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Realising the right to a healthy environment

An analysis of the policy efforts, budgeting and enjoyment of the right to a healthy environment in South Africa

September 2016

Zukiswa Kota

The Socio-Economic Rights Monitoring Tool

Working Paper 13

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McLaren, D, Moyo, B and Jeffery, J 'The right to food in South Africa: An analysis of the content, policy effort, resource allocation and enjoyment of the constitutional right to food' (2015) Studies in Poverty and Inequality Institute, Working Paper 11.

Franklin, S and McLaren, D 'Realising the Right to Basic Education: An analysis of the content, policy effort, resource allocation and enjoyment of the constitutional right to a basic education (2015) Studies in Poverty and Inequality Institute, Working Paper 10.

Hannah Dawson & Daniel McLaren 'A Framework for Monitoring and Evaluating the Progressive Realisation of Socio-Economic Rights in South Africa' (2015) Studies in Poverty and Inequality Institute.

Hannah Dawson 'Public participation and citizen-based monitoring in realising socio-economic rights' (2014) Studies in Poverty and Inequality Institute, Policy Brief 7.

Hannah Dawson & Daniel McLaren 'Monitoring the right of access to adequate housing in South Africa' (2014) Studies in Poverty and Inequality Institute, Working Paper 8.

Khetho Lomahoza 'Monitoring the right to health care in South Africa' (2013) Studies in Poverty and Inequality Institute, Policy Brief 2.

Hannah Dawson 'Monitoring the right to social security in South Africa' (2013) Studies in Poverty and Inequality Institute, Policy Brief 1.

Hannah Dawson, Khetho Lomahoza & Tshego Monnana 'The right to social security and primary health care in Zandspruit informal settlement South Africa' (2013) Studies in Poverty and Inequality Institute.

Stephanie Brockerhoff 'A Review of the Development of Social Security Policy in South Africa' (2013) Studies in Poverty and Inequality Institute, Working Paper 6.

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Preface

The Studies in Poverty and Inequality Institute (SPII) is an independent research think tank that focuses on generating new knowledge, information and analysis in the field of poverty and inequality studies.

This working paper has been undertaken as part of the Monitoring the Socio-Economic Rights Monitoring Tool Project conducted by SPII in partnership with the South African Human Rights Commission (SAHRC).

Through a combination of policy and budget analysis and statistical indicators, the objective of the project is to provide a comprehensive constitutional and human rights based framework and set of tools to monitor the progressive realisation of socio-economic rights.

It is hoped that this project will be a useful tool for policy makers, for those that exercise oversight over the executive, including Parliament and the Chapter Nine institutions (particularly the SAHRC), and civil society. This paper in particular seeks to influence discussion and debate in relation to the fulfilment of Section 24 of the South African Constitution: the right to a healthy environment.

Acknowledgments

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Please contact Zukiswa Kota (zukiswa.kota@gmail.com) or Daniel McLaren (daniel@spii.org.za) for any questions, queries or requests, including around the data used for the paper, which we are happy to provide.

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1 Funding is facilitated by the Foundation for Human Rights which is funded by the Department of Justice and Constitutional Development and the European Union under the Sector Budget Support Programme – Access to Justice and the Promotion of Constitutional Rights

Foreword

It is an honour to write a forward to this critical dialogue regarding the right to a healthy environment. Such a dialogue grapples with human interactions with the natural world, power dynamics and social justice.

A pervasive assumption in modern western society is the separation of human systems from ecological ones. This assumption supports unrestrained "development" and economic growth coupled with environmental destruction. Such environmental destruction includes critical thresholds being crossed in climate change and biodiversity loss and 15 of the 24 ecosystem services that humans depend on being degraded, detrimentally affecting human well-being. As the horrors of such destruction become apparent this assumption of human separation from the ecological world is being challenged. There is a growing call for the recognition that human systems are integrally connected with the ecological world. And because of this integral connection harm to ecology equals harm to humanity. A report, such as this, that discusses the values, nuances and challenges of a right to a healthy environment supports this call to recognise the dependence of human systems on ecological systems.

This report also grapples with power dynamics and issues of social justice, as it is often the poor and marginalized who feel the full negative effects of environmental destruction. A telling example, provided in the report, is the social-ecological-economic nexus and tensions between these that plays out in the South Durban Industrial Basin. The basin is a hub of economic activity, local residents are characterised as poor and marginalized and it is they who suffer the negative environmental effects of such activity. Another topical example of social justice issues is based in the Tsitsa catchment of the Eastern Cape. The South African government has announced that a multi-billion Rand, large dam will be built in the area. Local residents are sceptical of the benefits resulting from this proposed dam, and negative consequences will include the significant loss of land and disruptions to social connectivity.

An example that cuts across social and economic boundaries and brings the right to a healthy environment to the fore is the proposed fracking to occur in the Karroo. While this development will undoubtedly reap substantial financial profits, it also has the potential to inflict devastating consequences on local livelihoods and human wellbeing as the integrity of the environment will be severely undermined. The effects have the potential of reaching as far as the Amathole basin through the pollution of interconnected groundwater sources.

With these examples being representative of many that express similar themes, this report provides an important reminder of the importance of equity, social justice and a healthy environment for all and of the agency of state decision-makers and individuals alike .

-Dr. Helen Fox[2]

Plate 1: A pristine area in the Wild Coast area of the Eastern Cape Province where communities have no access to piped water and electricity. Community-based ecotourism and PES projects have the potential to meaningfully contribute to local livelihoods and conservation targets (Photographer: Zukiswa Kota)

2 Helen Fox is an environmental educator on a green village project in the Tsitsa catchment in the Eastern Cape. She is currently involved in the development of an Earth School to inspire and empower people to become a beneficial presence on the earth where their presence enhances rather than degrades nature's functioning. Her doctoral research at Rhodes University's Institute for Water Research explored drivers of environmental degradation in modern society and related transformative possibilities.

Acronyms

APP	Annual Performance Plan
AMD	Acid Mine Drainage
ENE	Estimates of National Expenditure
INEPG	Integrated National Electrification Programme Grant
RIBG	Regional Bulk Infrastructure Grant
BEP	Bucket Eradication Programme
ASEAN	The Association of South East Asian Nations
COP	Conference of Parties
CPI	Consumer Price Index
DEA	The Department of Environmental Affairs
DoRA	Division of Revenue Act
EIA	Environmental Impact Plan
GEF	Global Environment Fund
GHG	Greenhouse Gas
GHS	General Household Survey
ICESCR	the International Covenant on Economic, Social and Cultural Rights
IPCC	Intergovernmental Panel on Climate Change
MDG	Millennium Development Goal
MIG	Municipal Infrastructure Grant
MTEF	Medium Term Expenditure Framework
MTSF	Medium Term Strategic Framework
NDP	National Development Plan
NEMA	National Environmental Management Act
NUSP	National Upgrading Support Programme
PES	Payment for Ecosystem Services
PM	Particulate matter
Ppm	parts per million
RDP	Reconstruction and Development Programme
RHIG	Rural Household Infrastructure Grant
SAEO	South Africa Environmental Outlook
SAHRC	South African Human Rights Commission
SANParks	South African National Parks
SDG	Sustainable Development Goal
SER	Socio-Economic Right
SPII	Studies in Poverty and Inequality Institute
StatsSA	Statistics South Africa
UNEP	United Nation Environment Programme
UNFCC	United Nations Framework Convention on Climate Change
WfW	Working for Water
WoF	Working on Fire

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CHAPTER 1

1.1 Introduction

The Constitution of the Republic of South Africa guarantees justiciable socio-economic rights (SERs), including the right to a healthy environment for everyone in South Africa.[3] Section 24(a) provides for protection of the environment towards ensuring the health and well-being of individuals, while section 24(b) concerns the forward-looking nature of the right to environment. This has important implications for the management of natural resources. In this regard the Constitution confers upon the state the duty to respect, protect, promote and fulfil environmental rights both by avoiding any activities that may result in a violation of the right as well as by engaging in activities that will result in the full realisation of the right. Sections 24(b)(i-iii) contain a range of positive obligations, which dictate that the state must be pro-active in realising environment rights. Such obligations include the adoption of progressive policies, resource allocation, planning and expenditure.

The 2nd South African Environmental Outlook Report cautions that if certain key environmental risks or 'tipping points' are not managed adequately, South Africa will be placed at considerable risk of not transitioning along a sustainable growth path but instead towards greater environmental degradation. These tipping points specifically relate to water availability, land degradation and greenhouse gas emissions.

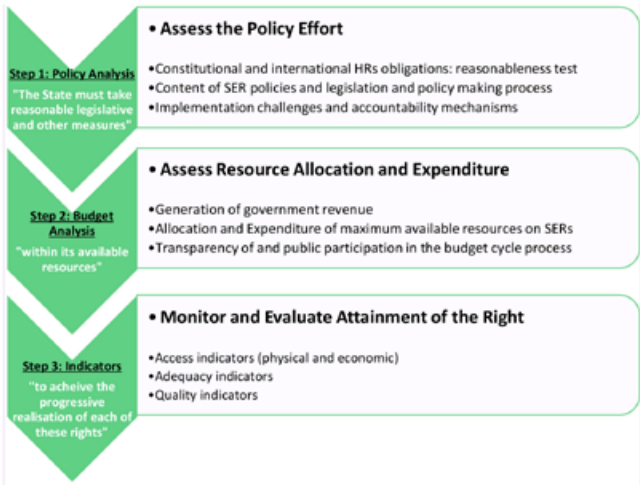
The Studies in Poverty and Inequality Institute (SPII), with the support of the Ford Foundation and Foundation for Human Rights, and in partnership with the South African Human Rights Commission (SAHRC), has therefore developed a methodology based on a combination of policy and budget analysis and statistical indicators to monitor and evaluate the progressive realisation of SERs in South Africa. This methodology developed by SPII builds on international best practice and combines various ways of monitoring SERs.

For a detailed outline of the objectives of the monitoring tool, three step methodology and anticipated use and users of the tool, please see the 2015 paper entitled 'A Framework for Monitoring and Evaluating the Progressive Realisation of Socio-Economic Rights in South Africa'.[4]

1.2 3-Step methodology

The methodology developed by SPII is based on three distinct steps (see figure below). These steps include an analysis of the *policy effort* (Step 1) and the *allocation and expenditure of resources* for specific rights (Step 2). These two steps assist in monitoring and evaluating the *attainment of rights* (Step 3) on the ground through specific outcome indicators. A summary of the three steps is provided below.

Figure 1: Summary of the 3-step Methodology



3 Constitution of the Republic of South Africa, 1996, Section 24

4 Hannah Dawson & Daniel McLaren 'A Framework for Monitoring and Evaluating the Progressive Realisation of Socio-Economic Rights in South Africa' (2015) Studies in Poverty and Inequality Institute. Available at: www.spii.org.za.

1.2.1 Step 1: Assess the Policy Effort

The first step of the analysis takes a closer look at the underlying policies and legislation guiding the realisation of SERs. This step *firstly* assesses whether the actual content of social and economic policies adequately reflects the Constitution and international treaty obligations and international standards that the state has signed or ratified.

Secondly, this step evaluates both the content and implementation of existing legislation, policy frameworks and government programmes to assess what gaps (in principle and in practice) exist. This assessment is based on a human rights framework that includes non-discrimination, gender sensitivity, dignity, participation, transparency and progressive realisation.

An important component of evaluating the policy effort is an assessment of the policy making process in terms of transparency and public participation in decision-making by relevant civil society organisations and communities specifically affected by the policy under review. Another important dimension is to analyse departmental responsibilities and institutional arrangements to assess the capacity challenges and accountability mechanisms currently in place.

1.2.2 Step 2: Assess Resource Allocation & Expenditure

The second step assesses the reasonableness of the budgetary priorities in light of the obligations on the state and human right principles and standards. This requires an analysis of *first*, the generation of government revenue.

S*econd*, an analysis of the allocation and expenditure of such resources to reduce disparities, prioritise the most vulnerable and disadvantaged groups, and progressively realise SERs. This step uses various budget analysis techniques to monitor *planned* (i.e. budget allocations) and *actual* resource expenditures at both national and provincial levels and therefore assesses the delivery and implementation of government policy and programmes as they relate to the realisation of rights.

Third, an analysis of the budget cycle process from the perspective of human rights principles of participation, non-discrimination, transparency and accountability. An assessment of resource availability cannot be separated from an analysis of institutional arrangements, human resources and local capacity which are necessary for the efficient and effective spending of budgets.

1.2.3 Step 3: Monitor and Evaluate Attainment of SERs

The third step measures the enjoyment of rights by rights holders and therefore monitors and evaluates the state's obligation to fulfil the realisation of SERs. This step evaluates the state's performance via the development of statistical indicators which provide a clearer and more specific illustration of SERs enjoyment on the ground over time. The outcome indicators make reference to the three dimensions of access (physical and economic), quality and adequacy over time. This requires that quantifiable and replicable indicators (proxies for the different dimensions of SERs) be developed along with agreed benchmarks and targets.

The indicators need to be aligned to data that is freely and easily available in annual surveys and data sets, and must be capable of being decomposed (disaggregated) by region, race, gender and age – wherever possible and useful. This allows disparities between, for example, different population groups or geographical regions to be identified, and an assessment of the extent to which progress has been made over time.

1.3 Objectives of Monitoring tool

The 3-step methodology provides a comprehensive framework from which to monitor and assess progress made to date. The purpose of the tool, however, goes beyond constitutional compliance and aims to achieve specific objectives:

1. Clarify and unpack the content of the SERs and the obligations on the state to ensure access to and enjoyment of SERs is continuously broadened.

2. Determine the extent to which organs of the state have respected, protected, promoted and fulfilled their obligations. This involves identifying achievements, deprivations, disparities, and regression to illuminate both causation and accountability in terms of policies, resources spent, implementation and institutional capacity.

3. Provide evidence for advocacy initiatives and legal interventions, and make recommendations that will ensure the protection, development and universal enjoyment of SERs.

By applying the 3-step methodology, this paper provides a comprehensive analysis of the status of the right to a healthy environment in South Africa.

Chapter 2 of this report explores the content of the right to healthy environment and then outlines key policy and legislative developments.

Chapter 3 provides an assessment of the allocations and spending performance of the Department of Environmental Affairs primarily at the national level, as well as related municipal grants as a means of interrogating the adequacy, efficiency and effectiveness of government's budgeting for the right to healthy, protected environment.

Chapter 4 provides an explanation of the process of developing performance and impact indicators that can be tracked and monitored over time and a discussion of what these indicators tell us.

Chapter 5 combines the policy and budget analysis with evidence from indicators. This chapter provides an overall analysis of the status of the right to a healthy environment along with key recommendations aimed at contributing to enhancing steps towards the fulfilment of the right to a safe, healthy environment that is protected for present and future generations.

CHAPTER 2

Defining the content of the right to a healthy environment

2.1 The South African Context

South Africa is within the top five largest economies on the African content, having recently been rated as the third largest economy after Nigeria and Egypt.5 The country is also listed amongst the world's richest areas in terms of its biodiversity; being one of seventeen 'megadiverse' countries. This list of countries possesses less than 10% of the earth's surface despite supporting more than 70% of terrestrial biological diversity.[6] This impressive economic and ecological context belies a complex socio-political history. The damage done by the policies of the racist apartheid government are keenly felt throughout South Africa, even 22 years after the advent of democracy.

The human rights landscape in South Africa is informed by the legacy of a system that systematically ignored the fundamental rights of the majority of its people. One of the key objectives of the apartheid government, for instance, centred on a separate development ideology that, unlike in many other countries with similar policies, was also supported by strict legislation. As a consequence, the most socio-economically vulnerable (black majority) were disproportionately affected and forced to inhabit degraded environments that were also devoid of basic amenities such as sanitation, water, housing and waste removal. In many areas unsustainable land use practices resulting from conditions of overcrowding and resource deprivation further exacerbated the degradation of the natural environment.[7] Unsustainable stocking rates combined with highly erodible soils and the dynamics inherent to communal land tenure had a heavy environmental impact (Meadows & Hoffman, 2003 in Bhorat *et al.* 2014).

In addition to this, marginalized rural communities were particularly prone to illnesses resulting from the use of fuelwood and other forms of energy with adverse environmental and respiratory impacts. The rich natural wealth of South Africa was directed almost completely towards enhancing the lifestyles of a minority, and resources were extremely unequally distributed with the majority of the people confined to 13% of the land by the Natives Land Act of 1913. Developments during apartheid were focused on resource extraction and were highly unsustainable (Fox & Rowntree 2000). According to the Department of Health (2013:10); "… *the health of poor urban people in South Africa is threatened more by environmental degradation caused by others than by lifestyle choices*." It is also worth highlighting that some of the major risk factors include air pollution, poor sanitation and hygiene, disease vectors chemical hazards and inadequate access to safe drinking water (Department of Health 2013).

The historical context shaping current South African environmental legislation is not only long (spanning hundreds of years of colonial and apartheid hegemony), but also complex. Various forms of natural conservation policies existed alongside laws enforcing inequality in access to and enjoyment of the country's natural resources. Rabie (1991 in Fox & Rowntree 2000) sites examples of water pollution legislation in South African common law as early as 1652 and the proclamation of conservation areas in the former Cape Colony and Transkei areas from 1888.[8] The progression of South African environmental legislation after World War 2 till 1970, according to Fox and Rowntree (2000), includes key watershed moments for the protection of natural resources in South Africa and globally.

With the advent of democracy came the recognition that the right to environment was a right long denied to the vast majority of South Africans. Section 24 of the South African Constitution

5 KPMG South Africa. May 2016. South African Economy not the Second largest in Africa Anymore www.sablog.kpmg.co.za/2016/05/south-africa-slips-to-third-largest-economy-on-the-continent/
6 Conservation International 2016
7 Department of Environmental Affairs and Tourism. 1996, Green Paper on Environmental Policy for South Africa: Green Paper for Public Discussion October 1996.
8 Van der Linde and Feris (2010) emphasise that the regulation and protection of the environment are relatively new notion in South African law despite the continued provisions of certain aspects of environmental protection through common law.

therefore made the protection of the environment an important part of rectifying the unjust policies of the past. However, the task of ensuring that all have the right to an environment that is healthy, promotes wellbeing and supports development in a sustainable way is met with many challenges. This has meant that the people who are socio-economically vulnerable are also the most likely to be adversely affected by climate change, unhealthy environments and polluted living and working conditions. The poor provision of electricity and infrastructure requires many to still rely on dangerous and polluting wood, coal and gas fires for light, cooking and warmth.[9] South African economic reliance on resource extraction which requires dangerous and exhausting manual labour that is directly damaging to the environment combines with household pollution. This means that despite its relatively small population, South Africa is one of the world's top 20 emitters of greenhouse gasses (GHGs).[10] Additional issues associated with primary resource extraction include long term environmental problems such as overuse and subsequent pollution of water, acid mine drainage, and the need to dispose of large quantities of toxic materials.

Finally, the overwhelming need for social and economic development has led government to prioritise economic and social development at the expense of environmental concerns. The result of these priorities is that the average South African's ecological 'footprint' (a measurement of the impact on the environment) of 2.8 global hectares (gha) is greater than the world average by 0.6gha and the African average of 1.6gha.[11] The right to environment is thus a present and pressing issue for large numbers of South Africans. Without a healthy and pollution free environment, it is impossible for South Africans to enjoy many of their most basic rights. This was a fact clearly articulated with the introduction of post-apartheid environmental policy. The National Environmental Act (NEMA) Act 107 of 1998 stipulates that:

"…inequality in the distribution of wealth and resources, and the resultant poverty, are among the important causes as well as the results of environmentally harmful practices" (NEMA Act 107 of 1998, Preamble)

9 Balmer, M. Household coal use in an urban township in South Africa, Journal of Energy in Southern Africa, Vol. 18, No. 3, August 2007: pp 27-32 www.npconline.co.za/MediaLib/Downloads/Home/Tabs/Diagnostic/MaterialConditions2/Household%20coal%20use%20in%20an%20urban%20township%20in%20South%20Africa.pdf

10 Nahman A, Wise R and de Lange, W. 2009. Environmental and resource economics in South Africa: Status quo and lessons for developing countries, South African Journal of Science 105(No. 9-10), September/October 2009: pp. 350-355.

11 Ibid.

Brief Case Study: South Durban Industrial Basin

Brief Case Study: South Durban Industrial Basin

The South Durban Industrial Basin (SDB) has over 100 factories that make up 50% of the city's industrial land. The SDB contributes to 40% of Durban's gross domestic product and refines 60% of South Africa's petroleum. South African Petroleum Refineries (SAPREF) (a joint venture between Shell Refining SA and BP Southern Africa) is located in the SDB and is "the largest crude oil refinery in South Africa with 35% of South Africa's refining capacity". Waste water treatment works, numerous chemical process industries, and a paper manufacturing plant are also located in this area. The SDB is of prime importance to Durban and South Africa's economy.

During the 1950s, the Group Areas Act saw Indian, Black and Coloured families forcibly moved into close proximity to the industries in the SDB as a cheap source of labour. The area has since become a thriving and close-knit community and currently has "at least 5000 businesses, 22 000 households and 200 000 residents". However, unemployment and its associated social ills is high. The SDB community also has "respiratory illnesses… clearly elevated compared to other areas", with a "leukaemia rate 24 times the national average", where "about 10% of the children and 12% of adults" were diagnosed with asthma, and with 53.5% of learners at one of the schools (Settlers Primary School) suffering from "some type of asthma". The SDB is "one of the most heavily polluted areas of South Africa" and a study in 2013 showed levels of Nitrogen Dioxide (NO2) and Nitrogen Oxide (NO) far higher in the SDB than in the north of Durban, and with the highest Sulphur Dioxide (SO2) levels in South Africa. Severe negative health consequences are attributed to this pollution.

With the pollution levels dangerously high, the communities' right to environment, particularly their right to an environment that promotes health and wellbeing, is seriously compromised on a daily basis. Community organisations such as the South Durban Community Environmental Alliance (SDCEA) have engaged with government, the media and industry and had some success in raising awareness and reducing pollution. However, the lack of proper regulation and effective government action has led to industry failing to adhere to regulatory legislation (such as the Air Pollution Prevention Act). There is also an acceptance that pollution is not the only challenge faced; high unemployment, drug use, poverty and poor hygiene are also significant issues.

The SDCEA, local government and industry representatives interact, and the South Durban Basin Area Based Management and Development Programme has shown some successes. However significant problems persist.

The South Durban Industrial Basin provides a telling example of the complex issues surrounding the right to environment: the area is a significant economic and industrial part of South Africa, but people suffer severe health problems as a result of this industrial activity.

2.3 Legal Interpretation, International Frameworks and Constitutional and International Treaty Obligations

The concept of a right to environment is a latecomer to the human rights discourse, having only gained prominence as a right in itself after the 1960's.[12] As such, most international instruments developed before then do not explicitly refer to the right to environment. Nevertheless, human rights have been interpreted in a manner that recognises the right to environment. For instance, the International Covenant on Economic, Social and Cultural Rights (ICESCR) of 1976 notes that state parties must "*recognise the right of everyone to an adequate standard of living for himself and*

12 United Nations Office of the High Commissioner for Human Rights, United Nations Report of the Independent Expert on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment, John H. Knox www.ohchr.org/documents/hrbodies/hrcouncil/regularsession/session22/a-hrc-22-43_en.pdf

his family, including adequate food, clothing and housing, and to the continuous improvement of living conditions".[13] The argument is often held that the right to a healthy environment should be included in this list.[14] This is based on the premise that a healthy environment is essential for the attainment of an adequate standard of living. Additionally, environmental rights are most often articulated in relation to public health. Further, protection of the environment is seen as an essential component of human survival and development.[15] Article 12 (1) of the ICESCR states that everyone has the right to enjoy the "*highest attainable standard of physical and mental health*", whereas Article 12(2)(b) notes that full realisation of the right to sound physical and mental health can be realised through "t*he improvement of all aspects of environmental and industrial hygiene*".[16] Similarly, Article 3 of the Universal Declaration of Human Rights (1948)[17] states that "*Everyone has the right to life, liberty and security of person*", while article 25(1) of the same convention recognises that everyone has the right "*to a standard of living adequate for health and well-being of himself and his family*".

The notion of the right to environment as a human right was entrenched by the landmark United Nations Conference on the Human Environment, held from 5 to 16 June 1972 in Stockholm, Sweden. Based on deliberations and commitments made, the Conference released a declaration, commonly referred to as the Stockholm Declaration. The Declaration confirms the environment as essential to human well-being and the enjoyment of basic human rights such as the right to life itself. Principle 1 notes that,

"[m]an[18] has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being, and he bears a solemn responsibility to protect and improve the environment for present and future generations…"[19]

Not only is there a right to a satisfactory environment, but also a responsibility to protect the environment for future generations through inter-generational equity. The forward-looking feature of the right to environment makes it distinct from most other human rights. Its forward-looking nature is important given that most environmental rights are based on non-renewable resources and failure to protect the resources applicable to the right would mean that future generations are unable to access the right. Principle 20 confirms the importance of "*scientific research and development in the context of environmental problems*" and further, that states must support and assist the "*free flow of up-to-date scientific information and transfer of experience*", the goal of which is to address environmental challenges.[20] The Principle is relevant here given the importance of having access to valid and reliable information, both towards resolving environmental problems, and to measure realisation of the right to a healthy environment, over time.

On a global level, the World Conservation Strategy of 1980 was undoubtedly amongst the most important milestones relating to conservation. This document highlighted the importance of resource conservation through 'sustainable development' as well as the notion of the inextricable nature of development and conservation (Palmer & Neal 1994). According to du Plessis (2009), the African Charter on Human and People's Rights, 1986[21] was the first international instrument to unambiguously distinguish the right to a generally satisfactory environment as a human right.[22] Article 24 of the African Charter confers on everyone "*the right to a general satisfactory environment favourable to their development*." The 1988 Additional Protocol to the American Convention on Human Rights in the Area of Economic, Social and Cultural Rights (Protocol of San Salvador), Article 11(1) also mentions the right to an environment, stating that "*everyone shall have the right to live in a healthy environment*".[23] In addition, Article 18 of the 2003 Protocol

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13 International Covenant on Economic, Social and Cultural Rights, New York, 3rd January 1976 www.ohchr.org/EN/ProfessionalInterest/Pages/CESCR.aspx

14 United Nations Office of the High Commissioner for Human Rights, United Nations Report of the Independent Expert on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment, John H. Knox www.ohchr.org/documents/hrbodies/hrcouncil/regularsession/session22/a-hrc-22-43_en.pdf

15 United Nations General Assembly (UNGA), Analytical Study on the Relationship between Human Rights and the Environment: report of the United Nations High Commissioner for Human Rights, A/HRC/19/34 (16 December 2011) www.ohchr.org/Documents/HRBodies/HRCouncil/RegularSession/Session19/A-HRC-19-34_en.pdf

16 International Covenant on Economic, Social and Cultural Rights (ICESCR) (3 January 1976) www.ohchr.org/en/professionalinterest/pages/cescr.aspx. South Africa ratified this convention in 2015.

17 United Nations Office of the High Commissioner for Human Rights, The United Nations Universal Declaration of Human Rights (1948) www.ohchr.org/en/udhr/documents/udhr_translations/eng.pdf

18 The gender specific language of this Declaration is an unfortunate result of social and cultural mores of this time period.

19 United Nations Environment Programme, Declaration of the United Nations Conference on the Human Environment (Stockholm Declaration) 1972 www.unep.org/Documents.Multilingual/Default.asp?documentid=97&articleid=1503

20 Ibid.

21 Ratified by South Africa on the 9th of July 1996.

22 Du Plessis, A (2009), *Fulfilment of South Africa's Constitutional Environmental Right in the Local Government Sphere*. The Netherlands: Wolf Legal Publishers.

23 Additional Protocol to the American Convention on Human Rights in the Area of Economic, Social and Cultural Rights ("Protocol of San Salvador"). Available at: www.refworld.org/docid/3ae6b3b90.html.

to the African Charter on Human and Peoples' Rights on the Rights of Women in Africa[24] (which South Africa ratified on the 17th of December 2004) declares that women "*shall have the right to live in a healthy and sustainable environment"* and confers on women *"the right to fully enjoy their right to sustainable development*".[25]

Twenty years after Stockholm, the United Nations Conference on Environment and Development was held in Rio de Janeiro. At this event, more than 178 governments adopted the Rio Declaration as well as Agenda 21.[26] Glazeweski (2005) notes that the Rio Declaration, which comprises 27 principles based on sustainable development, reconfirmed the principles contained in the Stockholm Declaration.[27] The principles also include the right to public environmental information and public participation, the development of liability rules, the precautionary principle, 'the polluter pays' principle, the principle of environmental assessment, and others.[28] The principles also state that development must occur so as to equitably meet the "*needs of present and future generations*" in language similar to Section 24 of the Constitution.[29] Further environmental protection is recognised as being "*integral… and cannot be considered in isolation from development*".[30] In this manner, to undertake sustainable development is to protect the environment. The need for the representation of vulnerable groups (such as women, the youth, and disadvantaged persons) in environmental decision making is also mentioned.[31] Lastly, Agenda 21 is a plan of action to facilitate implementation of the right to a healthy environment.[32]

Goal 7 of the Millennium Development Goals which was aimed specifically at ensuring environmental sustainability has now been replaced by a host of more elaborate, explicit Sustainable Development Goals (SDGs). These include SDG 6 (clean water and sanitation), SDG 7(clean and affordable energy), SDG 11 (sustainable cities and communities) SDG 12 (responsible production and consumption), SDG 14 ('life below water'), SDG 13 (Climate action), SDG 15 ('life on land').[33] The indicators used to measure the extent to which states achieved this target include the energy use from renewable and non-renewable sources, per capita carbon dioxide emissions, population with access to sanitation and water, ecological footprint and biodiversity. While the SDGs have been implemented for less than a year at present, the Millennium Development Goals Country Report (2013) shows, that although statistics are available for some portions of Goal 7, purely natural environment related statistics are lacking in some areas.[34] This challenge may become considerably greater given the ostensibly more comprehensive SDGs.

In addition to the instruments discussed above, there are a number of other international instruments that entrench the right to a healthy environment. These include, *inter alia*, the Convention on the Rights of the Child (CRC), United Nations World Charter for Nature of 1982, the United Nations World Commission on Environment and Development (WCED) Report on Sustainable Development (Brundtland Report) of 1987,[35] the United Nations Vienna Declaration and Program of Action (1993), and the Convention on Biological Diversity (CBD) and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), both of which South Africa has ratified.[36]

Transboundary pollution is also a significant issue, with pollution and unsustainable resource extraction in one state potentially negatively impacting on other states.[37] There are numerous treaties, conventions and regulations on transboundary pollution, including the Geneva Convention on Long-range Transboundary Air Pollution (1979), the Harare Resolution on

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24 African Commission on Human and Peoples' Rights, Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women in Africa www.achpr.org/files/instruments/women-protocol/achpr_instr_proto_women_eng.pdf.

25 Ibid.

26 United Nations Environment Programme, The United Nations Conference on Environment and Development, which was held in Rio de Janeiro, Brazil on 3-14 June 1992. www.unep.org/Documents.Multilingual/Default.asp?DocumentID=78&ArticleID=1163.

27 Glazeweski, J. (2005), *Environmental Law in South Africa*, 2nd edn. Durban: LexisNexis Butterworths.

28 Ibid.

29 United Nations Environment Programme, The United Nations Conference on Environment and Development, which was held in Rio de Janeiro, Brazil on 3-14 June 1992. www.unep.org/Documents.Multilingual/Default.asp?DocumentID=78&ArticleID=1163.

30 Ibid.

31 Ibid.

32 Ibid.

33 United Nations Development Programme (UNDP). Undated. The Sustainable Development Goals. www.undp.org/content/undp/en/home/librarypage/corporate/sustainable-development-goals-booklet.html.

34 United Nations Development Programme (UNDP), The National Coordinating Committee for the Millennium Development Goals, *Millennium Development Goals Country Report 2013* www.za.undp.org/content/dam/south_africa/docs/Reports/The_Report/MDG_October-2013.pdf. In particular see statistics related to proportion of land area and natural habitat.

35 South Africa was not one of the 21 representatives forming part of the Commission.

36 See du Plessis, 2009, pp: 48-56 (same as note 6 above) and Glazeweski, 2005, pp.29-63 for extensive discussion of relevant international instruments. Also, see South African Human Rights Commission (SAHRC), 7th Report on ESR, 2006-2009.

37 See Hanqin, X., *Transboundary Damage in International Law* http://catdir.loc.gov/catdir/samples/cam033/2002067377.pdf.

Prevention and Control of Regional Air Pollution in Southern Africa and its Likely Transboundary Effects (1998), the Association of Southeast Asian Nations (ASEAN) Agreement on Transboundary Haze Pollution (2002). Unfortunately, measuring this form of pollution is extremely difficult. It had been hoped that this report would be able to provide indicators addressing transboundary pollution; however there was insufficient data available to adequately measure this issue.

Finally, the United Nations Declaration on the Rights of Indigenous Peoples, Article 32(3) specifies that states must "*provide effective mechanisms*" to ensure justice for adverse environmental impacts on indigenous communities, and Article 29(1) protects the environmental rights of indigenous peoples.[38] The UN Food and Agriculture Organisation (FAO) further highlights the complex nature and potential breach of these communities' forest rights resulting from conventional government legislation in various countries.[39] In South Africa, the CSIR recognises the important role played by ecosystem services in poverty alleviation. One such intervention is the Department of Environmental Affairs' Working for Water Programme.[40]

Table 1: List of Key International Treaties and Conventions[41]

Treaty or Convention	Place and Date
Agenda 2030 for Sustainable Development	New York, 25th September 2015
The Convention on Wetlands of International Importance, Especially with Respect to Waterfowl Habitat (the Ramsar Convention)	Ramsar,2nd February 1971
The Convention on Fishing and Conservation of Living Resources of the High Seas	Geneva, 29th April 1958
The Treaty Banning Nuclear Weapons Tests in the Atmosphere, Outer Space and Under Water	Moscow, 5th August 1963
The Agreement Concerning Rivers of Mutual Interest Between Portugal, Mozambique, Swaziland and the Republic of South Africa	13th October 1964
The International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties	Brussels, 23rd November 1969
The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter	London, Mexico City, Moscow 29th December 1972
The Vienna Convention on the Protection of the Ozone Layer	Vienna, 22nd March 1985
The Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)	Washington, 3rd March 1973
The Montreal Protocol on Substances the Deplete the Ozone Layer	Montreal, 16th September 1987
The Convention on Biological Diversity	Rio de Janeiro, 5th June 1992
The Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal	Basel, 22nd March 1989

2.4 The Constitution

The South African Constitution provides various guiding frameworks for the provisioning and promotion of a clean, safe and healthy environment. It entrenches substantive environmental rights. Section 24 of the Bill of Rights states that everyone has the right –

a) *to an environment that is not harmful to their health or well-being; and*

b) *to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that –*

i. *prevent pollution and ecological degradation;*

38 United Nations, *The United Nations Declaration on the Rights of Indigenous Peoples* **www.un.org/esa/socdev/unpfii/documents/DRIPS_en.pdf**.
39 UN FAO 2000
40 The Council for Scientific and Industrial Research (CSIR). 2007. Ecosystem Services Delivery www.csir.co.za/nre/ecosystems/.
41 Adapted from Fox & Rowntree 2000 with some updated information.

ii. *promote conservation; and*

iii. *secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.*

Section 24(a) provides for protection of the environment towards ensuring the health and well-being of individuals, while section 24(b) concerns the forward-looking nature of the right to environment, which has important implications for the management of natural resources. Section 24, read with Section 7 of the Bill of Rights, confers upon the state the duty to respect, protect, promote and fulfil environmental rights. The state therefore has both negative obligations (must desist from any conduct that may result in a violation of the right) and positive obligations (to engage in activities that will result in the full realisation of the right) in respect of environmental rights. Sections 24(b)(i-iii), contain a range of positive obligations, which dictate that the state must be pro-active in realising environment rights. In accordance, du Plessis notes that section 24(b) provides an "*unambiguous, positive mandate directed at the legislative, executive and judicial branches of government*".[42] This has bearings on the horizontal and vertical applications of the right. This feature of the right to environment is particularly significant given the role that private actors play in economic development, which often occurs at the expense of environmental protection. The state therefore has a responsibility to provide access to remedies in case of violations, regardless of whether the violation results from actions of private actors or the state itself. As with all rights, it is important to note that the right to environment is read in the context of Section 9 of the Constitution and therefore respects the need for non-discrimination and equality. The Constitution also outlines responsibilities in terms of ensuring the delivery of services for a clean, healthy environment for all. Section 152, for instance, stipulates local government obligations. This must be read alongside the key sections in the Municipal Systems Act 32 of 2000 as it also has important implications for budget allocations and programme implementation.

