CORPORATE SOUTH AFRICA AND CARBON DISCLOSURE: A DIFFERENTIAL ANALYSIS OF 2011 AND 2012 CARBON DISCLOSURE PERFORMANCE

Collins C. Ngwakwe*

Abstract

This paper examined the performance of corporate South Africa in the 2012 Carbon Disclosure Project [CDP]. It is motivated by the growing shift to climate performance amongst the JSE listed companies in South Africa; hence the paper showcases the commitment of corporations in South Africa towards carbon disclosure. It thus shows exemplary commitment by corporations in an emerging economy to curb GHG emission through disclosure. The paper compared corporate South Africa carbon disclosure performance in 2012 with the 2011 disclosure performance. First, the performance of the Johannesburg Stock Exchange (JSE) 100 carbon performance leaders were examined; and using a statistical t-test of difference in means, the paper finds that the 2012 carbon performance improved remarkably over the 2011 performance; hence the T-test indicates a significant difference in means between the 2012 and 2011 carbon performance. Secondly, the paper also examined the climate performance of the JSE 100 companies and also found a significant difference between the 2011 and 2012 performance which also depicts an improvement over the 2011 climate performance. It is perceptible that the 2011 UN Climate Conference in South Africa, coupled with the SA's outstanding role in global climate change negotiations and the Carbon Disclosure Project is driving corporate SA to 'walk the talk' on climate change. In conclusion the paper highlights the need for further corporate climate initiatives, and calls on governments of developing countries to take a bold stance on climate negotiations as this is a key to encouraging the corporate toward climate friendly and carbon reduction initiatives.

Keywords: Carbon Disclosure, Climate Performance, Carbon Performance, Corporate South Africa, Climate Change, Carbon Disclosure Project, Johannesburg Stock Exchange

**Turfloop Graduate School of Leadership*
Faculty of Management & Law
University of Limpopo
South Africa
collins.ngwakwe@ul.ac.za

1 Introduction

The business empire is seen as contributing significantly to climate change through corporate operations (Karliner, 1999); the consequent negative outcome is not only affecting society and environment, but the corporate is also vulnerable to climate change impacts. Hence business is actively considering the risks and opportunities of climate change in order to boost resilience in an emerging environmentally friendly business environment. Corporate South Africa has been recognised for its carbon disclosure performance (CDP, 2012). The driver for corporate South Africa climate response seem to be closely linked to national government climate policy initiatives; for instance, the South African government is currently marking remarkable progress toward greening its economy and has made commitment to reduce national greenhouse gas emissions by 34% by 2020 and 42% by 2025 (Sonjika, 2010), this commitment, added to current national government green initiatives such as the green paper on climate change and the carbon tax, alerts corporate SA that South Africa is on the verge of "a regulatory phase to curb greenhouse gas emissions" (CDP, 2010, p. 7).

There has been much pressure on developed countries to shoulder the burden of reducing carbon emission; however developing countries also contribute significant proportion of global greenhouse gas (GHG) emission as some carbon emitting multinationals are located in developing countries (Karliner, 1999), therefore developing nations should equally take some measures to reduce carbon emission. Hence the supportive initiative by the COP in Cancun – to offer financial incentive to developing nations toward carbon emission was a step in the right direction, which attests to the importance of tackling global climate change from all fronts. South Africa occupies an important position in global climate change talk – it is a member of the BASIC countries (China, Brazil, India and South Africa) with common climate stance in the global climate change debate; also according to Department for International Development (DFID):

South Africa is also the world's 11th highest carbon emitter and produces 40% of Africa's fossil fuel emissions; its CO2 emissions per capita are seven times higher than India (DFID, 2011, p. 3)

