upon economic development. If we are to believe that 25 years after the Brundtland report that the ensuing statements and goals from nations were more than bombastic rhetoric then there would be evidence that nations are actively following sustainable development practices in their economic performance. Environmental degradation and our overconsumption of the natural resources from the Earth has changed the world dramatically over the last 2 centuries since the introduction of the industrial revolution and mass production. If we do not change our consumption patterns it is safe to say that the potentially ruinous repercussions from the changing environmental conditions will be because of own hubris. It is the goal of my thesis to see if the BRICS have heeded the call of sustainable development.

Hypothesis

We have established the aim of my thesis is to investigate whether or not the BRICS nations have grown their economies through sustainable development. My hypothesis for this question is therefore;

> *H1: No, the BRICS achieved their economic growth by becoming pollution havens instead of growing through sustainable development.*

What I expect to conclude from this investigation is that in order to grow their economies, the BRICS (Brazil, Russia, India, China and South Africa) sacrificed their national environments through lowering their regulatory standards and/or turning a blind eye to high levels of pollution in return for vast amounts of FDI and production contracts. Thus turning their nations into pollution havens for foreign and domestic firms alike to take advantage of and further damage the environment.

For this hypothesis to be refuted therefore, we must find evidence that either the BRICS have indeed been able to achieve their growth through sustainable development. Or that their growth is explained due to neither sustainable development nor the presence of a pollution haven. If this is the case then we should be able to find the indication of the explanation during this investigation, to be tested in later research.

Variables

In this investigation the independent variable is the individual quality of the environments of the BRICS and the dependent variable is the national economy of the BRICS. Thus the changes in the environmental degradation and the environmental regulation of the state will decide the type of economic growth that takes place. If environmental degradation declines, regulations are strengthened and enforced then one could find that sustainable development was pursued. If, however, degradation increases and regulations are diluted or ignored then one can argue that the hypothesis was in fact correct.

The independent variable, environmental quality, will be measured by taking into account both statistical data such as greenhouse gas emissions levels and environmental regulations. In order to test whether a pollution haven has been created we must be able to show it both through a rise in the level energy used and in regulatory processes. If a pollution haven does exist then this excludes the possibility of the state developing sustainably. Unsustainable

development can be said to use greater levels of fossil fuels, which are finite in existence and non-renewable (its use now precludes its use in the future) and emit dangerous greenhouse gases. Therefore one could expect to see that pollution havens would use more fossil fuels and less renewable sources of energy and use more pollution intensive production methods. This would increase the amount of greenhouse gases being pumped into the atmosphere. The data for this will be focused around the annual carbon dioxide (CO2) emissions that humans generate, measured in kilotons. CO2 is the gas produced the most by our burning of fossil fuels and is considered the greenhouse gas that is generated the most by human production levels, in fact "The projected 2010 anthropogenic CO2 emission rate of 35 gigatons per year is 135 times greater than the 0.26-gigaton-per-year preferred estimate for volcanoes."[18] Statistical data highlighting the CO2 emission shall be taken from the World Bank Data set.

CO2 emissions are not the only area to investigate in degradation, there is also the land used for production and agriculture[19]. This can be found by looking at the levels of deforestation as it is common for forests to be torn down in order for new farm land. If forests are continually destroyed this can be seen as unsustainable land usage. As not only do trees help soak up the carbon dioxide emissions but also protects biodiversity that would be gone if the trees are felled. Land can also be exploited in terms of desertification, where through a combination of global warming and reckless agricultural processes, once fertile land can be turned into a barren wasteland which can no longer produce crops or feed livestock. If such actions occur then this is unsustainable development as well. Like CO2 emissions data for deforestation and desertification shall be taken from the World Bank, unless otherwise stated.

To identify the existence of a pollution haven requires looking at the environmental regulation of each individual country. This refers to both domestic laws that the respective governments have introduced and any international treaties the country may have signed that have an effect upon the state's environmental condition. Such facts shall be appropriated from various new sources, government documents and the scholarly journals to ensure a more well-rounded approach and limit the possibility of any potential bias from a source.

[18] Terrence M. Gerlach, 'Volcanic Versus Anthropogenic Carbon Dioxide', *Eos*, 92 (24), (2011), p. 203
[19] Walter Radermacher, 'Indicators, Green Accounting and Environment Statistics: Information Requirements for Sustainable Development', *International Statistical Review / Revue Internationale de Statistique*, 67 (3), (1999), pp. 339-354

The dependent variable, economic growth, will be measured by looking at the annual figure of the country's Gross Domestic Product. Gross Domestic Product includes the monetary value of all goods and services produced within the country, regardless of whether or not the producer is a foreign or domestic company which is beneficial as it includes all FDI. The GDP will be measured from 1992, the year that the Rio Earth Summit was held and Agenda 21 agreed in principle. The data will be taken (unless otherwise stated) from the World Bank and will be stated in constant 2000 US $, this will mitigate the effect of inflation over the two decades and allow greater ease in comparison.

Data will be collected from 1992 as this gives all us all the available data from the time of the 1992 Rio Earth Summit. While sustainable development had been proposed before in papers, notably the aforementioned Brundltand Report of 1987, it had not taken hold at the international level. Data prior to 1992 may, therefore, skew the results as it would dilute any findings that suggest sustainable development has occurred. Post Rio the idea had been accepted and supported by the majority of the World's governments and after that date they had the ability to begin to introduce it within their own economies in a purposeful manner. Going back to 1992 offers as large a data sample as applicable and thus will increase the validity of the results.

It is important to note that this investigation is not concerned with the level of economic growth. In the sense that it is not the aim to see which type of growth, sustainable or haven, generates the higher levels of economic return. What I wish to examine is the economic growth and why it occurred not how much growth was generated. As such, if negative economic growth were to be discovered instead of growth this would not instantly invalidate the investigation as long as we can discover the causation behind it, whether it was due to sustainable development, creation of a pollution haven or an unknown (at this time) cause.

Indicators

To simply assess the environmental quality and economic growth of the BRICS would not be enough to decide whether or not it was a pollution haven or sustainable development that caused the respective data. To have a valid answer we must delve into the data and find what causation is behind their relationship. To do this we must first produce clear definitions of both sustainable development and pollution haven. After this I can evaluate what the necessary indicators are for the two competing ideas.

As previously noted the Brundtland Report defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs"[20]. What we can say with this definition then is that for sustainable development to have been achieved then we must to be able to see that while resources have been used for the economic growth of the state in the present. These same resources have not been expended at such a rate that jeopardises the state's growth and ability to provide for its populace in the future. What this states is that the use of resources, non and renewable, to provide growth is perfectly acceptable up to a point and the threshold is when the usage becomes so excessive that it endangers future generations survival. We can take away from this definition the goal of sustainable development, which is to provide economic growth now but not at the expense of the future. This is still too vague, however, for the purposes of this thesis. It does not state how one can quantifiably say what constitutes sustainable development.

One explicit problem with being able to correctly define development as sustainable is that we cannot correctly model what growth patterns, the necessary resources and the needs of future generations will be. What we classify now as sustainable, therefore, could in fact turn out to be unsustainable growth in the future. Thus to create a baseline figure would be an imperfect science and potentially damaging for future generations. The average generation for OECD countries in 2009 was just under 28 years[21]. With sustainable development attempting to protect future generations we are looking to provide security for growth that is at least 50 years in the future. The difficulty here is the weight and importance of their growth that one attaches to future generations, not just the immediate generations that succeed us but also centuries into the future[22].

In addition to the problem of protecting the growth potential of future generations is how one frames the environment and whether it is there for human consumption; an anthropocentric guise or whether one believes in "biocentric [sic] egalitarianism, by which is meant inter-species equity that recognizes non-human or biotic rights"[23]. There are divergent views on

[20] "Report of the World Commission on Environment and Development: Our Common Future", Chapter 2, Paragraph 1, October 1987 taken from http://www.un-documents.net/wced-ocf.htm
[21] OECD - Social Policy Division - Directorate of Employment, Labour and Social Affairs, 'SF2.3: Mean age of mothers at first childbirth' taken from http://www.oecd.org/dataoecd/62/49/41919586.pdf
[22] Graciela Chichilnisky, 'What Is Sustainable Development?', *Land Economics*, 73 (4), Defining Sustainability (1997), pp. 467-491
[23] Colin C. Williams & Andrew C. Millington, 'The Diverse and Contested Meanings of Sustainable Development', *The Geographical Journal*, 170 (2), Environment and Development in the UK (2004), p. 102

what the relationship between humans and the environment is and what it should be but as Williams and Millington eloquently expressed in their review piece on sustainable development literature "…this is in reality a spectrum of thinking rather than an either/or dualism"[24]. Why is this important? If one believes that the environment is there for human consumption and that we are the apex of the world then sustainable development becomes centred more upon monetary gain and sustaining resources for future economic growth. If one leans more towards bio-centric egalitarianism than one could be said to be concern themselves more with the protection of the biodiversity of Earth and the natural environment, if this is the case, then economic growth is valued less than the rights of the environment.