2.5 Constitutional Jurisprudence

While there have been a number of environmental cases decided by the courts, most cases have had a small component of the environment, often with greater focus on associated rights such as water, land or housing. Generally, courts have heard cases directed towards the right to environment in relation to development.

- *Fuel Retailers Association of South Africa (Pty) Ltd vs. Director-General Environmental Management Mpumalanga and Others*[43]

The Constitutional Court's consideration of this case serves mainly to highlight the importance of sustainable development as a means by which the right to environment should be considered. With Chief Justice Ngcobo presiding, the Court considered the question of social and economic development and the environment. It stated that economic and social development is necessary for the "*well-being of human beings*", but that such development would not be sustainable without a healthy environment. In this manner, "*the environment and development are thus inexorably linked*".[44]

In *Minister of Public Works and Others vs. Kyalami Ridge Environmental Association and Others [2001]*[45]

The Constitutional Court (Chief Justice Chaskalson presiding) was unwilling to enforce the environmental protection aspects of National Environmental Management Act (NEMA) against the government's response to emergency housing for flood victims. While reiterating that government departments "*must carry out… environmental implementation and management plans*", the Court nevertheless effectively ruled that the right to (even temporary) housing was more urgent than the right to environment.[46] More significantly, the Court determined that the

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42 Du Plessis, A (2009), *Fulfilment of South Africa's Constitutional Environmental Right in the Local Government Sphere*. The Netherlands: Wolf Legal Publishers.

43 Fuel Retailers Association of Southern Africa v Director-General: Environmental Management, Department of Agriculture, Conservation and Environment, Mpumalanga Province and Others 2007 (10) BCLR 1059 (CC). www.saflii.org/za/cases/ZACC/2007/13.html.

44 Fuel Retailers Association of Southern Africa v Director-General Environmental Management, Department of Agriculture, Conservation and Environment, Mpumalanga Province and Other www.constitutionalcourt.org.za/uhtbin/cgisirsi/2vQadOouUz/MAIN/129560026/9#top.

45 Minister of Public Works and Others vs. Kyalami Ridge Environmental Association and Others 2001 (7) BCLR 652 (CC) www.saflii.org/za/cases/ZACC/2001/19.pdf.

46 Minister of Public Works and Others vs. Kyalami Ridge Environmental Association and Others 2001 (7) BCLR 652 (CC) www.saflii.org/za/cases/ZACC/2001/19.pdf.

provisions for environmental management (including the need to ensure development that is environmentally sustainable) found in Section 2 of NEMA were limited to the "*drafting and adoption of… environmental implementation and management plans, rather than to controlling the manner in which organs of state use their property*".[47]

In addition, the Court interpreted the requirement for an assessment on the impact on the environment to be conducted when the activity "will" affect the environment instead of "may", further weakening NEMA.

In *Government of the Republic of South Africa and Others vs. Grootboom [2000]*[48]

The Constitutional Court ruled that SERs are pressing, and that the state does have an obligation to fulfil such rights. However, the Court further ruled that SERs are subject to progressive realisation in accordance with the principle of 'reasonableness' and available resources. As the right to environment is a socio-economic right, this ruling would appear to directly impact on the realisation of this right, potentially delaying its implementation by the state in 'reasonable' cases. Although specifically focusing on the right to housing, the court declared that "*it is not possible to determine the minimum threshold for progressive realisation… without first identifying the needs and opportunities for the enjoyment of such a right*".[49] The Court therefore did not supply a definition of minimum-core, apart from to state that such a determination would require a large amount of research, and differ from one context to the next.

It is important to mention that, unlike other socio-economic rights, the Constitution does not include a stipulation concerning progressive realisation with regards to the right to environment. Therefore, although the right to environment is generally regarded as a socio-economic right, the judgements in the *Grootboom* case on the reasonableness of state's inaction with regards to the resources for the provisioning of this right may not be wholly applicable. The issue of progressive realisation and the right to environment should be more extensively explored by the courts.

In *Company Secretary of ArcelorMittal South Africa vs. Vaal Environmental Justice Alliance [2014]*[50]

The Supreme Court of Appeal ruled that the historical information owned by companies relating to their operational and strategic approach to the protection of the environmental must be made available as per Section 50(1) of the Promotion of Access to Information Act (PAIA) (No. 2 of 2000). Further, the Court recorded that corporations "*must be left in no doubt that in relation to the environment… there is no room for secrecy and that constitutional values will be enforced*".[51]

In *Soobramoney vs. Minister of Health (Kwazulu-Natal) [1997]*[52]

The Constitutional Court's judgement in this matter impacts on the state's obligation to provide for socio-economic rights. Chaskalson (presiding judge) ruled that the state's inability to provide treatment for Soobramoney (an unemployed, terminally ill man) did not violate his rights in terms of Section 27(3) (the right to emergency medical care) of the Constitution, as his required treatment was chronic. Instead, the Court ruled that the state's obligation in terms of Section 27(1) and (2) to provide health care was restricted by available resources. Therefore, the state should not be expected to provide for the immediate satisfaction of socio-economic rights in a non-emergency situation, where resources are not available to do so in a manner consistently across South Africa.

The Court defined an emergency as an "*occurrence that was sudden*" with "*no opportunity of making arrangements in advance*", with "*urgency*" and "*immediate remedial treatment…in order to stabilise*" the occurrence in question.[53] In terms of the right to environment, this judgement shows that the alleviation of non-immediate threats to natural and human health may be limited by government resources. However, the interpretation of this judgement to allow government not to remedy environmental rights issues by claiming a lack of resources is only applicable if

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47 Minister of Public Works and Others vs. Kyalami Ridge Environmental Association and Others 2001 (7) BCLR 652 (CC) www.saflii.org/za/cases/ZACC/2001/19.pdf p 43.
48 Government of the Republic of South Africa and Others vs. Grootboom (Grootboom) 2001 (1) SA 46 (CC), 2000 (11) BCLR 1169 (CC) www.saflii.org/za/cases/ZACC/2000/19.pdf.
49 Government of the Republic of South Africa and Others vs. Grootboom (Grootboom) 2001 (1) SA 46 (CC), 2000 (11) BCLR 1169 (CC) www.saflii.org/za/cases/ZACC/2000/19.pdf pp 26 – 27.
50 Company Secretary of ArcelorMittal South Africa vs.Vaal Environmental Justice Alliance (69/2014) www.saflii.org/za/cases/ZASCA/2014/184.pdf.
51 Ibid p32.
52 Soobramoney vs. Minister of Health (Kwazulu-Natal) www.saflii.org/za/cases/ZACC/1997/17.pdf.
53 Ibid p11-13.

the right to environment is subject to progressive realisation. As has been mentioned previously, the right to environment is not limited in this manner by the Constitution.

A clear and authoritative constitutional ruling of the definition of the right to environment with regards to progressive realisation is necessary in order for the right to environment to be properly understood and protected.

In *The State vs. Blue Platinum Ventures PTY LTD and Matome Samuel Maponya [2015]*54

Although only a magistrate's court, the decision of the court is significant in that it was the first time an executive of a company was held criminally liable for environmental damage. The sentence was passed down, and the precedent it set may be used in future court decisions related to the environment.

Defining the Content of the Right

The exact meaning of the right to environment as contained in section 24 of the Constitution remains unclear and elusive. Kotze and du Plessis (2009) argue that "*section 24(a) is exceptionally broad, and notions of "environment", "health" and "well-being" are each loaded with probable meaning*".[55] Internationally, there is also the perception of a need for greater clarification and study on what defines the relationship between human rights and environmental protection.56 Although section 24(b)(i-iii) is clearer on what positive steps the state must take to realise the right to an environment that is conducive to the health and well-being of individuals, it lacks clarity on the scope and reach of what it means to "*promote conservation*" or "*secure ecologically sustainable development*". The Constitution's relative lack of clarity is a potential source of contestation. However, it does allow significant scope for the courts to interpret environmental rights, particularly as they relate to vulnerable groups. In this sense, the definition of environmental rights in the South African context is still evolving.

The Constitution does not state that the right to environment is subject to progressive realisation. However, it is important to emphasise the interconnectedness of all economic and social rights, including the right to a healthy environment. Further, there are elements of the right to environment which need to be addressed immediately, such as those which directly impact on human health, but which cannot reasonably be resolved without lengthy consultations and expense. Instances such as those which directly impact upon an individual's right to health in their living or working environment should be addressed as soon as possible. Where these instances constitute an emergency situation government must act immediately.

The vague and broad notions of environmental rights as contained in section 24 have serious implications for the planning, implementation and development of policies aimed at protecting the environment. Section 24 is helpful in this regard as it provides guidance on how the state can positively realise the right to environment. In particular, the state must put "*reasonable legislative and other measures*" in place. The courts have not yet defined reasonable legislative measures or what these other measures may entail in terms of this particular right, other than to say in *Soobramoney v Minister of Health* that a lack of resources is a valid reason for non-provision of rights in some circumstances.[57] However, in contrast to other socio-economic rights, the fulfilment of the right to environment is not constitutionally subject to the reasonableness clause. The consequences of this have yet to be adequately considered by the Constitutional Court. The right is also subject to a number of general limitations contained in Section 36 of the Constitution.

Although a comprehensive definition of the right to environment is not available, the key aspects of the right include a healthy environment not detrimental to wellbeing and the concept of sustainable development, and inter and intra-generational equity.[58]

The concept of 'wellbeing' is linked to health but is somewhat vague and harder to define; it can be said to disturb an individual without inflicting direct harm upon their health. For instance,

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54 The State vs. Blue Platinum Ventures PTY LTD and Matome Samuel Maponya http://cer.org.za/wp-content/uploads/2014/04/S-v-BLue-Platinum-Ventures-16-Pty-Ltd-and-others-_-sentencing.pdf.

55 Kotze LJ and du Plessis A (2009), Some Brief Observations on Fifteen Years of Environmental rights Jurisdiction in South Africa. http://law.pace.edu/sites/default/files/IJIEA/jciKotze_South%20Africa%203-17_cropped.pdf.

56 Office of the High Commissioner for Human Rights, United Nations Report of the Independent Expert on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment, John H. Knox www.ohchr.org/documents/hrbodies/hrcouncil/regularsession/session22/a-hrc-22-43_en.pdf.

57 Kotze LJ and du Plessis A (2009), Some Brief Observations on Fifteen Years of Environmental rights Jurisdiction in South Africa http://law.pace.edu/sites/default/files/IJIEA/jciKotze_South%20Africa%203-17_cropped.pdf,

58 Office of the High Commissioner for Human Rights, United Nations Report of the Independent Expert on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment, John H. Knox www.ohchr.org/documents/hrbodies/hrcouncil/regularsession/session22/a-hrc-22-43_en.pdf.

a judge in the Eastern Cape High Court59 declared that a "*stench*" in the working environment was harmful to wellbeing. The relatively vague definition of wellbeing has had consequences for the creation of indicators as it is sometimes hard to determine what aspect of wellbeing an indicator could be used to measure.

Health is both a quantitative and qualitative issue, however in terms of the right to environment, health impacts tend to be more focused on the negative effects caused by toxic pollution. For this reason, the indicators provided do consider certain human health related measurements. However, it was a challenge to attempt to include health indicators while still remaining focused on the environment.

There are minimum standards of air and water quality (for instance) that the government must enforce to ensure the right to environment is not violated.[60] An essential question is to what extent the state must act in a non-emergency situation, when acting would require a significant reallocation of resources.[61] However, basic indicators such as human health, access to water, food and sanitation must also be considered and are therefore represented in the indicators included in this report. Further to this, policies concerning the connection between human wellbeing and environmental health would be incomplete without an acknowledgement of ecosystem services.[62] Adding to this complexity is the extent to which these ecosystem services which are connected to the right itself can be adequately quantified and valued.

Sustainable development is mentioned in the Brundtland Report[63] and in Section 24 of the Constitution. It is defined as development that caters to current needs, whilst preserving the ability of future generations to meet their needs. Sustainable development is thus firmly linked to inter and intra-generational equity which requires that current and future generations are able to equitably enjoy natural resources. Therefore, to develop unsustainably and damage the environment prejudices the rights of future South Africans and is a clear violation of their rights as stated in Section 24 of the Constitution.

Finally, it must be recognised that as much as the right to environment is a South African concern, the complete fulfilment of this right will require engagement with regional and international institutions and companies. As an example the issue of climate change is only one of the many environmental threats that has both a South African and international element. Many factors that damage the South African environment operate on an international level and therefore originate outside of government's areas of direct control.[64] Unfortunately, this is extremely hard to accurately measure and therefore indicators specifically addressing the concerns of transboundary pollution have been regrettably left out.

2.6 Key Legislation and Policy Developments

There are many acts of legislation dealing with the right to environment.[65] While a wide range of national legislation exists to regulate environmental management in South Africa there are also numerous province-specific laws as detailed below. It is also worth noting that while the vagueness of the provision for the right in Section 24 presents a challenge for definition and containment, the National Department of Health (2013) has defined the related concept of environmental health to account for;

"*those aspects of human health, including quality of life that is determined by physical, chemical, biological, social and psychosocial factors in the environment.*"

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59 Hichange Investments (Pty) Ltd v Cape Products Company (Pty) Ltd t/a Pelts Products & Others (2004) http://cer.org.za/wp-content/uploads/2010/08/Highchange-Investments.doc. p 21.

60 See World Health Organisation, WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulphur dioxide, Global update 2005: Summary of risk assessment http://whqlibdoc.who.int/hq/2006/WHO_SDE_PHE_OEH_06.02_eng.pdf p 15. These minimum standards are good indicators of the right to environment and will be used as such in this report.

61 As an example, economically and strategically important oil refineries that refine 60% of South Africa's oil are situated in the South Durban Basin near residential areas. The residents of this area have long had negative health impacts from the emissions of the refineries and thus had their right to live in a healthy environment damaged. The refineries are too economically important to close, but the community is too large to be relocated. The short case study in this report briefly considers this issue.

62 These are the service that human beings derive from the natural environment. An example of an ecosystem service is the (ISET 2008)

63 United Nations, Report of the World Commission on Environment and Development: Our Common Future www.un-documents.net/our-common-future.pdf.

64 See Section 2(a) International Frameworks and Treaty Obligations for examples of international agreements that South Africa is involved with. Many international frameworks and obligations address issues such as climate change and ozone layer depletion that impact on, and are caused by the actions of, all nations. In particular, South African reliance on coal and relative over consumption has potential to contribute negatively towards global environmental issues.

65 For a complete listing of all legislation related to the environment, please see: www.environment.gov.za/legislation/actsregulations and the Department of Environmental Affairs Strategic Plan http://db3sqepoi5n3s.cloudfront.net/files/docs/110607stratplan.pdf.

Further- in relation to addressing environmental hazards, the Department states that environmental health refers to;

"…the theory and practice of assessing, correcting, controlling and preventing those factors in the environment that can potentially affect adversely the health of present and future generations".[66]

The most significant national and provincial legislation is listed below::

66 Department of Health National Environmental Health Policy 4th December 2013 Government Gazette no. 37112. P.7.

Table 2: Summary of Significant National and Provincial Legislation

LEGISLATION	DESCRIPTION
NATIONAL LEGISLATION	
National Health Act (No. 63 of 1977)	
Environmental Conservation Act (No. 73 of 1989)	The Act provides for the protection and utilisation of the natural environment. Specifically- the Act creates provisions for the relevant state authority to identify, name and declare a site as a protected area.
Mine Health and Safety Act (No. 29 of 1996)	This Act is significant for its role in regulating the mining environment in relation to the safeguarding of employees' health and safety. Amongst its provisions is employees' right to refuse to work under dangerous conditions as well as the promotion of general health and safety.
Water Services Act (No. 108 of 1997)	The Water Services Act provides a framework for the provisioning of water and sanitation services. Amongst other things- it sets service standards and norms and standard for delivery tariffs. Water services institutions are obliged by the Act to take reasonable steps to ensure everyone's right to basic sanitation and water supply.
National Environmental Management Act (No. 107 of 1998)1 (NEMA)	Potentially the most significant Act. NEMA mandates that "development must be socially, environmentally and economically sustainable". In addition NEMA describes how sustainable development must take place and specifically mentions that Environmental Justice must occur so that the environmental impacts of development not be distributed in such a manner as to "unfairly discriminate against any person, particularly vulnerable and disadvantaged persons". Finally, NEMA explains that environmental impact assessments must be considered with every application for environmental authorisation.
National Water Act (No. 36 of 1998)	The Act explicitly recognizes water as scarce resource in South Africa and seeks to provide reform to National Water laws while allowing for the equitable allocation, redistribution and management of water resources.
National Forests Act (No. 84 of 1998) & Forestry Laws Amendment Act (No. 35 of 2005)	The Act and its Amendment is designed to allow for the preservation of national forests. The Act also extends the regulatory powers of the Minister of Environmental Affairs, as well as allowing increased criminal sanctions with respect to activities within forests.
Marine Living Resources Act (No. 18 of 1998)	This Act provides for the protection of the marine ecosystem and the sustainable usage of marine living resources in an equitable manner.
Local Government Municipal Systems Act (No. 32 of 2000)	This Act considers the means by which municipalities can move towards social and economic development in a manner that is "in harmony with their local natural environment". Specifically Section 4(2)(d) requires municipalities to provide services in an environmentally sustainable manner. Section 78(1)(a)(i) mandates that municipalities asses the direct and indirect costs and benefits of any project including the impact on the environment.
Animal Act (No. 7 of 2002)	This Act relates to regulations pertaining to animal health.

Mining and Petroleum Resources Development Act (MRPDA) (No. 28 of 2002)	The Act is designed to ensure sustainable and equitable extraction and utilisation of South Africa's natural resources. The Act specifically mentions the need for greater participation of previously disadvantaged groups in the mining sector. Further, the Act requires "holders of mining and production rights" to "contribute towards the socio-economic development of the areas in which they are operating"
Environment Conservation Amendment Act (No. 50 of 2003)	This Act concerns the transportation and disposal of waste. More significantly, it discusses the regulations regarding environmental impact reports. Environmental impact reports are required to be done before any development may occur in order to preserve the natural environment and ensure sustainable development.
National Environmental Management: Biodiversity Act (No. 10 of 2004)	This Act works within the framework established by the NEMA in order to protect biological resources and regulate their usage in a sustainable and equitable manner. The Act also establishes the National Biodiversity Institute.
National Environmental Management: Protected Areas Act (No. 57 of 2003)	The Act calls for the creation of a national register of protected areas so as to ensure those areas are managed properly. The Act is designed to "provide protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes"
National Environmental Management: Biodiversity Act (No. 10 of 2004)	This Act operates within the framework of the NEMA and considers (amongst other issues) the sustainable use of "biological resources" in an equitable manner, as well as the protection of species and ecosystems considered in need of national protection.
National Environmental Management: Air Quality Act (No. 39 of 2004)	The Act seeks to reform the law regulating air quality in order to protect the environment by providing "reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development."
Mineral and Petroleum Resources Development Amendment Act, (No. 49 of 2008)	This Amendment seeks to create clear accountability in the management of environment matters in relation to prospecting, mining, exploration or production to align to the Mineral and Resource Development Act to NEMA. The Act places this responsibility on relevant national Minister.
National Environmental Management: Waste Act (No. 59 of 2008)	This Act focuses on the lack of proper waste management and the negative impact this has on local and global health. It also considers the necessity of sustainable development in terms of avoiding or reducing the creation of waste through recycling, re-use and recovery. The Act also recognizes that waste can be used as a resource that offers potential economic opportunities.
National Environmental Management: Integrated Coastal Management Act (No. 24 of 2008)	This Act establishes a system of integrated coastal and estuarine management in the Republic. The Act ensures that development and the use of natural resources within the coastal zone is socially and economically justifiable, and ecologically sustainable. It further determines the responsibilities of organs of state in relation to coastal areas. Lastly the Act controls dumping at sea and pollution in the coastal zone.

Environmental Impact Assessment EIA Regulations 2010	Regulates the submission of an EIA which requires an assessment be done on potential impacts to the environment (including sustainability) before any development can take place.
National Framework for Air Quality Management (2012)	The development of this Framework in aligned to requirements in Section 7 of the National Environmental Management: Air Quality Act (No. 39 of 2004).
Infrastructure Development Act (No. 23 of 2014)	This Act reiterates the requirement for an environmental assessment in terms of NEMA with respect to any strategic integrated project.
PROVINCIAL LEGISLATION2	
Orange Free State Conservation (Ordinance8 of 1969)	
Orange Free State Townships (Ordinance 9 of 1969)	
Natal Nature Conservation (Ordinance 15 of 1974)	
Gauteng Nature Conservation (Ordinance 12 of 1983)	

2.7 Key Policy Developments

The World Summit on Sustainable Development (WSSD) was an international summit hosted in Johannesburg in 2002. At the summit South Africa and the international community reaffirmed their commitment to the principles of the Rio Declaration through the signing of the Johannesburg Declaration on Sustainable Development.[67] This Declaration focuses on sustainable development, poverty eradication, responsible use of natural resources, health and the protection of vulnerable groups. However, it has been argued that there have been no substantial "*positive impacts on reducing poverty, emissions and equality since this summit*".[68]

The 2011 United Nations Climate Change Conference was hosted in Durban on the 11th of December 2011 with the intention of developing a treaty to limit carbon emissions. Although a treaty was not signed, this conference nevertheless realised a serious commitment by the South African government and other nations to consider international treaties concerning environmental matters, especially those related to climate change through the Durban Platform for Enhanced Action.[69]

The Green Economy Accord of 2011 represents an agreement between government, business and labour in South Africa. The Accord, established after COP 17, commits each of these parties to tangible targets in achieving low carbon -based economic development growth through renewable energy. The Accord signifies the recognition (through its Commitment 2) that new sources of public and private funding will need to be sourced if green economy investment levels are to grow at the required pace.

The Sustainable Development National Action Plan and Strategy (2011), builds on the National Framework for Sustainable Development (NFSD) (2008). The Plan contains 20 headline indicators and 113 interventions and requires that the National Committee on Sustainable Development work with all sectors of society. The strategic objectives for the National Strategy for Sustainable Development and Action Plan (NSSD 1) include commitments to sustainable development and ecosystem use, as well as promoting a green economy and responding to climate change. The NSSD 1 covers 2011 to 2014, with the NSSD 2 due to be launched in 2015.

The National Development Plan 2030 (NDP 2030) / Vision 2030 is government's substantive vision for development over next fifteen years, and was launched in 2012. Designed to allow for "*interventions to ensure environmental sustainability and resilience to future shocks*", the NDP 2030 considers a clean environment an important element of a decent standard of living. [70]

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67 United Nations, *World Summit on Sustainable Development: Johannesburg Declaration on Sustainable Development www.un-documents.net/jburgdec.htm.*

68 Rennkamp B., Energy Research Centre, *University of Cape Town Research Report Series: Sustainable development planning in South Africa: a case of over-strategizing?* www.erc.uct.ac.za/Research/publications/13-Rennkamp-Sustainable-Development_Planning.pdf.

69 United Nations Framework Convention on Climate Change, *Draft decision -/CP.17, Establishment of an Ad Hoc Working Group on the Durban Platform for Enhanced Ac*tion https://unfccc.int/files/meetings/durban_nov_2011/decisions/application/pdf/cop17_durbanplatform.pdf

70 National Planning Commission, National Development Plan 2030: Our Future – Make it Work (Executive Summary) www.education.gov.za/LinkClick.aspx?fileticket=09T%2BvV0a5Sg%3D&tabid=628&mid=2062 p 24.

In order to ensure sustainable management of the environment, the NDP 2030 dictates the need to:[71]

- *Protect the national environment in all respects, leaving subsequent generations with at least an endowment of at least equal value.*
- *Enhance the resilience of people and the economy to climate change.*
- *Extract mineral wealth to generate the resources to raise living standards, skills and infrastructure in a sustainable manner.*
- *Reduce greenhouse gas emissions and improve energy efficiency.*

In order to achieve the above, the NDP 2030 requires that an environmental management framework consider that developments with "*serious environmental or social effects need to be offset by support for improvements in related areas*".[72] The amount of land under protection must be properly investigated and sustainable targets set to increase protection where necessary. The NDP also requires that a "*set of indicators for natural resources*" be made available in the form of annual reports to "*inform policy*".[73]

In terms of climate change, the NDP 2030 proposes that the 2010 Integrated Resource Plan (which calls for the procurement of "*at least 20 000MW*" of renewable electricity) as a means of reducing "*carbon emissions from the electricity industry from 0.9kg per kilo-watt hour to 0.6kg per kilowatt-hour*".[74] The mining and mineral processing sector must improve its energy efficiency by 15 per cent by 2030. The NDP further states that "*over short term, policy needs to respond… to protect the natural environment and mitigate the effects of climate change*", long term actions require "*realistic, bold strategies and global partnerships*".[75]

The National Environmental Health Policy of 2013 is aligned to the NDP 2030 and is intended to serve as a framework within which South African Environmental Health Services should be provided. A key component of this framework is the inclusion of monitoring and evaluation responsibilities in the implementation of activities defined within the realm of environmental health services. This, according to the policy, includes the assessment of environmental risks and hazards including waste management, pollution control and water quality control. The policy also aims to give effect to the Libreville Declaration of 2008 and promote intergovernmental promotion for the implementation of its goals. Section 1 of the policy recognises the significant contribution of avoidable environmental factors to the country's quadruple burden of disease.[76] Lastly- the policy place an important emphasis on the need to recognise and address, particularly in relation to health determinants the distinct needs of men, women, children and special population groups.

Operation Phakisa is an initiative designed to fast-track the realisation of the goals of the NDP 2030. The first phase of the Operation focuses on "unlocking the economic potential of South Africa's oceans" and will be led by the Department of Environmental Affairs.[77]

The Medium Term Strategic Framework (MTSF) is *"Government's strategic plan*" for 2014-2019 and "*provides long-term coherence and continuity to the planning system*".[78] Three MTSF periods are envisaged as part of the NDP 2030. In terms of this report, the MTSF considers environmental rights in the form of MTSF Outcome 10. The first phase of Outcome 10 of the MTSF (2014-2019) considers the "creation of a framework for implementing the transition to an environmentally sustainable, low-carbon economy".[79] The second phase (2019-2024) focuses on the "implementation of sustainable development programmes" and targets "a peaking of greenhouse gas emissions".[80] The third and final phase of the MTSF expects that emissions will be "reaching a plateau by 2030".81

(Draft) National Groundwater Strategy of 2016 consists of a detailed review of the 2010 Groundwater Strategy and aims to enhance recognition of the strategic and valuable role

71 National Planning Commission, National Development Plan 2030: Our Future – Make it Work (Executive Summary) www.education.gov.za/LinkClick.aspx?fileticket=09T%2BvV0a5Sg%3D&tabid=628&mid=2062, pp 37 - 38.
72 Ibid p 38.
73 Ibid.
74 Ibid.
75 Ibid.
76 This includes the World Health Organisation estimation that across the African continent, 70% of child deaths are attributed to environmental risk factors.
77 eThekwini Municipality website www.durban.gov.za/Resource_Centre/new2/Pages/Pres-Zuma-to-launch-Operation-Phakisa.aspx.
78 South African Government, Medium-term Strategic Framework (MTSF) 2014-2019 www.gov.za/sites/www.gov.za/files/MTSF_2014-2019.pdf pp 4 – 5.
79 The Presidency, Department of Planning, Monitoring and Evaluation, Draft Outcome 10 MTSF 2014-2019 www.thepresidency-dpme.gov.za/news/MTSF/Outcome%2010%20Environment%20MTSF%20Chapter.pdf p 1.
80 Ibid.
81 Ibid.

played by groundwater in a water scare country such as South Africa. It encompasses guidelines for the protection and management of groundwater resources.

(Draft) Strategy to Address Air Pollution in Dense Low-Income Settlements was published in June 2016. The draft strategy is designed to address the threat to human and environmental health resulting from the exceeding of ambient air quality standards. Amongst the strategies proposed to address the problems are the establishment of a National Coordinating Committee on Residential Air Pollution and- importantly- the provision of subsidised, affordable energy alternatives.82

According to the MTSF, the government must protect South Africa's "*rich natural and environmental resources*", and "*capacity constraints in compliance monitoring and enforcement*" which must be addressed.[83] The most relevant targets for the MTSF in terms of this report are:84

- *Stabilisation and reduction of CO_2 (a 34% reduction in emissions of CO_2 from "business as usual" by 2020 (42% by 2025).*
- *Implementation of climate change responses in six critical sectors.*
- *Increasing the percentage of the coastline with at least partial protection from 22.5% in 2013 to 27% in 2019.*
- *Increasing the compliance of mines with the National Water Act from 35% in 2013 to 60% in 2019.*

The MTSF calls for the creation of an Environmental Management Framework "*to ensure that policies and programmes address long-term needs and that unavoidable environmental losses are offset by investments in related areas*". This also includes "*improved management of waste*" and "*investment in recycling infrastructure and services*".[85]

Outcome 10 of the MTSF is to "*Protect and Enhance Our Environmental Assets and Natural Resources*" and considers the following needs:[86]

- *Sub-outcome 1: Ecosystems are sustained and natural resource are used efficiently*
- *Sub-outcome 2: An effective climate change mitigation and adaptation response*
- *Sub-outcome 3: An environmentally sustainable, low-carbon economy resulting from a well-managed just transition*
- *Sub-outcome 4: Enhanced governance systems and capacity*
- *Sub-outcome 5: Sustainable human communities*

Positively, the MTSF shows the government's recognition of the deficiencies in the current manner in which environmental concerns are addressed. It is hoped that the MTSF could lead to significant improvements in environmental management and protection. The Back to Basics programme has the potential to improve waste management and removal.

Other key developments in policy include The Gaborone Declaration, the Libreville Declaration of 2008 and the Cancun Declaration of Like Minded Megadiversity Countries of 2002; each of which recognise the significant role not only of diversity but of the role of regional government co-operation for it management and the promotion of human wellbeing.

The King III Report is also worth noting here given its considerations of socio-economic and environmental matters through a leadership, sustainability and corporate citizenship focus.

Zipplies (2008) in his critique of South African environmental legislation is at pains on the one hand to laud its progressive nature and on the other to criticise its weak implementation mechanisms. There is an extensive array of criticism levelled against the various National Environmental Management Acts (relating to air quality, protected areas, biodiversity etc.). These range from poor public participation mechanisms[87], inadequate focus on human health88 and inadequate prioritisation of biodiversity conservation in relation to environmental

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82 Department of Environmental Affairs 2016. Draft Strategy to Address Air Pollution in Dense Low-Income Settlements, Government Gazette Notice No.356 of 2016.
83 South African Government, Medium-term Strategic Framework (MTSF) 2014-2019 www.gov.za/sites/www.gov.za/files/MTSF_2014-2019.pdf p 29.
84 South African Government, Medium-term Strategic Framework (MTSF) 2014-2019 www.gov.za/sites/www.gov.za/files/MTSF_2014-2019.pdf p 30.
85 South African Government, Medium-term Strategic Framework (MTSF) 2014-2019 www.gov.za/sites/www.gov.za/files/MTSF_2014-2019.pdf p 30.
86 The Presidency, Department of Planning, Monitoring and Evaluation, Draft Outcome 10 MTSF 2014-2019 www.thepresidency-dpme.gov.za/news/MTSF/Outcome%2010%20Environment%20MTSF%20Chapter.pdf p 4.
87 In relation to the NEMA Protected Areas Act No. 57 of 2003
88 In relation to the NEMA Air Quality Act No. 39 of 2004

impact assessment legislation. Researchers, law experts and environmental activists have made observations over the years indicating the need to acknowledge the dynamism of the environmental law, legislation and policy landscape.

2.8 Conclusion

This chapter has illustrated the significant arsenal of environmental policy and legislation that has been developed in South Africa particularly post-1994. Underpinned by the Constitution and international conventions that the country has not only ratified but in some instances played an influential role in developing, the right to a healthy environment is undoubtedly integral to the state's human rights obligations. However, the poorly defined scope of Section 24 of the Constitution has limiting implications for the planning, implementation and development of policies aimed at protecting the environment. While Section 24 does state that the government must put "*reasonable legislative and other measures*" in place, the courts have not yet defined reasonable legislative measures or what these other measures may entail in terms of the right, nor what it explicitly means to "*promote conservation*" or "*secure ecologically sustainable development*", for instance. On the other hand, there is significant scope for the courts to interpret environmental rights, particularly in connection promoting the rights of vulnerable groups.

Ultimately, while there is little doubt that South African environmental legislation is progressive and dynamic there is still a great need for deeper consideration of the inextricability of human wellbeing and environmental health. It is for this reason that the indicators discussed in Chapter 4 provide an important opportunity for policy makers in particular to consider the current chasm within the provisions and implementation of Section 24.

CHAPTER 3

Budget analysis of the Department of Environmental Affairs and related Municipal Grants

3.1 Budget Analysis Motivation and Framework

The South African Government's obligation to fulfil Section 24 – the right to a healthy environment – is dependent upon reasonable and appropriate budgeting at the various spheres of government. In South Africa, each year a Division of Revenue Act (DoRA) is passed by parliament setting out the division of nationally raised revenue among the three spheres of government: national, provincial and local. The portion of the budget allocated to the Department of Environmental Affairs for its programmes is divided across these spheres. This human rights budget analysis will look budget allocations and spending performance primarily at the national level of government and at related municipal grants in order to interrogate the reasonableness of government's budgeting for the right to a healthy environment.