This assertion is also confirmed by Ernst & *Young "South Africa is the 11th largest emitter of electricity and heat-based CO_2 worldwide, since the country depends on coal for 90% of its electricity"* (Ernst & Young, 2010, p. 1), and coupled with other industrial emissions in the country, South Africa therefore ranks as the *"23rd Largest emitter of CO2e, accounting for 1 percent of the world's emissions (423MMTCO2e. Per capita emissions are 9.0 metric tons of CO2e (59th highest in the world)"* (NRDC, 2010, p. 1). Furthermore, in recognition of the emerging South African government's climate initiatives (DEA, 2014), on the 9th of August 2010, the Secretary-General of the United Nations (UN) Ban Ki-moon appointed President Jacob Zuma a co-chair of the Intergovernmental Panel on Climate Change (IPCC) together with his counterpart President Tarja Halonen of Finland (UN News Centre, 2010). Based on the above South African global position on climate change debate, the paper attempts to answer the question on whether the UN Durban Climate Change Conference of 2011 made a difference in corporate South Africa's performance in the Carbon Disclosure Project of 2012. Therefore, the objective of this paper is to examine the difference in carbon disclosure performance between the 2011 and 2012 JSE 100 Carbon Disclosure Leadership Index (Cdli) through a comparison of carbon disclosure scores between 2011 and 2012, and to examine the Climate Performance between 2011 and 2012 amongst the JSE 100 companies. The significance of the paper is to highlight that global climate change negotiations and a country's support for climate change policies have a stimulus implication on the corporate positive response to climate and carbon initiatives.

The rest of this paper proceeds as follows: the next section following this introduction presents a review of related literature; section three presents the data and conducts a differential analysis of the corporate South Africa 2011 and 2012 carbon disclosure performance. The final section draws conclusion.

2 Review of related literature

The first section of this literature highlights the vulnerability of South Africa to climate change; this is followed by a review of corporate case for climate change response by stressing the risks and opportunities implicit in climate change response; the review ends with corporate carbon disclosure.

2.1 Vulnerability of South Africa to climate change

The African continent is generally regarded as vulnerable to climate change given it exposure to sun shine, high temperature and associated diseases (Brown et al. 2007; Patz et al. 2005; Collier et al. 2008). Within the African continent, South Africa is facing much vulnerability to climate change as some regions are getting arid and/or semi-arid and there are expectations that increasing change in climate may cause a further rise in temperature which would escalate drought and water scarcity (Oxfam, 2009). Climate change is beginning to cause erratic rain-falls and flooding with huge negative social, economic and environmental consequences. For instance, the erratic rain-fall of January 2011 is reported to be 10 times above average in some parts of South Africa, which contributed to rise in sea and river levels, triggering tragic incidents of flooding in many provinces which destroyed farm crops, houses and unfortunate loss of human lives numbering over a hundred (Samuhel, 2011). The magnitude of flooding in South Africa in early 2011 resulted in the declaration of disaster zones in eight provinces of South Africa; in addition farmers recorded heavy loss in assets and crops amounting to about a billion Rand ($145M) (Cohen and Lourens, 2011). From the fauna dimension, research shows that increase in atmospheric Co2 will impact negatively on terrestrial animals and species in fresh water in South Africa (Jaarsveld, et al. 2005). Furthermore, according Engineering News (2014) South Africa's number of days with increasing temperature exceeds the global average, and the rising temperature is likely to exacerbate food shorting in South Africa due to low agricultural yield (The Guardian, 2013). This indicates that without adequate mitigation strategy, climate change may cause a significant decline and/or an extinction of most animals in South Africa.

2.2 Corporate case for climate change response

The corporate case for climate change response has arisen because of many competitive and social reasons; these include *inter alia*, regulation, investors' demand and pressure, and new market opportunities.

2.2.1 Regulations

Albeit scientific debate, it is becoming apparent that regulations might change the behaviour of climate-adamant corporations (Fox, Ward and Howard, 2002), and those who refuse to change may likely be caught up in a quagmire of climate policy and competition. Contemporary evidence depicts that our world is altering beyond human predictions (Dawson et al. 2011). We are not only experiencing a global warming of the earth; there are also news of devastating storms and floods (such as in Australia, South Africa, India etc. (Nicholls, 1999) destroying businesses worth billions of Dollars including loss of human lives; and the melting of ice caps. These contribute to growing radical transformation in global political and policy scene targeted at reducing causative factors of warming – the GHGs. It is therefore not surprising that majority of industries in many countries are currently facing the challenge of obligatory limits of greenhouse gases, notably in those countries that have ratified the Kyoto Protocol BusinessWeek (2005); and more regulations are underway from other countries whose ongoing national policies are geared towards

green economic development such as the Republic of South Africa.