After taking the above into consideration the definition of sustainable development to be implemented through the investigation is;

> *Sustainable development is development that generates, annually, a comparatively greater financial return and economic growth than the environmental degradation by-product that is lowered over time.*

This is a more anthropocentric framing as it deals mainly with the economic growth of states instead of environmental protectionism. It states that the development should generate economic growth but economic growth that outweighs the degradation that is created due to the production levels. For the growth to be sustainable it is not enough for the profit merely to outweigh degradation year upon year but also to see that this degradation diminishes as well. Environmental degradation refers to the damage that is done to the planet through the methods of production and can be easily assessed by investigating the greenhouse gas emissions that are produced. Greenhouse gases are produced by humans mostly through the burning of fossil fuels which is a finite and damaging resource. For the economic growth to be sustainable then the burning of fossil fuels and the greenhouse gas emissions they create has to be replaced over time by the renewable sources of energy and materials. The extreme definition of sustainable develpoment would be that all production, energy usage and resource consumption would come from renewable resources. This is quite the utopian ideal, at least for the moment, and an examination of any state would fail in this. Sustainable development is not an overnight success where one can suddenly transition an entire nation's production and energy use to renewable sources, it takes time. Therefore it is important to

[24] Colin C. Williams & Andrew C. Millington, 'The Diverse and Contested Meanings of Sustainable Development', *The Geographical Journal*, 170 (2), Environment and Development in the UK (2004), p. 100

accept this need for time within the definition and the parameters of what constitutes sustainable development. If a state had 80% of its energy consumption coming from fossil fuels, at first glance, this could be seen as a reluctance or refusal to switch to sustainable development methods. Though if fossil fuels had accounted for 100% of its energy than an annual 4% decrease in fossil fuel rates coupled with continued economic growth could signify that sustainable development had become the modus operandi of that state. The definition above does not have a quantifiable baseline that a nation must reach to be considered developing sustainable it does allow for a process to be created in which one can quantifiably assess the nature of a state's development.

A reduction in carbon based fossil fuels does not signify alone that sustainable development is being attempted. This could merely represent a general downfall in levels of production in total but a not an actual decrease in the percentage use of fossil fuels in the remaining production. Thus it is important that for sustainable development to be a reality to see a shift away from fossil fuel dependence and the use of renewable energy sources and materials.

Sustainability does not simply refer to the energy used however; it also refers to usage of land. A lowering of deforestation and actual replanting of new trees would suggest that sustainable development is taking place. Raw material usage that is found as an indicator in the German Environmental Economic Accounting[25] program is also an indicator of sustainable development. Not only the amount of raw materials used in the production of goods but also the efficiency at which they are used at. If raw materials are being over consumed and creating lots of waste from its use then it cannot be said that present development is protecting the growth and needs of future generations.

To properly define what a pollution haven is poses less of a challenge than the more conceptual sustainable development. For my thesis I have decided to use the definition of Eric Neumayer which is; "A country provides a pollution haven if it sets its environmental standards below the socially efficient level or fails to enforce its standards in order to attract foreign investment from countries with higher standards or countries that better enforce their standards"[26]. The results of a pollution haven can be seen in the high levels of degradation that accompany production. Production that is stimulated by the large levels of FDI attracted

[25] Karl Schoer, 'Sustainable Development Strategy and Environmental-Economic Accounting in Germany', Federal Statistical Office Germany Environmental-Economic Accounting (EEA), (2006)
[26] Eric Neumayer, 'Pollution Havens: An Analysis of Policy Options for Dealing With an Elusive Phenomenon', *Journal of Environment & Development*, 10 (2), (2001), p. 148

due to lax environmental regulation. Without the overly lax or unenforced environmental regulation business a pollution haven would not be formed and FDI that it brought into the state cannot be said to have been brought in solely due to the desire to avoid pollution ablation costs elsewhere. Socially efficient level means that "… for each different pollutant the standard is set such that the marginal social benefit of an increase in pollution is just equal to the marginal social cost of such an increase"[27]. This equates to the belief within the populace that the benefits of a pollution increase justify the problems associated with the pollution increase. A pollution haven, therefore, would see the social benefits given to the populace by the increased pollution overshadowed by the costs that are incurred.

Within the literature it is believed that if a pollution haven is to exist then it will be indicated by, among other variables;

"1. Differences in environmental standards affect the allocation of investment flows.
2. Developing countries' production and exports have become increasingly pollution intensive.
3. Pollution-intensive industries flee the high-standards countries."[28]

What this means for this investigation is that if we are to believe that a pollution haven has been created then we should see changes in environmental regulation, changes that relax to socially inefficient levels. This would tie in to Cole et al who argued that havens were more likely in highly corruptible governments. Corruptibility is a hard concept to tie down within individual leaders but through the work of the likes of freedom house and other think tanks we can gauge the overall level of corruptibility in the government. This corruptibly would also explain why leaders would be willing to risk the ire of the populace when the social costs were felt from the worsening environmental regulations. As this case is looking at 5 developing nations then what we should also see is the influx of companies from developed countries bringing their pollution-intensive production to take advantage of the lower standards. This can be found in the level of FDI that the state receives and whether there was any sudden growth. Coupled with high levels of pollution we must see an active influx of FDI coming into the country with the specific goal of taking advantage of poor environmental standards.

[27] Eric Neumayer, 'Pollution Havens: An Analysis of Policy Options for Dealing With an Elusive Phenomenon', *Journal of Environment & Development,* 10 (2), (2001), p. 148
[28] Eric Neumayer, 'Pollution Havens: An Analysis of Policy Options for Dealing With an Elusive Phenomenon', *Journal of Environment & Development,* 10 (2), (2001), p.149

Cases

Why did I decide to use the BRICS to investigate the role of sustainable development in economic growth for my thesis? The 5 countries represent are all on the path to becoming developed nations represent the future of the world's economy. China has become the world's 2nd largest economy less than a half a century after the disastrous and bloody Cultural Revolution. Combined the 5 nations comprise "About 42% of the world's population, and 30% of the world's territories, are in BRICS countries" and Professor Yue Fubin goes on to state "It is expected that by 2015, the GDP of BRICS will reach 22% of the global total"[29].

"China and India are the cost leaders among the high growth countries, with overall business costs 25.8 and 25.3 percent, respectively, below the United States"[30]. With Russia, Brazil and South Africa all growing quickly, consistently yet cheaper in terms of business costs to developed nations they are most-likely cases for pollution havens to arise within. They offer businesses the opportunity to lower their costs by transferring production to them from developed states. They also have large workforces, hungry for work and the political desire to continue their economic growth. Pollution havens are believed to take root in developing nations eager to gain financially from FDI by relaxing environmental regulation in order to entice said foreign direct investment, at the expense of the environment. If this is the case then we should expect to see that the rapid economic growth of the BRICS has come about due to lax environmental laws, creating a sanctuary for pollution intensive production within their borders.

What will follow is a qualitative analysis of the past 20 years of the economic growth of Brazil, Russia, India, China and South Africa to test whether their economic growth was due to the formation of pollution havens within their respective nations.

Brazil

What we find from Brazil's growth is that throughout the 19 year period there is, minus 2 years, a varying level but consistent growth pattern in the nation's GDP (Table 1) and the same can be said for FDI that Brazil received[31]. If a pollution haven is to exist then we would

[29] Yue Fubin , Viewpoint: China and the BRICs - golden years ahead, taken from http://www.bbc.co.uk/news/business-15911603

[30] KPMG, Competitive Alternatives: KPMG's Guide to International Business Location Costs 2012 Edition, (2012), p. 7

[31] Definition of the data set for Foreign direct investment, net inflows (BoP, current US$) is "Foreign direct investment are the net inflows of investment to acquire a lasting management interest (10 percent or more of

expect an increase in FDI as the opportunity to avoid pollution abatement costs is taken advantage of by either more foreign companies or particular businesses transferring more of its production into Brazil. Before we can decide if this is the case or not the first part of my hypothesis dictates that for a pollution haven to exist than the country must not be developing sustainably. Therefore it is imperative that the investigation does not get ahead of itself and look for a possible pollution haven before concluding that Brazil is practicing sustainable development.

For the growth to be sustainable it must provide a greater amount of financial gain than the environmental degradation it creates. The degradation must also diminish over time, otherwise even if economic growth continued to outperform the degradation you would still be consistently increasing the damage to the environment. To be able to judge this you must be able to look at the emissions levels of the nation, which is represented by CO2 and also whether there has been a switch from the burning of fossil fuels to alternative energies. This would represent part of sustainable development but for a more rounded analysis looking at environmental protection, including land usage, should be analysed. Deforestation and material usage signifies not only potential degradation from excessive consumption but also the lack of protection of the needs and growth of future generations.

Overall, GDP growth outperforms the growth of the CO2 emissions assisting said growth, though GDP growth does not always outperform emission levels. For instance, between 1995 and 1997 the percentage rise in carbon emissions is far greater than the GDP growth generated during this time. During this time Brazilian unemployment was climbing close to 10% annually[32] which could explain why GDP growth began to decline but does not explain the high rise in emissions seen over the same time.