Applying a human rights lens to budget analysis raises several key questions:

- *Adequacy* – Are resource allocations to the relevant departments and entities sufficient to address the need for environmental protection and human wellbeing, and are they increasing in real terms over time? Are there any regressive spending patterns?
- *Efficiency* – Are the funds intended to fulfil this right being spent efficiently? I.e. in full and on their intended purpose? Are there any under or over-expenditure patterns?
- If so, why? Are institutions capable and prepared to spend the funds allocated to them and has adequate planning taken place to ensure that this is the case?
- If significant under-spending is occurring, are ineffective allocations being re-directed to better performing programmes? Are audits of spending conducted to ensure accountability and improved performance?
- *Priority* – Are these resources being utilised to prioritise the needs of the most vulnerable and to reduce disparities in access to environmental resources? Is the spending equitable and reasonable given the greatly varying needs of different sections of the South African population?
- *Equity* – are resources being distributed fairly across provinces and municipalities considering their respective social, economic and demographic conditions?
- *Effectiveness* – Is the spending effective? Are targets being met? Does rigorous monitoring occur?

These and other related questions are fundamental to the realisation Section 24.

3.1.1Inflation and nominal vs real figures

Inflation is the term used to describe general increases in the prices of goods and services in the economy. Inflation erodes the value of money because rising prices mean that R1 today buys you slightly more than R1 tomorrow. Departmental Annual Reports and Treasury documents tend to only provide the nominal amounts allocated in the budget each year, unadjusted for the effect of inflation. This makes comparing spending patterns over time difficult as the value of the amounts allocated in previous years (i.e. what they can buy) has changed. Therefore, when conducting an analysis of government budgets over time, it is important to take the effects of inflation into account. Converting nominal amounts to real amounts equalizes the value of money over time, which allows us to compare much more accurately the allocations and expenditures for different years.

Crucially, using real amounts tells us whether government budgets have increased in real terms each year, or in other words, if budgets have increased at a rate below, in line with, or above

inflation. This is important because, if budgets increase at a slower rate than inflation, they really aren't increasing at all. For example, if the total cost of a state subsidised house was R100,000 in 2010, and government was spending R1,000,000 on its subsidised housing programme, it would be able to build 10 houses. However, if the annualised inflation rate for that year was 10%, by the end of the year, the cost of a state-subsidised house would be R110,000. The cost of building 10 houses in 2011 would therefore have risen to R1,100,000. If government failed to increase its programme budget by 10% or more, it would no longer be able to afford to build 10 houses. That would mean less houses built per year, which could be seen as regression rather than progress on improving access to housing for the poor.

In South Africa, the most widely used measurement of general inflation is the Consumer Price Index (CPI), which is tracked by Statistics South Africa (StatsSA). Adjusting the nominal amounts provided in DEA's reports and by National Treasury in the Estimates of National Expenditure (ENE) to real amounts requires us to make a calculation using 'inflators' which are based on the annual CPI inflation rate provided by StatsSA. The CPI inflation rate and inflators used in this budget analysis to convert nominal amounts to real amounts are shown in the Annexure.

3.2 Overview of the Budget and delivery context

The South African National Development Plan outlines access to water and sanitation as well as a clean environment as central components of a decent standard of living.[89] Ensuring adequate provisioning for the former is dependent on infrastructure planning and implementation arrangements that are, according to the NDP, not only overly complex but ineffective:

> *"In general, human settlements are badly planned, with little coordination between those installing water reticulation infrastructure and those responsible for providing bulk infrastructure"*

This poor coordination has a direct impact on the ability of the relevant departments to effectively allocate resources in order to fulfil their obligations to give effect to the right of citizens to an environment that is not harmful to their health or wellbeing (Vote 27). An additional mandate is that which is held by the Department of Water and Sanitation (Vote 36) to ensure the delivery of services in accordance with people's rights to sufficient water and food. Section 24 of the South African Constitution of 1996 guarantees everyone:

> *a) the right to an environment that is not harmful to their health or well-being; and*
>
> *b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that-*
>
> i) *prevent pollution and ecological degradation;*
>
> ii) *promote conservation; and*
>
> iii) *secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.*

The aforementioned complexity of the planning and implementation terrain is also reflected in related budget frameworks. One instance is within the allocation of funds to address critical water and environmental infrastructure projects, which is a function that currently spans across several different departments. As such, a thorough analysis of the extent to which the South African government effectively allocates and spends funds towards the realisation of Section 24 requires an analysis of the various interlinked programmes within and between departments such as Water and Sanitation, Environmental Affairs, Human Settlements and to some extent Health[90] and Agriculture. This, however, is not with the ambit of this budget analysis which exclusively seeks to interrogate mainly the resource allocation and expenditure trends across key programmes of the Department of Environmental Affairs ('the Department' or DEA).

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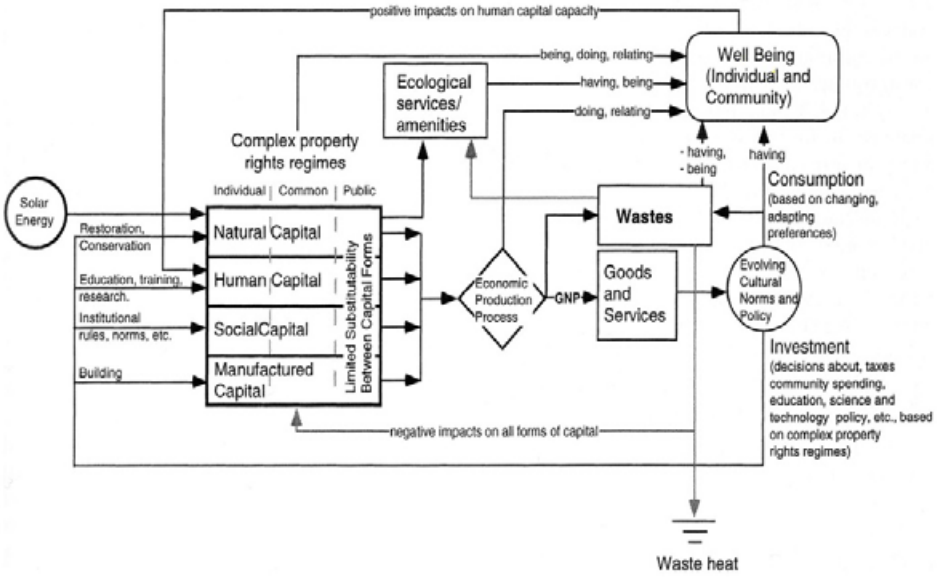
89 NDP 2011

90 An analysis of the policy environment relating to the right to a healthy environment indicates that in its definition of environmental health and in the formulation of relevant policy- the national Department of Health clearly envisions itself as a fundamental stakeholder in the oversight and implementation of key programmes to achieve a healthy, safe environment for all in South Africa. Specifically- the Department of Health is the lead department in the National Environmental Health Policy of 2013 which not only recognises the need for interdepartmental co-operation but calls on the functions of municipalities through- amongst others the Municipal Systems Act of 2000.

Determining government spending trends towards the realisation of the right to a healthy environment is perhaps as complex as understanding the legislative context governing this right. At the core of this is the assumption that government programmes in their design have not only accounted for processes of redress, equality and equitable distribution of resources, but that this has been balanced with an accurate valuation of the natural resource base necessary to meet this right in addition to mechanisms for its protection. This resource complexity encompasses economic, social, spiritual, cultural and environmental aspects (Figure 1).

Figure 2: Interactions between ecological systems, human wellbeing and social systems (Source: Constanza, 2000)[91]



The analysis focusses primarily - although not exclusively - on the resource allocation and expenditure trends within the National Department of Environmental Affairs[92] over the fiscal period between 2006/07 and 2017/18.

A leading environmental scientist, Constanza (2000) argues that in order to determine the value of something, it is necessary to quantify or understand its contribution towards achieving a specific objective. In the case of steps towards the realisation of the right to a healthy environment specifically and sustainable development generally, this budget analysis also attempts to provide an idea of how the South African government has attempted to weigh specific priorities in terms of investment of public funds (see 'investment' in Figure 1). At the time of publication of this report, the most recent National Budget Review (2016) outlined a deteriorating economic environment along with a revision of projected revenue increases from 10.4% to 8.5% in 2015.[93] Furthermore, in outlining relevant revenue trends and tax proposals, the Minister of Finance lists the reduction of inequality, promoting public health and environmental sustainability as key national goals. It is therefore pertinent to interrogate the extent to which the broader goals of environmental sustainability have been a focus of South African fiscal policy over the years by focussing on specific programmes. While some of these programmes are specific to the Department of Environmental Affairs others are connected to other departments and – testament to the complexity of this topic – others involve more than one department. It is not possible within the scope of this analysis however, to consider the comprehensive list. It is also not possible within this analysis to interrogate fully the provincial and municipal performance and delivery although it is important to note that these are significant spheres of budget implementation and expenditure. Some of the programmes analysed, however, relate to Municipal Grants as per Schedule 6 of the 2016 Division of Revenue Bill and as such provide some insight to local government expenditure trends.[94]

91 Constanza, R. 2000. Social Goals and Valuation of Ecosystem Services
92 While the Department has undergone name change(s) from its status as The Department of Environmental Affairs and Tourism in 2006 it shall- for ease of reference- be referred to interchangeably as 'The Department' or 'DEA' throughout this report.
93 National Treasury *Budget Review 2016*
94 Republic of South Africa 2016, Division of Revenue Bill 2016/17 www.treasury.gov.za/legislation/bills/2016/bills2016_bill02-2016.pdf

3.3 Recent Developments in the South African Environmental Sector

The progressive rollout of renewable energy as outlined in the policy chapter of this report is central national infrastructure development within the environmental sector. To date, the Department has reportedly authorised 137 renewable energy applications which equates to 5719 Megawatts. In tandem with this – and alongside the Department's large infrastructure projects are Strategic Environmental Assessments (SEA) and shale gas exploration.

In terms of fiscal responses to South Africa's commitments in the transition to a greener economy, the Green Fund was established in 2012. The Fund has a current budget of approximately R 1.1 billon and is aimed primarily at supporting research and innovation. In her 2016/17 Budget vote address, Minister Edna Molewa announced that through the Green Fund more than 1 600 direct job opportunities have been created with 11 300 indirect job opportunities and several research and development capacity-building projects. However, in the Department's 2013/14 Annual Report, a target of 12 937 jobs were announced in relation to Outcome 4: Decent Employment through Inclusive Economic Growth.95

In April 2016, South Africa along with 174 other countries ratified the Paris Agreement, signifying significant steps towards international collaborative initiatives in the transition to greener, climate resilient economies. South Africa has played a significant role in global climate discussions and research over the two decades of the Conference of Parties which has included the hosting of events such as COP17 in Durban.96 The most recent resolutions from COP21 and the resulting Paris Agreement signed in April 2016 will have important implications for South African policy makers and business alike.[97] At these landmark negotiations, the South African government was lead negotiator for the Africa group of countries and chaired the Group of 77 plus China.

The current financial year 2016/17 marks the beginning of the country's voluntary implementation of the 5-year greenhouse gas emission mitigation system which is a commitment aligned with both the Paris Agreement as well as with the NDP. According to the Department of Environmental Affairs' 2016 Budget and Policy Statement, this will require businesses to submit carbon budgets alongside pollution prevention plans, amongst other requirements. In relation to state measures to address climate change and pollution, there are requirements for the establishment of more efficient transport systems that function on reduced carbon emissions.[98]

The Climate Change Adaptation Strategy also identifies priority interventions in areas such as agriculture, water and sanitation, biodiversity, health, human settlements, and Disaster Risk Reduction. A stark observation however, is the general lack of connectivity between the relevant departments in these sectoral arrangements and – perhaps more tellingly – in the planned budget allocations. A particularly missing link is that which should exist between the Department of Health's recently published National Environmental Health policy, and the explicit budgetary allocations. The policy as discussed in Chapter 2 of this report is progressive in its illustration of the interconnected nature of human wellbeing, environmental health and safety and the range of socio-economic and environmental rights attached to this. In this way, the connections defined in the National Health policy and as illustrated in Figure 1 above that ties human rights intimately to the environment are not as clearly realised through the budget as will be outlined below.

The Department of Environmental Affairs is also supported through donor funds such as from the German Development Bank and the Global Environment Facility (GEF) to carry out various climate adaptation and biodiversity projects. These are not included in this analysis, however but are worth considering for their contribution to what is an ever tightening fiscal envelope

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95 The distinction between 'direct' and 'indirect' job opportunities was not made

96 At this- the 17th annual meeting of the Conference of Parties to the UN Framework Convention on Climate Change (UNFCC) - 2015 was set as the deadline for the establishment of a new universal protocol to limit greenhouse gas emissions. It was envisaged that implementation of the protocol would commence in 2020. The UNFCCC is an international treaty adopted aimed at dealing with human-induced climate change.

97 The 21st Conference of Parties (COP21) was hosted in Paris, France in December 2015. COP21 was positioned as an unmatched opportunity to address the many shortcomings and disappointments emanating from a range of climate negotiation pre-dating it.

98 Department of Environmental Affairs, *Budget and Policy Speech 2016/17* Delivered by Minister Edna Molewa 3rd May 2016 Available Online: http://www.gov.za/speeches/minister-edna-molewa-tables-department-environmental-affairs-20162017-budget-vote-policy Accessed: 7th September 2016

by many accounts. GEF funding for WfW is based on the programme's unique model in which payment for ecosystem services (PES) forms a central component of the funding and delivery model.

The definition of PES varies widely. For the purposes of this report the GEF definition will be used. The PES concept relates to arrangements between buyers and sellers of environmental goods and services in which "*those that pay are fully aware of what it is that they are paying for, and those that sell are proactively and deliberately engaging in resource use practices designed to secure the provision of the services" (GEF, 2014).* .In South Africa, GEF has provided funding for the WfW over several years based on its strong PES component.

3.4 Over-arching Financial Management Trends: DEA

The ability of government departments and their accounting officers to manage funds efficiently, effectively and in a transparent manner and as prescribed by the Public Finance Management Act (PFMA) of 1999 has a direct bearing on the extent to which allocated funds are used for the intended purpose of addressing socio-economic needs. The findings of the supreme audit institution can therefore provide important indicators as to the nature of expenditure management and general performance of a government department. Table 1 is an illustration of the audit findings by the Auditor-General of South Africa on the Department of Environmental Affairs since 2006/07.

Table 3: Audit Outcomes for the Department of Environmental Affairs: 2006/07 to 2015/16[99]

Year	Opinion	Key Audit Findings	Expenditure outcomes as % of Final Appropriation
2014/15	Unqualified audit	No emphasis of matters	99.1%
2013/14	Unqualified audit	No emphasis of matters	99%
2012/13	Unqualified audit	No emphasis of matters	96%
2011/12	Unqualified audit	The Auditor-General noted a forensic investigation into alleged fruitless and wasteful expenditure within the Zeekoeivlei Nature Reserve construction projects.	98%
2010/11	Unqualified audit	No emphasis of matter	96%
2009/10	Unqualified audit	Extensive unexpected effort was required to obtain sufficient appropriate audit evidence to verify the performance against predetermined objectives.	99.8%
2008/09	Unqualified audit	Emphasis on two matters	99.80%
2007/08	Unqualified audit	No significant emphasis of matters	99.9%
2006/07	Unqualified audit	21% overall departmental vacancy rate- including the vacant post of Chief Financial Officer within the same financial year.	99.90%

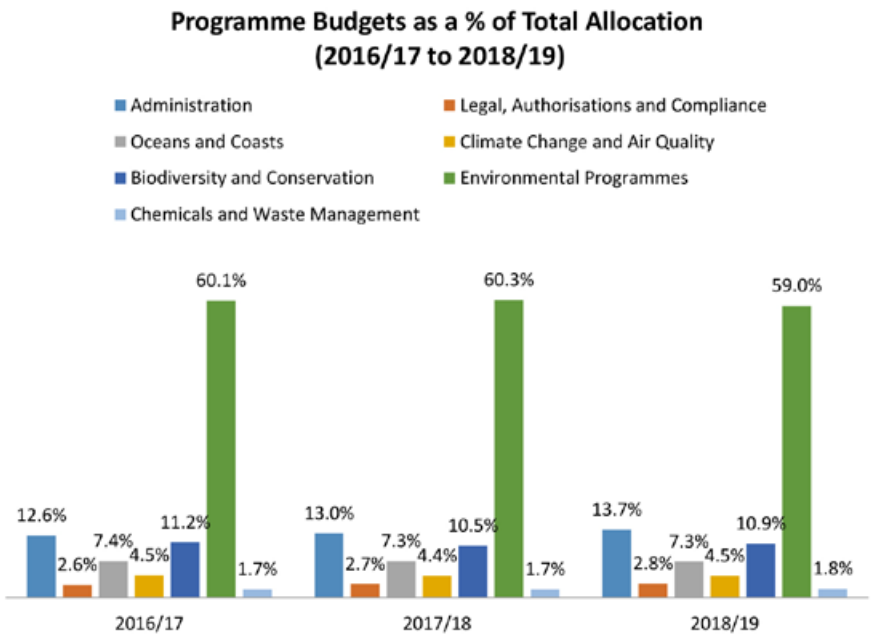
When considering the overall financial performance of the Department it is evident that there has been a generally stable and positive audit history over the years with unqualified audit outcomes representing the most common finding by the Auditor-General. Secondly, the Department has a history of spending between 96% and 99% of its annual budget across all economic classifications (Table 1). It is noteworthy that even in a year where high vacancy rates were noted by the Auditor-General (including that of Chief Financial Officer at the beginning of the year) - the overall financial performance of the Department remained generally positive. This may be attributable to a longstanding or institutionalised strategy towards public resource management that has enabled the Department to mitigate against disruptions within its human resource domain. Under-expenditure of less than 2% of a budget is considered acceptable by normal accounting standards. It must be noted, however, that given the fact that

99 Source: Department of Environment Affairs Annual Reports 2006/07, 2007/08, 2008/09, 2009/10, 2010/11, 2011/12, 2012/13, 2013/14, 2014/15, 2015/16

the Department is allocated less than 1% of the total national budget, any under-expenditure (approximately R 93 million in 2013/14, for instance) has potential consequences for the delivery of public services even where it may be within the acceptable region of accounting standards.

In 2016/17, the Department of Environmental Affairs is allocated a total of R 6.43 billion of which R 3.86 billion has been set aside for one programme alone. Figure 2 depicts the overarching resource allocation trends by programme. The highest budget allocation year on year is set aside for Programme 6 (Environmental Programmes) whose objective is to ensure the rolling out of expanded public works and green economy projects in the environmental sector (Annexure Table 1). Between 2016/17 and the outer year of the MTEF, the budget for this programme is set to decrease marginally from 60.1% of the total allocation to 59%; a nominal budget increase of a mere R 122.5 million. The overall budget for Administration, however, increases from 12.6% of the total allocation in 2016/17 to 13.7% in 2018/19. As a point of departure- these nominal allocations for the current MTEF are worth noting.

Figure 3: Main Budget Allocations for the 2016/17 MTEF (Source: National Treasury 2016)



The smallest allocation of the total budget accommodates, in 2016/17, Chemical and Waste Management at R 109.3 million or 1.7% of the total budget. Programme 2 accounts for 2.6% of the budget and is intended to facilitate the creation of an environment in which enforcement and compliance with environmental law is ensured. The allocation to Biodiversity and Conservation is the third largest budget line item after Environmental Programmes and Administration – at 11.2% of the 2016/17 budget, a total of R 718.2 million.

The Minister of Finance, in his 2016/17 Budget Speech mentioned several initiatives driven by different government departments with varying environmental impacts;

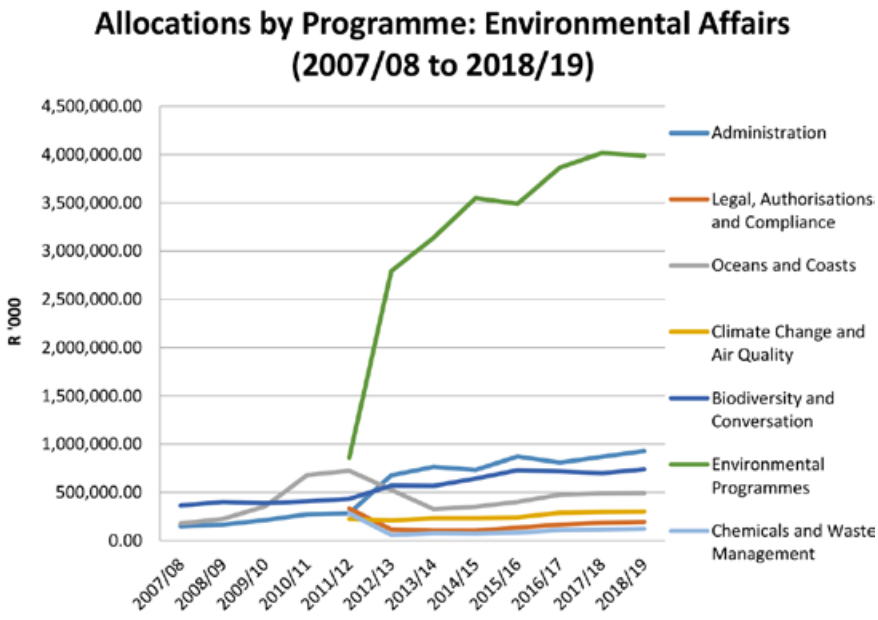
a. Initiatives to transform ownership of land and improve productivity in agriculture aimed at addressing drought-related challenges in rural areas
b. The preparation of a response to the global climate change challenge and strengthening of the National Business Initiative on the green economy
c. Expansion of the Department of Environmental Affairs' Community Work Programme along with the approval of Jobs Fund partnership projects of R 12 billion
d. Building on the Phakisa oceans economy initiative involving a R 9 billion investment in rig repair and maintenance facilities at Saldana Bay along with new work on a new gas terminal and oil and ship repair facilities in Kwazulu-Natal
e. The renewable energy, coal and gas independent power producer programme along with preparatory work for investment in nuclear power is underway
f. Work on beneficiation initiatives, including titanium, fuel cells, fluorochemicals and composite materials is also underway

As noted in the list above, South Africa's energy generation regime continues to consist of a mix of coal, renewables and nuclear which is a subject that is heavily contested with many civil society organisations critiquing the state's responses to what is often termed an 'energy crisis'. In 2016, for example, the environmental activist organisation Greenpeace decried the increased budget allocation for goods and services related to South Africa's nuclear energy investment, arguing instead that the allocation could be better prioritised to social programmes such as education.[100]

Many environmental activists and practitioners have also argued that while NEMA legislation is itself strong- enforcement of environmental law is weak. One such example is noted by the South African Institute for International Affairs in relation to the lack of technical skills at the municipal level to ensure adherence to coastal environmental legislation in the first instance and in the second where funding for some coastal management interventions competes with terrestrial interventions within a resource constrained context.[101] Notably, the context of provincial environmental resource allocation can be considered to be a microcosm of the national sphere in many respects. Scarr (2013: 1), citing Eastern Cape provincial budget allocation trends, laments the severe under prioritisation of environmental governance mechanisms and enforcement within the overall fiscus;

> *"…the 2013/14 budgetary allocation to the Chief Directorate: Environmental Affairs comprises a mere 0,49% of the total fiscal envelope. This affirms perceptions that the Eastern Cape Provincial Government does not have appropriate regard for the scope and implications of the global environmental crisis, from which the Eastern Cape is not excepted"*[102]

Figure 4: Budget Allocation across all Programmes in Environment Affairs Department between 2007/08 and 2018/19[103]



The Department has 7 main programmes; two of which are primarily administrative in their function i.e. programmes 1 and 2 (Annexure 1).

The majority of programmes in the Department reflect budget increases from 2008/09 (Figure 3 and Table 2). The most notable change between 2008/09 and 2009/10 is reflected in the budget for Programme 3: Oceans and Coasts whose mandate includes coastal conservation and management programmes. In December 2009, the Integrated Coastal Management Act

100 Greenpeace Africa, 11th March 2016, Fukishima 5 Years On: South Africa Prioritises Nuclear over Economy and Education www.greenpeace.org/africa/en/Press-Centre-Hub/Fukushima-5-years-on-South-Africa-prioritizes-nuclear-over-economy-and-education-1/

101 Chevallier, C. 2015. South African Institute for International Affairs (SAII) June 2015: Occasional Paper 218 Governance of Africa's Resources Programme, Promoting the Integrated Management of South Africa's Coastal Zone www.saiia.org.za/occasional-papers/831-promoting-the-integrated-governance-of-south-africa-s-coastal-zone/file

102 Scarr. N. 2013. Public Service Accountability Monitor (PSAM) Budget Analysis: Eastern Cape Department of Economic Development, Environmental Affairs and Tourism www.psam.org.za

103 Note: not all programmes illustrated in this figure existed over the entire period of analysis. Some of programmes such as Programme 2, 4, 6 and 7 are either new or existed in combination with other programmes making strict comparison difficult

No. 24 of 2008 was promulgated.[104] While it may be possible that this spike in expenditure related to the implementation of this Act, it has been noted that this is amongst the many progressive legislative tools that at the locus of implementation (local government) is often categorised as an unfunded mandate.[105] It is therefore unlikely that this change was attributed to increased compliance-related activities. There is also no direct link made in the relevant Annual Performance Plan (APP).

From 2011/12 it is evident that the allocation to Environmental Programmes (Programme 6) far outweighs all programmes In the Department (Figure 3). This programme also accounts for the most significant increase in real terms over the entire period at 17.23% (Table 2). Between 2015/16 and 2016/17, however, it accounts for a less significant increase in real terms at only 5.25%.

The overall allocation for the DEA increased in real terms by an average of 7.45% between 2007/08 and 2018/1; that is from R 1.56 billion to a projected R 6.76 billion. Between 2015/16 and 2016/17, the allocation increased in real terms by a mere 2.76% (Table 2).

3.5 Budget Trends by Programme

Amongst the functions of the DEA is to ensure compliance with waste management legislation at various levels and by various public and private entities. This also entails providing support to municipalities for waste and chemical disposal. It is therefore noteworthy that this specific line item represents the lowest allocation across the entirety of the period under review. In addition the introduction of a programme dedicated specifically for the management of chemicals and waste occurred – according to the 2013/14 Annual Report – only at the beginning of the 2013/14 financial year in acknowledgement of severe underfunding of this important function at the expense primarily of poor, underserved communities.[106] Within this context of environmental management, the lack of relevant technical skills and capacity in municipalities was an additional factor leading to the formation of the programme.

3.5.1 Chemicals and Waste

Given the significant problems related to poor delivery of waste management services across South African municipalities and the acknowledgement of a capacity deficit in this regard, it is difficult to justify the illustrated budget trends (Table 2). Over the years since the inception of the programme – there has been a marked decrease in the overall allocation in real terms of 10%. Secondly, despite unquestionable increases in the need for better waste management given industrial growth and urbanisation – this line item remains the lowest allocation remaining below R 200 million into the MTEF. A positive trend however is shown in the correlation between the inception of waste management as a standalone, funded programme with the increases in the overall tonnage of paper waste recycled nationally (Figure 4). This is discussed further in Chapter 4 of this report which considers individual indicators related to the right to a healthy environment.

However the realisation of this as a secure sustainable employment creation opportunity and as an effective response to the country's burgeoning waste management problems is still far from being achieved. An objective of Programme 7 is also to provide opportunities for income generation through waste management and despite this being a potentially lucrative industry – under funding, poor governance and lack of capacity continue to pose serious obstacles (Burger, 2014). Recycling targets across all waste streams remain unmet in all provinces and while governance failures are noted there is undoubtedly a need to reconsider the viability of this programme at the current funding levels and strategies.

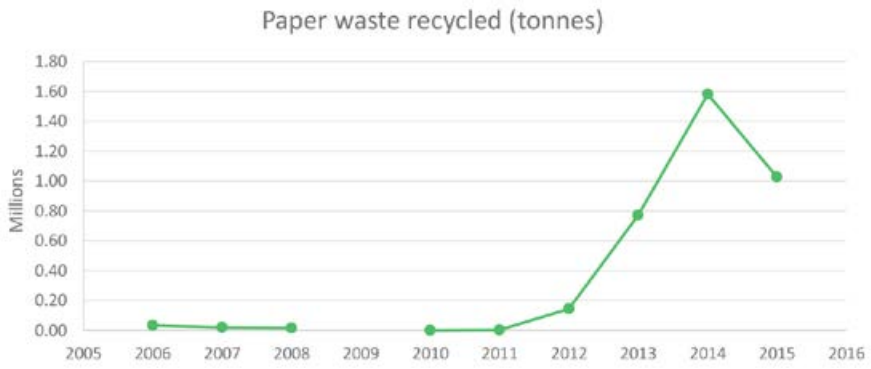
Solid waste management in South Africa is a function of municipalities as specified in Section 156(1) (a) of the Constitution. By 2012, the South African government was supposed to have provided all households with access to proper waste removal services. This target has not been

104 Another notable change resulting from the macro restructuring of several national departments was the split in 2009/10 of tourism as a standalone department from what was previously the Department of Environment Affairs and Tourism (DEAT).
105 Chevallier, 2015
106 Despite this assertion- the programme was allocated funds in the two financial years preceding 2013/14 and in the years prior to that- components of waste management formed part of another programme.

met and although significant progress has been made towards achieving it, lack of access remains highest in rural municipalities (Fakoya, 2014).

Fakoya (2014) lists municipal administrative weakness, officials' lack of awareness of the breadth and scope of waste management requirements and mismatched technical skills in core operational positions. This is a criticisms shared by Mjoli (2012) with a similar view that staff appointed to either carry out planning, oversight or actual implement of waste management programmes are often not able to fulfil their performance indicators due to being underskilled.

Figure 5: Tonnes of Paper Recycled in South Africa since 2006



The management of waste or lack thereof in South Africa is undoubtedly both an environmental and social justice issue. A result of apartheid-era spatial planning policies was that black people were forced to live near polluted mining land, industrial dumps and landfills. While waste services were well-developed in urban, mainly white settlements, the opposite was true in township and rural areas where the majority lived. According to Hallowes (2011) the accumulation of human waste, uncollected refuse, air pollution and contaminated water continues to be part of the realities faced by many residents of South African townships - as highlighted in Chapter 4 of this report.

The inequality of the system is exacerbated by the fact that more affluent communities whose waste is also better managed – generate more waste than poorer communities who effectively live closer to the peripheries were such waste is ultimately dumped. The DEA107 outlines the fact that while population growth is slowing down in South Africa, households' demand for goods and services is increasing as are the numbers of households which has a direct influence on waste and waste management systems.

107 Department of Environmental Affairs, SOER 2016

Table 4: Budget allocations by Programme: Environmental Affairs: 2007/08 to 2018/19

	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	Average Nominal % Change (2007 to 2018)	Nominal Change (2015-2016)	Average Real % Change (2007 to 2018)	Real Change (2015-2016)
Administration	146,540	164,489	211,064	270,225	280,816	675,575	765,026	731,335	870,184	808,226	866,457	926,650	15.24%	-7.12%	10.65%	-11.74%
Legal, Authorisations and Compliance					330,661	114,452	102,934	100,621	133,921	164,647	182,280	191,597	-4.11%	22.94%	-6.05%	16.83%
Oceans and Coasts	177,500	223,945	353,947	679,938	723,279	524,585	326,088	349,257	399,529	475,041	489,055	491,872	-2.92%	18.90%	-4.88%	12.99%
Climate Change and Air Quality					223,232	207,531	229,760	229,292	240,149	286,582	295,020	300,783	3.80%	19.345	0.42%	13.40%
Biodiversity and Conversation	363,433	398,496	386,852	405,887	430,441	568,412	565,662	643,068	730,600	718,249	696,607	737,860	5.60%	-1.695	1.39%	-6.58%
Environmental Programmes					857,634	2,793,573	3,137,724	3,549,608	3,489,633	3,865,083	4,016,878	3,987,632	21.18%	10.76%	17.23%	5.25%
Chemicals and Waste Management					280,816	58,534	73,113	71,878	79,281	109,273	114,260	120,676	-10.02%	37.83%	-12.95%	30.98%
	1,564,532	1,789,877	2,124,341	2,438,514	3,126,879	4,942,662	5,200,307	5,675,059	5,943,297	6,427,101	6,660,557	6,757,070	11.91%	8.14%	7.45%	2.76%

Table 2 illustrates the overall budget trends for the entire Department. A notable change in the overall allocation between 2007/08 and 2018/19 is that of a mere 7.45% increase in the budget in real terms. Between 2015/16 and the current financial year, the Department was allocated in real terms a mere increase of 2.76%. Changes that are indicative of aforementioned budget priorities include a 13.4% increase in the Climate and Air Quality budget between 2015/16 and 2016/17. Interestingly, however the long term budget allocations for this programme have seen an increase in real term of less than 1% at 0.42%. This reflects negatively on overall responses in budgetary terms by the state to climate change priorities. This minimal increase in likely cushioned by funding from international donors which is a feature of DEA budgets.

Table 5: National Environmental Programmes

	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	Average Nominal % Change (2012 to 2018)	Nominal Change (2015 to 2016)	Average Real % Change (2012 to 2018)	Real Change (2015-2016)
Environmental Protection and Infrastructure Programme	1,258,589	1,297,581	1,481,104	1,263,951	1,544,898	1,522,638	1,492,459	2.46%	-18.19%	-0.57%	-13.91%
Working for Water and Working on Fire	1,446,199	1,562,732	1,771,512	1,871,690	2,064,122	2,303,070	2,409,776	7.57%	-9.32%	4.38%	-4.58%
Green Fund	88,785	250,000	250,000	300,000	180,000	110,455	0	-100%	66.67%	-100%	75.39%
Environmental Programmes Management	0	5,288	7,273	6,462	7,516	7,993	8,457	8.14%	-14.02%	5.39%	-9.53%
Information Management and Sector Coordination	0	22,123	39,719	47,530	68,547	72,722	76,940	23.09%	-30.66%	19.96%	-27.03%
Total Programme Budget	2,793,573	3,137,724	3,549,608	3,489,633	3,865,083	4,016,878	3,987,632	5.22%	-9.71%	2.10%	-4.99%

3.5.2 National Environmental Programmes

As mentioned previously, this programme is allocated the single largest budget of all the programmes of the DEA. The mandate of this programme is therefore high on the government's priority list. Two sub programmes in particular stand out: the Environmental Protection and Infrastructure Programme and the Working for Water and Working on Fire Programme. Both of these programmes have a long history and were initially interdepartmental in terms of their administration. Working for Water (WfW) emanated from the realisation by the South African government of the interplay between economic development and ecological health and therefore of the need for state interventions in the environmental sector to take this fact into account. The inception of this programme was officially in 1995 under the leadership of the Minister of

Water Affairs and Forestry, Kader Asmal.[108] The programme initially involved the Departments of Water Affairs and Forestry, the Department of Environmental Affairs and Tourism and the Department of Agriculture. From its inception it has had a strong focus on ensuring socio economic benefits from activities within the environmental sector. The current version of the programme has the following amongst its strategic objectives:

1. *Ecosystem services restored and maintained*
2. *Enhanced contribution of the environmental sector towards sustainable development and transition to a green economy*
3. *Improved socio economic benefits within the environmental sector*[109]

Between 2012/13 and the end of the 2016/17 MTEF both the WfW, WoF and Environmental Protection sub-programmes combined have been allocated more than 90% of the total budget with the exception of the 2015/16 appropriation of 89.9%, likely as a result of a trade-off with the Green Fund allocation. The Green Fund increased from R 250 million in 2014/15 to R 300 million in 2015/16. In 2018/19 – 98% of the sub programme's budget is set to be shared between these two programmes; a total of R 3.90 billion. Focussing on the individual programmes, the larger proportion of the budget is allocated to the WoF and WfW programmes annually. This allocation rose from R 1.45 billion in 2012/13 to a projected R 2.41 billion in 2018/19 representing an average increase over the entire period in real terms of 4.38%. A less positive change over the period under review can be seen for the first sub programme which has decreased by an average of 0.57% since 2012 and by 13.91% between 2015/16 and the current financial year (Table 3).