2.2.2 Investors

Climate change friendliness is dictating business competitiveness and financial health, thus investors are putting the pressure on corporations to show evidence of compliance and/or responsiveness to climate change (Continuity Central, 2007). Investors are keen to protect their investment, this is apparent in a declaration by Investors Network on Climate Change (INCR, 2008, p.1) "*As fiduciaries entrusted with trillions of dollars of fund assets, we remain firmly convinced that climate change presents both material risks and significant opportunities for investment portfolios*". It therefore means that ordinary 'green wash' will not be enough strategy to showcase corporate proactive response to climate change; business must be pragmatic in handling the ever increasing most single source of corporate market challenge of the 21st century – climate change. Investors' interest in climate change will continue to grow especially with the emergence of carbon as a business asset and liability (Larrinaga, 2014) and the transition of many countries to a low carbon economy. Hence INCR (2008, p.1) firmly states: "*we hereby state our intentions to manage our investments; to engage companies, investors, and others; and to support policy action to the best of our abilities*". Since therefore climate change may pose long term business risk (Continuity Central, 2007) it needs to be tackled earlier than delayed.

2.2.4 New products and new markets

Climate change and sustainability suggests that businesses that fail to adopt proactive climate change and sustainability strategy may suffer market instability and reputational impairment towards commercial success from emerging market boom in poor countries and emerging economies. However, experts recognise an abundance of business opportunities in emerging markets and in poor communities which could be utilised by adopting enabling climate change and sustainability strategies and re-channelling poverty as a business risk to business opportunity. For instance, the renowned advocate of the bottom of the pyramid, explains that

If we stop thinking of the poor as victims or as a burden and start recognising them as resilient and creative entrepreneurs and value-conscious consumers, a whole new world of opportunity will open up"(Prehalad, 2006).

Hence corporate climate change and sustainability strategy would achieve a dual benefit – for the poor and for the business; whilst expanding business to the poor communities, the corporate would, in addition, gain wider market share from the huge population prevalent in such sectors. Climate change and sustainability strategy makes it imperative for corporations to invest in new products (Hoffman & Woody, 2013) that are climate friendly and sustainable for consumption. Such products are currently in dire need by green-conscious consumers who are ready to spend extra amounts to purchase healthy products. New products adhering to consumer green expectations may positively engender corporate financial growth and long term market competitiveness which yields invaluable good will. There are huge green business opportunities buried untapped in developing countries; for instance, in the energy sector, many developing countries lack steady supply of electricity, with greater majority depending on mobile electric generating machines, which has been found to generate poisonous carbon emissions dangerous to human life (Uduma and Arciszewski, 2010). Moving into such markets with clean fuel generators such as bio fuels will create new business opportunities in addition to saving lives that would be lost due to carbon pollution.

2.3 Corporate carbon disclosure

Peters and Romi (2009) examined carbon disclosure practices of firms in response to the carbon disclosure project requirements of 2006. They find *inter alia*, that the magnitude of carbon disclosure by firms is related to the level of government's environmental disclosure regulations, a country's market structure, and the level of environmental commitment in the private sector. In another related study, Harmes (2011) examined the business case for corporate carbon disclosure and the effectiveness of corporate social responsible investment through the extent of carbon disclosure commitment. Similarly, Tang and Luo (2011) surveyed the level of transparency in corporate carbon disclosure project and find that there is high level of inconsistencies amongst firms regarding their level of transparency in carbon disclosure project, and they concur the findings of previous research that managerial commitment, government regulations, firm size and industry membership contribute towards determining the level and transparency in corporate carbon disclosure. In another related study, Lee (2012) studied a cluster of 241 Korean firms and analysed their carbon strategy as comprising the following "*wait-and-see observer', 'cautious reducer', 'product enhancer', 'all-round enhancer', 'emergent explorer' and 'all-round explorer*" (Lee , 2012, p. 33), and found there is significant relationship existing between a company's carbon strategic preference and its size and sector. In their study on corporate incentives for carbon disclosure, Luo, et al. (2012) examined the motivation of global 500 companies for their response to 2009 Carbon Disclosure Project. They find that social pressures such as economic pressure motivate companies to disclose; in addition, they find that companies within the carbon intensive sectors and big companies disclose more than other companies. In another study seeking to find the influences on carbon disclosure, Cotter and Najah (2012) applied the stakeholder engagement approach and examined the influence of