Two incidents can explain this rise in emissions, first is the increase in coal, natural gas and oil consumption that took place at this time (oil consumption alone increased by over 100,000 barrels per day)[33]. This rise is reflected in the increase in the total fossil fuel energy consumption indicator. Secondly, in 1995 there was also a 95% rise in the level of deforestation, 29,059 square kilometres were chopped down compared to the 14,896 in

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voting stock) in an enterprise operating in an economy other than that of the investor…This series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors" taken from http://data.worldbank.org/indicator/BX.KLT.DINV.CD.WD

[32] Brazil Unemployment, taken from http://www.economywatch.com/unemployment/countries/brazil.html

[33] U.S. Energy Information Administration, International Energy Statistics, taken from http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm

1994[34]. "Between 1995 and 1998, the government granted land in the Amazon to roughly 150,000 families. Forty-eight percent of forest loss in 1995 was in areas under 125 acres (50 hectares) in size, suggesting that both loggers and peasants are significant contributors to deforestation"[35]. With a rise in unemployment people were returning to agricultural work and the decision by the Brazilian government to give land to people in the Amazon saw these lands have its trees uprooted in order to make space for farmland and cattle grazing grounds. The Brazilian beef industry is the largest meat exporter in the world and "Of the 766,000 or more square kilometres of Amazonian jungle that has been lost over the past 40 years, 62% has been converted to pastureland for cattle"[36].

Rises in fossil fuel consumption, which can be seen in Table 1 and mass deforestation to be used for the grazing of cattle that will be sold for their meat, does not appear to be the work of sustainable development, far from it. The use of alternative energies has not significantly risen since 1992, staying around 14% of total energy usage and does not show a significant decrease either, only in 2010 does the fossil fuel consumption decrease below its 1992 percentage and only then by 1%. Carbon dioxide emissions have increased, so did deforestation and so did growth, yet Brazilian growth cannot be said to have been because of sustainable development. Does this mean, however, that it was because of a pollution haven?

For this to be the case then what we should expect to see is threefold; first, a relaxing and/or a wilful ignorance to environmental regulations in Brazil, second, a spike in FDI from companies willing to take advantage of these regulations, leading to the third consequence which is increased production in pollution intensive industries. If these three actions occur then one can say that a pollution haven was present within Brazil.

In 1995 FDI was just shy of $5 billion (in current US $) yet by 1998 this by over $27 billion. This is a meteoric rise in the amount of FDI pumped into Brazil and must be accounted for. I believe that the change in the levels of FDI flowing into Brazil between 1995 and 1998 can be linked to constitutional amendments made in 1995 and the Petroleum Investment Law signed by President Fernando Henrique Cardoso in 1997.

[34] Calculating Deforestation Figures for the Amazon, taken from http://rainforests.mongabay.com/amazon/deforestation_calculations.html
[35] Amazon Destruction: Why is the rainforest being destroyed in Brazil?, taken from http://rainforests.mongabay.com/amazon/amazon_destruction.html
[36] JBS Scorecard: How the biggest meat company on the planet is still slaughtering the Amazon, Greenpeace International, 2nd Edition (2012), p. 3

In 1995 an amendment was made to article 177 of the Brazilian Constitution which stated that:

"**Article 177.** The following are the monopoly of the Union:

I. prospecting and exploitation of deposits of petroleum and natural gas and of other fluid hydrocarbons;

II. refining of domestic or foreign petroleum;

III. import and export of the products and basic by-products resulting from the activities set forth in the preceding items:

IV. ocean transportation of crude petroleum of domestic origin or of basic petroleum by-products produced in the country, as well as pipeline transportation of crude petroleum, its by-products and natural gas of any origin;

V. prospecting, mining, enrichment, reprocessing, industrialization and trading of nuclear mineral ores and minerals and their by-products.

Paragraph I - The Union may contract with state-owned or with private enterprises for the execution of the achvities [sic] *provided for in items I through IV of this article, with due regard for the conditions set forth by law*"[37]

Items I through V state that the fossil fuels and minerals of Brazil were property of the state. The amendment made to this in 1995 was paragraph 1 that allowed for private enterprises whereas previously sole propriety had been given to state owned companies. The state owned company Petrobras had held a monopoly over the hydrocarbon based fuels market within Brazil since its creation in 1953. In 1997 the Petroleum Investment Law stated in article 64:

"PETROBRAS and its subsidiaries are hereby authorized to form consortia with national or foreign enterprises, either as leader or not, aiming at the expansion of its activities, the gathering of technologies, and the expansion of investments applied to the petroleum industry."[38]

[37] Brazilian Constitution, Article 177 Items I –V and Paragraph 1, (1995), taken from http://web.mit.edu/12.000/www/m2006/teams/willr3/const.htm

[38] 'The Regulation Of The Petroleum Industry In Brazil, Law No. 9478 of August 6, 1997', taken from http://www.anp.gov.br/brasil-rounds/round1/Docs/LDOC01_en.pdf

These laws opened the doors for foreign investment into the energy sector of Brazil, a previously untouchable sector for anybody except for the state run Petrobras and between 1999 and 2008 there was a 69% increase in crude oil production in Brazil[39]. While the increase is not solely down to this FDI the laws opened up vast investment opportunities, this money certainly went to increasing production levels and the opening of new markets. The limitation of these laws is that foreign companies cannot hold full ownership of any energy deals and must work with Petrobras.

Do the regulations provide the requirements for a pollution haven? I do not think so, the FDI arrived in Brazil at this time to enter a previously closed market and take advantage of a new source of fossil fuels. These laws may have relaxed the business regulations on who could extract natural resources but they did not relax environmental regulations. It was the privatising of the market that enticed the investment, not the environmental standards. The other sudden increase in FDI came in the last couple of years during the economic crash. The FDI rise then has been linked to the upward mobility, higher income levels and market size of the Brazilian population with 190 million inhabitants;

> "…the main attraction is the Brazilian consumer. Consumers have an increasing capacity to purchase imported goods coupled with an unprecedented access to credit. For one, buying power is buoyed by an appreciating currency, which already has reached R$1.63 to the U.S. dollar in 2008. Additionally, interest rates remain at a historic low — the benchmark SELIC lending rate currently sits at 12.25 percent — while auto financing, home mortgages, credit and debit cards are penetrating previously "unbanked" sectors of society."

FDI is flowing in not to take advantage of lax environmental regulations but to take advantage of new consumers. The service sector is Brazil's largest business sector, exceeding agriculture and resource extraction[40].

In fact Brazil ranks 62nd in the Environmental Performance Index[41], just behind America. Brazil's FDI is based on entering a new market to gain greater sales and worldwide market share, not to take advantage of explicitly weak environmental regulations. Both spikes in FDI

[39] P. E. J. Pitfield, T. J. Brown & N. E. Idoine, 'Mineral Information and Statistics for the BRIC countries 1999–2008', *British Geological Survey*, (2010)
[40] Rob Wilmink & Raymond Timmer, 'Investing in Brazil', KPMG (2011)
[41] J. Emerson, D. C. Esty, M.A. Levy, C.H. Kim, V. Mara, A. de Sherbinin, & T. Srebotnjak, *2010 Environmental Performance Index*, Yale Center for Environmental Law and Policy (2010)

show this and if a pollution haven were to be created one would expect to a see a reaction in terms of an increase in FDI in the succeeding years but for Brazil this is not the case. One regulation that has not yet entered into law is the Forrest Code which would exempt any illegal deforestation prior to 2008 from legal prosecution and "could lead to the loss of as much as 190 million acres of forest"[42]. If this is signed into law by current President Dilma Rousseff and an influx in agricultural production, like beef exports, then it would have to be asked whether a pollution haven had been created in the agricultural sector by weakening the protection of the Amazon rainforest in order to assist Brazilian agriculture. This, however, has not yet come to pass and the current evidence on offer does support that Brazil isn't developing sustainable but not because of a pollution haven.

[42] Simon Romero, 'Brazil's Leader Faces Defining Decision on Bill Relaxing Protection of Forests', *The New York Times*, May 16th 2012

Table 1, Brazil 1992 - 2010[43]

Year	GDP (constant 2000 US$)	GDP growth (annual %)	CO2 emissions (kt)	CO2 emissions growth (annual %)[44]	Foreign direct investment, net inflows (BoP, current US$)[45]	Foreign direct investment, net inflows (% of GDP)	Alternative and nuclear energy (% of total energy use)	Fossil fuel energy consumption (% of total)	Agricultural land (% of land area)	Arable land (% of land area)	Terrestrial protected areas (% of total land area)
1992	506980820288.78	-0.47	220705.73		2061000000	0.53	13.62	52.67	29.16	6.12	9.55
1993	530632240834.10	4.67	230738.64	4.55	1292000000	0.29	13.74	53.26	29.49	6.18	9.66
1994	558938074182.60	5.33	242154.01	4.95	3072000000	0.56	13.41	53.26	29.72	6.24	10.70
1995	583625429865.93	4.42	275564.05	13.80	4859000000	0.63	13.96	54.60	30.55	6.86	11.12
1996	596173376608.04	2.15	301244.05	9.32	11200000000	1.33	13.84	56.26	30.62	6.84	11.86
1997	616293863302.67	3.37	321199.86	6.62	19650000000	2.26	13.92	56.67	30.68	6.83	12.91
1998	616527313474.62	0.04	314012.54	-2.24	31913000000	3.78	14.19	57.32	30.75	6.82	14.22
1999	618073920863.76	0.25	322068.94	2.57	28576000000	4.87	14.06	57.27	30.82	6.82	15.05
2000	644701831101.39	4.31	330125.34	2.50	32779239700	5.08	14.70	57.98	30.90	6.82	16.92
2001	653149809198.70	1.31	339894.23	2.96	22457353372	4.06	14.09	58.69	31.14	6.97	17.81
2002	670512665737.21	2.66	335185.80	-1.39	16590204193	3.29	14.44	57.13	31.16	6.99	20.44
2003	678217761978.68	1.15	324753.19	-3.11	10143524671	1.84	15.00	54.54	31.18	7.07	21.15
2004	716959543488.88	5.71	341166.68	5.05	18165693855	2.74	14.64	54.56	31.27	7.15	22.94
2005	739613124999.31	3.16	349967.48	2.58	15066291735	1.71	14.71	54.22	31.27	7.21	25.01
2006	768867489436.04	3.96	352541.71	0.74	18782215423	1.72	15.12	53.39	31.27	7.21	26.27

[43] Data from the World Bank's World Development Indicators (WDI) and Global Development Finance (GDF) Databank, taken from http://databank.worldbank.org/ddp/home.do?Step=1&id=4

[44] This is not taken from the World Bank as no such indicator could be found. I created it myself by calculating the percentage annual growth of the indicator CO2 emissions (kt). As one can imagine, any figure with a negative sign in front of it represents. This will be the same for the remaining BRICS.