The importance of the WfW sub programmes cannot be underestimated. Turpie *et al.* (2008), for instance, state that WfW has been hailed as one of the most successful interventions of its kind based on its accomplishments in relation to social empowerment, water conservation and biodiversity. It is estimated that the ecological cost of the alien invasive plants and animals -which the programme seeks to address – are in excess of R 6,500 million per annum.[110] These impacts are most heavily felt through losses in agriculture harvests and a reduction in ecosystem services such as grazing and water for livestock. In 2012/13, the DEA cleared 532 701 hectares of alien invasive species. In the 2013/14 financial year the DEA set a target of 863 067 hectares and by the end of that financial year had surpassed its target by approximately 62%.[111] While the DEA states that resources were not diverted from other programmes in order to achieve this significant (positive) deviation from its targets- this does beg the question about the extent to which the DEA is able to set strategic targets that seek to optimise available time and resources. Within the 2013/14 fiscus for instance, nearly 50% of the planned targets were exceeded without any reported shifting of funds or reprioritisation of resources to do so. The majority of the remaining targets were met with no significant deviations whether negative or positive. While one cannot argue that the DEA's ability to effectively 'over achieve' can be viewed positively, there is need to be circumspect regarding the extent to which targets set and allocated resources are not overly conservative. In 2014/15, the DEA sought to clear 169 045 hectares of invaded land and again reported exceeding its target by 22%.[112]

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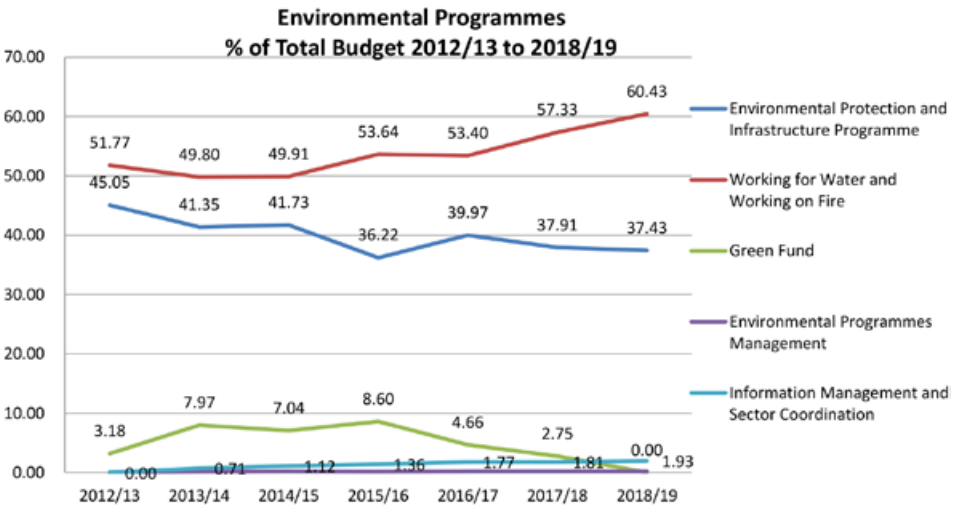
108 UNEP undated
109 Department of Environmental Affairs, Annual Report 2013/14
110 Department of Environmental Affairs, State of the Environment Report 2016
111 Department of Environmental Affairs, Annual Report 2013/14
112 Department of Environmental Affairs, Annual Report 2014/15

Figure 6: Environmental Programmes as a % of Total Budget



3.5.3 Biodiversity and Conservation

Section24 (b) (i) of the Constitution obliges the South African government to promote conservation and to ensure the protection of the environment for present and future generations. The Biodiversity and Conservation Programme consists of eight sub programmes that seek to promote precisely this. In determining the country's commitment to this aspect of environmental management it is worth noting that between 2012 and the current MTEF (2016/17 to 2018/19) the average real growth has amounted to a pitiful 0.01%. Monitoring and Evaluation, Biodiversity Planning and Management as well as the South African National Parks have all experienced budgetary decreases in real terms since 2012 (Figure 7).

The findings of the 2007 South African Environmental Outlook Report paint a dire portrait of the state of the country's environment. With only 18% of riverine ecosystems still intact, 54% critically endangered, 34% of terrestrial ecosystems categorised as threatened and a rapidly deteriorating natural resource base resulting from biodiversity loss and over-exploitation – there is cause for alarm. King *et al.* 2005 also highlight that more than 50% of the country's wetlands have been destroyed. In South Africa, as with the general global trends outlined in this report, it is the poorest populations that are made most vulnerable by environmental degradation and climate change (King *et al.* 2005).

It is therefore alarming that not only is funding for programmes aimed at the protection of South Africa's biodiversity decreasing in real terms between 2015/16 and 2016/17 (6.58%) but that key programmes such as those aimed at monitoring protection, managing biodiversity and sustainability have either stagnated since 2012/13 or have decreased in real terms, in some cases by as much as 30.86% (Figure 7). This is despite biodiversity and sustainability being key policy priorities nationally and provincially.

In the Western Cape, for instance, the 2016/17 Estimates of Provincial Revenue and Expenditure (EPRE) indicate that as a result of budget reprioritisation, CapeNature[113] which is supported by the DEA and funded provincially by the Western Cape Department of Economic Development and Environmental Affairs, has had been negatively affected with compromises in programme human resourcing needing to be made. CapeNature also experienced budget cuts in 2014/15 as a result of MTEF reprioritisation, which resulted in the shrinking of conservation programme activities.

Given the aforementioned fiscal environment that requires careful prioritisation of limited resources – it is also incumbent on the DEA to be innovative in mobilising additional funds. In the early years of the WfW programme, for instance, utilised the harvested alien invasive species to build coffins, school desks and other types of furniture – providing additional employment in the process. In this way, there is also the possibility of generating an income from the waste products of WfW activities.

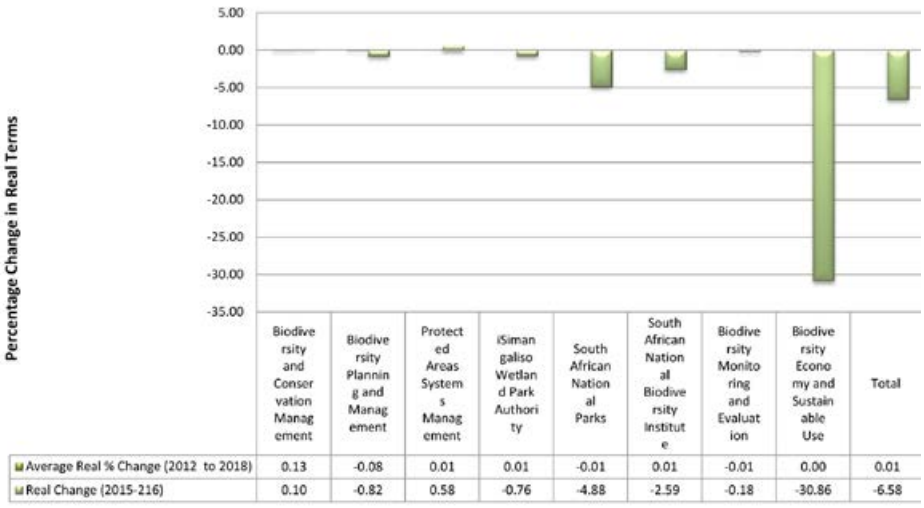
113 CapeNature is a public institution mandate relates to biodiversity conservation in the Western Cape. The institution is governed by the Western Cape Nature Conservation Board Act 15 of 1998 and is mandated to promote and ensure nature conservation; render services and provide facilities for research and training; and generate income.

In addition to this is the opportunity to seek PES funding from international donors as well as creating more sustainable PES funding mechanisms locally. Turpie *et al.* (2008) argue that as a result of the increasing scarcity of water in South Africa, support for research into the connections between alien invasive clearing and water supply has been significant. The results of some of this research have in turn influenced government allocations, according to Turpie *et al.* (2008). It is also notable that in addition to being funded through the tax base the clearing of alien invasive species has also received voluntary funding support making it a unique programme with a strong replicability element and clear buy-in from the government, research institutes, non-governmental organisations and international donors. Furthermore, in a country with high unemployment rates, a substantial unskilled labour base, PES schemes such as this have the added value of potentially contributing to poverty alleviation targets. WfW is labour intensive, increases water yields, contributes to land rehabilitation and biodiversity and (potentially) local entrepreneurship. While neither the WfW programme nor PES are perfect – they offer a great by way of financing opportunities for conservation, land rehabilitation and the protection of precious water resources. An important avenue that the DEA and various government departments must consider is the identification of ways not only to enhance the efficacy of the PES component but of maximising the flow between this and overall service delivery components. In other words – it is important to ensure that the WfW programme and similar initiatives strike a sustainable balance between what some may consider to be the commodification of nature, ecosystem service yields and service delivery. .

Table 6: Biodiversity and Conservation Allocation Trends: 2012/13-2018/19

	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	Average Real % Change (2012 to 2018)	Real Change (2015-216)
Biodiversity and Conservation Management	8,714	13,172	17,383	17,909	17,927	18,966	20,066	0.13	0.10
Biodiversity Planning and Management	52,911	22,695	21,955	27,386	27,161	28,724	30,390	-0.08	-0.82
Protected Areas Systems Management	50,384	41,735	49,003	49,753	50,042	52,373	55,411	0.01	0.58
iSimangaliso Wetland Park Authority	33,310	33,607	33,679	33,282	33,031	34,523	36,525	0.01	-0.76
South African National Parks	316,209	277,144	302,652	293,253	278,939	285,336	302,175	-0.01	-4.88
South African National Biodiversity Institute	239,978	243,599	245,853	244,293	237,973	249,928	264,714	0.01	-2.59
Biodiversity Monitoring and Evaluation	0	7,540	9,509	6,531	6,519	6,892	7,292	-0.01	-0.18
Biodiversity Economy and Sustainable Use	0	20,812	27,517	96,411	66,657	19,865	21,017	0.00	-30.86
Total	701,506	660,304	707,551	768,818	718,249	696,607	737,590	0.01	-6.58

Figure 7: Budget Allocation Trends for Biodiversity and Conservation, 2012 - 2018



	Biodiversity and Conservation Management	Biodiversity Planning and Management	Protected Areas Systems Management	iSimangaliso Wetland Park Authority	South African National Parks	South African National Biodiversity Institute	Biodiversity Monitoring and Evaluation	Biodiversity Economy and Sustainable Use	Total
Average Real % Change (2012 to 2018)	0.13	-0.08	0.01	0.01	-0.01	0.01	-0.01	0.00	0.01
Real Change (2015-216)	0.10	-0.82	0.58	-0.76	-4.88	-2.59	-0.18	-30.86	-6.58

Map 1: Location of 19 South African National Parks[114]

Covering less than 4% of the country's land surface, South African national parks represent environmental protection, heritage preservation, and environmental education opportunities and provide an array of social and economic services. Their distribution presents a unique prospect to provide genuine spaces to create equitable opportunities for access, enjoyment and education. Despite efforts by the DEA to promote access to previously excluded communities living near national parks, statistics collected for this are not published publically. However, anecdotal evidence points to minimal success outside of formal school tours and special events (see further detail as per Indicator 5b in Chapter 4 of this report). Confirming this struggle to create inclusive access to their parks, the Chair of the Western Cape Conservation Board wrote in the 2014/15 CapeNature Annual Report;

> *"The historical trend towards exclusivity, with respect to access to CapeNature-managed reserves and protected areas, is changing. Successful conservation is critically dependent on the awareness and concern as well as responsibility of our citizenry. Therefore, in order to instil a love for the natural environment and*

114 Source: SANParks: https://www.sanparks.org/parks/

an understanding and appreciation for the value of biodiversity, CapeNature is striving to facilitate access to all"

By that same token, however, budget cuts will make it increasingly difficult for publically funded parks to accommodate this important need while maintaining high standards of service and environmental protection. There is an urgent need for the DEA and its SANParks affiliates to identify innovative methods of generating revenue to ensure this. Not only is this important to promote equitable access for all but it is also vital in changing public agency and awareness of the inextricability of their livelihoods and wellbeing from the health and ecological integrity of the natural environment.

3.5.4 Climate Change Mitigation

In 2009, Raubenheimer[115] stated that the South African government's work in the climate change sector was extraordinary and that its work within the international climate policy arena was laudable. One example cited is the country's cutting edge research driven by the Department of Science and Technology. According to Raubenheimer (2009: 144) however, despite the 2008 national budget spearheading this alignment, what was clearly missing was a complementary response in South Africa's industrial, energy generation and transport policies. The 2008 budget also presents a useful platform from which to track the South African government's commitment to climate change mitigation as it coincides roughly with various commitments to move away from previous growth-without-constraints scenarios.[116] Greenhouse gas emissions in particular are listed as a significant tipping point for South Africa. With the envisioned development of significant coal-fired power stations already approved and underway (Medupi and Kusile) and another in the pipeline, combined with increasing traffic volumes and coal to liquid based refineries, South Africa will have a future of increased emissions. Additionally, the country will continue to be one of the most significant emitters globally.[117]

3.5.5 Basic Sanitation and Water Infrastructure

The 2008/09 ENE stipulates- in alignment with Programme 3 (Water Services)- the following key objectives (emphasis added);

i) Ensure that all people in South Africa have access to a functioning basic water supply facility and a functioning basic sanitation facility by 2014 by developing policy and regulating and implementing it at local government level as guided by the strategic framework for water services.

ii) Provide all schools that currently have no services with a safe water supply and sanitation service by a target date to be determined by Cabinet.

iii) Provide all clinics that currently have no services as well as those with inadequate services with a safe water supply and sanitation service by 2007/08[118]

iv) Facilitate the provision of regional bulk infrastructure by 2011 by developing the national implementation framework.

v) Ensure the provision of safe drinking water by all water services authorities by 2009 by effective monitoring, regulation and support as guided by the strategic framework for water services and specified by South African National Standard 241

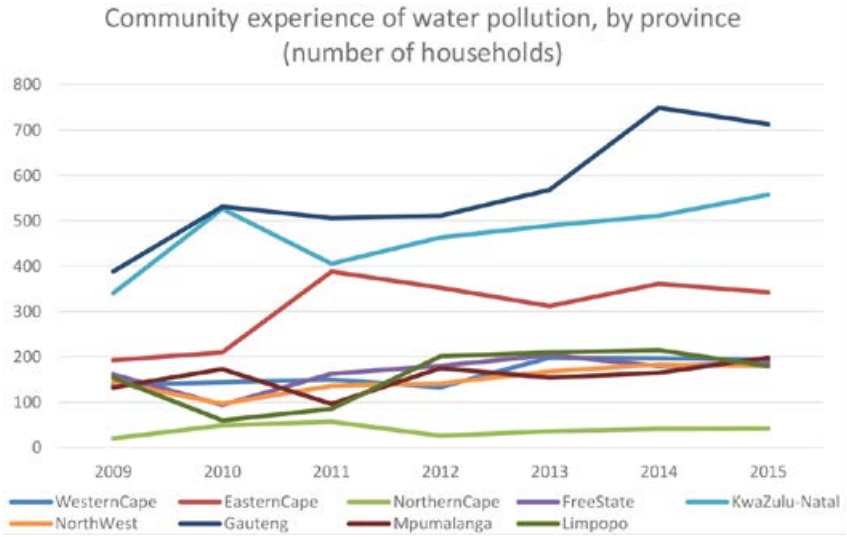
Water Services Projects provides for the construction of new water services infrastructure projects such as water treatment works and pipelines. The total budget for the sub-programme in 2011/12 was R 547.5 million and was used solely to finance transfers for: the construction of pipelines for different phases of the Nandoni and Inyaka water treatment works and distribution networks as well as for the Hluhluwe regional water scheme. In 2012/13, budget cuts to the sub-programme expenditure were approved amounting to R 16.6 million to be used to finance improvements in waste water infrastructure in district municipalities.[119] This is an important further recognition not only of municipalities as the locus of service delivery but also of their

115 Raubenheimer. S. 2009. Chapter 11: Your Government Our Government. pp. 139-155 In Zipplies, R (Ed). 2009. Bending the Curve: Your Guide to Tackling Climate Change in South Africa. Africa Geographic.
116 Ibid.
117 DEA, 2016, 2nd South African Environmental Outlook (SAEO)
118 Notably this target with a deadline for 2007/08 is included in the 2008/09 budget statement
119 National Treasury. 2016. Estimates of National Expenditure 2016/17: Vote 36: Water and Sanitation.

significant underfunding to support basic water treatment and services. Numerous examples of this can be highlighted in municipalities as geographically varied as Makana in the Eastern Cape, Tswelopele in the Free State and Kamiesberg in the Northern Cape (Mjoli 2012).

Glancing at point i) to v) above and in consideration of the related indicators defined in Chapter 4 of this report, it is evident that significant performance failures have led to the entrenchment in affected communities of sub-standard water services provisioning.

Figure 8: Community reports of water pollution by province (2009 to 2015)



At the National level, programmes within Vote 36 (Water and Sanitation) that have been earmarked for change include the Rural Households Infrastructure Grant which effectively falls away as a standalone grant and has been merged, as from 2016/17, with the water services infrastructure grant.[120]

3.5.6 Bucket Eradication Programme

Within the Water and Sanitation Services Programme is the indicator: "*Number of existing bucket sanitation systems in formal settlements replaced with adequate sanitation services per year*" which was introduced in 2014/15 and according to the 2015/16 ENE;

> *The indirect bucket eradication programme grant was due to end in 2015/16 but will be extended to 2016/17 to complete the eradication of bucket sanitation systems in formal residential areas.*

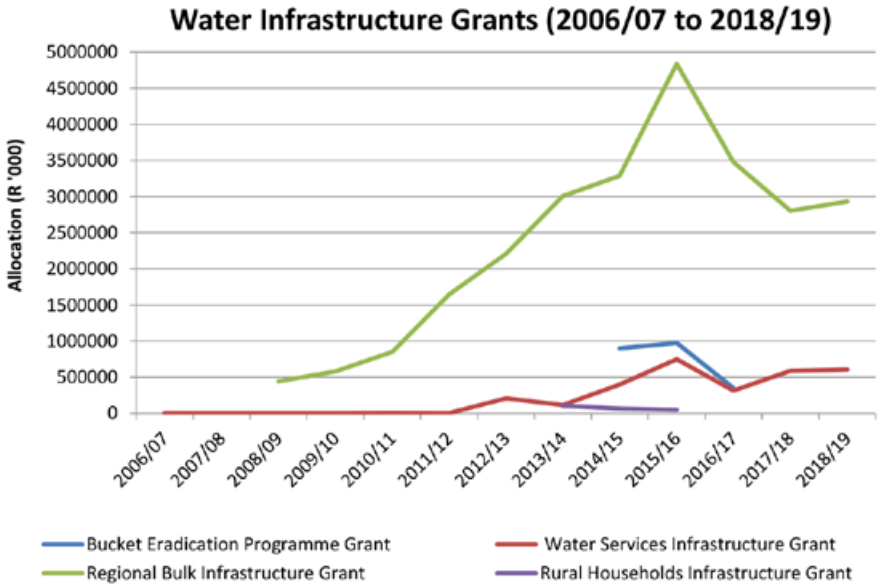
According to the ENE, sanitation upgrading and bucket system eradication in informal areas will continue to be funded through the urban settlements development grant, human settlements development grant and municipal infrastructure grant. The bucket eradication programme (BEP) is a component of the rollout of basic services and informal settlement upgrading. Furthermore, funds have been transferred out of the Human Settlements Development Grant (2016/17) allocation in order to allow for the extension of the bucket system eradication grant.[121] This shifting of budget line items and programmes present a useful lens by which to compare delivery of these services across a grouping of earmarked grants at the same sphere of government. However, in terms of accountability and long term tracking, programmatic shifts as with the BEP also make it difficult to accurately track efficiency. Several researchers have indicated the challenges of coordination in such instances and the adverse impact on delivery.

As mentioned previously - the right to a healthy environment implicitly creates accountability lines within and between different government departments. Figures 9 and 10 below are an illustration of this. Key infrastructure grant allocations aimed at addressing access to water and

120 National Treasury. 2016. Estimates of National Expenditure 2016/17: Vote 36: Water and Sanitation. p.3.
121 2015/16 MTBPS Technical Notes: www.treasury.gov.za/documents/mtbps/2015/mtbps/Technical%20annexure.pdf

sanitation require the involvement of the Departments of Water and Sanitation, Energy and Human Settlements.

Figure 9: Overview of Schedule 6 Conditional Grants Water Infrastructure allocations since 2006



3.5.7 The Regional Bulk Infrastructure

Figure 9 provides critical insight into government prioritisation of water, sanitation, infrastructure and electrification services over 13 years including the 2016/17 medium term projects. Four key time period are worth noting; 2010/11 to 2012/1 3; 2012/13 to 2015/16; 2015/16 to 2016/17 and the 2016/17 MTEF. While some of the changes may be attributable to practical programme changes within and across departments, others may reveal government spending policy changes and political prioritisation of allocations. Most notable overall are the trends on the Regional Bulk Infrastructure Grants which- in the MTEF is expected to increase from R 1.85 billion in 2016/17 to R 2.0 billion in 2018//19. This follows an exponential growth between 2010/11 and 2013/14 in particular R 850.6 million to R 3.0 billion. As reflected in Table 3- this grant accounts for a substantial proportion of the South African government's annual grants for infrastructure.

Addressing the needs of previously marginalised communities is at the core of many of the programmes outlined in Tables 7 and 8. The Regional Bulk Infrastructure Grant (RBIG) and Integrated National Electrification Programme Grant (INEPG) are two of the programmes highlighted a significant proportion of the overall allocations to these Municipal in-kind grants (Refer to Annexure 2 for details).

3.5.8 Integrated National Electrification

Allocations to the Integrated National Electrification Programme Grant (INEPG) are accounted for in the ENE within these municipal grants beginning in 2016/17 and over the MTEF the total allocation towards the INEPG equates to 52% of all Municipal Grants allocations. This equates to an increase of 4.25% in real terms over the three years. Indicator 1 associated with this programme shows the significant progress over the past decade in ensuring household access to electricity. Despite this progress the indicator highlights several provinces are still lagging behind (Eastern Cape and KwaZulu most notably) with about 20% of households in those provinces without access. Gender disparity is also evident in that female-headed households are most likely to be without access to electricity.

PROGRAMME	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	Real Change (MTEF)	Real Change (2006-2018)
Integrated National Electrification Programme (Eskom) Grant											3,526,334	3,876,154	3,995,031	4.25	
Bucket Eradication Programme Grant									899,177	975,399	350,000			-100.00	-26.99
Water Services Infrastructure Grant	3,857	642	712	1,574	4,867	407	206,067	112,739	395,951	746,454	311,545	587,122	608,175	24.98	-24.70
Regional Bulk Infrastructure Grant			443,167	581,568	850,617	1,646,856	2,209,947	3,009,546	3,288,014	4,837,109	3,478,829	2,806,279	2,931,443	-5.55	9.61
Rural Households Infrastructure Grant								106,721	65,624	48,182					-100.00

Figure 10: Percentage change in Schedule 6 Grant Allocation in Real Terms

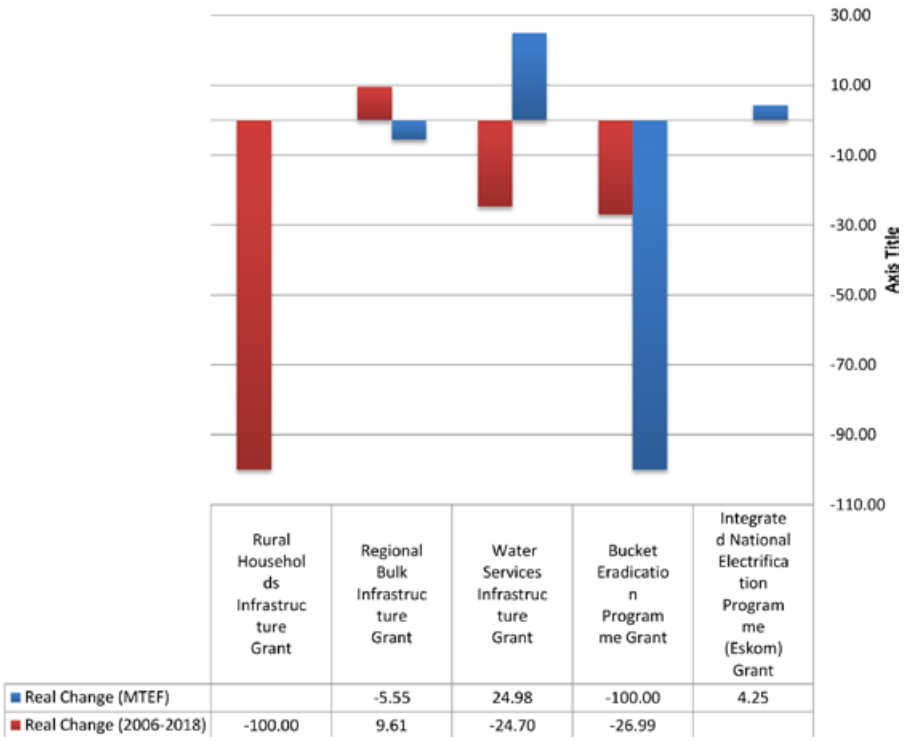


Table 8: In-Kind Municipal Grants across 2016/17 Medium Term Expenditure Framework[122]

Grant [3]	Programme Allocation as Percentage of Total Municipal Grant (2016: R 7.7 billion)	Programme Allocation as Percentage of Total Municipal Grant (2017: R 7.40 billion)	Programme Allocation as Percentage of Total Municipal Grant (2018: R 7.68 billion)
Integrated National Electrification Programme (Eskom) Grant	45.4%	52.4%	52.0%
Bucket Eradication Programme Grant	4.5%	0.0%	0.0%
Water Services Infrastructure Grant	4.0%	7.9%	7.9%
Regional Bulk Infrastructure Grant	44.8%	37.9%	38.2%
Rural Households Infrastructure Grant	0.0%	0.0%	0.0%

3.6 Budget Analysis – key findings

This budget analysis has outlined the key programme changes and budget trends across specific programmes and grants related to provisioning for the environment. The DEA reflects a rather remarkable history not only in its overall audit outcomes but in its general expenditure. While the scope of the analysis has not allowed for in-depth coverage of the sector, it is evident the key programmes such as the WfW and WoF sub programmes have seen some serious improvements in terms of their governance, administration and resourcing. The same has not been true, however, for the municipal grants, across departments. This suggests a greater capacity to effectively manage budgets at the national level.

Having said this, the analysis has also uncovered a degree of lethargy in terms of the accurate setting of performance targets by the DEA. The exceeding of targets over some years and

122 Note: Percentage allocations in this table do not add up to 100% as two programme have been omitted; a National Treasury allocation to the "Neighbourhood Development Partnership Grant" aimed at attracting community investments and a Co-operative Governance Grant which together account for less than 3% of the remaining allocation.

in several programmes suggests that there is room for less conservative and more strategic planning if the South African government intends to address significant environmental challenges and respond adequately to global demands for more sustainable development.

There are various trends which have contributed to limiting the adequacy, efficiency and effectiveness of resources allocated to realise the right to a healthy environment. Listed below are key findings and recommendations emanating from this analysis.

3.6.2 Adequacy of resource allocation

The DEA receives significant donor funding from sources such as the UNDP, UNEP, GEF and the German Development Bank for various programmes. While this has not been included in this analysis, the role of these funds must be considered in further research in order to provide a more comprehensive picture of all state and non-state financing and their impact on the DEA's delivery environment.

3.6.2 Efficiency of expenditure

The DEA undoubtedly has a positive history of clean financial performance exhibiting expenditure within 2% since 2006/07. The Department has also received affirmation for its good accounting standards from the AG of South Africa. Allocated funds are used for their intended purpose according to audit reports. This happens largely within the planned timeframes and with seemingly transparent, accountable reporting. The efficiency of strategic planning, which is associated with resource allocation within public resource management, raises some questions, however.

Over several years, the DEA has managed to outstrip its own targets by significant margins in select key programmes. In WoF, WfW and other environmental programmes – there is a need to review whether or not more robust, SMART (specific, measurable, achievable, realistic, time-bound) and less conservative planning is needed. Quite to the contrary, the efficiency with which the BEP in all its forms over the years has been poor – failing to connect resources allocate to meet set targets. Exhibiting slow delivery, poor planning and poor coordination – the BEP is perhaps a useful example of inefficient resource allocation. The question of adequacy becomes arguably secondary in the face of prolific expenditure and performance failures.

3.7 Findings and recommendations

- **Finding**: Budget allocations to the majority of Biodiversity and Conservation sub-programmes have decreased in real terms between 2012 and the 2016/17 Medium Term Expenditure Framework. This does not bode well for the protection of the country's resource base and has already had negative impacts on national programmes such as CapeNature. The national allocation for Biodiversity and Sustainable Development sub-programme decreased in real terms by a staggering 30.86% between 2015/16 and 2016/17
- **Recommendation**: National government must work to support conservation by at the very least avoiding further budget cuts to programmes that are already strained and reliant on donor funding to a substantial degree. Environmental issues can no longer be under-prioritised as they have been if South Africa is to meet its SDG obligations.
- **Finding**: funding allocations towards programmes aimed at the protection of South Africa's biodiversity decreased in real terms between 2015/16 and 2016/17 by 6.58%.
- **Recommendation**: the DEA is in a good position to motivate for additional funding though the enhancing of the PES component of programmes such as WfW in the first instance. Secondly, The DEA must harness existing research capacity within its own entities as well as other government departments to ensure that the PES innovations are enhanced and feed back into funding for environmental programmes and service delivery targets. Thirdly, the DEA must garner additional support both locally and internationally through PES financing schemes in addition to actively fostering sustainable voluntary PES payments.

- **Finding**: Over several years, the DEA has managed to outstrip its own performance targets by significant margins in select programmes.
- **Recommendation**: Within the WfW and WoW programmes, for instance, the DEA must plan in a more robust and strategic manner in recognition of both the difficult funding space but also of the need to utilise all resources efficiently and effectively at all times and in all programmes.
- **Finding**: Since 2006/07, the DEA has obtained unqualified audit opinions from the Auditor-General of South Africa.
- **Recommendation**: there is no doubt that the DEA is working within a tight fiscal space given the overall constrained financing environment. The DEA must therefore motivate for additional funds and push for recognition of ecosystem services given their importance for human wellbeing and fostering of sustainable development overall.

CHAPTER 4

The status of the right to a healthy environment: what the indicators tell us

SPII's monitoring of socio-economic rights combines analysis of the content and implementation of government policies and budgets with an assessment of their outcomes on the ground. This requires the development of performance and impact indicators relevant to the right to a healthy environment that can be tracked and monitored over time.

4.1 The Process of Developing Indicators

The process of developing indicators was initiated with a review of international and local policies, conventions and jurisprudence on the content of environmental rights. Discussions with various stakeholders have shown that environmental monitoring is often conducted by companies rather than government or public organisations. Companies tend to conduct environmental audits themselves, and then treat this information as confidential. Gaining access to this information may therefore prove problematic. In some cases it may be necessary to use PAIA to gather this information.[123]

4.2 Examples of South African Monitoring Frameworks

The Department of Environmental Affairs (DEA) (2011) Environmental Sustainability Indicators Technical Report.[124] The first Environmental Sustainability Indicator Technical Report was published in 2009 and includes environmental systems and resources such as air, water, land and biodiversity.

The Statistics South Africa (Stats SA) (2013) Selected development indicators 2013 General Household Survey[125] considers water pollution, air pollution, land degradation, excessive noise pollution. The survey also monitors the percentage of households that have used pesticides in dwelling, pesticides in the garden, herbicides and weed killers used during the past 12 months. The use of such chemicals can directly impact on the quality of the environment.

The Work Programme 2013/2014 (Statistics SA)[126] is produced annually to allow for the monitoring of national developmental goals. The Programme considers (amongst other indicators) the environmentally sustainable use of resources.

Although ending this year, South Africa's commitment to the Millennium Development Goals Country Report can be seen in the National Coordinating Committee for the Millennium Development Goals annual report.[127] Of relevance to the right to environment, the report considers environmental sustainability.

Following the target year of the MDGs being reached and the United Nations Sustainable Development Summit in September 2015, a list of 17 Sustainable Development Goals (SDGs), replaced the Millennium Development Goals. Along with Agenda 2030, the objectives of the SDGs include tackling climate change, eradicating poverty, fighting inequality and promoting people's wellbeing while protecting the planet by 2030.[128]

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123 See Company Secretary of ArcelorMittal South Africa v Vaal Environmental Justice Alliance (69/2014) for an example of the successful use of PAIA to gain access to environmentally relevant information www.saflii.org/za/cases/ZASCA/2014/184.pdf.

124 The Department of Environmental Affairs, Environmental Sustainability Indicators Technical Report (2011) www.environment.gov.za/sites/default/files/docs/environmental_sustainability_indicators.pdf.

125 Statistics South Africa (2013), General Household Survey, 2013 http://beta2.statssa.gov.za/publications/P03182/P031822013.pdf

126 Available from: http://beta2.statssa.gov.za/work_programme/work_programme_2013.pdf.

127 United Nations Development Programme, The National Coordinating Committee for the Millennium Development Goals, Millennium Development Goals Country Report 2013 www.za.undp.org/content/dam/south_africa/docs/Reports/The_Report/MDG_October-2013.pdf.

128 United Nations Development Programme (UNDP).2016. UNDP Support to the Implementation of Sustainable Development Goal 6: Sustainable Management of Water and Sanitation www.undp.org/content/undp/en/home/librarypage/sustainable-development-goals/undp-support-to-the-implementation-of-the-2030-agenda/

The Environmental and Sustainable Development Indicators, North West Province[129] provides a proposed set of potential indicators which include waste management, atmospheric and climate change, biodiversity, natural heritage, land use and human settlements.

The South African National Atmospheric Emissions Inventory System (NAEIS)[130] is an online national reporting platform that holds inventories of both air pollutants and greenhouse emissions. The system offers new innovative ways to report emissions as is required by the National Environmental Management Air Quality Act of 2004. The NAEIS objective is to provide all stakeholders with relevant, up to date and accurate information on South Africa's emissions profile for informed decision making.