institutional investors on corporate climate change disclosure amongst global large companies; they find that institutional investor expectations influence the level of carbon disclosure amongst large companies.

These findings are indeed significant in informing stronger proactive policies towards cajoling firms to disclose their carbon performance. The preceding literature findings suggest that external influences are playing a significant role in driving carbon disclosure amongst the corporate, and such positive disclosure can be boosted the more by capitalizing on strengthening such influences, such as improving governments' stance and policies on carbon and climate change, boosting institutional investors' pressures, consumers and industry group pressure.

Although this paper is narrowly focused within the South African JSE setting, is a modest attempt towards responding to the recommendation of Busch (2010) that improvement in corporate carbon performance requires continuous measurement of progress. Accordingly the following section presents an analysis of improvement in the Johannesburg Stock Exchange companies' carbon disclosure leaders in the 2012 and 2011 Carbon Disclosure Project.

3 Data presentation and analysis of difference between 2011 & 2012 corporate South Africa carbon disclosure leaders' performance

Sample of study is drawn from the listed companies in the Johannesburg Stock Exchange JSE which commit to carbon disclosure. The sample is judgementally chosen from companies that participated in the 2011 and 2012 carbon disclosure project (CDP). Selection of sample was based on the companies that were adjudged as the carbon disclosure leaders (CDL) in the 2011 and 2012 carbon disclosure project. Thus the 12 companies that were selected as the CDL in 2012 were considered for this analysis, but only 11 companies were used in the analysis; this is because one of the companies – Oceana was dropped from the analysis because it did not have 2011 data as it was not in the JSE 2011 Sample (CDP South Africa, 2012, p. 32). The analysis below seeks to evaluate possible effect of Durban 2011 by comparing the disclosure score differences between CDP2011 and CDP2012 after the Durban conference. A t-test of difference in means is therefore employed to assess the difference. Table 1 shows the Comparison of Carbon Disclosure Scores Between 2011 and 2012, and Table 3 presents an overall comparative of the JSE 100 companies in specific climate items. The t-test analysis appears in Table 2 and Table 4.

Table 1. The 2012 JSE 100 carbon disclosure leadership index (Cdli): comparison of carbon disclosure scores between 2011 and 2012

Rank	Company	Sector	2012 Score	2011 Score
1.	Exxaro Resources Ltd	Materials	100	94
2.	Gold Fields Ltd	Materials	99	98
3.	Harmony Gold Mining Co Ltd	Materials	98	91
4.	FirstRand Ltd	Financials	97	88
5.	Mediclinic International	Health Care	97	74
6.	Remgro	Financials	97	80
7.	Sanlam	Financials	97	88
8.	Anglo American Platinum	Materials	96	85
9.	Pick 'n Pay Holdings Ltd	Consumer Staples	96	86
10.	Growthpoint Properties	Financials	95	83
11.	Nampak Ltd	Materials	95	82
12.	Oceana	Consumer Staples	95	Not in JSE 100 sample

Source: Carbon Disclosure Project (2012, P. 32) CDP South Africa 100 Climate Change Report 2012, http://www.nbi.org.za/Lists/Publications/Attachments/277/CDP%202012%20Report_web2.pdf

Table 1 above shows the carbon disclosure scores among the JSE 100 Carbon Disclosure Leaders in 2012 compared with the 2011 scores. A physical view of the scores indicates an improvement over 2011 scores; Table 2 shows the T-test output and the level of significance between 2011 and 2012 carbon disclosure.