[45] The data in this column is shown in current US$, this is in contrast to GDP that is in constant 2000 US$. The World Bank data set did not provide such an option for this information. This will be the same for the other BRICS and should not skew the results. Due to inflation direct financial comparison between GDP and FDI may suffer but the main objective is to discover if a pollution haven exists and not the figure out how much FDI must be increased by to produce an X% increase in GDP.

2007	815703390473.87	6.09	368368.49	4.49	34584901025	2.53	15.11	52.66	31.27	7.21	26.28
2008	857827247452.68	5.16	393219.74	6.75	45058156304	2.73	14.36	52.56	31.29	7.23	26.28
2009	852297396504.70	-0.64			25948579800	1.63	15.62	51.30	31.27	7.23	26.28
2010	916131427896.29	7.49			48506489215	2.32					26.28

Russia

The first thing that must be mentioned when observing the data for Russia is the massive loss in GDP that occurred between 1992 and 1996 (Table 2). This can be accounted for by the dissolution of the Soviet Union and the introduction of 'shock therapy' economic policy that aimed to have rapid privatisation of Russia's industrial complex, trade liberalisation and tax reform to name but a few, in as fast a time scale as possible. The belief being that a rapid transition would lessen the long term damage of the economic upheaval. "To summarize, shock therapy is nothing less than a revolutionary strategy for the complete reconstruction of the economic arrangements of a country" argues Peter Murrell "With the goal treated as unattainable unless revolutionary changes are implemented immediately, existing arrangements only require attention insofar as they present roadblocks"[46].

As a result of the collapse of the Soviet Union and the failed implementation of shock therapy economics, Russia faced devastating losses with only one year of GDP growth between 1992 and 1998. This loss in GDP came about through the loss of the market that it once had for its state produced goods and the lack of any private business infrastructure to replace it with once sectors were forcibly privatised. Hyperinflation set in and reached a high of 2333% in December 1992[47]. The Russian economy was haemorrhaging but from an environmental perspective it caused some benefit. With the hyperinflation and mass unemployment from the sudden lass of the majority of state jobs, people could not afford to buy products to stimulate the economy. This meant that production and services fell and thus so did the amount of CO2 emissions being produced. CO2 emissions continued to drop between 1992 and 1998 at an equivalent rate to the decrease in GDP, in 1994 when the GDP dropped by 12.57% CO2 emissions fell by 13.65%. Even in 1997 when the GDP grew by 1.4% CO2 emissions shrank by 5.51%.

This does not mean that throughout this painful period, Russia had included switching to sustainable development during their shock therapy. Sustainable development importantly requires that while the environment is protected from damaging practices, economic growth and prosperity is not sacrificed. Otherwise it could not be defined as development. A continued decrease in environmental degradation would only signify sustainable development if it is coupled with economic growth. Individual years suffering from economic decline can

[46] Peter Murrell, 'What is Shock Therapy? What Did it Do in Poland and Russia?', *Post-Soviet Affairs*, 9 (2), (1993), p. 115
[47] http://www.tradingeconomics.com/russia/inflation-cpi

Table 2, Russia 1992 – 2010[48]

Year	GDP (constant 2000 US$)	GDP growth (annual %)	CO2 emissions (kt)	CO2 emissions growth (annual %)	Foreign direct investment, net inflows (BoP, current US$)	Foreign direct investment, net inflows (% of GDP)	Alternative and nuclear energy (% of total energy use)	Fossil fuel energy consumption (% of total)	Agricultural land (% of land area)	Arable land (% of land area)	Terrestrial protected areas (% of total land area)
1992	313172304874.57	-14.53	2220720.53		1161000000	0.25	5.83	92.57	13.52	8.05	5.35
1993	286024837286.71	-8.67	2030029.20	-8.59	1211000000	0.28	6.17	92.40	13.35	7.91	5.99
1994	250072213201.15	-12.57	1752998.35	-13.65	690000000	0.17	6.23	92.57	13.29	7.84	6.57
1995	239710400009.99	-4.14	1692364.50	-3.46	2065000000	0.52	6.50	92.30	13.21	7.78	7.78
1996	231080825609.63	-3.60	1668958.04	-1.38	2579000000	0.66	6.66	92.32	13.20	7.69	8.64
1997	234315957168.17	1.40	1577033.69	-5.51	4864643273	1.20	6.99	92.07	13.31	7.78	8.76
1998	221897211438.25	-5.30	1511269.71	-4.17	2761260000	1.02	7.05	92.12	13.26	7.70	8.92
1999	236098632970.30	6.40	1534250.80	1.52	3309430000	1.69	7.54	91.31	13.23	7.63	8.95
2000	259708496267.33	10.00	1553451.21	1.25	2714230000	1.05	7.84	91.12	13.26	7.59	8.96
2001	272932811944.54	5.09	1544404.72	-0.58	2748285600	0.90	8.16	90.89	13.24	7.56	8.98
2002	285879843583.36	4.74	1537195.40	-0.47	3461131800	1.00	8.24	90.75	13.23	7.54	9.07
2003	306737220531.81	7.30	1584998.41	3.11	7958120200	1.85	8.25	90.91	13.20	7.48	9.07
2004	328748527632.26	7.18	1602963.04	1.13	15444370800	2.61	8.27	90.69	13.18	7.46	9.07
2005	349710148602.65	6.38	1615683.87	0.79	12885807500	1.69	8.36	90.69	13.17	7.43	9.07
2006	378223527671.34	8.15	1669603.44	3.34	29701427100	3.00	8.41	90.62	13.16	7.42	9.07
2007	410505209127.69	8.54	1667575.58	-0.12	55073197800	4.24	8.58	90.55	13.16	7.42	9.07
2008	432048331749.88	5.25	1708653.32	2.46	75002416000	4.52	8.34	90.95	13.16	7.43	9.07
2009	398287677636.72	-7.81			36499625000	2.99	9.02	90.16	13.16	7.43	9.07
2010	414355712287.47	4.03			43287698500	2.93					9.07

[48] Data from the World Bank's World Development Indicators (WDI) and Global Development Finance (GDF) Databank, taken from http://databank.worldbank.org/ddp/home.do?Step=1&id=4

still be considered part of sustainable development if one can prove that the loss came from the sunk costs of transferring production to more environmentally safe techniques. Continued financial decline, regardless of whether there is a transfer to sustainable energy practices, cannot be seen as sustainable development as it does not meet the needs of the present.

When Russia's decline ends at the turn of the 21st Century, the growth returns at a rapid rate and far outweighs the increase in CO2 emissions. The years 2001, 2002 and 2008 all produced high rates of growth and show a decrease in emissions while the rest of the decade shows the increase in GDP outperforming the increase in emissions. Throughout the dataset alternative and nuclear energy usage increases and there is a small but consistent decrease in percentage of fossil fuel used. While it is a small decrease the consistency of it is notable, especially when one considers the abundance of fossil fuels the Russian environment provides and the level of trade Russia has in the energy market.

> "Russia has the world's largest natural gas reserves, eighth largest oil reserves and second largest coal reserves and is considered to be an energy superpower. It is the world's largest natural gas producer and exporter, and the second largest oil producer and exporter after Saudi Arabia. Natural gas, oil, metals and timber account for over 80 per cent of Russian exports and contribute more than 60 per cent to its GDP."[49]

Russia's economy is based around the production, internal use and exportation of natural resources. Its GDP is dependent on the sale of these materials abroad "In 2009 Russia produced an estimated 9.9 million bbl/d of oil, and consumed roughly 2.9 million bbl/d. Russia exported around 7 million bbl/d in 2009 including roughly 4.0 million bbl/d of crude oil and the remainder in products"[50]. 81% of these sales were to European nations, nations that are themselves suffering from an economic crisis. With this in mind it was stated that if the price of oil was to fall below $90 per barrel then government spending would have to be cut[51].

Russia's growth is undeniably linked to the continued sale of its raw materials to fellow nations only in part due to the high prices that these materials command in the world today.