The Environmental Sustainability Indicator Report State of Environmental Systems[131] integrates nine datasets into a set of 20 indicators of environmental sustainability. The goals of this report are to allow for the ability to protect the environment in a sustainable manner, and allow for an assessment of government's successes in this regard. Using these indicators, government intends to create a State of Environmental Systems Environmental Sustainability Indicator Report[132].

The Department of Water Affairs and Forestry, South African Water Quality Guidelines.[133] The water quality guidelines provide a large amount of information on dangerous contaminants found in water, including means by which the contaminants may be measured.

4.3 Examples of International Monitoring Frameworks

The OECD Environmental Indicators: Development, Measurement and Use Reference Paper[134] of the Organisation for Economic Co-operation and Development supplies indicators that can be used at national and international levels. This paper is designed to provide a means of measurement to allow for the incorporation of sustainable development into developmental policies and frameworks.

The Organisation for Economic Development and Co-operation and Development 2008 Key Environmental Indicators[135] presents a list of indicators, including the measurement of:

- Climate change measured by CO_2 and greenhouse gas emission intensities.
- Ozone layer measured by the presence and manufacture of ozone depleting substances.
- Air quality measured by Sulphur Oxides (SO_x) and Nitrous Oxides (NOx) emission intensities.
- Waste generation measured by the increase in municipal waste.

The Manual on Environmental Health Indicators and Benchmarks: Human Rights Perspectives[136] (2007) provides a framework and suggestions on indicators that can be used to measure environmental health. Amongst other factors, these indicators include:

- Air Quality (indoor and outdoor pollution and the impact on human health).
- Water Quality and Sanitation (sources of water contamination, drinking water standards, sanitation and waste disposal).

Environmental Indicators: A Systematic Approach to Measuring and Reporting on Environmental Policy Performance in the Context of Sustainable Development[137] by the World Resources

129 North West Provincial Government, The Environmental and Sustainable Development Indicators, North West Province www.nwpg.gov.za/soer/FullReport/indicators.html.
130 South African Air Quality Information Systems, The South African National Atmospheric Emissions Inventory System www.saaqis.org.za/Emissions3.aspx
131 The Environmental Sustainability Indicator Report State of Environmental Systems www.environment.gov.za/sites/default/files/docs/2009envirosustainability_indicators_introduction.pdf.
132 State of Environmental Systems Environmental Sustainability Indicator Report www.environment.gov.za/sites/default/files/docs/envirosustainability_indicators_systems_state.pdf.
133 Department of Water Affairs & Forestry, South African Water Quality Guidelines, Volume 1: Domestic Water Use, Second Edition, 1996 www.dwaf.gov.za/IWQS/wq_guide/domestic.pdf.
134 The Organisation for Economic Development and Co-operation and Development, The OECD Environmental Indicators: Development, Measurement and Use Reference Paper of the Organisation for Economic Co-operation and Development www.oecd.org/environment/indicators-modelling-outlooks/24993546.pdf
135 The Organisation for Economic Development and Co-operation and Development, 2008 Key Environmental Indicators www.oecd.org/env/indicators-modelling-outlooks/37551205.pdf.
136 American Association for the Advancement of Science, Manual on Environmental Health Indicators and Benchmarks: Human Rights Perspectives (2007), A. Karim Ahmed, Anya Ferring and Lina Ibarra Ruiz www.aaas.org/sites/default/files/migrate/uploads/EnvironmentalHealth.pdf.
137 World Resources Institute, Environmental Indicators: A Systematic Approach to Measuring and Reporting on Environmental Policy Performance in the Context of Sustainable Development by the World Resources Institute http://pdf.wri.org/environmentalindicators_bw.pdf.

Institute. This document provides indicators that can be used to measure environmental issues, including acidification, toxic dispersion, solid waste disposal, and composite pollution.

The United Nations Millennium Development Goals Report 2013[138] includes indicators to assess the loss of natural habitat, CO2 emissions, Ozone-Depleting Substances (ODS), the protection of terrestrial and marine areas, species threatened with extinction, population using improved drinking water source, population using improved sanitation facility and the use and availability of electricity.

The United Nations Environment Programme Key Environmental Indicators: Tracking progress towards environmental sustainability.[139] This document tracks ozone layer depletion, climate change, natural resource use, environmental governance and chemicals and waste.

- The World Health Organisation, WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulphur dioxide, Global update 2005: Summary of risk assessment provides clear and specific measurements that are to be used as guidelines for a healthy environment.[140]

4.4 Stakeholder Engagements

Engagements with stakeholders have been crucial to the creation of the indicator list. A total of 13 stakeholders were contacted in the first round of interviews. Of this number, five responded positively and contributed towards this study. In the second round of interviews, 18 stakeholders were contacted, with three responding positively and contributing. Stakeholders included representatives of the following organisations: Earthlife, Council for Scientific and Industrial Research, Federation for a Sustainable Environment, Environmental Monitoring Group, Centre for Environmental Rights, University of Cape Town, and the North West University. Significant stakeholders who were contacted but were unable to provide assistance include World Wildlife Fund, Greenpeace Africa and the South African National Biodiversity Institute (SANBI). Government stakeholders who were contacted but did not contribute include the Department of Rural Development, the Department of Mineral Resources, the Department of Energy, the Department of Agriculture, Forestry and Fisheries and the Department of Environmental Affairs. It should be noted that while civil society has been forthcoming and contributed significantly to this report, responses from government departments have been less so.

Many stakeholders were concerned over the lack of government monitoring and enforcement of regulations concerning pollution and sustainability. In particular, the ideal of industry self-monitoring and reporting was argued to be insufficient to protect the right to environment. Stakeholders believed that businesses were disinterested in environmental concerns and often acted without properly adhering to regulations and laws.

The issue of potentially unsustainable practices in resource extraction and the unsustainable use of natural resources (such as water) were almost universally highlighted. Stakeholders from civil society were concerned over the apparent de-emphasis on human health and environmentally sustainable development; practices potentially creating employment were seen as being prioritised, despite potentially significant short and long term health and environmental damage. In addition, there was concern over the lack of education with regards to environmental rights amongst vulnerable groups. Stakeholders related instances where the health and wellbeing of vulnerable groups are compromised due to environmental concerns, with groups having no means of asserting and defending their rights. Stakeholders explained that, in most instances, vulnerable communities were not even aware that they had a right to environment. Stakeholders believed that many community members did not understand that environmental degradation has a significant negative impact upon all of their rights.

138 United Nations, The Millennium Development Goals www.un.org/millenniumgoals/pdf/report-2013/mdg-report-2013-english.pdf.
139 United Nations Development Programme, The United Nations Environment Programme Key Environmental Indicators: Tracking progress towards environmental sustainability www.unep.org/yearbook/2012/pdfs/UYB_2012_CH_4.pdf.
140 World Health Organization, WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulphur dioxide, Global update 2005: Summary of risk assessment http://whqlibdoc.who.int/hq/2006/WHO_SDE_PHE_OEH_06.02_eng.pdf.

4.5 Indicator Wish list and Limitations

This report and the indicators were created using a methodology which prioritised the output of useful indicators with reliable, reputable and disaggregated data sources (ideally available from 2002). Unfortunately some potential indicators had to be discarded as they did not adhere to the above stipulations. In particular, the availability of regularly updated data was problematic. In addition, potentially useful indicators were discarded when their required data was found to be either not reliably available or not easily accessible.

Potentially useful indicators that had to be discarded due to lack of reliably available and updated data include:

- Riparian Vegetation Index (RVI): measures the health and presence of riparian vegetation (plants that contribute towards the overall health of the aquatic ecosystem) in waterways.
- Fish Index and Stream Fish Assemblages: Fish Index (FI) and Stream Fish Assemblages: measures the extent to which fish presence and species differ from the natural state.
- Soil Health: measurement of Soil Organic Matter shows the presence of organic matter in soil which is directly related to soil quality and fertility.
- Index of Habitat Integrity (IHI): measures the type and presence of riparian habitats in order to assess the significance of human impact on riparian and in stream ecosystems.
- Benthic Index of Biotic Integrity (BIBI): measures the condition of the benthic area (located at the bottom of water systems) to assess the relative health of the ecosystem.
- SASS: Measures the presence, species and health of invertebrate (especially macroinvertebrate) in river systems as a means of determining overall aquatic exosystemic health.141 The Department of Water Affairs (DWA) Annual Report (2013/14) mentions that the Mini-SASS is "*ready for use*".[142]

A real challenge throughout this report was sourcing data for indicators suitable for comparison over time. A good example of this is that although the data provided by SANBI and South African Air Quality Information System (SAAQIS) is significant, it was determined to be inadequately available for this report as it did not provide coverage of most regions of South Africa.

There are also a number of reports and discussions potentially yielding significant indicators, but whose data is only available for the specific time period mentioned in the report (usually only a year or so). As such, data and indicators from sporadic reports is unfortunately not sufficient for inclusion as per this research project's methodology.

An added issue (as noted by the stakeholders) is the emphasis placed on data collection and the submission of reports from private companies. In this case, although data may be available, accessing this data can prove to be problematic without the costly and timely use of PAIA. There is also the question of bias where business is expected to collect data and submit reports that could be used against them in the manner of fines, or the ordering of potentially costly actions to adhere to environmental legislation and commitments.

There is also a lack of capacity and resources from government. As an example, ideally water should be continuously sampled to ensure minimum standards are met; however there are obviously insufficient resources to measure every river and every water source. Even if additional government resources were made available, the collection and analysis of the massive amounts of data would be impractical.

The issue of attribution is another area of uncertainty; as an example, where a river is polluted it is generally extremely hard to determine the exact source of contamination. This problem is exacerbated when seemingly innocuous contaminants from one source combine with contaminants from another source in a mix that then becomes toxic. This issue is made even more complex when considering the potential impact of transboundary pollution.

As with all studies, the quality of this report and indicators rests heavily on the reliability of data. Although care has been taken, some indicators such as the Quality indicators *Community*

141 Dickens C., Graham P., The South African Scoring System (SASS) Version 5 Rapid Bio assessment Method for Rivers, African Journal of Aquatic Science 2002, 27: 1-10 www.csir.co.za/rhp/methods/dickens%20and%20graham.pdf.

142 Department of Water Affairs, Annual Report 2013/14 p15 www.dwa.gov.za/documents/AnnualReports/DWA%20ANNUAL%20REPORT%202013-14.pdf

Experience of Environmental Problems and *General Environmental Problems Experienced*, as well as some variables like *Subjective Quality of Drinking Water* are based upon subjective questions that allow for differing interpretations. Thus, it must be remembered that even where the data comes from valuable and trusted sources such as Stats SA, it is potentially prone to bias and misunderstanding.

Finally, at the onset of this report, it was acknowledged that assistance from government departments would be important. Unfortunately, government departments have not been forthcoming with their assistance. Although many government reports were read during the course of this report, proper engagement with government departments may have added additional insight.

4.6 Indicators for the right to Environment

According to the methodology followed in this report, using the research conducted, and the assistance of stakeholders, the indicators measuring the right to environment have been created and divided into Access Indicators, Adequacy Indicators and Quality indicators. It is important to remember that the indicators below work best when combined with one another and that some variables in one indicator could also be used to provide additional insight into a related indicator. As an example the Access indicator *Access to Water* should be considered along with the Adequacy indicator *Water Supply* and *Acid Mine Drainage*, as well as the Quality indicator *Quality of Water Supply*. The links between so many indicators is indicative of the fundamental link of the many aspects of right to environment, and the manner in which this right impacts on other rights.

Finally, the indicators have been designed to clearly show the variables that influence them. In this way, it is intentionally made possible to 'cherry-pick' certain aspects of the indicators, or even to use the variables themselves directly.

Please refer Annexure 4 for a more detailed explanation of the indicators.

ACCESS	ADEQUACY	QUALITY
Access to Mains Electricity Physical access to electricity from mains supply.[4]	Energy Sustainability Sources of energy[5] Energy Consumption per capita[6]	Quality of Drinking Water Blue Drop Score (out of 100)[7] Subjective Quality of Drinking Water[8]
Access to Basic Sanitation Percentage of households with access to basic sanitation[9]	Waste Recycled Paper Waste Recycled[10] Total Waste Recycled[11]	Ecological Footprint Ecological Footprint[12]
Access to Water Percentage of households with access to piped or tap water in their dwellings, off-site or on-site by province, 2002–2013[13]	Emissions of Greenhouse Gas CO2 emissions per capita[14] CH4 emissions[15] N2O emissions[16] HFC emissions[17] PFC emissions[18]	Biodiversity Percentage of Threatened Amphibian Species[19] Percentage of Threatened Bird Species[20] Percentage of Threatened Mammal Species[21] Number of endemically threatened taxa[22]

4 Stats SA - General Household Survey 2013.
5 Department of Environmental Affairs.
6 International Energy Agency.
7 Department of Water Affairs.
8 Stats SA - General Household Survey 2013.
9 Stats SA - General Household Survey 2013.
10 Department of Environmental Affairs.
11 Department of Environmental Affairs.
12 Department of Environmental Affairs.
13 Stats SA - General Household Survey 2013.
14 Department of Environmental Affairs, Greenhouse Gas Inventory.
15 Department of Environmental Affairs.
16 Department of Environmental Affairs.
17 Department of Environmental Affairs.
18 World Bank.
19 Department of Environmental Affairs, Greenhouse Gas Inventory.
20 Department of Environmental Affairs, Greenhouse Gas Inventory.
21 SANBI.
22 Department of Environmental Affairs.

Access to Waste Removal Services Physical access to waste removal, determined by the removal of refuse (whether by municipality or private arrangement) at least once a week.[23]	Fine Particulate Matter (PM) Fine Particulate Matter (PM 2.5)[24] Fine Particulate Matter (PM 10)[25] Emission from Eskom[26]	Responsible Environmental Management (Business) Number of ISO 14001 companies[27]
Access to Natural Environment Number of National Parks[28] Number of visitors to national parks[29]	Water Supply Organic Water Pollutant Emissions Per Day[30] Trophic Status of Dams[31] Renewable freshwater resources per capita[32] Drainage Region Summary - Percentage Full[33] Water Management Areas - Percentage Full[34] Provincial Summary - Percentage Full[35]	Air Quality Impact on Health and Wellbeing Number of TB deaths by province[36] Number of deaths from diseases of the respiratory system[37]
	Acid Mine Drainage (AMD) Total Dissolved Solids in water[38] Sulphate levels in water[39] Iron levels in water[40]	Health Infant Mortality (ages 0 - 4) per 1000 live births[41]
	Environmental Protection by Government Percentage of biome protected[42] Number of ramsar sites protected[43] Number of Biosphere Reserves[44] Proportion of terrestrial areas protected[45] Proportion of marine areas protected[46] % of river ecosystem types protected / degree of protection[47] Wetlands Rehabilitation[48] Number of hectares of invasive alien plants treated/ cleared[49] Area (ha) of land restored and rehabilitated[50] Proportion of South African coastline within marine bioregions[51] Protection Levels of national Strategic Water Source Areas[52] Number of Rivers Monitored by the River Health Programme[53] Number of Rivers Monitored by the River Health Programme[54]	General Environmental Problems Experienced Percentage of households who experience specific kinds of environmental problems[55]
		Food Security[56] Food access severely inadequate (Percentage of households) Food access inadequate (Percentage of households) Food access adequate (Percentage of households)

23 Stats SA - General Household Survey 2013.
24 World Bank.
25 Department of Environmental Affairs, State of Air Report.
26 Eskom. As the energy supplier, Eskom is the primary emitter of PM in South Africa.
27 Department of Environmental Affairs, ISO14001 certification requires a business to have a framework for environmental management. ISO 14001 is thus an indication of private commitment to environmental protection, management and sustainability.
28 SANParks Website.
29 Knoema.
30 Stats SA - Mortality and causes of death in South Africa, 2013: Findings from death notification.
31 SANParks, Annual Report 2012/2013.
32 Department of Environmental Affairs. Trophic Status of Dams shows the quality and biological and ecological health of water in dams, and is a direct measure of the health of water sources.
33 Department of Water and Sanitation, Water Management Areas - Weekly Summary.
34 Department of Water and Sanitation, Water Management Areas - Weekly Summary.
35 Department of Water and Sanitation, Water Management Areas - Weekly Summary.
36 Department of Water and Sanitation, Water Management Areas - Weekly Summary.
37 Stats SA - Mortality and causes of death in South Africa, 2013: Findings from death notification.
38 Department of Water and Sanitation, ACID Report.
39 Department of Water and Sanitation, ACID Report.
40 Department of Water and Sanitation, ACID Report.
41 Stats SA - Mid-year population estimates, 2014. Infants are especially vulnerable to pollution related illness, thus an assessment of Infant mortality gives an indication of the general quality of the environment in terms of health and wellbeing.
42 SANBI.
43 Fifth National Report to the Convention on Biological Diversity, South Africa.
44 Fifth National Report to the Convention on Biological Diversity, South Africa.
45 MDG Country Report 2013.
46 MDG Country Report 2013.
47 SANBI.
48 SANParks, Annual Report 2012/2013.
49 SANParks, Annual Report 2012/2013.
50 SANParks, Annual Report 2012/2013.
51 Department of Environmental Affairs.
52 Stats SA - General Household Survey 2013.
53 SANBI.
54 SANBI.
55 Department of Water Affairs, Annual Report 2014.
56 All variables from Stats SA - General Household Survey 2013.

		Community Experience of Environmental Problems[57] Irregular or no waste removal Water Pollution Outdoor / Indoor air pollution Land degradation / over utilisation of natural resources Excessive noise / noise pollution Other[58] Littering
		Governmental funding allocated to Department of Environmental Affairs[59] Oceans and Coasts (in R thousands) Climate Change and Air Quality (in R thousands) Biodiversity and Conservation (in R thousands) Environmental Programmes (in R thousands) Chemicals and Waste Management (in R thousands) Total budget allocation to the DEA
		Environmental Infringements[60] Number of reported environmental incidents Total number of arrests Number of inspections conducted

Access Indicators

(Indicator 1) Access to Mains Electricity

Source:

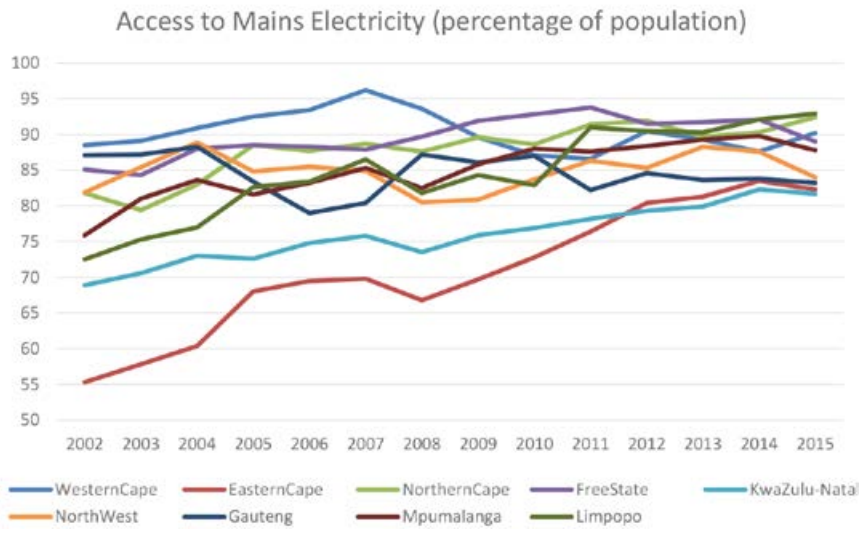
General Household Survey 2015 (StatsSA);

Disaggregation by sex of head of household available from 2009 onwards (from GHS 2009-2015)

Description: People with access to mains electricity tend to burn far less fossil fuels. As such, access to mains electricity can significantly reduce local air pollution. Access to mains electricity also reduces the amount of deforestation and damage to flora, as energy generation without electricity tends to involve the burning of combustible material, including wood and grass. In addition, the use of mains electricity also reduces the amount of air pollution (especially indoor air pollution), and can significantly improve human health. The extent to which access to mains electricity reduces pollution is highly dependent on the source of the energy

57 Data for all variables from Stats SA - General Household Survey 2013.
58 Please note that the statistics used are drawn from the Stats SA General Household Report 2013 and this variable is presented without explanation. It likely refers to any other environmental issue that was not considered in the questionnaire.
59 Except for Total budget allocation to the DEA which is from the Department of the National Treasury, data for all variables from Department of Environmental Affairs.
60 Data for all variables from Department of Environmental Affairs.

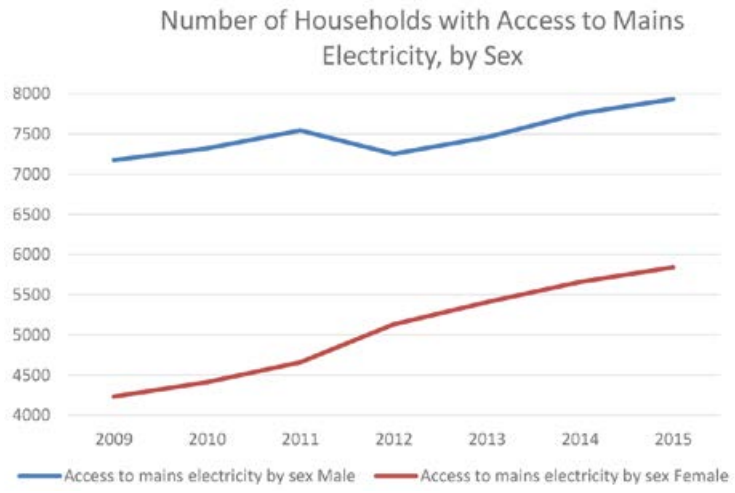
Figure 11: Access to Mains Electricity (percentage of population)



(Indicator 1a) (*By province, percentage of population*):

In relation to access to mains electricity, the Eastern Cape showed the largest increase between 2002 and 2015. At the beginning of period the province exhibited the lowest levels of access at 55% access, increasing by about 30 percentage points to match the two other low performing provinces in 2015; KwaZulu Natal and Gauteng at just over 80% access. The Western Cape was the consistently the province exhibiting highest access from 2002 to 2009 when it was surpassed by the Free State after a decrease from the highest recorded value in 2007 of about 97% access. From 2012 onward, there is no clear leader in access, and all the provinces are within 15 percentage points of each other, with a maximum of about 93%. In 2002, the range was 35 percentage points with a maximum of 90%. While this generally bodes well in terms of overall access for South Africans, access still remains lowest in predominantly large, rural provinces such as the Eastern Cape and Kwa-Zulu Natal.

Figure 12: Number of Households with Access to Mains Electricity, by Sex



(Indicator 1b) (*By sex of head of household: number of households, national)*:

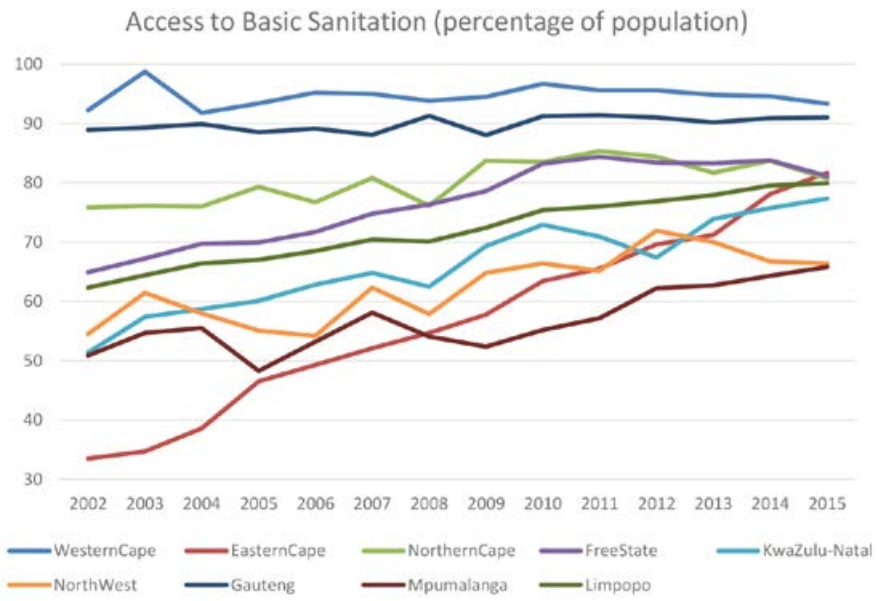
Both Male and Female led households showed an upward trend over the total time range (2009- 2015). Male-led households showed a very slight downward trend over 2011/2012, which was not matched by female-led households. The difference between the numbers of households in each category decreased from about 3000 in 2009 to about 2000 households in 2015.

(Indicator 2) Access to Basic Sanitation

Source: General Household Survey 2015 (StatsSA)

Description: Access to sanitation significantly improves local environmental quality and human health. Sanitation is defined as the "*collection, removal, disposal or treatment of human excreta and domestic wastewater, and the collection, treatment and disposal of industrial wastewater where this is done by or on behalf of a water services authority.*"[143] The proper treatment and disposal of faecal waste made possible by access to basic sanitation, reduces water and land pollution and significantly reduces the risk of cholera and other diseases. Therefore, access to basic sanitation is vital for an environment that is healthy and promotes human and natural wellbeing.

Figure 13: Access to Basic Sanitation (percentage of population)



(By province, percentage of population):

This indicator is an example of service provisioning that still mirrors the legacy of apartheid's discriminatory spatial planning. The stark difference in access in 2002 with the Eastern Cape only having 34.7% access to basic sanitation and the Western Cape with 92.2% access in the same year speaks volumes. While the gap has narrowed – it is still marked. South Africans in different provinces still enjoy access to basic sanitation differently depending on where they live.

The indicator also signposts change in access over time with the Western Cape consistently exhibiting more than 90% access throughout the time series (2002-2015) with a short lived peak in 2003 to more than 98%. Gauteng, which was consistently at or slightly below 90% throughout the period is the province with high access levels. The greatest improvement over the period was shown by the Eastern Cape with an increase in access from just over 30% in 2002 to about 80% in 2015. The range of percentage access decreased from almost 60 percentage points in 2002 to less than 30 percentage points in 2015. The lowest performing province changed from the Eastern Cape in 2002 to North West and Mpumalanga provinces in 2015.

It is interesting to note that while a provinces like the Eastern Cape has seen consistent increases in access to basic sanitation- there are provinces like the Western Cape, North West and Free State for whom access towards the end the period under review begun to decrease. This may be indicative of the state's struggle to provide for growth in urban informal settlements and townships.

(Indicator 3) Access to Water

Sources:

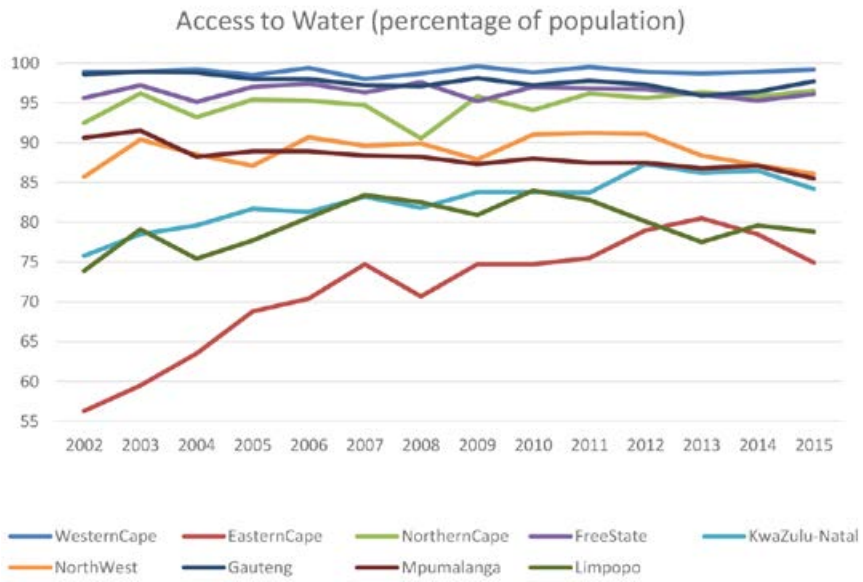
General Household Survey 2015 (StatsSA);

Data by sex available from GHS 2009-2015

143 Department of Water Affairs and Forestry, Draft White Paper on Water Services: Water is Life, Sanitation is Dignity, Draft for Public Comment, October 2002 www.gov.za/sites/www.gov.za/files/draft_SA_water_services_wp6.1.pdf p iii.

Description: Access to water leads to a significant improvement in human health. Properly provisioned water from a sustainable source also decreases potential strain on river and other water systems. It is significant to note that there are some concerns with the quality of access provided. In some instances, infrastructure provided on paper is in reality "*broken or dysfunctional*".[144] Not only does non-functioning infrastructure negatively impact on human access, poorly constructed and badly maintained results in loss and waste of water, which impacts on sustainability and increases strain on already limited natural water resources.

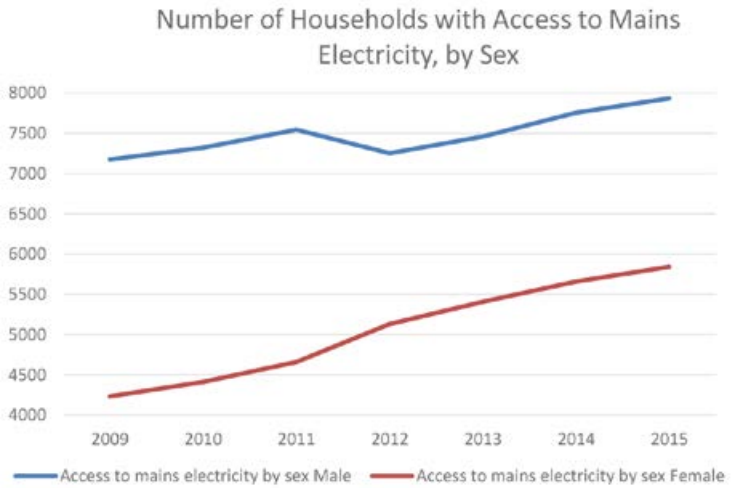
Figure 14: Access to Water (percentage of population)



(Indicator 3a) (*By province, percentage of population):*

The two highest performers, Gauteng and the Western Cape, were consistently between 95% and 100% throughout the considered period (2002-2015). The Eastern Cape was the poorest performer throughout the period, except in 2013. The province also showed the largest increase in access, from about 56% in 2002 to a peak of 80% in 2013 and finally 75% in 2015. Except for the two highest performers, and the Northern Cape, the other provinces, with much fluctuation, showed a small increase in access or even a slight decrease, as is the case with Mpumalanga. The range was 45 percentage points in 2002, decreasing to less than 25 percentage points in 2015.

Figure 15: Number of Households who's Main Source of Water was Supplied by the Local Municipality, by Sex



(Indicator 3b) *(By sex of head of household, number of households, national; [see supporting document]):* Both categories showed an upward trend over the period under consideration

144 South African Human Rights Commission, Report on the Right to Access Sufficient Water and Decent Sanitation in South Africa, 2014: Water is Life. Sanitation is Dignity: Accountability to People who are Poor, 2014 p14 www.sahrc.org.za/home/21/files/FINAL%204th%20Proof%20 4%20March%20-%20Water%20%20Sanitation%20low%20res%20%282%29.pdf.

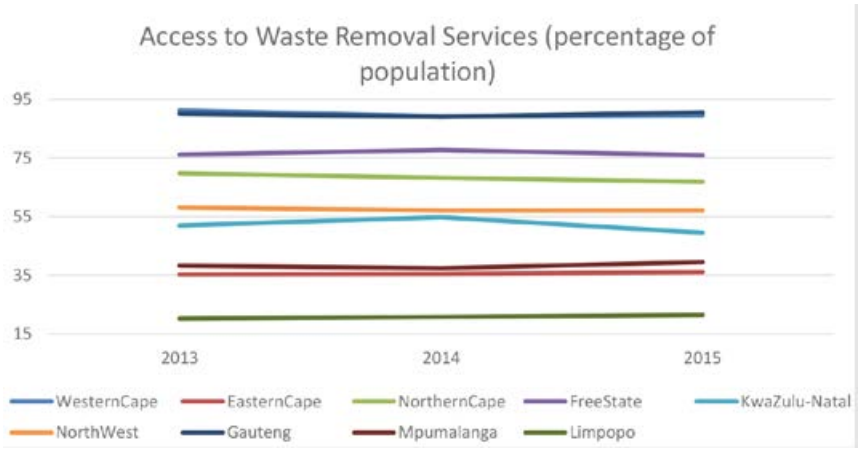
(2009-2015). As with access to electricity, the number of male-headed households shows a decrease in 2011/2012 that is unmatched by female-led households. The difference between the two categories decreases slightly from about 3000 in 2009 to about 2500 in 2015.

(Indicator 4) Access to Waste Removal Services

Source: General Household survey 2013-2015 (StatsSA)

Description: Access to waste removal reduces local air, land and water pollution as well as improving human health. Statics South Africa highlights the importance of refuse removal to "*maintain environmental hygiene of the households' neighborhoods*".[145] This indicator considers the removal of refuse (whether by municipality or private arrangement) at least once a week. It is important to note that urban and metropolitan areas have a far higher rate of refuse removal than rural areas. Ideally, the data should be considered in terms of rural, urban and metropolitan, however before the *Statistics South Africa General Household Survey 2013* this additional data was not captured. Although refuse removal includes the "proper disposal" of waste, this indicator does not properly consider the management and proper disposal of waste after removal. In this sense, this indicator must be considered along with the adequacy indicator *Waste Recycled*.

Figure 16: Access to Waste Removal Services (percentage of population)



(Indicator 4a) *(By province, percentage of population):*

The data is only available for years 2013-2015 so there are no clear increasing or decreasing trends, but the stratification of the provinces is evident.

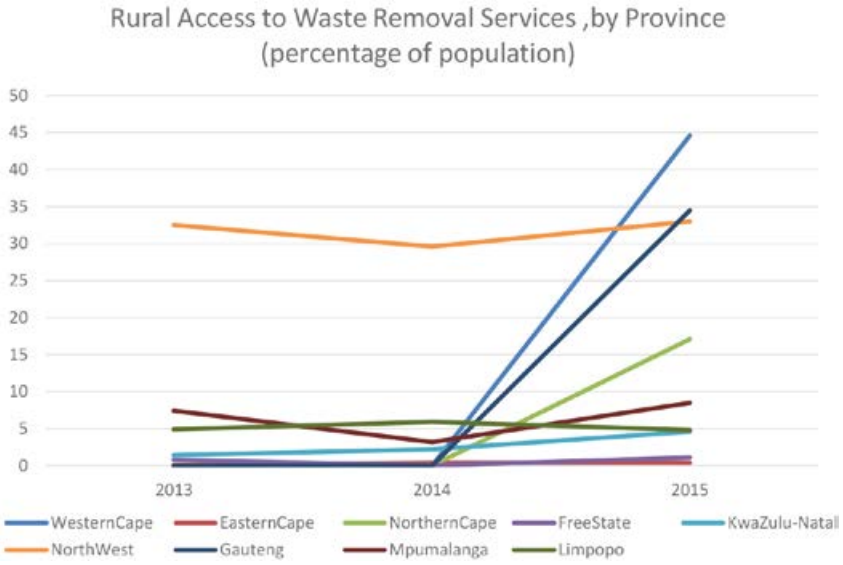
This indicator shows clearly the limited changes to access to waste removal for many households. The Free State continue to enjoy high levels of coverage though to lower levels in 2015. It is striking that in 2015 –four provinces report situations where less than 50% percent of their residents have access to waste removal while in the remaining provinces the levels of access are above 55% across all three years.