Tested at 5 per cent significance level, the output result above at two tail (less than 1 per cent) indicate a significance positive difference between the 2011 and 2012 carbon disclosure scores of the JSE 100 companies. This confirms improvement in carbon disclosure amongst the JSE listed companies soon after the UN Durban 2011 Climate Conference.

Table 2. t-Test: paired two sample for means in carbon disclosure scores between 2011 and 2012

t-Test: Paired Two Sample for Means

	2011 Scores	*2012 Scores*
Mean	86.27272727	97
Variance	44.61818182	2.4
Observations	11	11
Pearson Correlation	0.657124043	
Hypothesized Mean Difference	0	
df	10	
t Stat	-6.154520972	
P(T<=t) one-tail	5.38405E-05	
t Critical one-tail	1.812461123	
P(T<=t) two-tail	0.000107681	
t Critical two-tail	2.228138852	

Table 3. Climate performance between 2011 and 2012 amongst the JSE 100 companies

Climate Item	2012	2011
Average carbon disclosure score	82	76
No of Companies calculating scope 3 emissions	71	61
No of companies with emission verification	37	27
Carbon performance leader (carbon performance band	6	2
Companies with emission reduction targets	43	40
GHG emissions (million tons of carbon)(tCO2e*)	132	137

Source: Carbon Disclosure Project (2012, p.9) CDP South Africa 100 Climate Change Report, http://www.nbi.org.za/Lists/Publications/Attachments/277/CDP%202012%20Report_web2.pdf

(tCO2e):million tons of carbon dioxide equivalent

The t-test analysis of difference in Table 4 excludes GHG emissions (million tons of carbon)(tCO2e); the reason being that the direction of GHG emission data runs in the opposite direction with the other variables being analysed. The GHG emission is adjudged to be in positive direction when it is reducing; but the other variables are judged to be in the positive direction when they are increasing. Hence the analysis of difference below excludes GHG emission data. However, it can be seen from the data that whereas GHG emission was 137 million tons of carbon dioxide equivalent in 2011, it reduced to 132 million in 2012.

Table 4. t-Test: paired two sample for difference in means of climate performance between 2011 and 2012 amongst the JSE 100 companies

t-Test: Paired Two Sample for Means

	2011	*2012*
Mean	41.2	47.8
Variance	835.7	898.7
Observations	5	5
Pearson Correlation	0.994429	
Hypothesized Mean Difference	0	
df	4	
t Stat	-4.49073	
P(T<=t) one-tail	0.00545	
t Critical one-tail	2.131847	
P(T<=t) two-tail	0.0109	
t Critical two-tail	2.776445	

Tested at 5 per cent significance level, the output result above (about 1 per cent) indicate a significance positive difference between the 2011 and 2012 climate performance of the JSE 100 companies. This confirms improvement in climate performance amongst the JSE listed companies soon after the UN Durban 2011 Climate Conference.

3.1 Toward Further Climate Action in SA Companies

The preceding section indicates a growing carbon and climate performance amongst the SA corporate, and this is a welcome development as SA is not bound by the Kyoto Protocol as a non-annex 1 country