[49] P. E. J. Pitfield, T. J. Brown & N. E. Idoine, 'Mineral Information and Statistics for the BRIC countries 1999–2008', *British Geological Survey*, (2010), p.26

[50] Russia Country Analysis Brief, U.S Energy Information Administration, (2010), taken from http://www.eia.gov/countries/cab.cfm?fips=RS

[51] 'Russia to Cut Spending, if Oil Falls Below $90 – Shuvalov', *RIA Novosti*, June 19th 2012

"Russia is eager to regain its lost post-cold war global image and enhance its leverage in reaching a strategic geo-regional balance of political-economic power based on its mineral resources"[52] argues Anatoly Zhuplev. "Russia's clout" Zhuplev continues "as the geo-regional energy supplier, as the demand for oil and gas increases, makes countries in Europe and elsewhere highly dependent on Russia for reliable supplies, generating particularly strong momentum for internationalization on Russian terms"[53]. What Zhuplev does not account for though is that Russia is highly dependent on foreign countries continued purchase of its raw materials for its continued rapid growth. If this demand were to curtail for whatever reason (a cheaper alternative or switch to greener energies perhaps) or the price of the raw materials was to drop then the Russian economy would falter.

Such an event occurred in 2009 when dropping oil prices coupled with the economic crash affecting nations around the world caused GDP negative growth of 7.81%. Growth dependent on the continued sale of raw materials, materials that face volatile market prices cannot be considered sustainable. If prices were to drop to similar levels found at the beginning of the century, around $30[54] for a barrel of oil, then Russia would be forced to sell far more to achieve the same GDP, exhausting reserves quicker, or accept a decrease in GDP. In addition to this is the fact that the growth is dependent on the future sale of finite fossil fuels and other raw materials, when the international consensus is that nations should move away from using fossil fuels (even if no consensus can be reached on how to achieve this).

In 1996 there came a Presidential Decree from Boris Yeltsin declaring that Russia was going to adopt sustainable development practices

> "…it is necessary and possible to implement in the Russian Federation, a gradual transition to sustainable development, providing a balanced solution of socio-economic problems and problems of preservation of a favorable environment and natural resources potential to meet the needs of present and future generations."[55]

[52] Anatoly Zhuplev, 'Economic Internationalization of Russia: Roots, Trends, and Scenarios', *International Political Science Review / Revue internationale de science politique*, 29 (1), (2008), pp. 113 - 114

[53] Anatoly Zhuplev, 'Economic Internationalization of Russia: Roots, Trends, and Scenarios', *International Political Science Review / Revue internationale de science politique*, 29 (1), (2008), p. 114

[54] Oil prices since 1998, *The Guardian*, Monday 28 February 2011, taken from http://www.guardian.co.uk/business/interactive/2008/sep/18/oilprice

[55] Boris Yeltsin, Presidential Decree on the Concept of Russian Federation's transition to sustainable development, 440, (April 1st, 1996)

Though such a strategy may have been called for it never got going and failed to "extend beyond rhetoric"[56], while vast amounts of raw materials were extracted and then used or sold to the highest bidder.

Russia's GDP is dependent on raw materials sales and is not sustainable but does this equate to finding a state where environmental regulation is low and a pollution haven in place? The first notable environmental regulation that Russia has is the Kyoto Treaty which it signed and ratified, forcing it to emission standards. The standards for Russia however are relatively easy as they have to stay under their 1990 ghg emissions, a level which they have not reached since, mainly due to the financial crash that occurred with the collapse of the Soviet Union. Russia has the room to increase emissions and yet remain true to the Kyoto Protocol. Even so Russia has backed out of this commitment, along with Canada, complaining that the treaty did not cover China and the USA, the world's largest polluters[57].

Domestically, environmental laws have been relaxed as well. In 2001, article 50 of the Law on Environmental Protection was amended to include;

> "Import to the Russian Federation form [sic] foreign states irradiated thermo-generating components of nuclear reactors for temporary technological storage and/or for their processing is authorized after state environmental audit of the respective projects envisaged by the Russian legislation. The modalities of import of the aforesaid commodities must be established by the Russian government taking into consideration the main principles of ensuring non-proliferation of nuclear arms, environmental protection and economic interests of the Russian federation, taking into account the priority of restitution after processing of radioactive waste to the country of origin."[58]

This amendment made it legal for nuclear waste material from foreign countries to be shipped over to Russia to be stored and processed there for financial gain bringing in a projected $20 billion from importing approximately 20000 tonnes of nuclear waste[59].

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[56] Jonathan D. Oldfield, 'Russian Environmentalism', *European Environment*, 12, (2002), p. 126

[57] 'Russia supports Canada's withdrawal from Kyoto protocol', *The Guardian* , Friday 16th December 2011, taken from http://www.guardian.co.uk/environment/2011/dec/16/russia-canada-kyoto-protocol

[58] Law on Environmental Protection, Article 50, Paragraph 4, (2001)

[59] 'Import of spent nuclear fuel to Russia' (2002) taken from http://www.bellona.org/english_import_area/international/russia/nuke_industry/waste_imports/22414

As Arthur Mol points out it is not just environmental regulations that are weakened in Russia during this time but also the staff who attempt to enforce the regulations.

> "…between 1991 and 1998 the number of environmental staff working for the central administration dropped by almost 80% (from 1500 to 330). The head of the Committee on Environmental Protection was no longer a staff member of the Russian government. And the 25 Federal Target Programmes—approved in 1996—received only 5% of the finances required and budgeted for their implementation."[60]

Arthur Mol's discovery that massive numbers of layoffs and financial cuts in the state's environmental agencies coupled with the amendment to article 50 shows the relaxing of regulation and of the enforcement of said regulations that is expected to be seen in a pollution haven. The amendment also contributes to a growth in investment from foreign sources that are taking advantage of the less stringent regulations to introduce pollution intensive production into the country.

Russia gave false hope when it claimed an adoption of sustainable development when in fact it was a poor mask to the actual pollution haven that was being created. Environmental laws and those hired to create and enforce them were disbanded to allow for greater consumption of the vast raw materials that Russia has. Mol eloquently explains what Russia sees when it looks at the resources available and thus succinctly explains why a pollution haven was set up to generate as much capital from the resources as possible "…the environment and abundant natural resources are primarily a source of economic exploitation and economic development. Stringent and innovative environmental policy and reform may only complicate such economic development"[61]. Russia created a pollution haven.

[60] Arthur P.J. Mol, 'Environmental Deinstitutionalization in Russia', *Journal of Environmental Policy & Planning*, 11 (3), (2009), p. 230

[61] Arthur P.J. Mol, 'Environmental Deinstitutionalization in Russia', Journal of Environmental Policy & Planning, 11 (3), (2009), p. 233

India

C Raja Mohan's opinion on the growth and national strategy of India's being akin to a porcupine, slow and prickly[62], changed once the financial crisis of the early 1990s had been resolved by, in combination of other factors; the devaluation of the Rupee and allowing both a market based exchange rate and liberalising the reforms pertaining to Foreign Investment[63]. In 1992 Financial Institutional Investors (hedge funds and insurance companies are seen as Financial Institutional Investors) were allowed to invest in the primary and secondary markets within India, thus opening a vast new market to foreign investment. This resulted in a boom of FDI net inflow into India in the following years; rising almost $2 billion (current US $) within 4 years. The liberalisation of the Indian market saw a dramatic rise in both FDI and GDP growth and by 2004 India "…ranked 20th among world exporters, and 15th among world importers of merchandise; in services, it was the eighth largest exporter and the seventh largest importer"[64].

Growth rose at a dramatic and consistent rate as well, with an annual growth that only dropped below 4% once (in 2002 growth was 3.77%) between 1992 and 2010 (Table 3). This was accompanied by a consistent increase in carbon emissions which rose at a rate lower than the growth in GDP in all but 3 years (1996 – 8.93%; 1997 – 4.16%; 2008 – 8.08%). Growth that consistently outperforms the emissions it creates is one necessary requirement to prove that the growth was a product of sustainable development but it is not sufficient.

With continued growth we should see a diminishing return on the growth of carbon emissions and fossil fuel usage. As mentioned before, to expect a sudden and massive switch to alternative energy is not a realistic process. Shock therapy did not work when transferring economic models and it would not work in changing energy patterns. There would be massive energy shortages in both industry and domestic energy usage, which would result in GDP loss and a decrease in the living standards of the populace. The infrastructure is not in place to transfer to alternative energies in a short time period. It is therefore wiser to attempt a slow transition where the infrastructure for energy production can be built and implemented at a speed that does not disrupt the needs of the present. For sustainable development to be found, therefore, there should be evidence of transferring from fossil fuel usage and an

[62] Gleaned from Amrita Narlikar, 'All That Glitters Is Not Gold: India's Rise to Power', *Third World Quarterly*, 28 (5), (2007), pp. 983-996
[63] Arunabha Ghosh, 'India's Pathway Through Financial Crisis', *GEG Working Paper*, 2004/06, (2004)
[64] Amrita Narlikar, 'All That Glitters Is Not Gold: India's Rise to Power', Third World Quarterly, 28 (5), (2007), p. 984

Table 3, India 1992 - 2010[65]