The closely matched highest performers were the Western Cape and Gauteng, at just under 95% access. Limpopo province was the poorest performer, at about 20%. This is almost 15 percentage points behind the next worst performers, the Eastern Cape and Mpumalanga, both at about 35% access. The range is about 80 percentage points over all three years, with minor fluctuations.

This suggests that responses to this discrepancy must not only take modern migration patterns into account but must question interventions to date that have clearly failed the patterns of privilege created largely by apartheid era spatial planning policy.

145 Statistics South Africa, General Household Survey 2013, 18th June 2014 p49 http://beta2.statssa.gov.za/publications/P0318/P03182013.pdf.

Figure 17: Rural Access to Waste Removal Services, by Province (percentage of population)

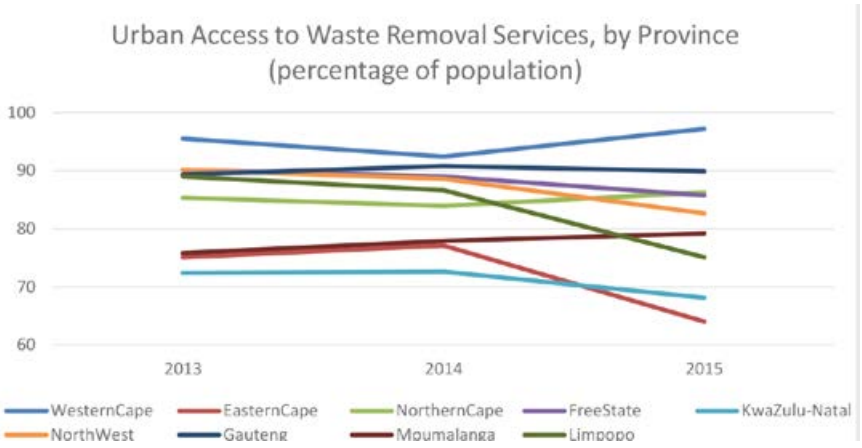


(Indicator 4b) (*By province, geotype:* RURAL, *percentage of population*):

The period under consideration is 2013-2015. The North West was the only province to maintain >30% access, making it the best performer by far in 2013/2014. All the other provinces were below 10% access until 2014, when the Western Cape and Gauteng increased enough to exceed and match the North West, respectively. The only other province to rise above 10% access was the Northern Cape.

One would expect that provinces with higher percentages of rural residents would have the lowest percentages of access to rural waste removal services given the well-documented challenges in the delivery of basic services.

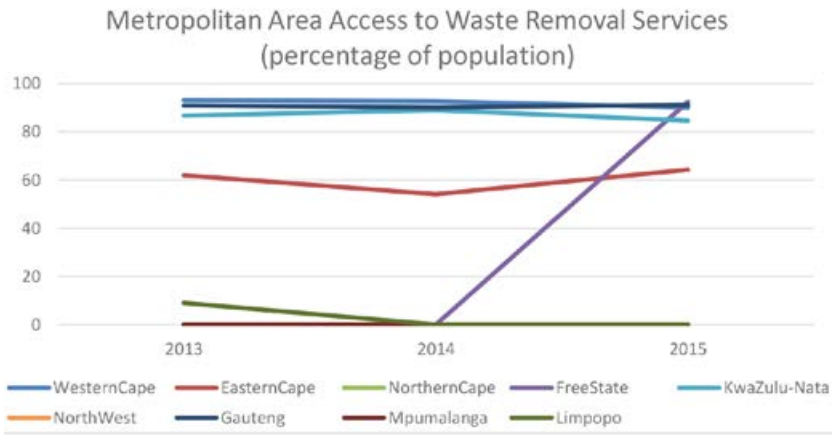
Figure 18: Urban Access to Waste Removal Services, by Province (percentage of population)



(Indicator 4c) *(By province, geotype:* URBAN, *percentage of population):*

The period under consideration is 2013-2015. The best performer was the Western Cape, which showed a slight decrease in 2013/14 and an increase in 2014/15.The only other provinces to show a net increase were Mpumalanga and the Northern Cape. The other provinces showed either no change, a slight net decrease, or in the case of the Eastern Cape and Limpopo, as net decrease of about 10 and 15 percentage points respectively. The range increased from about 25 percentage points to approximately 30 percentage points. This trend is especially telling in that historically under-served provinces are also those exhibiting net decreases.

Figure 19: Metropolitan Area Access to Waste Removal Services (percentage of population)



(Indicator 4d) *(By province, geotype:* METROPOLITAN, *percentage of population):*

The period under consideration is 2013-2015. The Western Cape, Kwa-Zulu Natal and Gauteng provinces were tied at around 90% access. The Eastern Cape was steady at about 60% access. The Free State showed a remarkable increase from 0% to 90% in 2014/15, which suggests that an area classified as urban in 2013 was reclassified as metropolitan in 2014. The range (considering only provinces which contain metropolitan areas) was about 30 percentage points throughout.

(Indicator 5) Access to the Natural Environment

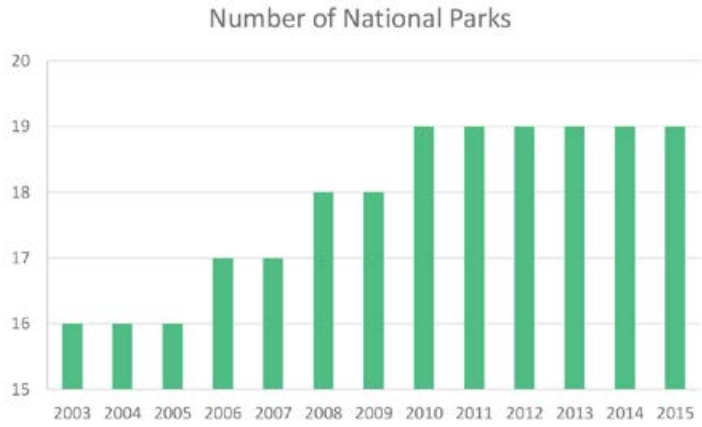
Source:

SANParks webpage (www.sanparks.org/about/);

SANParks Annual Reports (2002-2015) (www.sanparks.org/about/annual)

Description: Access to national parks ensures physical accessibility to healthy natural environment as well as increasing biodiversity and is measured by the number of national parks and the number of visitors. Unfortunately this indicator does not properly consider location or the nature of the visitors. Therefore, although the indicator does provide useful data, its significance could be enhanced substantially by increasing the amount of data gathered by SANParks to allow for better disaggregation. This indicator is purely an access indicator of quantity and does not allow for a determination of quality of access.

Figure 20: Number of National Parks

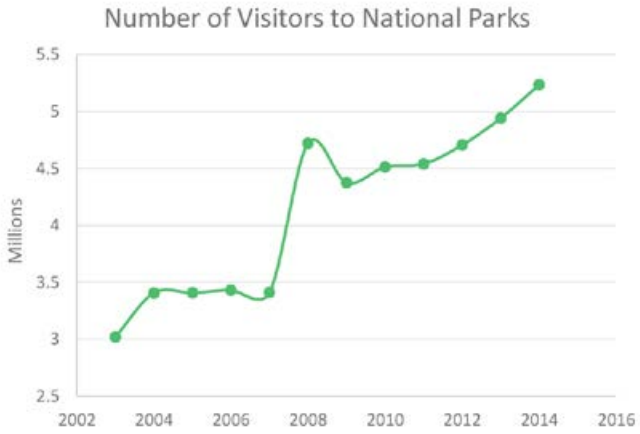


(Indicator 5a) *(Number of national parks):*

The number of national parks has increased by 3 from 16 to 19 over the period under consideration (2003-2014). The new parks were commissioned in 2006, 2008 and 2010. Public education campaigns are an increasingly strong component of South African national parks

and this indicator combined with the indicator below can assist with determining the number of people potentially reached by parks' conservation and environmental awareness message.

Figure 21: Number of Visitors to National Parks



(Indicator 5b) *(Annual number of visitors to national parks):*

Over the period 2002-2015, the number of visitors showed a net increase of over 2 million (from 3 million in 2002 to over 5 million in 2015). There was a very large increase in 2007/8 of over a million visitors followed by a smaller decrease of about 500 thousand in 2008/9.

The South African National Parks (SANParks) was established in 1926 and is operated in terms of the National Environmental Management: Protected Areas Act, 57 of 2003. The primary mandate of SANParks is to oversee the conservation of South Africa's biodiversity, landscapes and associated heritage assets through a system of national parks.

In addition to fundamental nature conservation mandates, SANParks is also responsible for the conservation of South Africa's cultural heritage. The entity also works to ensure that South Africans

> "*Participate and get involved in biodiversity initiatives, and that all its operations have a synergistic existence with neighbouring communities for their educational and socio-economic benefit*"[146]

This latter aspect is an important component in addressing social injustices of the past in which access to conservation facilities not only excluded the majority but where their establishment at times also resulted in the displacement of communities. Hallowes (2011) states, for instance that prior to the democratic dispensation "*for many black people, the environment was associated with conservation and conservation with forced removals*".

The Department of Environmental Affairs has introduced some measures to improve access to conservation areas for all South Africans. In a 2013 written reply to a Parliamentary question relating to such measures in two specific major parks, the Department outlined firstly that The Table Mountain National Park Wild Card initiative offers all city residents "*limited but affordable access*" while remaining open access areas remain free of charge.

According to the Department the SANParks responsible Tourism Strategy aims to provide equitable access through the implementation of some subsidies. While some subsidies are targeted at learners, senior citizens and – all South African citizens (for a week in September annually) – it is not immediately evident how local community members that would otherwise not access parks are specifically targeted. And while the overall figures pertaining to access to national parks reflect an increase- the current disaggregation of data is limited.

146 Department of Environmental Affairs Annual Report 2010/11, p.13.

Adequacy indicators

(Indicator 6) Energy Sustainability

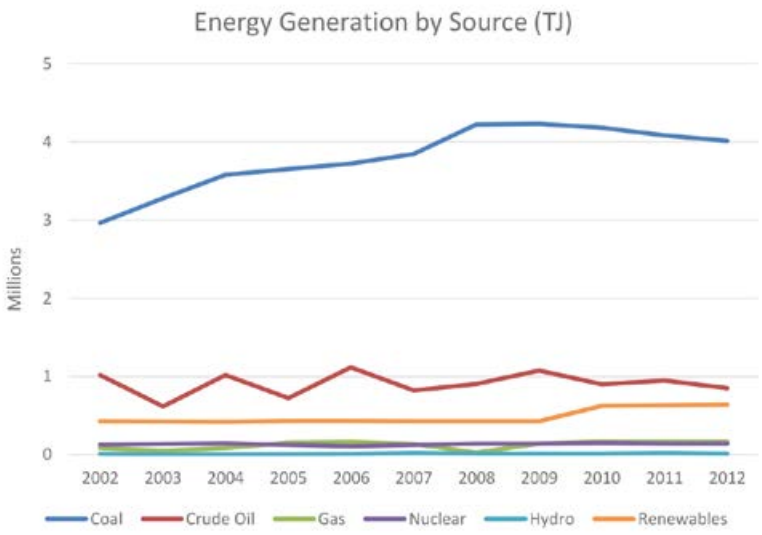
Sources:

(2002-2008): Department of Environmental Affairs website (http://soer.deat.gov.za/1323.html)

(2008-2012): Department of Energy Annual Commodity Flow and Energy Balance spreadsheets (www.energy.gov.za/files/energyStats_frame.html)

Description: An indicator of sustainable energy generation practices. Sustainable energy generation practices contribute towards environmental sustainability. The use of non-fossil fuels allow for sustainable energy generation. Further, the type of energy generation used, can reduce air, land and water pollution. *Sources of Energy* and *Gross Energy Consumption* are the most useful variables to measure this indicator. The source of energy is important as energy generation is widely considered to be one of the most significant contributors to environmental pollution. The combustion of carbon, in particular the use of 'dirty coal', for power generation leads to high and hazardous amount of air pollution that directly impacts on human and natural health. In the South African context, the emissions from power generation can largely be accounted for by the emissions from Eskom (see the variable *Emissions from Eskom* in the Adequacy indicator *Fine Particulate Matter*). Split into separate indicators for ease of use (and indicators in their own right), a comprehensive understanding of air quality would likely require the Adequacy indicators *Energy Sustainability* to be considered with *Emissions of Greenhouse Gas* and *Fine Particulate Matter* as well as the Quality indicator *Air Quality Impact on Health and Wellbeing*.

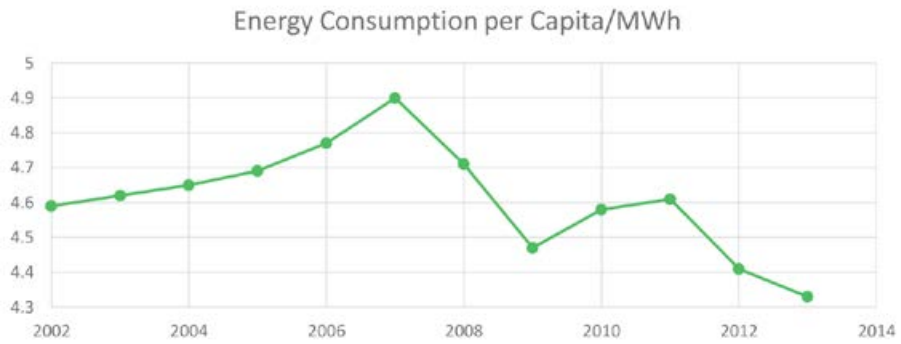
Figure 22: Energy Generation by Source (TJ)



(Indicator 6a) *(Tera joules of electricity generated, by energy source*):

The period under consideration is 2002-2012. Coal was by far the most used source, and also showed the largest net increase over the period, from 3 million TJ in 2002 to 4 million in 2012. The next most used source was crude oil which showed no net increase over the entire period but showed large annual fluctuations of about 500 thousand TJ between 2002 and 2007.The fluctuations smoothed out after 2007 and crude oil usage remained at about 1 million TJ. Use of renewable energy sources (excluding hydro-electric) was steady at around 400 thousand TJ until 2010, when it increased slightly to 600 thousand TJ and held steady. Use of nuclear, hydro-electric and gas sources was the lowest, all less than 300 thousand TJ.

Figure 23: Energy Consumption per Capita/MWh



(Indicator 6b) *(Energy consumption per capita/MWh):*

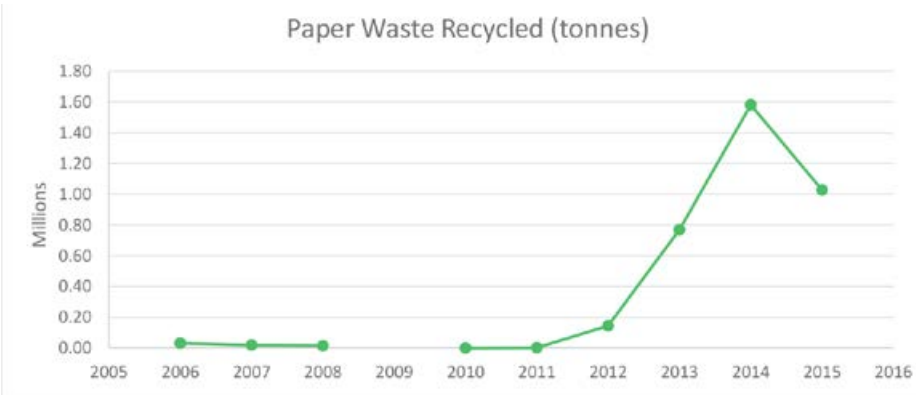
The period under consideration is 2002-2015. Over the entire period, per capita energy consumption showed a net decrease from 4.6 MWh to 4.3 MWh. There were two years in which consumption peaked after 2002; 2007 at 4.9 MWh/capita and, after a period of decrease, 4.6 MWh/capita in 2011.

(Indicator 7) Waste Recycled

Source: South African Waste Information Centre (SAWIC) website (http://sawic.environment.gov.za) interactive tonnage report generator

Description: The amount of waste generation directly impacts on environmental and human health and high levels of waste generation are unsustainable. Reducing quantity of waste is important, and the amount of waste recycled as a percentage of total waste reduces pollution and increases sustainability. This indicator is most effective when considered with the access indicator *Access to Waste Removal Services*.

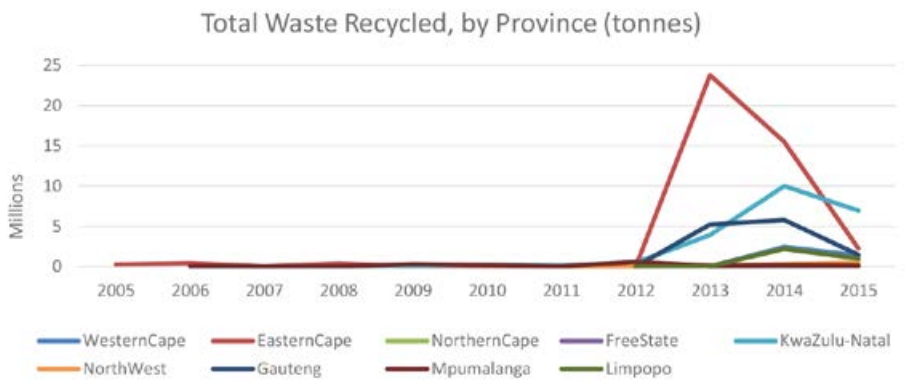
Figure 24: Paper Waste Recycled (tonnes)



(Indicator 7a) *(Tons of paper waste recycled, national):*

The period under consideration is 2006-2015, with no data for 2009. Paper waste recycled was below 200 thousand tonnes until 2012/13 when a rapid increase began which peaked at 1.6 million tonnes in 2014, followed by a decrease in 2015 to 1 million tonnes.

Figure 25: Total Waste Recycled, by Province (tonnes)



(Indicator 7b) *(Tons of waste recycled, by province):*

The period under consideration is 2005-2015. Until 2012, the total waste recycled was below 200 thousand tonnes for all provinces. Thereafter, the Eastern Cape, Kwa-Zulu Natal, Gauteng showed an increase. By far the largest increase was the Eastern Cape, peaking at just under 25 million tonnes in the very next year and followed by a large decrease to less than 5 million tonnes in the two years after that. Gauteng showed a similar trend, albeit with a plateau of 5 million tonnes over 2013/14. Kwa-Zulu Natal showed a more steady increase to a peak of 10 million tonnes in 2014 followed by a decrease to about 6 million tonnes in 2015.

Note: Many of the dramatic changes in reported values for this indicator are likely to be due to changes in national and provincial reporting practices and waste categorisation, rather than large changes in actual materials recycled.

(Indicator 8) Emissions of greenhouse gases

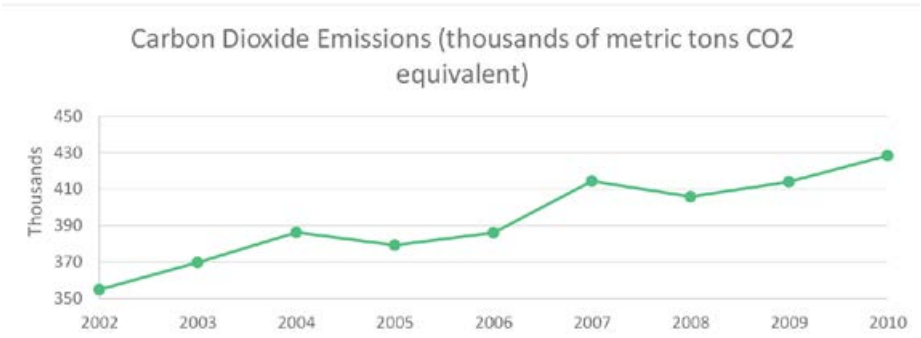
Sources:

Department of Environmental Affairs GHG Inventory for South Africa 2000-2010 (www.environment.gov.za/sites/default/files/docs/greenhousegas_invetorysouthafrica.pdf);

World Bank World Development Indicators (http://wdi.worldbank.org/)

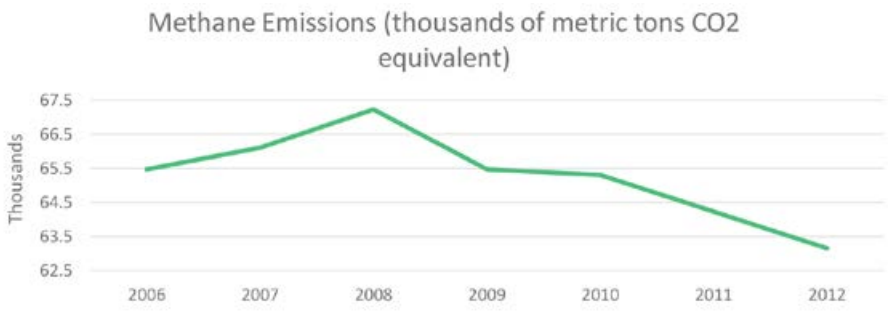
Description: Greenhouse gas emission impacts negatively on human and natural health, as well as contributing to climate change and is considered an international issue. The most significant variables in calculating this indicator include *CO_2 emissions per capita, CH_4 emissions, N_2O emissions, HFC emissions, PFC emissions*. This indicator should be considered with the Adequacy indicator *Fine Particulate Matter*, the Quality indicator *Air Quality Impact on Health and Wellbeing* and the variable *Emissions from Eskom* for a more complete assessment of air pollution and greenhouse gas emissions in South Africa.

Figure 26: Carbon Dioxide Emissions (thousands of metric tons CO_2 equivalent)



(Indicator 8a) *(CO_2 emissions, thousands of metric tons CO_2 equivalent):* The period under consideration is 2002-2010. Over the entire period, CO2 emission showed a net increase of about 90 thousand tons, with some fluctuation.

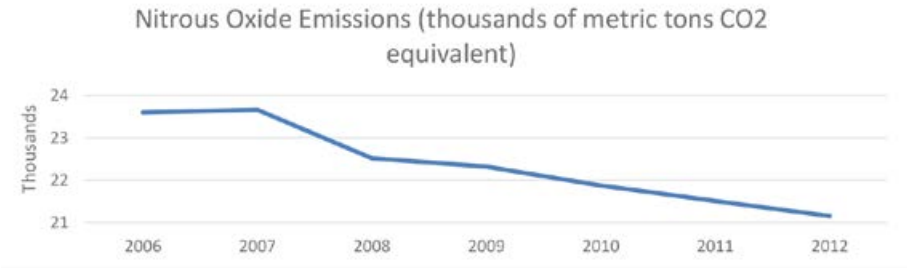
Figure 27: Methane Emissions (thousands of metric tons CO_2 equivalent)



(Indicator 8b) *(CH_4 emissions, thousands of metric tons CO_2 equivalent):*

Over the entire period, 2006-2012, methane emission showed a net decrease of about 2 thousand tons CO_2 equivalent, after an increasing trend which lasted until 2008 with a peak of just under 67.5 thousand tons CO^2 equivalent.

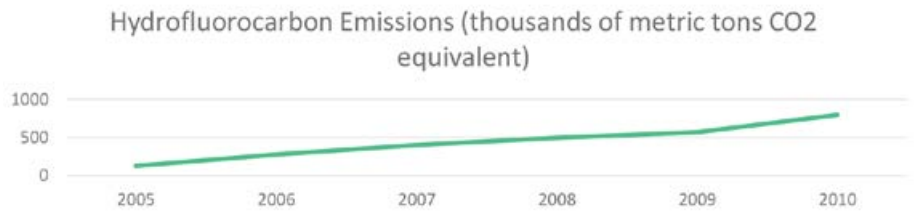
Figure 28: Nitrous Oxide Emissions (thousands of metric tons CO_2 equivalent)



(Indicator 8c) *(N_2O emissions, thousands of tons CO2 equivalent):*

Over the entire period, 2006-2012, nitrous oxide emissions showed a net decrease of about 2 500 tons CO2 equivalent.

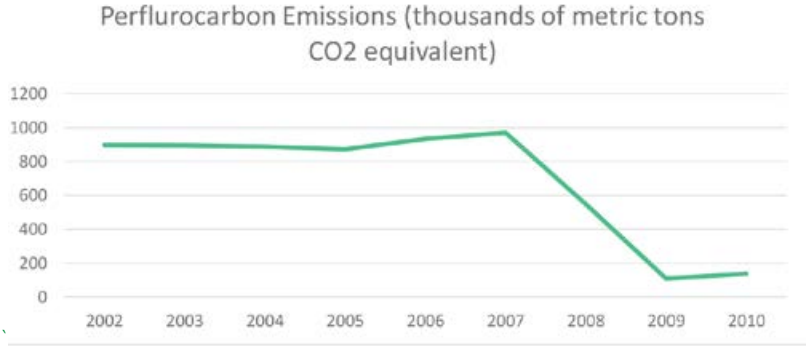
Figure 29: Hydrofluorocarbon Emissions (thousands of metric tons CO_2 equivalent)



(Indicator 8d) *(HFC emissions, thousands of tons CO_2 equivalent):*

Over the period 2005-2010, hydrofluorocarbon emissions increased steadily from about 100 to 800 tons CO_2 equivalent.

Figure 30: Perfluorocarbon Emissions (thousands of metric tons CO_2 equivalent)



(Indicator 8e) *(PFC emissions, thousands of tons CO_2 equivalent):*

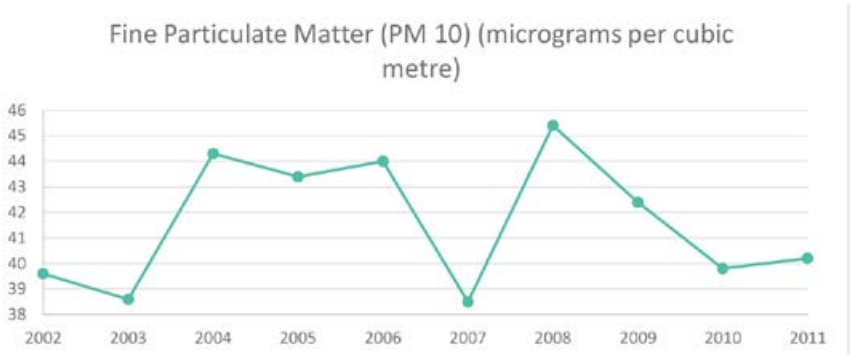
The period under consideration is 2002-2010. Perfluorocarbon emissions were steady at about 900 tons CO_2 equivalent until 2007 and then began a decrease to settle at 100 tons CO_2 equivalent in 2009/2010.

(Indicator 9) Fine Particulate Matter

Source: Eskom Annual Integrated Reports www.eskom.co.za/OurCompany/MediaRoom/Pages/Publications.aspx

Description: Particulate matter is a result of the effectiveness of governmental regulation and industry commitment to a clean and healthy environment. Although PM can be considered a greenhouse gas, it is left as a separate indicator due to its significant and lasting human and natural health impacts. PM is a clear indication of the levels of dangerous air pollution, typically caused by the combustion of carbon rich fossil fuels and other carbon emissions from industry and domestic energy consumption. This indicator considers background concentrations of Fine Particulate Matter ($PM_{2.5}$) and (PM_{10}). $PM_{2.5}$ should not exceed 10 $\mu g/m^3$ annual mean and 25 $\mu g/m^3$ 24-hour mean. PM10 should not exceed 20 $\mu g/m^3$ annual mean and 50 $\mu g/m^3$ 24-hour mean. Multiple studies by the World Health Organisation have determined that PM can "*cause or aggravate cardiovascular and lung diseases, heart attacks, and arrhythmias, affect the central nervous system, the reproductive system and cause cancer*".[147] The variable *Emissions from Eskom* is included in this indicator, as Eskom is the primary energy producer and thus a primary emitter of air pollution; it is important to note that the "*energy sector was by far the largest contributor to the total GHG emissions… providing 85.0% in 2010*". [148 / 149] In addition to this, not only is the energy sector the largest contributor to carbon dioxide emissions, its current growth is indicative of South Africa's under-pricing of this fossil fuel and its coal-dominant electricity production.[150]

Figure 31: Fine Particulate Matter (PM_{10}) (micrograms per cubic metre)

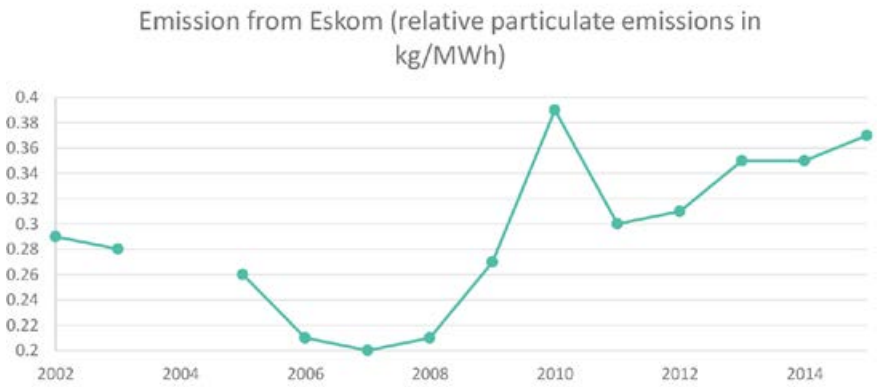


(Indicator 9a) *(PM 10 Fine particulate matter, micrograms per cubic metre):*

Over the period 2002-2011, PM $_{10}$ particulates showed almost no net increase (40 $\mu g/m^3$ in 2002 and 2011) but displayed a plateau at 44 $\mu g/m^3$ from 2004-2006 and a peak of 45 $\mu g/m^3$ in 2008.

147 European Environmental Agency, Exceedance of air quality limit values in urban areas (CSI 004) www.eea.europa.eu/data-and-maps/indicators/exceedance-of-air-quality-limit-3/assessment#toc-4.
148 Department of Environmental Affairs, Green House Gas Inventory for South Africa 2000 – 2010 www.environment.gov.za/sites/default/files/docs/greenhousegas_invetorysouthafrica.pdf.
149 Note, the variable Emissions from Eskom could also be used with the indicator Greenhouse Gas Emissions.
150 OECD. 2013. Environmental Performance Reviews: South Africa 2013. OECD Publishing.

Figure 32: Emission from Eskom (relative particulate emissions in kg/MWh)



(Indicator 9b) (Relative particulate emissions from Eskom, kg/MWh):

Period under consideration is 2002-2015, with no data for 2004. Over the entire period, relative particulate emission increased from about 0.27 kg/MWh to 0.37 kg/MWh, with a peak of 0.39 kg/MWh in 2010 and trough in 2007 of 0.2 kg/MWh.

(Indicator 10) Water Supply

Sources:

Knoema Data Atlas South Africa page (https://knoema.com/atlas/South-Africa/topics/Environment) ;

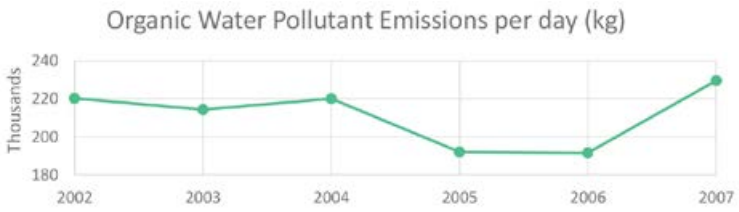
World Bank World Development Indicators (http://wdi.worldbank.org/tables);

Department of Water and Sanitation Weekly State of the Reservoirs (www.dwaf.gov.za/Hydrology/Weekly/Weekly.pdf);

National Integrated Water Information System (NIWIS) (http://niwis.dws.gov.za/niwis2/)

Description: The quantity and quality of water supply is important in determining environmental sustainability. As a water stressed state, the sustainability of water use is crucial and can be considered using the variables *Renewable Freshwater Resources per Capita,* and *Annual Freshwater Withdrawal as a Percentage of Total Internal Resources*. Ideally, the Strategic Water Source Areas (SWSA) should also be considered along with the Mean Annual Runoff, but unfortunately this information is not regularly updated or available in an adequate form for the methodology in use.[151] The variable *Organic Water Pollutant Emissions per day* shows the level of organic emissions that impact negatively on both human and natural health. Organic water pollutants may lead to harmful algal blooms which reduce the oxygen content of water, thereby destroying healthy natural ecosystems (in particular in South Africa, riverine systems). The variable *Trophic Status of Dams* shows the quality and biological and ecological health of water in dams, and is a direct measure of the health of water sources. The extent to which dams are full can be seen in the variables *Drainage Region Summary - Percentage Full*, *Water Management Areas - Percentage Full* and *Provincial Summary - Percentage Full.* Also consider the Quality indicator *Quality of Drinking Water* and the Access indicator *Access to Water* for a more comprehensive understanding of water issues. This indicator is useful on its own, but should be considered with the Adequacy indicator *Acid Mine Drainage* and the Access indicator *Access to Water* for a more comprehensive overview of water use, health and sustainability in South Africa.

Figure 33: Organic Water Pollutant Emissions per day (kg)

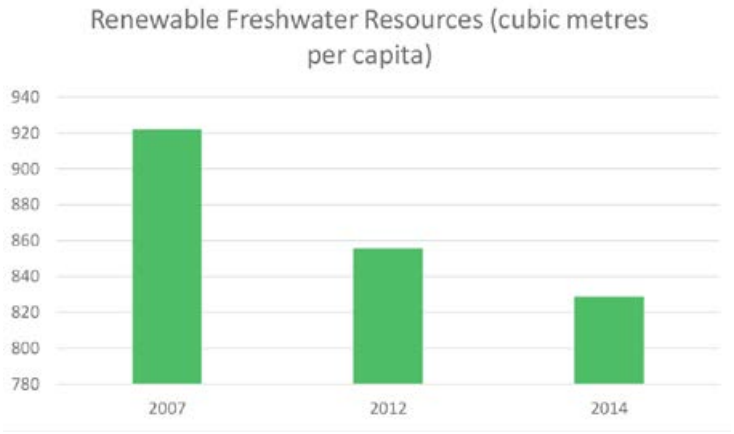


151 See http://bgis.sanbi.org/NFEPA/SWSAmap.asp for the Strategic Water Source Area www.csir.co.za/rhp/state_of_rivers/state_of_umngeni_02/umngeni.html; and www.csir.co.za/impact/docs/Final_Freshwater_Atlas_Article.pdf; and http://bgis.sanbi.org/nba/NBA2011_SynthesisReport_lowres.pdf for other useful information that is unfortunately not updated regularly.

(Indicator 10a) *(Organic water pollutant emissions per day, kg):*

Period under consideration is 2002-2007. Organic water pollutant emissions were steady at 220 thousand kg per day until 2004, when there was a decrease to 190 thousand kg over 2005/6 before an increase in 2006/7 to 230 thousand kg, for a net increase of about 10 thousand kg over the entire period.