(UNFCCC, 2011; Environbusiness, 2011)[9]. However due to South African government's voluntary commitment along with its counterparts in the Basic group Chauhan (2010), the South African government policies have instilled climate friendly actions amongst its corporations. Nonetheless more efforts are still desirable to move toward a carbon neutral economy. Firstly it is pertinent to dissuade feelings of inertia by companies who have not yet committed to climate strategy. Phobia for potential financial loss should be put aside by companies; this is because some empirical evidence such as (Ziegler et al, 2011) have shown that corporate sustainability commitment has potential reward for the firm. In their examination of disclosed corporate climate change response and stock performance in the European and US stock markets; Ziegler et al. (2011) find a trading strategy where investors patronize stock of companies which disclose their climate responsibility, but sold stock of companies without any climate response disclosure. They further find that the stock performance of energy firms are positively related to disclosed corporate climate change response strategy (Ziegler et al, 2011). This suggests that corporate climate change response may pay off financially rather than depleting corporate finance. It is therefore important that corporate SA should continue with and improve their current momentum in climate initiatives. Required strategy is no longer the out-fashioned attempt to "influence policy debate" (Kolk and Pinks, 2004, p. 304) but corporate climate strategy has metamorphosed to pragmatic economic response. According to (Kolk and Pinks, 2004) corporations may adopt a range of climate change response strategy which includes: internal – in-house cleansing of carbon operations, vertical – greening corporate supply chain, or horizontal – collaborating with other firms (Kolk and Pinkse, 2004, p. 304). Another important consideration in assisting with corporate climate action is on the need to step up efforts on recycling of rare metals in South Africa; according to a recent report by the United Nations Environment Programme (UNEP, 2011) the UN laments that negligence on recycling of rare metals would jeopardise clean technology industries. Metals usage is recognised as booster to economic growth of developed, emerging and developing nations (UNEP, 2011), the UNEP cautions that excessive pressure on these metals would cause scarcity and depletion in near future, in addition to concern for negative environmental, political and social tensions (UNEP 2011) associated with continuous mining of metals without recycling discarded metals in used materials and products. The UNEP reaffirms that recycling of metals is a veritable approach to achieving sustainable development. This is understandable as it fosters clean environment, enhances eco-efficiency, creates new jobs through recycling, and may obviate social and political confrontations associated with mining. Hence this paper recommends that in addition to ongoing climate initiatives by corporate SA, further climate action should include more investment and engagement in the recycling of used metals.

4 Conclusion

This paper made a modest attempt to examine corporate SA response to climate change. This became necessary given contemporary global pressure on business to adapt corporate operations to climate friendliness; and the belief in some quarters that developed nations should shoulder the burden of carbon reduction. Consequently, in consideration of SA's government contemporary involvement in global climate change movement, its global position in the consumption of fossil fuel in energy generation and the concomitant carbon emission; the paper thus examined how some leading corporations in the SA JSE Carbon Disclosure Project are taking action to reduce climate impacts through carbon disclosure. Findings from the paper indicate that the Republic of South Africa recognises its position in energy and carbon issues, and is currently playing a supportive role and contributing to regional and international climate initiatives aimed at global carbon reduction. The South African voice is eloquent in global carbon reduction initiatives; and it is instituting national green policies for carbon reduction. The government vocal stance on carbon reduction seems to have instilled green solidarity and initiatives from the corporate South Africa. It is apparent therefore that international climate change negotiations and the ensuing policies are equally driving the corporate South Africa toward carbon reduction initiatives, which includes amongst others, the calculation of carbon emission, the verification of carbon emission, reduction initiatives, and the disclosure of carbon emissions. Using an archival approach the paper collected secondary data from the Carbon Disclosure Project (CDP) for 2011 and 2012 to examine how and if the outcome of the UN Climate Conference of 2011 held in Durban South Africa made a difference in the level of climate performance of corporate south Africa. Accordingly, using the CDP data for 2011 and 2012, and applying a T-test of difference in means, the statistical analysis disclosed a significant difference between the 2011 and 2012 carbon performance of corporate South Africa, and this indicates that the 2012 climate performance showed a significant improvement over the 2011 performance after the UN Climate Conference in South Africa. A deductive conclusion from the findings suggests that the vocal stance of a country (nationally and internationally) on climate policies, is a catalyst that could drive corporate climate change and carbon reduction initiatives. The paper thus recommends the need for developing countries to demonstrate a pragmatic support to international climate negotiations and initiatives and to initiate national climate policies with enabling awareness to win the support of corporations and the citizenry.