Year	GDP (constant 2000 US$)	GDP growth (annual %)	CO2 emissions (kt)	CO2 emissions growth (annual %)	Foreign direct investment, net inflows (BoP, current US$)	Foreign direct investment, net inflows (% of GDP)	Alternative and nuclear energy (% of total energy use)	Fossil fuel energy consumption (% of total)	Agricultural land (% of land area)	Arable land (% of land area)	Terrestrial protected areas (% of total land area)
1992	288353259333.11	5.48	783634.23		276512439	0.11	2.27	57.67	60.86	54.48	4.88
1993	302100866388.36	4.77	814297.69	3.91	550370025	0.20	2.14	58.48	60.89	54.50	4.89
1994	322203110259.01	6.65	864931.62	6.22	973271469	0.30	2.37	59.52	60.89	54.48	4.89
1995	346591482106.51	7.57	920046.63	6.37	2143628110	0.60	2.18	61.35	60.80	54.40	4.93
1996	372784133902.80	7.56	1002224.10	8.93	2426057022	0.62	2.12	62.22	60.84	54.32	4.94
1997	387898660909.21	4.05	1043939.90	4.16	3577330042	0.87	2.22	63.12	60.83	54.32	4.99
1998	411923321463.34	6.19	1071911.77	2.68	2634651658	0.63	2.46	63.36	60.89	54.33	5.01
1999	442353379785.96	7.39	1144390.03	6.76	2168591054	0.48	2.36	64.89	60.86	54.15	5.02
2000	460182031503.10	4.03	1186663.20	3.69	3584217307	0.78	2.40	65.01	61.41	54.73	5.02
2001	484189242979.59	5.22	1203843.10	1.45	5471947158	1.15	2.51	64.99	60.67	53.91	5.03
2002	502427834715.24	3.77	1226791.18	1.91	5626039508	1.11	2.27	65.75	60.55	53.79	5.03
2003	544485550467.26	8.37	1281913.53	4.49	4322747673	0.72	2.34	66.08	60.64	53.77	5.03
2004	589559010700.39	8.28	1346595.74	5.05	5771297153	0.80	2.35	67.49	60.57	53.63	5.03
2005	644499568182.66	9.32	1411127.61	4.79	7606425242	0.91	2.59	67.99	60.49	53.55	5.03
2006	704256486829.92	9.27	1504364.75	6.61	20335947448	2.14	2.75	68.90	60.53	53.38	5.03
2007	773393372039.48	9.82	1612383.57	7.18	25482651962	2.05	2.68	70.14	60.44	53.18	5.03
2008	811540036224.84	4.93	1742697.75	8.08	43406277076	3.57	2.43	71.03	60.44	53.15	5.03
2009	885430184576.82	9.10			35595861689	2.58	2.35	73.05	60.53	53.12	5.03
2010	963404740694.30	8.81			24159180720	1.40					5.03

[65] Data from the World Bank's World Development Indicators (WDI) and Global Development Finance (GDF) Databank, taken from http://databank.worldbank.org/ddp/home.do?Step=1&id=4

economy that is built around its use and exportation. Russia, in fact showed a decrease in fossil fuel consumption (Table 2) but its exportation had increased and their GDP was heavily reliant on the sale of natural resources.

When we look at the figures for India's fuel consumption we find a consistently low energy consumption coming from alternative and nuclear fuels, around 2% each year. Yet when one looks at the level of fossil fuel consumption it is a different story with a steady rise in the percentage of energy consumption that is produced with fossil fuels. In 1992 the level was 57.67% but by 2010 almost three quarters of energy use came from fossil fuels, 73.05%.

A lot of this rise can be found from an increase in the amount of coal produced and the amount consumed. Coal production in India rose over 250000 thousand short tons between 2000 and 2010. Production did not match consumption, however, as in the same time scale consumption increased by just less than 320000 thousand short tons to 721,986 (production in 2010 totalled 622,818)[66].

Continuous rises in fossil fuel usage coupled with no rise at all in the use of alternative energy shows that the growth India has produced over the last two decades has not been because of sustainable development. Coal in particular is the major fuel provider for India and already there are question about the longevity of India's reserves and how long such consumption can continue[67]. The over exploitation of coal may produce economic growth now but it harms the environment and the quality of life that future generations may have.

The proof that a substantial pollution haven has been created within India is lacking. There is of course mass levels of degradation taking place within India but when one investigates the level of environmental regulation one does not find it lacking.

> "…the air regulations have led to improvements in air pollution, while the water pollution regulations have been ineffective. In the preferred econometric specification which controls for city fixed effects, year fixed effects and pre-existing trends among adopting cities, we find that the Supreme Court-mandated Action Plans are associated with declines in NO2 concentrations; however, we do not observe an effect of the policy on SO2 or PM. Additionally, the requirement that new automobiles have catalytic converters is associated with economically

[66] Data taken from http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm
[67] 'India's coal reserves to run out in 45 years', December 2009, taken from http://www.domain-b.com/industry/Mining/20091226_india_coal_oneView.html

> large reductions in PM, SO2, and NO2 of 19 percent, 69 percent, and 15 percent, respectively, five years after its implementation. In contrast, the National River Conservation Plan, which is the cornerstone of water policy in India, had no impact on the three measures of water quality we consider."[68]

Environmental regulations that are implemented are shown to have a positive effect upon the environment and yet degradation continues to rise seemingly unabated. This suggests that the implementation of the majority of the environmental laws is not strong enough to have a discernible impact. This is a view shared by the Finnish consultancy group, Finpro, who deal with analysing international markets to improve Finnish companies' greater success in said markets.

> "Despite the efforts the environmental degradation continues. The environmental legislation is rather well in place in India. The problem lies with implementation. Often Supreme Court's intervention is required for enforcing the rules. There are several reasons for that. First, there is not too much faith in institutions and the corruption is common. Second, the industries often have no means for fulfilling the requirements. There is a lack of know-how, equipment and financial resources."[69]

Cole et al argued that high levels of corruption would lead to weaker environmental protection when coupled with FDI. On the Transparency International Corruption Perception Index for 2011 India was ranked 95th out 182 with a score of 3.1 out of 10 (0 = highly corrupt, 10 = very clean)[70]. This all would suggest that a pollution haven is in place within India. Except for the fact that environmental regulation is not in fact inefficiently low but is at a high standard, India has set up a Nation Green Tribunal that has the same power as a civil court would have so it can provide "effective and expeditious disposal of cases relating to environmental protection"[71]. Implementation is poor, another sign of potential for a pollution haven yet there is very little evidence of foreign firms arriving in India because of the fact that they can use pollution intensive production methods. What keeps the multinational corporations from using India as a pollution haven? A survey on environmental management

[68] Michael Greenstone & Rema Hanna, 'Environmental Regulations, Air and Water Pollution, and Infant Mortality in India', *Faculty Research Working Paper Series Harvard Kennedy School*, RWP11-034, (2011), p. 4
[69] 'Environmental Legislation in India', Finpro, (2008), p. 34
[70] http://cpi.transparency.org/cpi2011/results/#CountryResults
[71] 'National Green Tribunal', Ministry of Environment and Forests, (2010), taken from http://moef.nic.in/modules/recent-initiatives/NGT/

by multinational corporations working in India found out that; "The main motivating factor for improved environmental performance in India was attributed to pressure from the headquarters (50% of surveyed firms), followed by 'current or future regulatory pressure' (23%), local management leadership (12%), and NGO pressure (6%)"[72]. India does not suffer from having a pollution haven though its weak implementation and high levels of corruption do mean that it is in danger of becoming one if multinational corporations felt inclined.

China

China has grown to become the 2nd largest economy in the world, surpassing Japan in 2011. If China's growth pattern continues in the same vein then it is predicted that it will overtake the United States of America as the largest economy in the world within a decade[73]. China's economy are also in the financially enviable position of still being classified as a developing nation under the Kyoto Treaty and was therefore not subject to any binding emissions cuts. Instead, China was allowed to pursue rapid expansion and growth without the impingement of international emission standards. This, coupled with vast untapped resources, has allowed China to become the world's leading producer in 37 minerals and metals, including; rare earth minerals (99% of the world's production is in China), coal and iron ore. While this has greatly stimulated the economy of China it also has some serious environmental consequences. In 2009 China became the world's largest emitter of carbon dioxide and in that year it emitted more carbon dioxide than America and Canada combined[74].