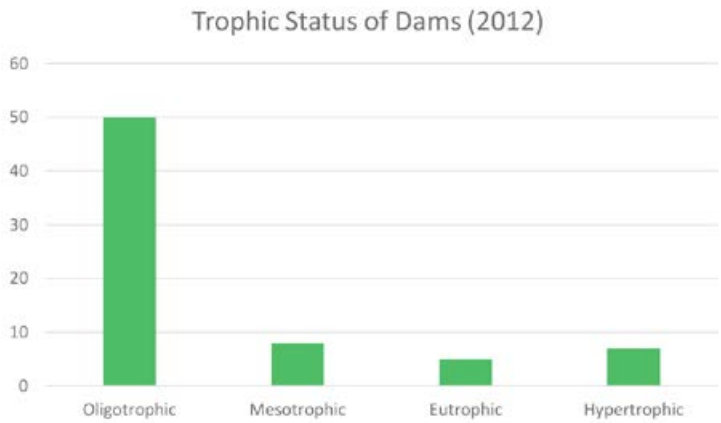
Figure 34: Trophic Status of Dams (2012)



(Indicator 10b) *(Trophic status of dams):*

Data only available for 2012. 50 dams were categorised as oligotrophic, 8 as mesotrophic, 5 as eutrophic and 7 as hypertrophic.

Figure 35: Renewable Freshwater Resources (cubic metres per capita)



(Indicator 10c) *(Renewable freshwater resources per capita, cubic metres):*

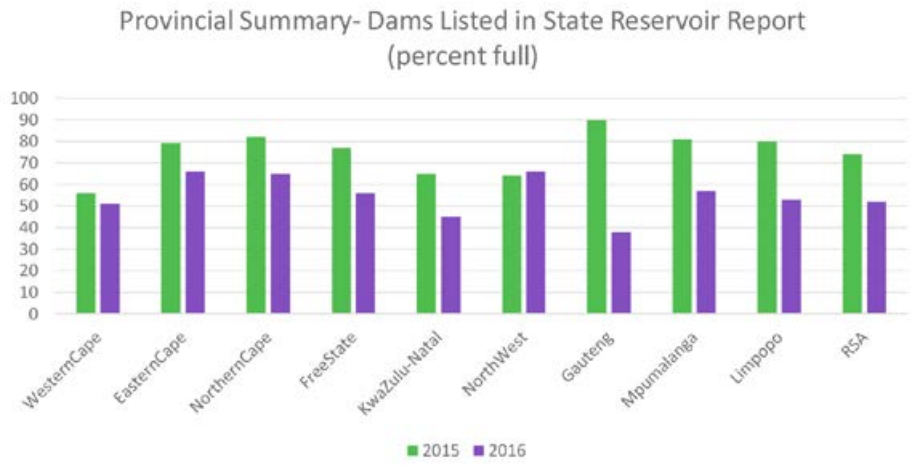
Data available for 2007, 2012 and 2014. Per capita renewable freshwater resources decreased from 920 m3 in 2007, to 850 m3 in 2012 and 830 m3 in 2014.

Figure 36: Water Management Areas - Percentage Full (National)

(Indicator 10d) *(Drainage region/water management area summary, percent full, national):*

Over 2015/2016, water management areas totalled 74% and 52% full respectively.

Figure 37: Provincial Summary- Dams Listed in State Reservoir Report (percent full)



(Indicator 10e) *(Drainage region/water management area summary, percent full, by province):*

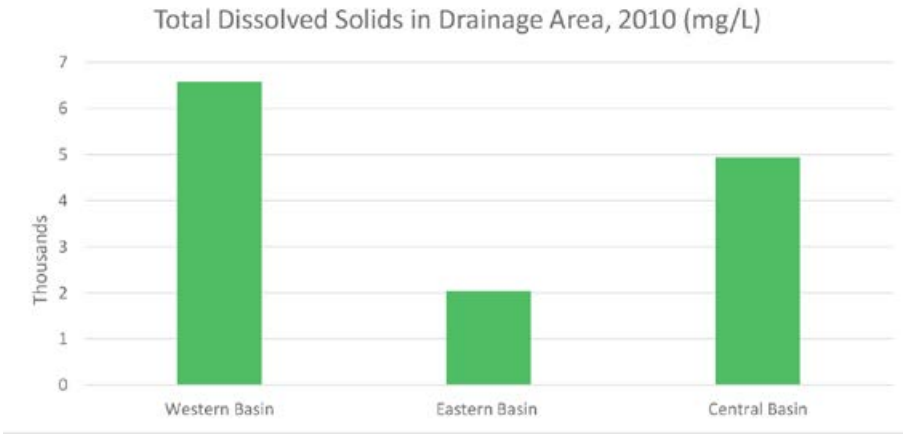
Over 2015/16, all provinces showed a decrease in percentage fill of drainage regions, except the North West, which showed a very small increase. Gauteng saw the largest drop, from having the highest percentage full at about 85% to one of the lowest at about 40%.

(Indicator 11) Acid Mine Drainage (AMD)

Source: Mine Water Management in the Witwatersrand Gold Fields with Special Emphasis on Acid Mine Drainage: Report to the Inter-ministerial Committee on Acid Mine Drainage (December 2010) (www.dwaf.gov.za/Documents/ACIDReport.pdf)

Description: AMD is a serious threat to human and natural health and sustainability, and as such is included separately from other indicators dealing with water. To determine AMD levels, variables such as the *Levels of pH*, *Electrical Conductivity*, *Total Dissolved Solids*, *Sulphate* and *Iron* in water must be considered. AMD has long term effects and although a report was commissioned by Parliament on the 9th of February, 2011 entitled *AMD Report on Mine Water Management in the Witwatersrand Gold Fields with Special Emphasis on Acid Mine Drainage*, the issue still remains a serious threat to natural and human health. This indicator should be considered along with the Adequacy indicator *Water Supply*, the Quality indicator *Quality of Drinking Water* and the Access indicator *Access to Water* for a more comprehensive overview of the state of water in South Africa.

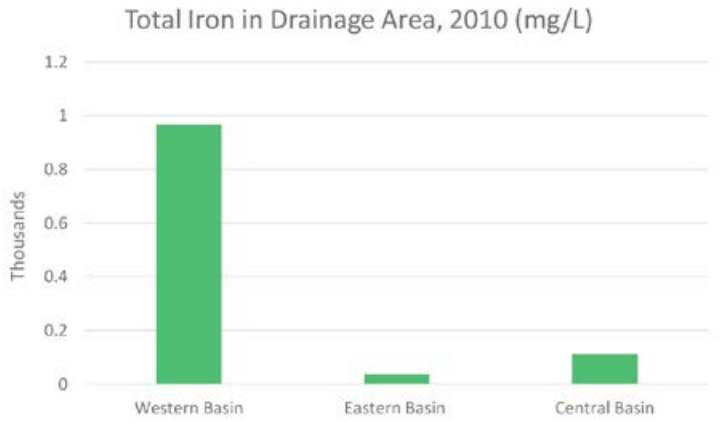
Figure 38: Total Dissolved Solids in Drainage Area, 2010 (mg/L)



(Indicator 11a) *(Total dissolved solids, mg/L):*

Data available for 2010 only. The Western basin had the highest dissolved solids at 6.5 thousand mg/L, followed by the Central basin at 5 thousand mg/l and finally the Eastern basin at 2 thousand mg/L total dissolved solids.

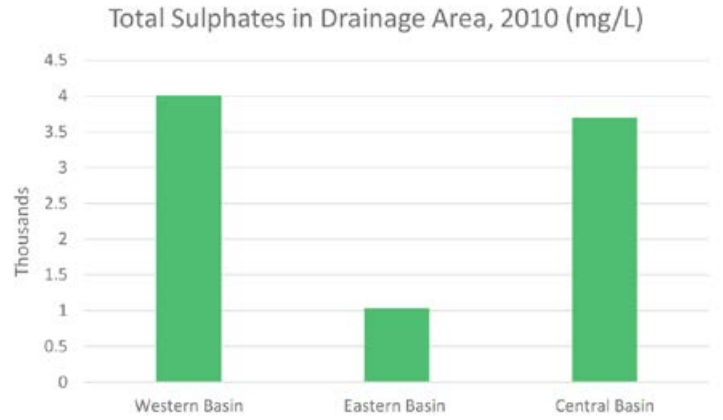
Figure 39: Total Sulphates in Drainage Area, 2010 (mg/L)



(Indicator 11b) *(Total sulphate in drainage area, mg/L):*

Data available for 2010 only. The Western basin had the highest dissolved sulphates at 4 thousand mg/L, followed by the Central basin at 3.6 thousand mg/L and finally the Eastern basin at 1 thousand mg/L.

Figure 40: Total Iron in Drainage Area, 2010 (mg/L)



(Indicator 11c) *(Total iron in drainage area, mg/L):*

The Western basin had the highest iron content at 1 thousand mg/L, followed by the Central basin with 100 mg/L and finally the Eastern basin with about 40 mg/L.

(Indicator 12) Environmental Protection from the Government

Sources:

SANBI Red List (http://redlist.sanbi.org/stats.php#National statistics);

Ramsar Sites Information Service (rsis.ramsar.org);

South Africa's Fifth National Report to the Convention on Biological Diversity March 2014 (www.cbd.int/doc/world/za/za-nr-05-en.pdf);

South African MDG Report 2013 source: UNDP (www.za.undp.org/content/south_africa/en/home/library/mdg.html#);

National Biodiversity Assessment 2011 (bgis.sanbi.org),

SANParks Annual reports (2004-2014) (www.sanparks.org/about/annual/); (http://soer.deat.gov.za/1218.html),

adapted from *South African National Spatial Biodiversity Assessment 2004 Technical Report. Volume 4: Marine Component;* Department of Water Affairs Annual Reports (2010/11-2014/15)

Description: This indicator shows commitment from government to protecting the health of the natural environment through the following variables:

Percentage of Biome Protected

Number of Ramsar Sites Protected: Ramsar sites are designated by the *Ramsar Convention* as sites of particular ecological importance and sensitivity. Some stakeholders are sceptical of the legal protections this affords. However, as it is internationally recognised, it was included in this list of indicators.

Number of Biosphere Reserves

Proportion of Terrestrial Areas Protected

Proportion of Marine Areas Protected

Percentage of River Ecosystem Types Protected / Degree of Protection

Wetlands Rehabilitation

Number of Hectares (ha) of Invasive Alien Plants Treated / Cleared

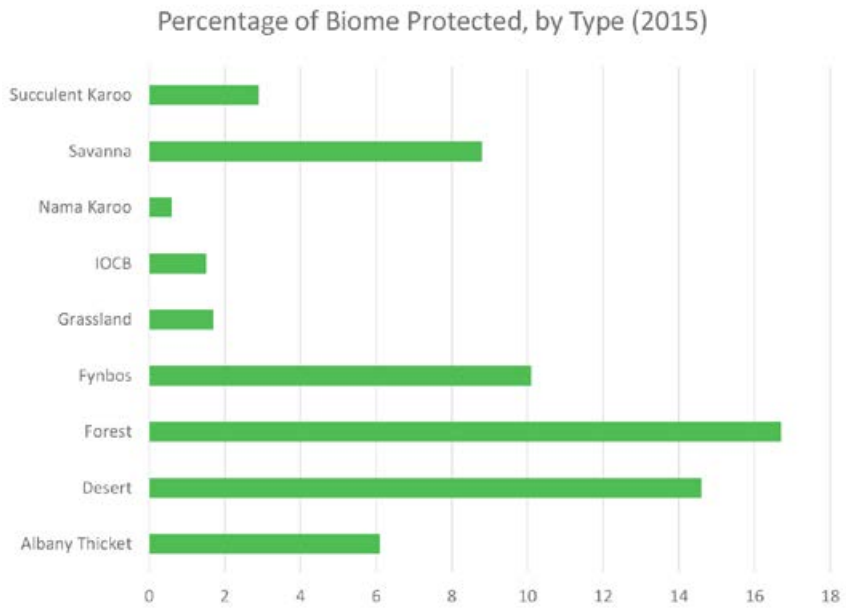
Area (ha) of Land Restored and Rehabilitated

Protection Levels of National Strategic Water Source Areas

Proportion of South African Coastline within Marine Bioregions

Number of Rivers Monitored by the River Health Programme

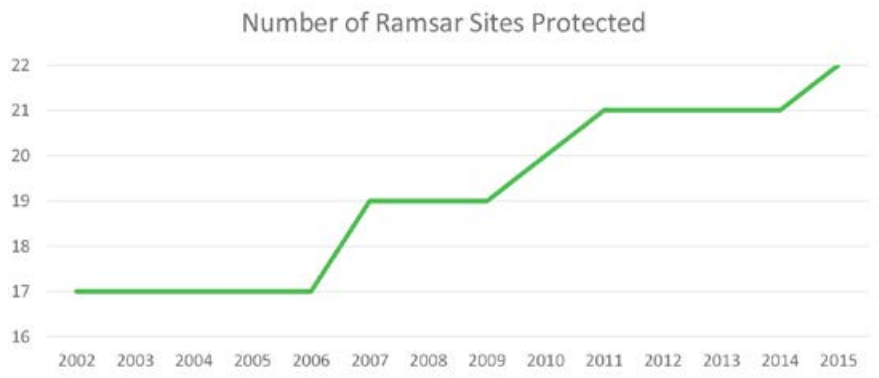
Figure 41: Percentage of Biome Protected, by Type (2015)



(Indicator 12a) *(Percentage of biome protected, by biome type):*

Data available for 2015 only. All the biome types had less than 18% protected, and the most protected was Forest biome at 17%. Savanna, Fynbos and Desert were all above 8% protected. The three least protected biomes were Nama Karoo, IOCB, and Grassland, which were all below 2% protection.

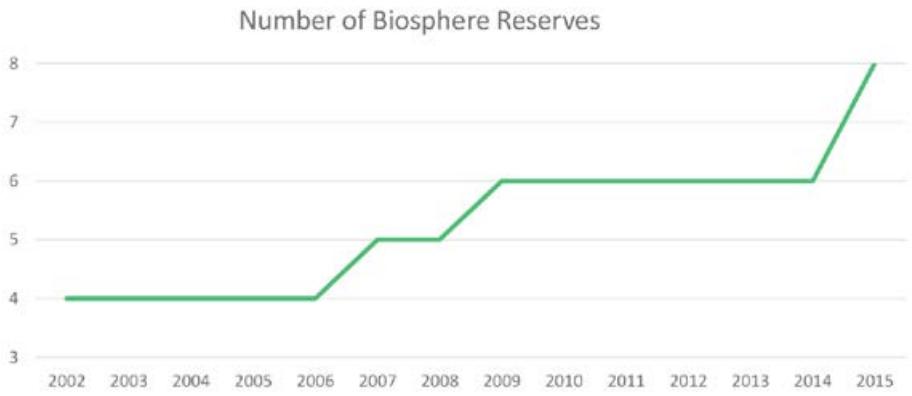
Figure 42: Number of Ramsar Sites Protected



(Indicator 12b) *(Number of Ramsar sites protected):*

Over the entire period (2002-2015), the number of Ramsar sites increased from 17 to 22, with two new sites being declared in 2007, and one each in 2010, 2011 and 2015.

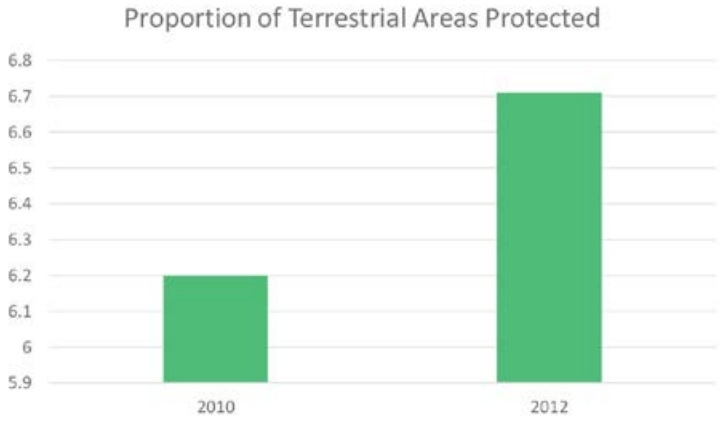
Figure 43: Number of Biosphere Reserves



(Indicator 12c) (*Number of biosphere reserves):*

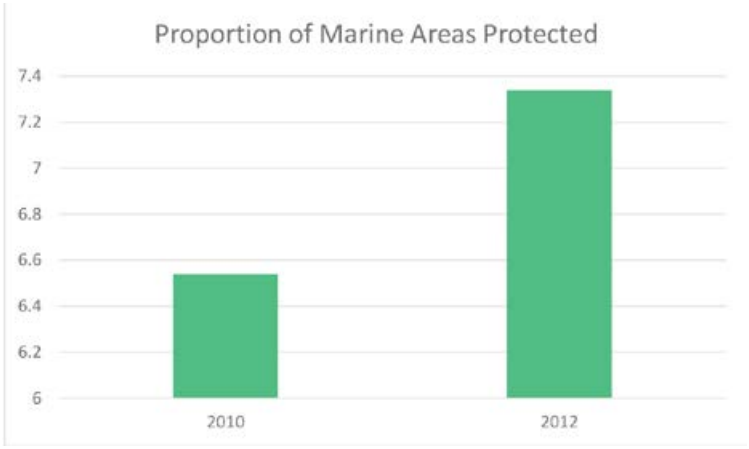
Over 2002-2015, the number of biosphere reserves doubled from 4 in 2002 to 8 in 2015. New reserves were declared in 2007, 2009 and the last two in 2015.

Figure 44: Proportion of Terrestrial Areas Protected



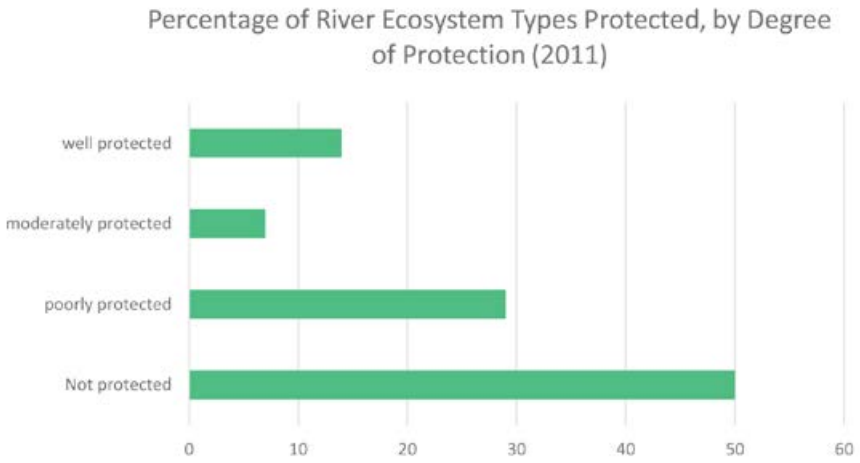
(*Proportion of terrestrial areas protected):* Data available for 2010, 2012. The proportion of terrestrial areas protected increased slightly from 6.2 to 6.71%.

Figure 45: Proportion of Marine Areas Protected



(Indicator 12d) *(Proportion of marine areas protected):* Data available for 2010, 2012. The proportion of marine areas protected increased from 6.54 to 7.34

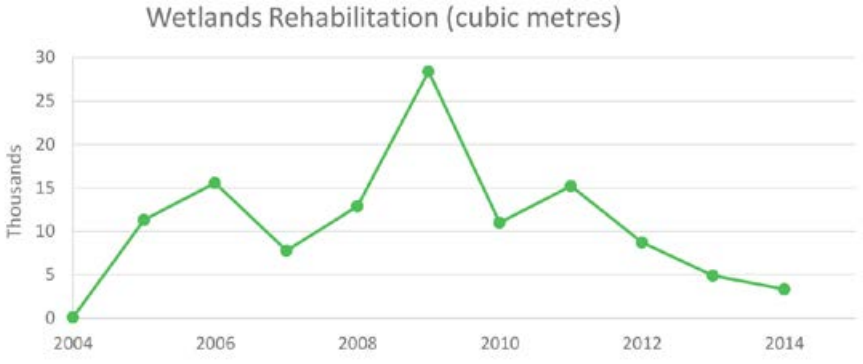
Figure 46: Percentage of River Ecosystem Types Protected, by Degree of Protection (2011)



(Indicator 12e) (*Percent river ecosystem protected, by ecosystem degree of protection):*

Data for 2011 only. 50 % of river ecosystems were not protected at all, 29% poorly protected, 7% moderately protected and 14% were well protected.

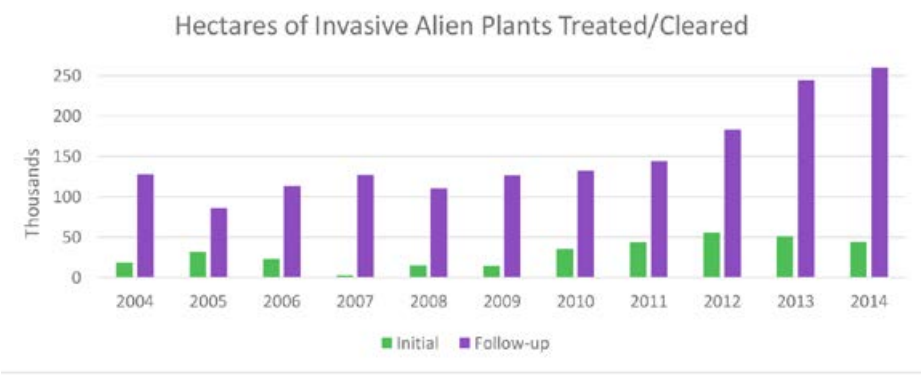
Figure 47: Wetlands Rehabilitation (cubic metres)



(Indicator 12f) (*Wetlands rehabilitation, cubic metres):*

Although over the entire period, 2004-2014, wetlands rehabilitation showed a net increase of less than 5 thousand m^3, it had peaks at 15 thousand m^3 and 30 thousand m^3, in 2006 and 2009 respectively.

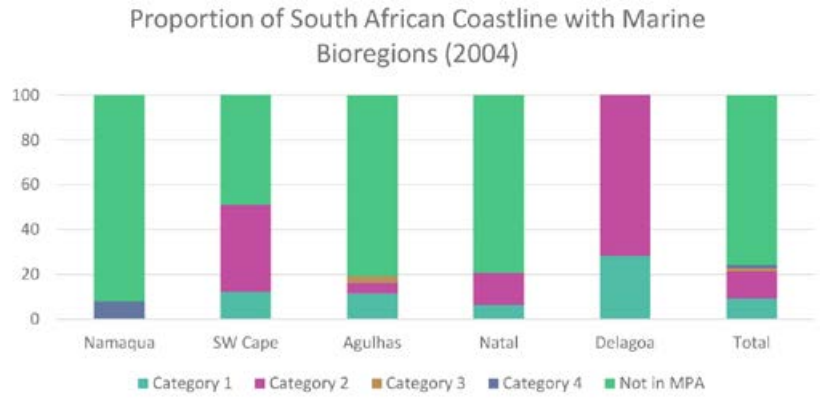
Figure 48: Hectares of Invasive Alien Plants Treated/Cleared



(Indicator 12g) *(Hectares of invasive alien plants treated/cleared):*

Data available for 2004-2014. The initial clearing of invasive alien plants showed a net increase from about 175 thousand ha in 2004 to 250 thousand ha in 2014.

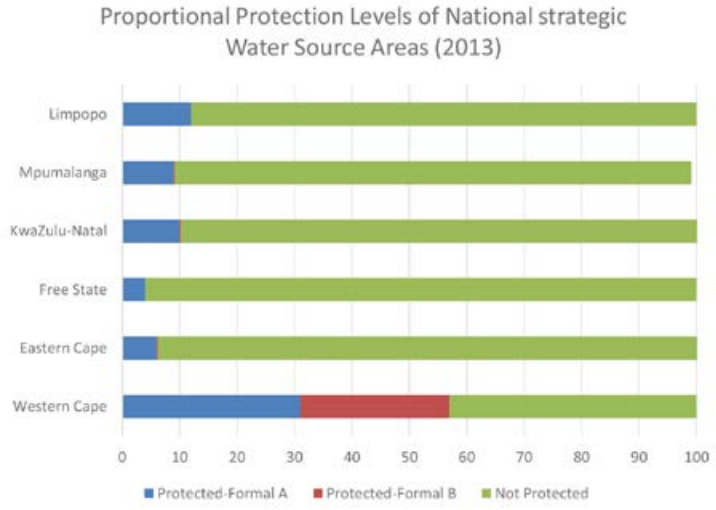
Figure 49: Proportion of South African Coastline with Marine Bioregions (2004)



(Indicator 12h) (*Proportion of South African coastline with marine bioregions, by bioregion):*

Data available for 2004 only. For all bioregions except Delagoa the largest proportion falls into the not in MPA category. For the Natal, SW Cape and Delagoa bioregions, the next largest proportion is category 2, and Category 1 for Agulhas. Namaqua is the only bioregion to have a significant proportion that falls into category 4.

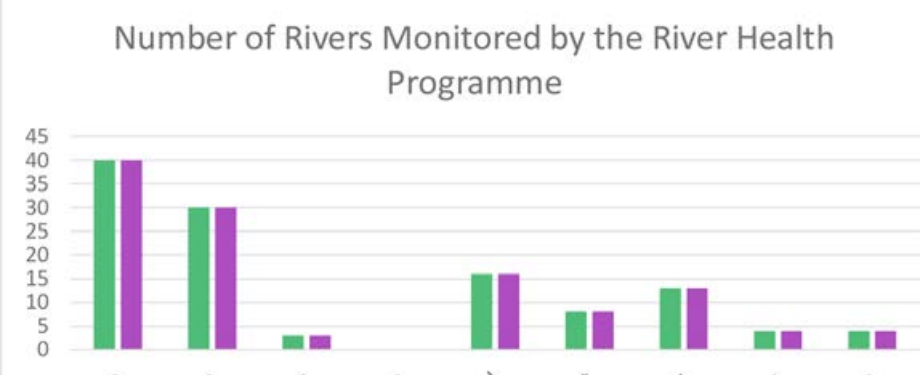
Figure 50: Proportional Protection Levels of National strategic Water Source Areas (2013)



(Indicator 12i) (*Protection levels of national strategic water source areas, by province):*

Data available for 2013 only. For all provinces, the largest proportion is the Not Protected category, followed by Protected-Formal A and then Protected- Formal B for the Western Cape.

Figure 51: Number of Rivers Monitored by the River Health Programme



(Indicator 12j) *(Number of rivers monitored by the river health programme):*

Data available for 2014-2015. There was no change over the one year period in number of rivers monitored in any province. The highest number of rivers were in the Western Cape with 40 rivers, followed by the Eastern Cape with 30.

Quality indicators

(Indicator 13) Quality of Drinking Water

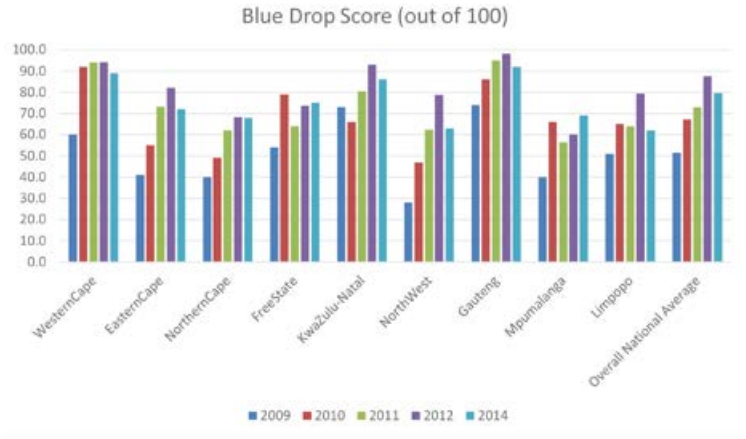
Sources:

Department of Water Affairs 2014 Briefing Summary notes (www.dwa.gov.za/Documents/Blue%20Drop%20Report%202014.pdf);

GHS 2015 (StatsSA)

Description: Measured by the variables *Blue Drop Score* and *Subjective Quality of Drinking Water*, this indicator is determined as a result of municipalities' attempts and commitment to providing a healthy, well organised and maintained source of drinking water. Some stakeholders have expressed concern that the *Blue Drop Score* may not provide a reliable assessment of the actual quality of drinking water, but instead provide a more overall view of the management of drinking water. The *Subjective Quality of Drinking Water* is a subjective outcome of the water distribution and filtration process. Total percentage subjective rating of water quality supply is rated: not safe to drink; not clear; not in good taste; not free from bad smells. Clean drinking water is essential for a healthy human and natural environment. As has been previously explained, this indicator should be considered with the Access indicator *Access to Water*, and the Adequacy indicators *Acid Mine Drainage* and *Water Supply*

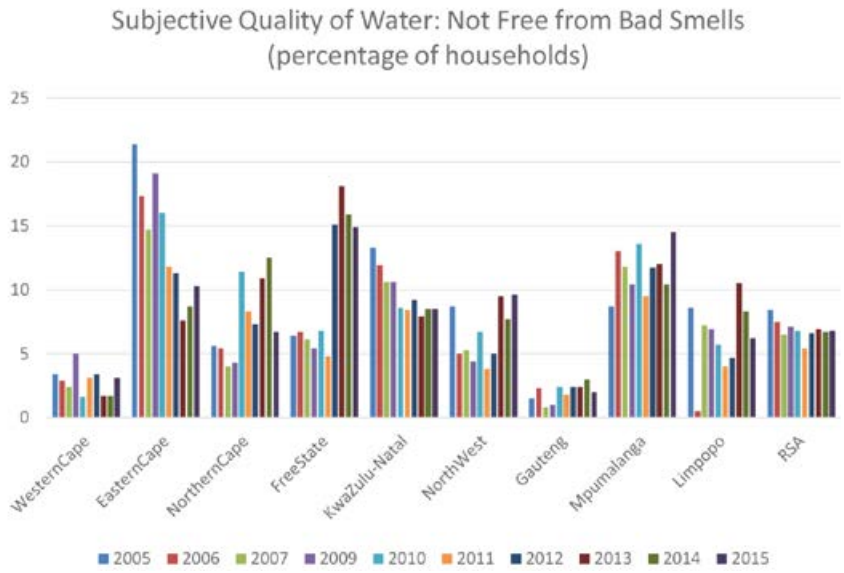
Figure 52: Blue Drop Score (out of 100)



(Indicator 13a) *(Blue drop score out of 100, by province):*

Data available for 2009-2014, except 2013. Every province showed a net increase over the whole period, although 2012 was the year when most provinces showed peak water quality of nearly 100, in the case of Gauteng. 2010 was the best year for the Free State, with a score of 80. The most consistent quality was shown by the Western Cape, with an increase to, and maintenance of a score of about 90.

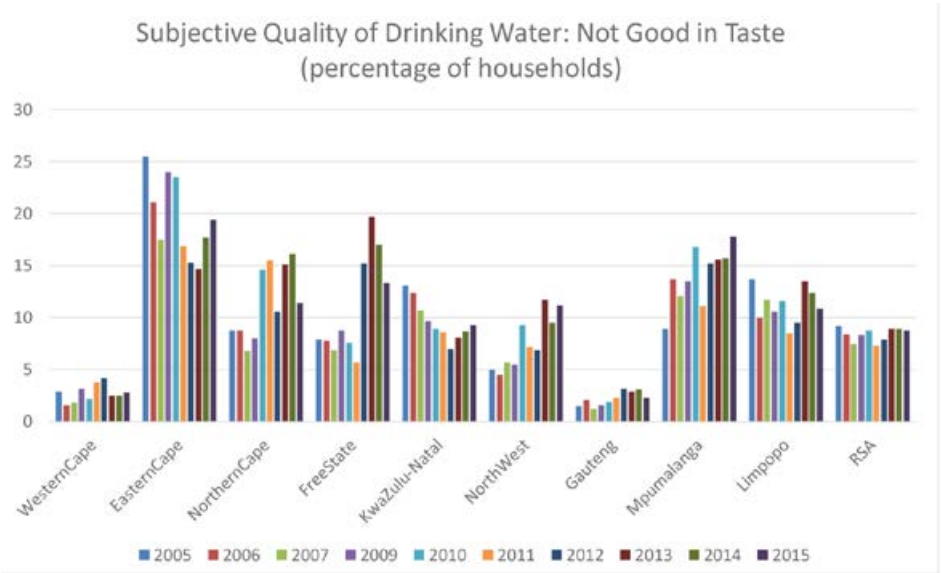
Figure 53: Subjective Quality of Water: Not Free from Bad Smells (percentage of households)



(Indicator 13b) (*Subjective quality of drinking water, percentage of households, by province, category:* NOT FREE FROM BAD SMELLS*):*

Data available for 2005-2015. Throughout the period, the two provinces with markedly good performance in this category were the Western Cape and Gauteng provinces which were never above 5% of households. Gauteng was consistently below about 2.5%. The greatest improvement was shown by the Eastern Cape, which showed a net decrease of about 11 percentage points, with some fluctuation in between. Kwa-Zulu Natal also showed a consistent improvement, dropping from about 12% to roughly 6% in 2015. The Northern Cape and Free State both recorded a net increase in complaints in this category over the period, increasing by about 2 and 10 percentage points respectively.

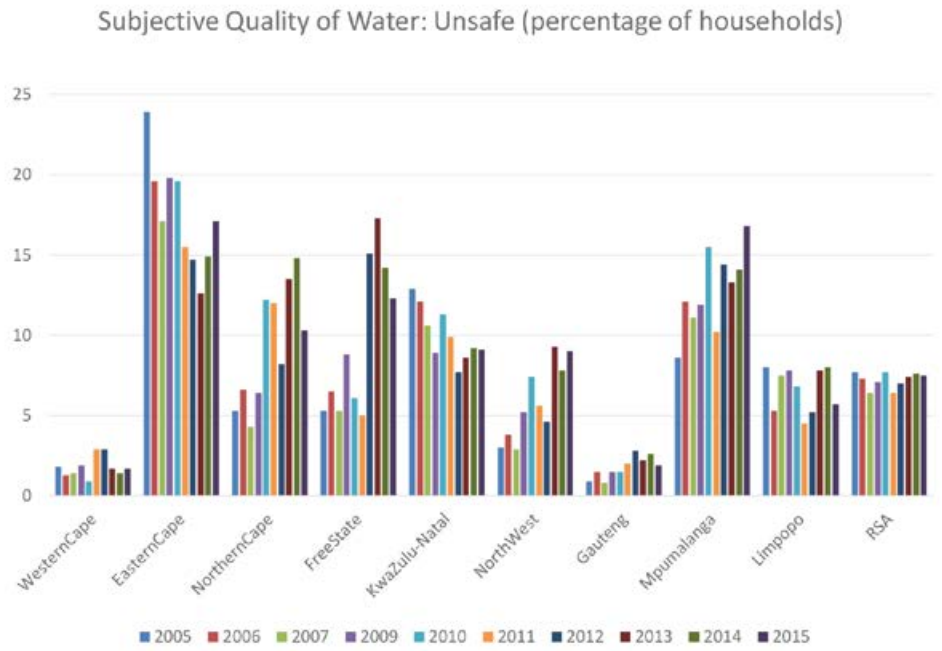
Figure 54: Subjective Quality of Drinking Water: Not Good in Taste (percentage of households)



(Indicator 13c) (*Subjective quality of drinking water, percentage of households, by province, category:* NOT GOOD IN TASTE):

Data available for 2005-2015. The best performers in this category were the Western Cape and Gauteng provinces, both below 5% throughout the period. The worst performer in 2005, which also showed the largest net improvement, was the Eastern Cape, decreasing complaints by 5 percentage points from 25% to 20%, with a low of 15% in 2013. Kwa-Zulu Natal showed a consistent improvement for a net decrease of about 2 percentage points to drop below 10%. The Northern Cape, Free State, North West and Mpumalanga all showed a net increase over the period, with complaints in the Free State increasing by about 6 percentage points.