References

1. Brown, O., Hammill, A., & McLeman, R. (2007). Climate change as the 'new 'security threat: implications for Africa. *International Affairs*, *83*(6), 1141-1154.
2. Busch, T. (2010). Corporate carbon performance indicators revisited. *Journal of Industrial Ecology*, *14*(3), 374-377.
3. BusinessWeek (2005), "the race against climate change", available at: http://www.businessweek.com/magazine/content/05_50/b3963401.htm (accessed 30 January 2011).
4. Carbon Disclosure Project (CDM) (2010), "Carbon Disclosure Project 2010 South Africa JSE 100", available at: https://www.cdproject.net/CDPResults/CDP-2010-South-Africa-JSE100.pdf (accessed 10 January 2011)
5. Chauhan, C (25 Jan 2010). (2010) Copenhagen accord not legally binding: Basic countries. *Hindustan Times* (New Delhi: hindustantimes.com). available at: http://www.hindustantimes.com/Copenhagen-accord-not-legally-binding-Basic-countries/H1-Article3-501441.aspx (accessed 10 June 2011)
6. Cohen, M and Lourens, C. (2011). Floods in South Africa, available at: http://www.businessweek.com/news/2011-01-18/floods-in-south-africa-damage-corn-grape-crops.html (accessed March 3 2011).
7. Collier, P., Conway, G., & Venables, T. (2008). Climate change and Africa. *Oxford Review of Economic Policy*, *24*(2), 337-353.
8. Continuity Central (2007), "Long term business risks of climate change need to be faced, not ignored" http://www.continuitycentral.com/news03239.htm (accessed 7 May 2011).
9. Continuity Central (2007), "Long term business risks of climate change need to be faced, not ignored" http://www.continuitycentral.com/news03239.htm (accessed 7 May 2011).
10. Cotter, J., & Najah, M. M. (2012). Institutional investor influence on global climate change disclosure practices. *Australian journal of management*, *37*(2), 169-187.
11. Dawson, T. P., Jackson, S. T., House, J. I., Prentice, I. C., & Mace, G. M. (2011). Beyond predictions: biodiversity conservation in a changing climate. *science*, *332*(6025), 53-58.
12. DEA:Department of Environmental Affairs South Africa (2014) South African Government's Position on Climate Change, available at: http://www.climateaction.org.za/cop17-cmp7/sa-government-position-on-climate-change (accessed 7 May 2011) .
13. Department for International Development South Africa (2011) Operational Plan 2011-2015, available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/67536/south-africa-2011.pdf (accessed 20 July 2014).
14. Engineering News (2014) SA temperature rise above global average, available at: http://www.engineeringnews.co.za/article/sa-temperature-rise-above-global-average-2011-11-29 (accessed 7 May 2011).
15. Environbusiness (2011) UNFCCC Annex 1 and Annex 11 countries, available at: http://www.environbusiness.com/CChange/annex12.html
16. Ernest & Young (2010), Climate change country overview, available at: http://www.ey.com/GL/en/Services/Specialty-Services/Climate-Change-and-Sustainability-Services/The-business-case-for-climate-change---South-Africa
17. Fox, T., Ward, H., & Howard, B. (2002). *Public sector roles in strengthening corporate social responsibility: a baseline study*. Washington, DC: World Bank.
18. Harmes, A. (2011). The limits of carbon disclosure: theorizing the business case for investor environmentalism. *Global Environmental Politics*, *11*(2), 98-119.
19. Hoffman, A. J., & Woody, J. G. (2013). *Climate change: What's your business strategy?*, Boston: Harvard Business Press. http://unfccc.int/parties_and_observers/parties/non_annex_i/items/2833.php (accessed 7 May 2011).
20. Investor Network on Climate Risk (INCR) (2008), "investor network on climate risk action plan" http://www.un.org/partnerships/Docs/Investor%20Network%20on%20Climate%20Risk%20Action%20Plan.pdf (accessed 7 May 2011).
21. Jaarsveld van A.S, Chown, S.L., Erasmus, B.F.N., Kshatriya, M.,and Wessels, K.J.(2005), "Vulnerability and adaptation assessment of south african animal taxa to climate change", available at: http://www.environment.gov.za/climatechange2005/Vulnerability%20and%20Adaptation%20Sector%20Reports/Animal%20Biodiversity/Animal%20Biodiversity%20Report.pdf (accessed 2 March 2011).
22. Karliner, J (1999), Corporate power and ecological crisis, available at: http://www.worlddialogue.org/content.php?id=27 (accessed 7 May 2011).
23. Karliner, J (1999), Corporate power and ecological crisis, available at: http://www.worlddialogue.org/content.php?id=27 (accessed 7 May 2011).
24. Kolk, A and Pinkse, J (2004) Market strategy for climate change**,** *European Management Journal*, Volume 22, Issue 3, pp. 304-314.
25. Larrinaga, C. (2014). Carbon Accounting and Carbon Governance. *Social and Environmental Accountability Journal*, *34*(1), 1-5.
26. Lee, S. Y. (2012). Corporate carbon strategies in responding to climate change. *Business Strategy and the Environment*, *21*(1), 33-48.
27. Luo, L., Lan, Y. C., & Tang, Q. (2012). Corporate incentives to disclose carbon information: evidence from the CDP Global 500 Report. *Journal of International Financial Management & Accounting*, *23*(2), 93-120.
28. Natural Resources Defense Council (NRDC) (2010), "From Copenhagen accord to climate action", available at:http://www.nrdc.org/international/copenhagenaccords/ (accessed 19 Jan 2011).
29. Nicholls, R. J., Hoozemans, F. M., & Marchand, M. (1999). Increasing flood risk and wetland losses due to global sea-level rise: regional and global analyses. *Global Environmental Change*, *9*, S69-S87.
30. Oxfam, (2010). Climate change development and energy problems in South Africa, available at:http://www.oxfam.org.uk/resources/policy/climate_change/downloads/oi_climate_change_south_africa.pdf (accessed 7 May 2011).
31. Patz, J. A., Campbell-Lendrum, D., Holloway, T., & Foley, J. A. (2005). Impact of regional climate change on human health. *Nature*, *438*(7066), 310-317.
32. Peters, G., & Romi, A. (2009). Carbon disclosure incentives in a global setting: an empirical investigation.