When looking at the data in Table 4 one can see the huge rise in GDP that China has generated through their mass production of goods, the refinement of minerals and metals. Growth was at its lowest in 1999 when it fell to 7.60% still a highly impressive number. 1999 and 1998 were the worst two years in terms of percentage GDP growth (1998 recorded growth of 7.8%) and yet they were best in terms of emissions because this is only time in the dataset that emissions dropped. In 1997 and 1998 the Asian financial crisis occurred which began with the devaluation of the Thai Baht and spread like wildfire through Asia, affecting the national currencies and stock markets of numerous states in the region. Though China's growth was not wiped because of this it did take a sizeable chunk. In 1998 coal consumption

[72] Aparna Sawhney, *The New Face of Environmental Management in India*, (2004), p. 45
[73] 'China overtakes Japan as world's second-biggest economy', taken from http://www.bbc.co.uk/news/business-12427321
[74] 'World carbon dioxide emissions data by country: China speeds ahead of the rest', *The Guardian*, 31 January 2011

Table 4, China 1992 -2010[75]

Year	GDP (constant 2000 US$)	GDP growth (annual %)	CO2 emissions (kt)	CO2 emissions growth (annual %)	Foreign direct investment, net inflows (BoP, current US$)	Foreign direct investment, net inflows (% of GDP)	Alternative and nuclear energy (% of total energy use)	Fossil fuel energy consumption (% of total)	Agricultural land (% of land area)	Arable land (% of land area)	Terrestrial protected areas (% of total land area)
1992	554442855289.53	14.20	2695982.07		11156000000.00	2.64	1.30	75.68	57.08	13.33	13.66
1993	632064855030.06	14.00	2878694.01	6.78%	27515000000.00	6.25	1.45	76.68	56.91	13.07	13.77
1994	714865351039.00	13.10	3058241.33	6.24%	33787000000.00	6.04	1.88	77.22	56.96	13.05	13.92
1995	792785674302.25	10.90	3320285.15	8.57%	35849200000.00	4.92	1.95	78.53	57.11	13.09	13.99
1996	872064241732.47	10.00	3463089.13	4.30%	40180000000.00	4.69	1.92	79.25	57.06	13.01	14.34
1997	953166216213.59	9.30	3469510.05	0.19%	44237000000.00	4.64	1.99	79.26	56.97	12.88	14.48
1998	1027513181078.26	7.80	3324344.52	-4.18%	43751000000.00	4.29	2.10	79.15	57.12	13.04	14.62
1999	1105604182840.20	7.60	3318055.61	-0.19%	38753000000.00	3.58	2.11	79.17	57.06	12.98	14.86
2000	1198474934198.78	8.40	3405179.87	2.63%	38399300000.00	3.20	2.31	79.16	57.06	12.97	15.47
2001	1297948353737.28	8.30	3487566.36	2.42%	44241000000.00	3.34	2.79	78.63	56.96	12.87	16.29
2002	1416061653927.37	9.10	3694242.14	5.93%	49307976629.16	3.39	2.86	80.01	56.86	12.75	16.61
2003	1557667819320.10	10.00	4525177.01	22.49%	47076718733.06	2.87	2.87	82.09	56.66	12.51	16.62
2004	1714992269071.44	10.10	5288166.03	16.86%	54936483255.05	2.84	2.99	84.11	57.29	13.10	16.63
2005	1908786395476.51	11.30	5790016.98	9.49%	117208286228.85	5.19	3.07	85.01	56.92	12.69	16.63
2006	2151202267702.02	12.70	6414463.08	10.78%	124082036118.51	4.57	3.07	86.01	56.92	12.67	16.63
2007	2456672989715.72	14.20	6791804.71	5.88%	160051835203.20	4.58	3.27	86.40	56.02	11.72	16.64
2008	2692513596728.42	9.60	7031916.21	3.54%	175147650311.57	3.87	3.61	86.87	56.02	11.64	16.64
2009	2940224847627.44	9.20			114214527413.25	2.29	3.66	87.37	56.21	11.79	16.64
2010	3246008231780.70	10.40			185080744436.04	3.12					16.64

[75] Data from the World Bank's World Development Indicators (WDI) and Global Development Finance (GDF) Databank, taken from http://databank.worldbank.org/ddp/home.do?Step=1&id=4

decreased compared to 1997 levels by 60000 thousand short tons[76]. This decrease could be seen due to in part the financial crisis affecting production levels and the fact that "In 1998, the government directed that 25,000 small, non-state mines and 40 state-owned mines be closed, accounting for about 250 Mt of output annually"[77]. Closure of mines and a downturn in the continents finances can be attributed, at least in part, for the two year decline in carbon emissions.

Apart from this two year blip China's growth returned to its average of around 10% and CO2 emissions began to increase again. In 2003 China's carbon dioxide emissions growth spiked by an unprecedented 22.49% compared to the GDP growth of 10%. The argument for this sudden spurt of emissions is the rise in China's exports. China's exports grew to $438.2 billion, a 34.6% increase from the previous year[78]. The increase in production would have attested for the rise in emissions. It is actually argued that if China were not to have produced the goods it exported to America in 2003 than its emissions would have decreased by 14%[79].

Has China's growth been based around sustainable development? No it has not, with huge rises in carbon emissions year upon year and the overall greater dependence upon fossil fuel usage (which accounts for 87.37% of total energy use in 2009) one cannot say such growth could be sustained while protecting the environment and the needs of future generations. Slightly ironically however, is the fact that one of the many growing sectors within Chinese industry is the production of solar panels and other relatively green products. "China has become the world's biggest investor in renewable energy sources, investing more than 300 billion Yuan (47.62 billion U.S. dollars) in renewable energy sources in 2010"[80]

Has this increase been down to increases in FDI because of a relaxing of Chinese environmental regulations? Again it is no, China has not grown so quickly because of a pollution haven. Though mass industry has entered into China and foreign companies have joined in ventures with Chinese companies it is not because they saw China as an area of exploitation and China did not lower its environmental regulations to entice said FDI. The FDI is actually partly forced upon China as part of the commitments it must accept if it wishes to join the World Trade Organisation. With FDI being allowed in agriculture,

[76] http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm
[77] Jonathan E. Sinton & David G. Fridley, 'What goes up: recent trends in China's energy consumption', *Energy Policy*, 28 (10), (2000), pp. 671–687
[78] https://www.uschina.org/statistics/tradetable.html
[79] 'Trade Imbalance Shifts U.S. Carbon Emissions to China, Boosts Global Total' taken from http://www.ucar.edu/news/releases/2005/china.shtml
[80] http://www.china.org.cn/environment/2012-02/23/content_24715422.htm

banking, telecoms[81] it is not solely pollution intensive corporations that were interested in entering a market of over 1 billion people with a growing income to spend.

Shaukat Ali and Wei Gou argue that foreign firms and FDI flows into China because;

> "China's huge potential market size is the most significant factor for FDI inflow in China, which is in line with both theory and previous studies. China's large population, fast growing economy, coupled with membership of the World Trade Organization, are an unbeatable combination for foreign firms"[82].

The attraction of China is not because of inefficiently low environmental regulations to bring in pollution intensive industry, which would discount the influx of tertiary businesses like banks who wish to open in China. The attraction is the potential market share that China offers to these industries. Judith Dean et al ran a quantitative study of the FDI from non-Chinese ethnic countries and found that high polluting industries from these countries were enticed by China, regardless of pollution regulation[83].

South Africa

South Africa became one of the BRICS on December 24, 2010, "The addition of South Africa was a deft political move that further enhances BRICS' power and status. The new member possesses Africa's largest economy, but as number 31 in global GDP economies it is far behind its new partners, nearly by 20-1 in China's case"[84]. While the economy of South Africa is numerically lagging behind those of it BRICS partners its addition means that the most powerful group of developing nations has the largest African economy within its membership. This should help enhance trade within Africa, as a sign of goodwill and brotherhood between developing nations and a sense of equality. Africa's vast abundance of resources will be critical in the future as BRICS and developed nations alike look to extract them for their own economies. The BRICS having an African partner could potentially help in future negotiations. South Africa has also become the first African nation to have its government bonds included into the US bank, CitiGroup's World Government Bond Index

[81] 'WTO successfully concludes negotiations on China's entry', WTO, (2001) taken from http://www.wto.org/english/news_e/pres01_e/pr243_e.htm
[82] Shaukat Ali & Wei Gou, 'Determinants of FDI in China', *Journal of Global Business and Technology*, 1 (2), (2005), p. 39
[83] Judith M. Dean, Mary E. Lovely & Hua Wang, 'Are foreign investors attracted to weak environmental regulations? Evaluating the evidence from China', *Journal of Development Economics*, 90 (2009), pp. 1 – 13
[84] Jack A. Smith, 'BRIC Becomes BRICS: Changes on the Geopolitical Chessboard', 2011, taken from http://www.foreignpolicyjournal.com/2011/01/21/bric-becomes-brics-changes-on-the-geopolitical-chessboard/2/

Table 5, South Africa 1992 - 2010[85]

Year	GDP (constant 2000 US$)	GDP growth (annual %)	CO2 emissions (kt)	CO2 emissions growth (annual %)	Foreign direct investment, net inflows (BoP, current US$)	Foreign direct investment, net inflows (% of GDP)	Alternative and nuclear energy (% of total energy use)	Fossil fuel energy consumption (% of total)	Agricultural land (% of land area)	Arable land (% of land area)	Terrestrial protected areas (% of total land area)
1992	554442855289.53	14.20	2695982.07		11156000000.00	2.64	1.30	75.68	57.08	13.33	13.66
1993	632064855030.06	14.00	2878694.01	6.78%	27515000000.00	6.25	1.45	76.68	56.91	13.07	13.77
1994	714865351039.00	13.10	3058241.33	6.24%	33787000000.00	6.04	1.88	77.22	56.96	13.05	13.92
1995	792785674302.25	10.90	3320285.15	8.57%	35849200000.00	4.92	1.95	78.53	57.11	13.09	13.99
1996	872064241732.47	10.00	3463089.13	4.30%	40180000000.00	4.69	1.92	79.25	57.06	13.01	14.34
1997	953166216213.59	9.30	3469510.05	0.19%	44237000000.00	4.64	1.99	79.26	56.97	12.88	14.48
1998	1027513181078.26	7.80	3324344.52	-4.18%	43751000000.00	4.29	2.10	79.15	57.12	13.04	14.62
1999	1105604182840.20	7.60	3318055.61	-0.19%	38753000000.00	3.58	2.11	79.17	57.06	12.98	14.86
2000	1198474934198.78	8.40	3405179.87	2.63%	38399300000.00	3.20	2.31	79.16	57.06	12.97	15.47
2001	1297948353737.28	8.30	3487566.36	2.42%	44241000000.00	3.34	2.79	78.63	56.96	12.87	16.29
2002	1416061653927.37	9.10	3694242.14	5.93%	49307976629.16	3.39	2.86	80.01	56.86	12.75	16.61
2003	1557667819320.10	10.00	4525177.01	22.49%	47076718733.06	2.87	2.87	82.09	56.66	12.51	16.62
2004	1714992269071.44	10.10	5288166.03	16.86%	54936483255.05	2.84	2.99	84.11	57.29	13.10	16.63
2005	1908786395476.51	11.30	5790016.98	9.49%	117208286228.85	5.19	3.07	85.01	56.92	12.69	16.63
2006	2151202267702.02	12.70	6414463.08	10.78%	124082036118.51	4.57	3.07	86.01	56.92	12.67	16.63
2007	2456672989715.72	14.20	6791804.71	5.88%	160051835203.20	4.58	3.27	86.40	56.02	11.72	16.64
2008	2692513596728.42	9.60	7031916.21	3.54%	175147650311.57	3.87	3.61	86.87	56.02	11.64	16.64
2009	2940224847627.44	9.20			114214527413.25	2.29	3.66	87.37	56.21	11.79	16.64
2010	3246008231780.70	10.40			185080744436.04	3.12					16.64