University of Arkansas, Fayetteville, AR, working paper. Available at: http://waltoncollege.uark.edu/acct/Carbon_Disclosure.doc (accessed Feb 28 2014).
33. Prehalad, C.K. (2006) *The Fortune at the Bottom of the Pyramid*, Wharton: Wharton School Publishing
34. Samuhel, D (2011), "La Nina Influenced Flooding in South Africa", available at: http://www.accuweather.com/blogs/news/story/44853/la-nina-influenced-flooding-in.asp (accessed 2 March 2011)
35. Sonjika, B. (2010), "Carbon Disclosure Project 2010 South Africa JSE 100", available at: https://www.cdproject.net/CDPResults/CDP-2010-South-Africa-JSE100.pdf (accessed 10 January 2011).
36. Tang, Q., & Luo, L. (2011). Transparency of corporate carbon disclosure: International evidence. *Available at SSRN 1885230*.
37. The Guardian (2013) Climate change: how a warming world is a threat to our food supplies, available at: http://www.theguardian.com/environment/2013/apr/13/climate-change-threat-food-supplies (accessed 10 Feb 2011).
38. Uduma K and Arciszewski T (2010), " Sustainable Energy Development" available at: http://www.mdpi.com/2071-1050/2/6/1558/pdf (accessed 10 Feb 2011)
39. UN News Centre (2010), "Ban announces high-level panel to tackle global sustainability issues", available at: http://www.un.org/apps/news/story.asp?NewsID=35567&Cr=climate+change&Cr1= (accessed 15 Jan 2010)
40. UNEP (2011) Recycling rates of metals, available at: http://www.unep.org/resourcepanel/Publications/RecyclingratesofmetalsAbid/56073/Default.aspx (accessed 10 June 2011)
41. UNFCCC (2011) List of non-annex parties to convention, available at: http://unfccc.int/parties_and_observers/parties/non_annex_i/items/2833.php (accessed 7 May 2011).
42. Ziegler, A; Busch, T and Hoffmann, H. V (2011**)** Disclosed corporate responses to climate change and stock performance: An international empirical analysis. *Energy Economics* doi:10.1016/j.eneco.2011.03.007 (accessed 10 June 2011).