[85] Data from the World Bank's World Development Indicators (WDI) and Global Development Finance (GDF) Databank, taken from http://databank.worldbank.org/ddp/home.do?Step=1&id=4

from October this year[86] which will have a market value of $83 billion. The inclusion on the Index and could increase investment in the government bonds.

South Africa is progressing into strongly developing nation but its comparative weakness with the other BRICS and late inclusion into the group during the time scale may provide the investigation with a different angle. In 1992 the other BRIC nations already had been growing for some time[87] while South Africa was still in the midst of apartheid. The domestic racism and violence this caused and the sanctions placed upon South Africa. Disinvestment from South Africa came about from the gathering belief in social responsibility for investment firms, the international community took a stand against apartheid by refusing to bankroll the government[88].

FDI was just over $3 million in 1992 but it has recovered and grown to over $ 1 billion in 2010. South Africa is now the world' 19th largest steel producer and is ranked 10th in the list of exporters[89]. Has the total growth for South Africa been sustainable however? From the numbers one cannot say that with all certainty that it has. While carbon emission data is Erratic throughout the 19 years, overall there is an increase is to greater fossil fuel dependency. With oil, natural gas and coal consumption all increasing and "The expansion of renewable energy in South Africa has taken place mostly in the rural areas, where poor households are electrified with solar home systems (SHSs) in places where the national grid cannot penetrate economically"[90] it seems that the majority of energy consumption is based around fossil fuels. The production of steel is also an industry that produces large amounts of carbon emissions and other dangerous greenhouse gases.

Much like the other nations one cannot say that the reason for the growth has been because of a pollution haven. In fact private enterprise has helped strengthen the environmental regulations of South Africa with the national forestry policies being heavily influenced the Forest Stewardship Council and the policies that it implements[91]. While the forest Stewardship Council is not a profit based business its influence in shaping governmental

[86] 'South Africa included in Citi bond index', taken from http://www.southafrica.info/business/investing/citigroup-wgbi-180612.htm
[87] Except for Russia which was in a financial freefall due to the collapse of the Soviet Union but had previously had a strong economy
[88] Kate O'Niell, The Environment and International Relations, (2009)
[89] http://www.southafrica.info/business/economy/sectors/manufacturing.htm
[90] Harald Winkler eds, 'Energy policies for sustainable development in South Africa: Options for the future', Energy Research Centre University of Cape Town, (2006), p. 12
[91] Kate O'Niell, The Environment and International Relations, (2009)

policy suggests that South Africa is not generating its business through pollution havens. If they were they would not have shaped policy around the work of a private enterprise which wishes to see sustainable use of wood in industry. Apart from wood, while examining SACU's relationship with US and UK trade Anton Nahman and Geoff Antrobus found that "the pollution haven effect does not seem to be an important determinant of SACU's trade with the USA and the UK"[92].

Conclusion

After looking at the BRICS it is clear that none of them are growing through sustainable development. They have achieved tremendous growth and have brought themselves from poor states into a position where they are the future of the world economy. That might sound grandiose but with the huge workforce that each of the countries hold, the ever improving infrastructure being built around them and the vast resources at their disposal the BRICS will be economic superpowers for years to come.

Though that does not mean that the growth they will achieve in the future will be sustainable either. The techniques they are using to fuel their nations are dominated by the burning of fossil fuels and only Russia showed any decrease in the percentage amount of fossil fuel used, Brazil returned to the same percentage they started with. China, India and South Africa all increased their percentage use of fossil fuel. The BRICS did not achieve sustainable development as one of the requirements of sustainable development is the protection of future generations' needs. This could be achieved by lowering the current consumption rate of finite raw materials and fossil fuels that produce the majority of greenhouse emissions. Yet at the rate they were consuming the fossil fuels the BRICS would need a major shift in energy policy to turnaround consumption patterns.

Such a policy may not come domestically but it could come from international pressure and the introduction of a new treaty on emission cuts to replace the Kyoto Protocol. Only Russia was classified as a developed nation when Kyoto was signed and only Russia, out of the BRICS, was legally bound to curb emission rates. But due to the crash of the Soviet Union the emissions fell, which gave Russia room to increase their emissions in later years while

[92] Anton Nahman & Geoff Antrobus, 'Trade and the Environmental Kuznets Curve: Is Southern Africa a Pollution Haven?', *South African Journal of Economics*,73(4), (2005), p. 813

remaining under the 1990 level set by the Kyoto protocol. In effect, therefore, the BRICS have had no external, legally binding requirements to cut emissions and have therefore felt no need to do so along as it promoted economic growth. In future negotiations the BRICS need to be classified as developed nations and have emission cuts placed upon their economies. The danger here is that the BRICS would not accept such a treaty and continue to the same method of growth. The developed nations that have had emission standards placed upon have attempted to meet their requirements. The question is though, have the imposed cuts made a fundamental change in energy policy within the nation, enough so that they have achieved or are actively working towards sustainable development? Or have the imposed cuts merely slowed down fossil fuel use and pre-Kyoto levels will return once the treaty expires? If it is the former then as long as economic growth continues then it could entice the BRICS into moving away from their fossil fuel dependency.

Sustainable development is was not but for four of the BRICS this did not mean that their growth was down to the creation of a pollution haven either. Brazil, India, China and South Africa grew through the overconsumption of natural resources but the FDI they brought into their respective countries was not because of lax regulations in their countries. Instead FDI increased because of the opening of previously closed markets and the potential for their own turnover. They did not come to lower costs by circumventing their national pollution laws and destroy the environment through pollution intensive techniques. They came to increase worldwide market share and to sell their goods to a total population of over 2 billion potential customers.

I believe that Russia was the only nation that created a pollution haven to grow their economy. Though I feel the pollution haven was actually more for state-owned business than it was for foreign competitors. Russia's economy is too dependent on the sale of their raw materials and needs to constantly exceed consumption levels when extracting raw materials. This is because they sell it to willing buyers around the globe in order to grow their economy. Throughout my research Russia was the only state out of the BRICS that I found too purposefully lower environmental regulations in order to bolster economic growth. Further research into Russia's regulatory practices could show in greater depth whether the pollution haven they created was for the gain of foreign investors or the state owned energy companies.

The green movement is becoming ingrained in our daily lives and our financial markets. The world cannot sustain economic growth that results in the degradation of our planet. But a change in economic development and an international agreement on sustainable development would cause a major shift in the world's make up. We would need to ask fundamental questions about what is important to us as an individual, as a society and as nations. Question that I feel are perfectly summed up by Henry Shue

> "Everyone claims to be in favour of this supposed perfect harmony of environmental protection and economic development, but no one explains concretely how it can work. One serious danger is that we will tacitly assume that business more or less as usual, with slight adjustments for the sake of greater sustainability, will serve. I am not saying that it will not. I am saying that we must, first, face squarely the factual question, is everything valuable attainable together? I hope it is, but I have trouble believing that it is. If it is not, then we must, second, face squarely the choices among values that we must make and at least make them consciously. This means that we cannot simply assume that there is something appropriately called 'sustainable development', where 'development' is understood to be essentially unchanged from past practice and merely cleaned-up around the edges. For example, the OPEC nations insist that poor nations can develop, rich nations can continue to expand their economies, and climate change can be avoided without any initiative to move away from fossil fuel as our main energy source. That is either true or false. If it be true, everything is fine. If it is false, as I believe it is, and we cannot have all these things together, then either the poor nations cannot develop, rich nations cannot grow still wealthier, or both cannot rely on fossil fuel. My guess is that if 'development' means industrialization based on fossil fuel, there is no such thing as 'sustainable development'. We must, then, choose which values and interests the international order will respect and which it will sacrifice."
> [93]

[93] Henry Shue, 'Ethics, the Environment and the Changing International Order', *International Affairs*, 71 (3), (1995), pp. 460 - 461

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