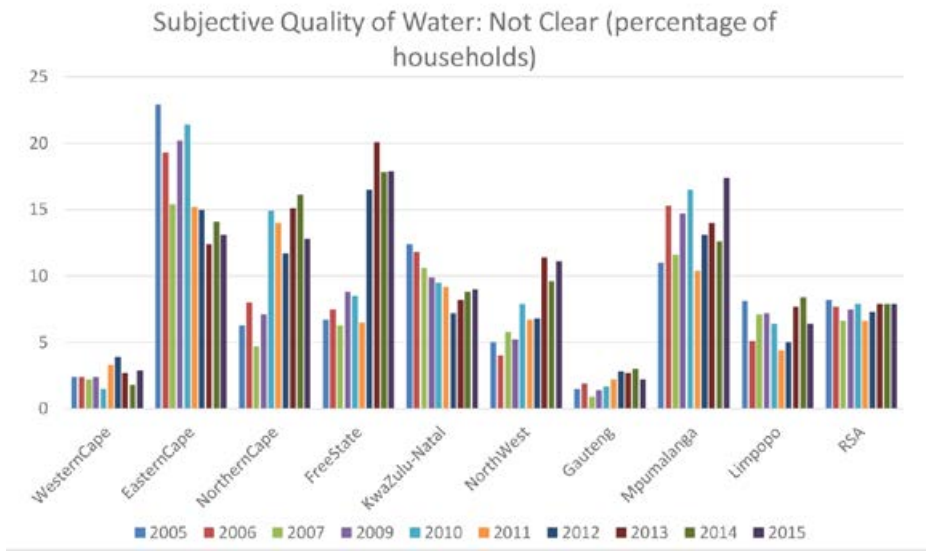
Figure 55: Subjective Quality of Water: Unsafe (percentage of households)



(Indicator 13d) (*Subjective quality of drinking water, percentage of households, by province, category:* UNSAFE*):*

Data available for 2005-2015. Staying consistently below 2.5%, the best performers were the Western Cape and Gauteng. The worst performer in 2005 was the Eastern Cape, which showed a net decrease of about 8 percentage points. It thus matched Mpumalanga which showed a net increase of just under 10 percentage points over the same period. The Northern Cape, Free State, and North West also showed a net increase in complaints over that period.

Figure 56: Subjective Quality of Water: Not Clear (percentage of households)



(Indicator 13e) *(Subjective quality of drinking water, percentage of households, by province, category:* NOT CLEAR*):*

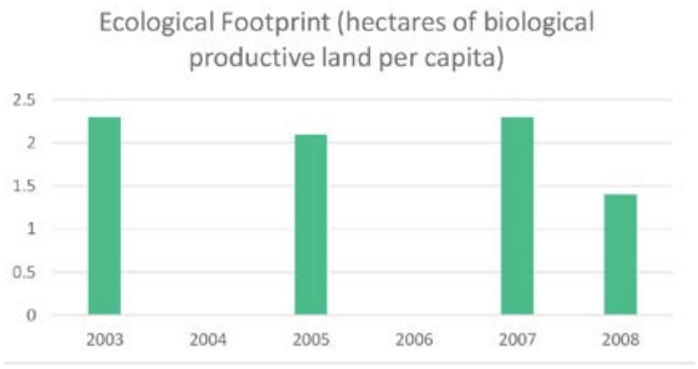
Data available for 2005-2015. The best performers were Gauteng and the Western Cape, both consistently below 5%. The Eastern Cape was the worst performer in 2005 but showed the largest net improvement, dropping nearly 10 percentage points from its initial 22%. Kwa-Zulu Natal was another province to show marked improvement, with a net decrease of about 5 percent points. The Northern Cape, Free State, North West, and Mpumalanga all showed a net increase in percentage of households in this category. The largest increase was shown by the Free State, from about 6% in 2005 to 16% in 2015, with a peak of 20% in 2013.

(Indicator 14) Ecological Footprint

Source: Department of Environmental Affairs Environmental Indicators Database (http://enviroindicator.environment.gov.za/)

Description: A measurement of the amount of biological land required per capita. Note: some stakeholders consider this indicator to no longer be current; however it is included as it may still provide useful information.

Figure 57: Ecological Footprint (hectares of biological productive land per capita)



(Hectares of biological productive land per capita): Data available for 2003,2005,2007,2008. For the years in which data is available, the national ecological footprint was steady at about 2 ha per capita until 2008, when it dropped to 1.5 ha per capita.

(Indicator 15) Biodiversity

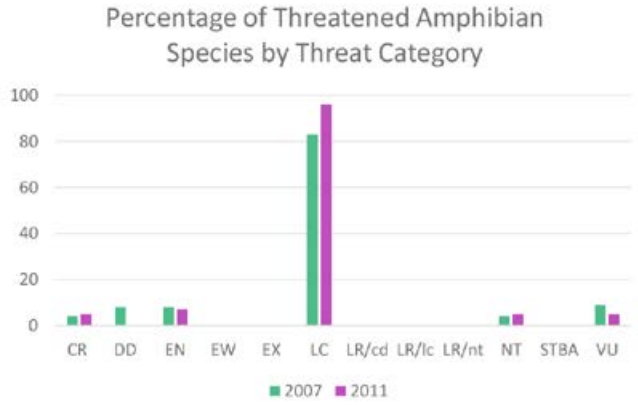
Sources:

Department of Environmental Affairs Environmental Indicators Database (http://enviroindicator.environment.gov.za/);

SANBI Red List statistics (http://redlist.sanbi.org/stats.php)

Biodiversity: An indication of natural ecosystem health, by considering the different types of species and protections afforded to said species. This indicator may also be understood as a means of showing the commitment and success of government in ensuring a healthy natural environment. Biodiversity can be measured by a combination of the *Percentages of Threatened Amphibian, Bird* and *Mammal Species*, as well as number of *Endemically Threatened Taxa*.

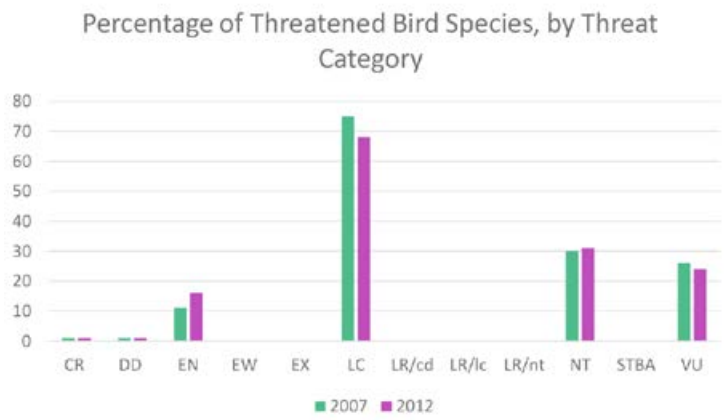
Figure 58: Percentage of Threatened Amphibian Species by Threat Category



(Indicator 15a) *(Percentage of threatened amphibian species, by threat category):*

Data available for 2007, 2011. For both years, the LC category dominated, with 80% and about 95% in 2007 and 2011 respectively. All other categories showed less than 10% - CR, DD, EN, NT, VU - or 0%.

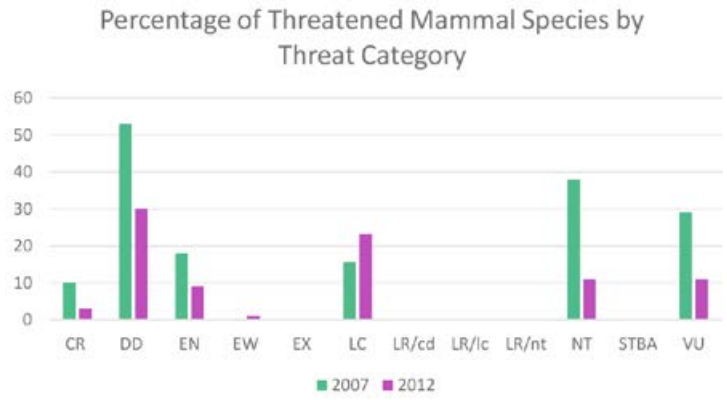
Figure 59: Percentage of Threatened Bird Species, by Threat Category



(Indicator 15b) *(Percentage of threatened bird species, by threat category):*

Data available for 2007, 2012. The LC category dominated for both years, with about 75% and 68% in 2007 and 2012 respectively. The NT category was unchanging at 30% and VU decreased slightly, but remained above 20%. Besides the EN category, which climbed to about 15%, all the other categories were well below 5% for both years or 0%.

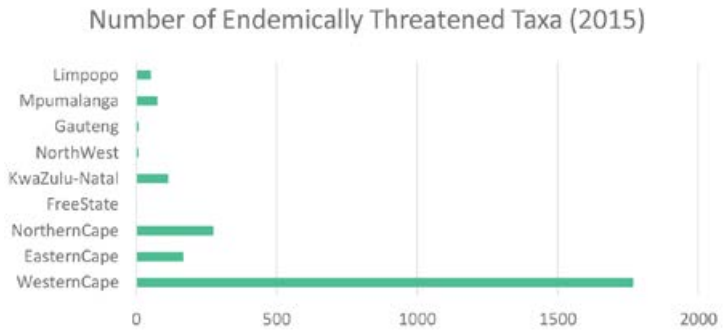
Figure 60: Percentage of Threatened Mammal Species by Threat Category



(Indicator 15c) *(Percentage of threatened mammal species, by threat category):*

Data available for 2007, 2012. The most dominant category in 2007 was DD with about 51%. It decreased to 30% in 2015, but was still the largest category. All the other categories (except LC and those which were 0%) showed a similar decrease, although their starting values were lower. The LC category was the only one to show an increase, climbing from about 15% to 22%.

Figure 61: Number of Endemically Threatened Taxa (2015)



(Indicator 15d) *(Number of endemically threatened taxa, by province):*

Data available for 2015 only. In 2015, the Western Cape had the largest number of endemically threatened taxa at about 1700, followed by the Northern Cape and Eastern Cape with about 250 and 200 respectively. All the other provinces had less than 100 endemically threatened taxa.

(Indicator 16) Responsible Environmental Management (business)

Sources:

(National) Department of Environmental Affairs Environmental Indicators Database (http://enviroindicator.environment.gov.za/);

2016 Regional Data from South African Bureau of Standards website. (www.sabs.co.za)

Description: ISO14001 certification requires a business to have a framework for environmental management. ISO 14001 is thus an indication of private commitment to environmental protection, management and sustainability. It may also show the successes government and civil society have had in advocating for environmental protection, as government and civil pressures may influence business attitudes towards certification. Some stakeholders were critical of the value of ISO 14001, believing it to be a framework without any substantial real-world application. They were therefore sceptical of its actual real-world impact on environmental health.

Figure 62: Number of ISO 14001 Companies, National

(Indicator 16a) *(Number of ISO 14001 certified companies, national):*

Data available for 2010-2016. The net increase in total national number of ISO 14001 certified companies was 180, for a total of 430 in 2016.

Figure 63: Number of ISO 14001 Companies, Provincial (2016)

(Indicator 16b) (*Number of ISO 14001 certified companies, by province):*

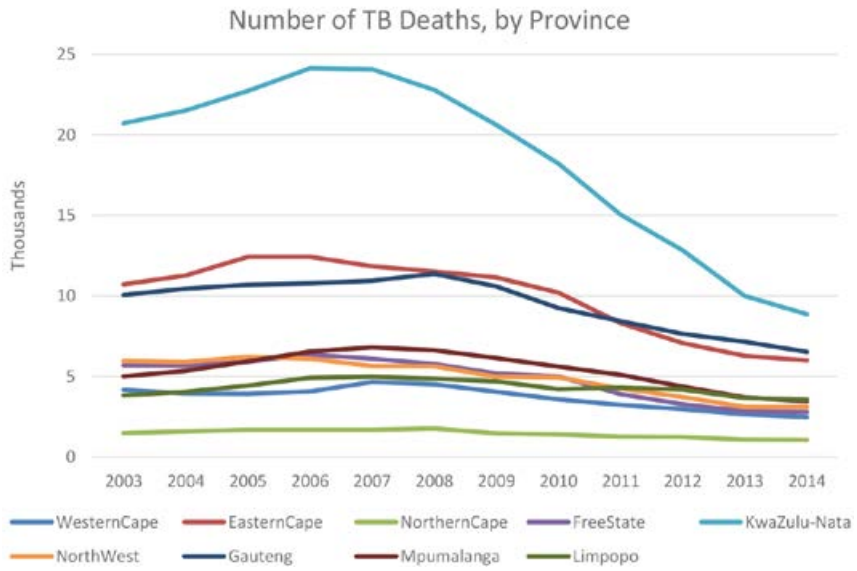
Data available for 2016 only. The only provinces with more than 20 certified companies were the Western Cape, Eastern Cape, Gauteng and Kwa-Zulu Natal. Gauteng and Kwa-Zulu Natal were the leader with 100 and 120 certified companies respectively. The Western Cape had 60, over twice the Eastern Cape's 21 certified companies.

(Indicator 17) Air Quality Impact on Health and Wellbeing

Source: Mortality and causes of death in South Africa (2003-2014): Findings from Death Notification (StatsSA)

Description: An indication of the air pollution and its impact on human health. This is considered an outcome as it is a result of government regulation, health care services and commitment by private and government owned companies to reducing air pollution. This indicator can be measured by the *Number of Deaths from TB* (strongly linked to indoor air pollution) and the *Number of Deaths from other Respiratory Causes*. Although air pollution is not the only cause of such deaths, stakeholders have argued that air pollution exacerbates such health issues and is thus a primary, on-going cause. This indicator is considered separately from the Quality indicator *Health* as it highlights the direct relationship between air pollution and human health, but should be considered along with the related Adequacy indicators *Fine Particle Matter* and *Emission of Greenhouse Gases*.

Figure 64: Number of TB Deaths, by Province

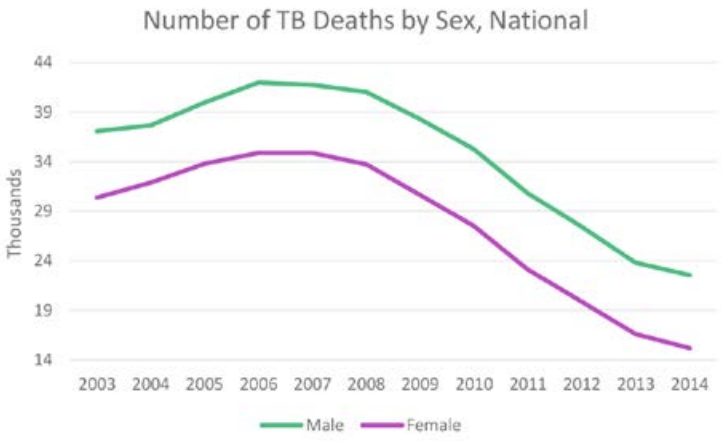


(Indicator 17a) *(Number of TB deaths, by province):*

Data available for 2003-2014. The largest number of TB deaths during the entire period were in Kwa-Zulu Natal, at 20 thousand in 2003, rising to a high of 25 thousand in 2006/7 before falling steadily to about 9 thousand in 2014. Most of the provinces followed this pattern, although

much less defined and with highs occurring slightly earlier or later. The Northern Cape was almost unchanging during the whole period, as the best performer throughout with less than 2000 deaths in all years. The national range was about 19 thousand in 2003, and decreased to about 9 thousand in 2014.

Figure 65: Number of TB Deaths by Sex, National



(Indicator 17b) *(Number of TB deaths, by sex):*

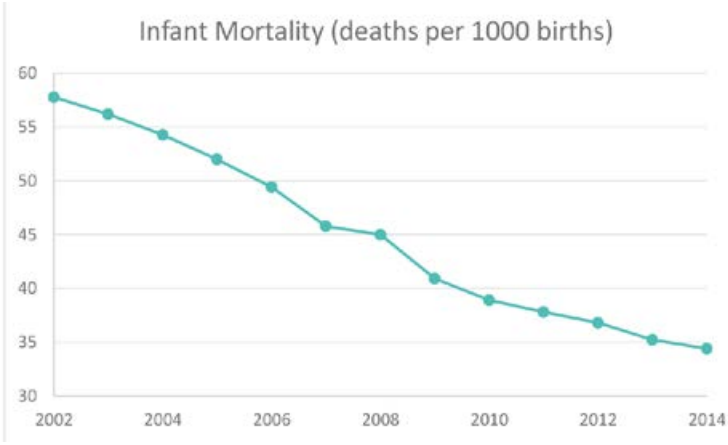
Data available for 2003-2014. Both categories showed an identical trend, ending lower than in 2003 with a high in 2006-2008 and then a steady decrease. Throughout that period, there were more male deaths from TB by about 8 thousand.

(Indicator 8) Health

Source: Mid-Year Population Estimates (2002-2014) (StatsSA)

Description: Infants are especially vulnerable to pollution related illness, thus an assessment of Infant mortality gives an indication of the general quality of the environment in terms of health and wellbeing. A healthy environment is not the sole determinant of infant mortality; however stakeholders have argued that toxic pollution, unclean drinking water and air pollution have a significant impact on infant mortality.

Figure 66: Infant Mortality (deaths per 1000 births)



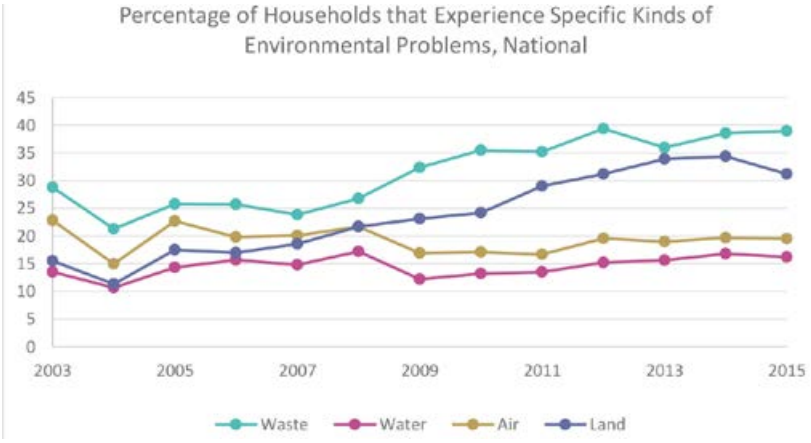
(Infant mortality, national): Data available for 2002-2014. Infant deaths per 1000 births declined steadily from about 57 in 2002 to 35 in 2014.

(Indicator 19) General Environmental Problems Experienced

Source: General Household Survey 2015 (StatsSA)

Description: Measured by the percentage of households who experience specific kinds of environmental problems. Stakeholders were particularly concerned about the inability (mainly caused by a lack of education) of ordinary people to determine environmental rights violations and to understand their right to environment.

Figure 67: Percentage of Households that Experience Specific Kinds of Environmental Problems, National



(*Percentage of households that experience specific kinds of environmental problems, by problem, national):*

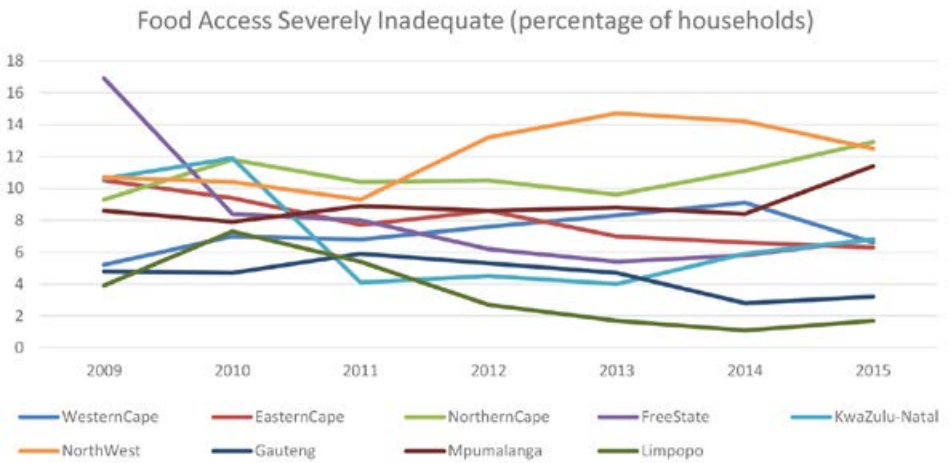
Data available for 2003-2015. Throughout the period, waste related problems were the most commonly experienced, rising from 30% in 2003 to 40% in 2015, with fluctuations. Land related problems also showed a net increase, with a steadier rise from 15% to 30% in 2015. Air related problems showed a very slight net decrease of 2 percentage points, and water related problems fluctuated around 15% with no net change over the period as a whole.

(Indicator 20) Food Security

Source: General Household Survey 2009-2015 (StatsSA)

Description: Food security is an outcome of a healthy environment capable of supporting sustainable agricultural practices. The issue of environmental sustainability is bound to food security as without food, South Africa cannot be said to be sustainable.

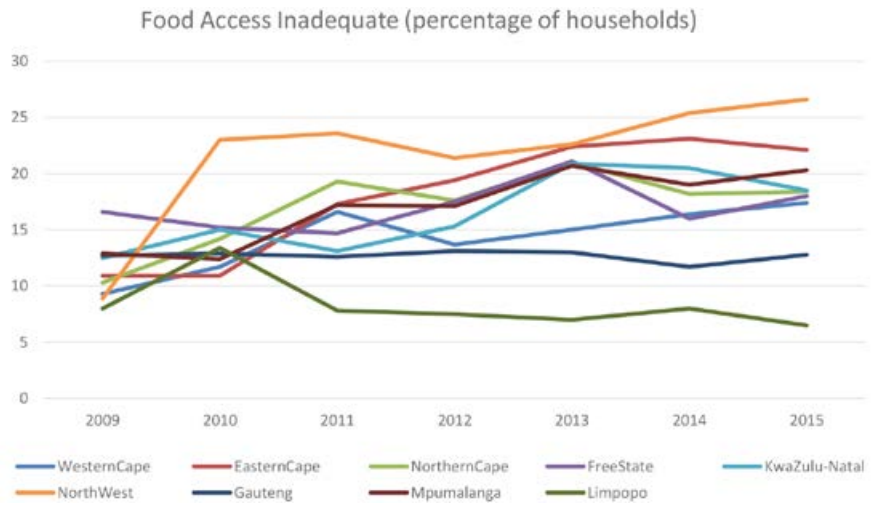
Figure 68: Food Access Severely Inadequate (percentage of households)



(Indicator 20a) (Food access severely inadequate, percentage of households, by province):

Data available from 2009-2015. The North West showed a large increase starting in 2011 to become one of the two provinces with the highest severe food inadequacy at about 12%. The other was the Northern Cape. Limpopo province showed a significant decrease to become the province with the lowest severe food inadequacy at about 2% in 2015. The range in 2009 was about 11 percentage points, and in 2015 it was roughly the same.

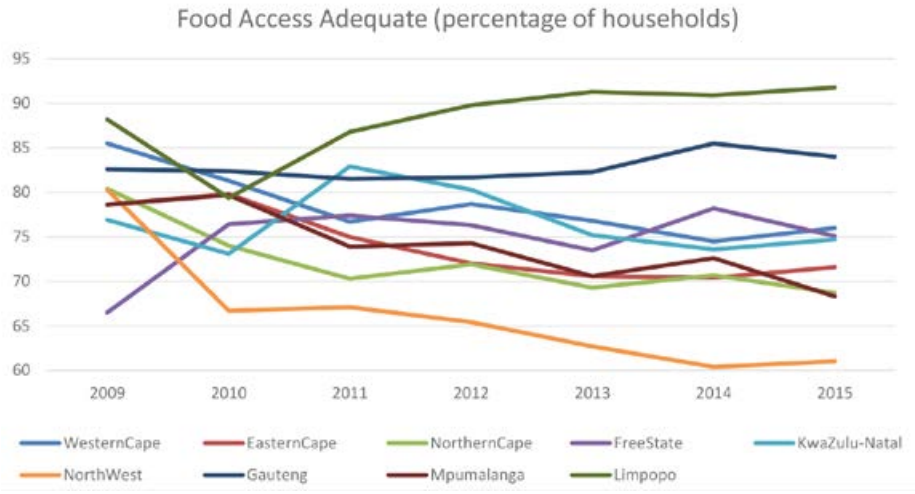
Figure 69: Food Access Inadequate (percentage of households)



(Indicator 20b) *(Food access inadequate, percentage of households, by province):*

Data available from 2009-2015. Most provinces showed a net increase in food inadequacy during this period, with the North West being the most prominent, with just over 15 percentage points gained from 5% in 2009, making it the province with the highest food inadequacy over the entire period. Gauteng province showed no net change over the period, making it the province with the second lowest food inadequacy after Limpopo. Limpopo province was the only one to show a net decrease over the period as a whole, of about 1 percentage point.

Figure 70: Food Access Adequate (percentage of households)



(Indicator 20c) *(Food access adequate, percentage of households, by province):*

Data available from 2009-2015. The two best performing provinces from about 2011 onward were Limpopo and Gauteng, with 91% and 84% adequate food access respectively. Except for the North West, all the other provinces were fairly close together in 2015 (within about 6 percentage points of each other) between 70% and 75% adequate food access. The Free State went from being the worst performer by far at 65% in 2009 to the middle of pack in 2015 at 75%. This was the opposite trend to the North West, which declined from the middle of the pack at 80% adequate access in 2009 to the worst by a significant margin in 2015 at 60%.

(Indicator 21) Community Experience of Environmental Problems

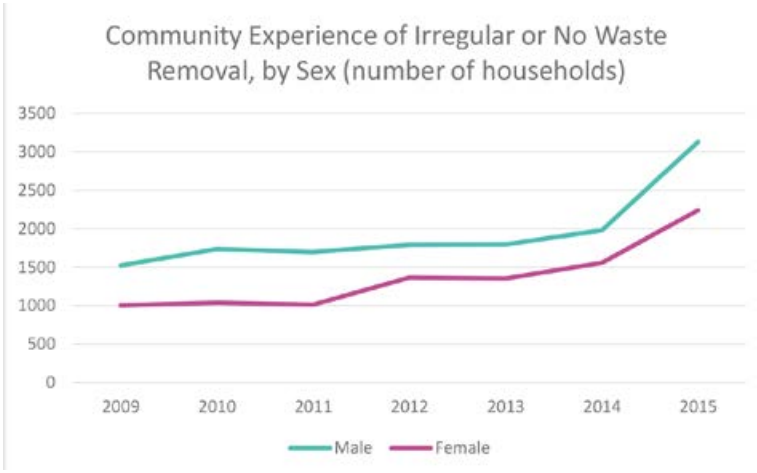
Source: General Household Survey 2009-2015 (StatsSA)

Description: A relative, subjective measurement of the health and suitability of the environment as perceived by communities. Provides a potentially significant general overview

of environmental problems faced, however it is important to remember that this assessment is not comprehensive and is based upon answers to a questionnaire with prepared, rigid answer options. The issue of understanding and recognition of the right to environment, and the articulation of environmental issues may also lead to unintentional bias. This indicator is split into the following variables:

- *Irregular or no waste removal*
- *Littering*
- *Water Pollution*
- *Outdoor / Indoor air pollution*
- *Land degradation / over utilisation of natural resources*
- *Excessive noise / noise pollution*
- *Other: Please note that the statistics used are drawn from the Stats SA General Household Report 2013 and this variable is presented without explanation. It likely refers to any other environmental issue that was not considered in the questionnaire.*

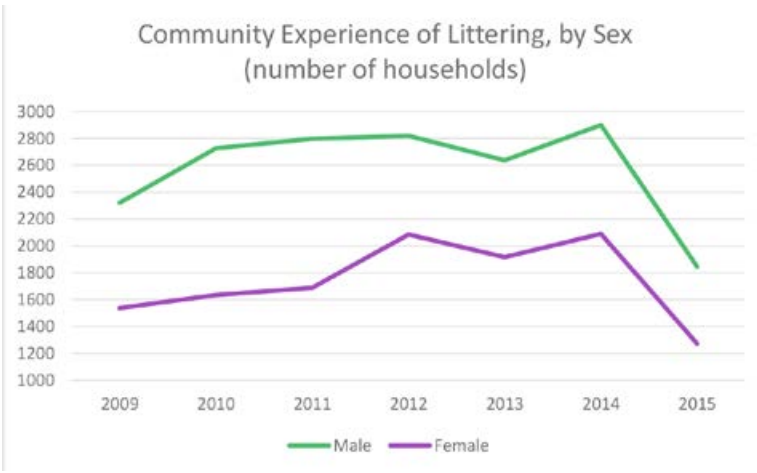
Figure 71: Community Experience of Irregular or No Waste Removal, by Sex (number of households)



(Indicator 21a) *(Irregular or no waste removal, number of households, by sex of head of household, national.):*

Data available for 2009-2015. For both male and female led households, there was a net increase in the number of households who experienced irregular or no waste removal, rising steadily from 1500 and 1000 in 2009 to 3000 and 2100 respectively in 2015.

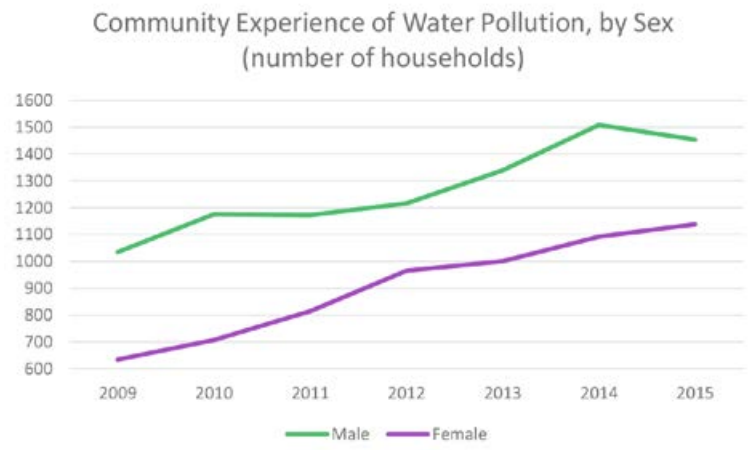
Figure 72: Community Experience of Littering, by Sex (number of households)



(Indicator 21b) (*Littering, number of households, by sex of head of household, national):*

Data available for 2009-2015. Male and female led households showed a similar trend, rising to highs in 2012 and 2014 with a dip in 2013. They both showed a net decrease overall in household experience of littering, decreasing from 2300 to 1800 and 1500 to 1300 for male and female led households respectively.

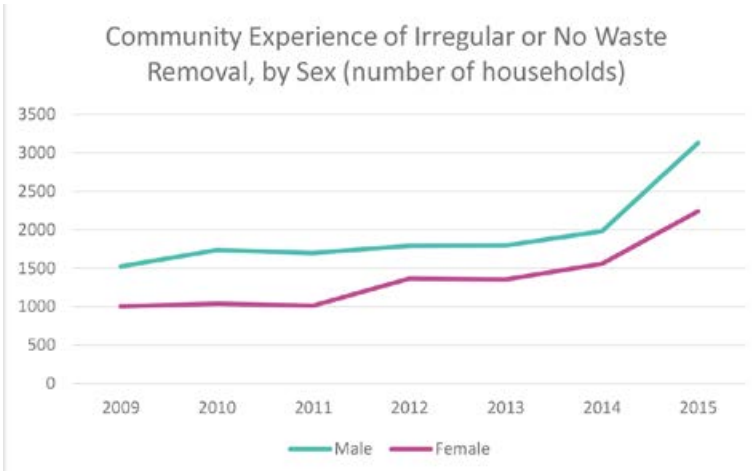
Figure 73: Community Experience of Water Pollution, by Sex (number of households)



(Indicator 21c) *(Water pollution, number of households, by sex of head of household, national):*

Data available for 2009-2015. Both categories showed a steady increase from 600 and 1000 households in 2009 to 1100 and 1400 household in 2015 for female and male led households respectively.

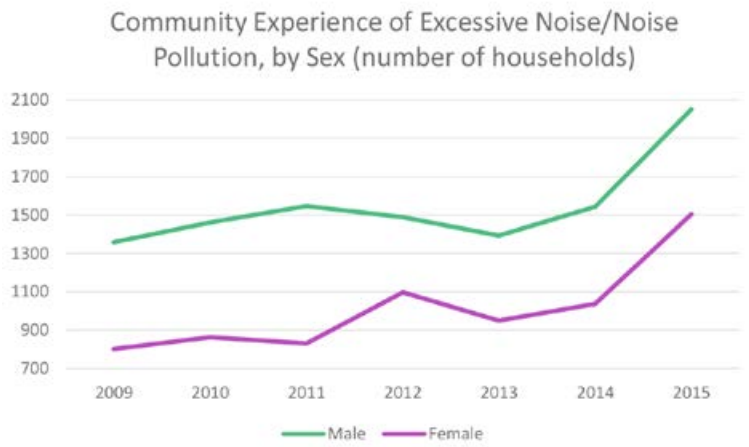
Figure 74: Community Experience of Outdoor/Indoor Air Pollution, by Sex (number of households)



(Indicator 21d) (*Outdoor/indoor air pollution, number of households, by sex of head of household, national):*

Data available for 2009-2015. Both categories showed a net increase, of 1200 and 1100 households from initial values of 800 and 1500 for female and male led households respectively.

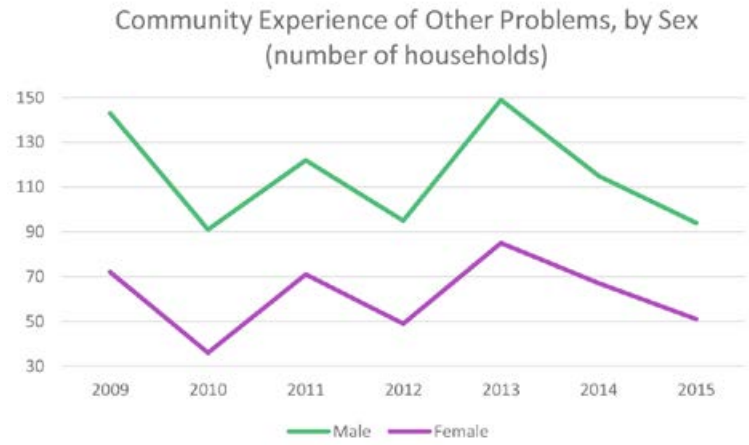
Figure 75: Community Experience of Land Degradation/Over Utilisation of Resources, by Sex (number of households)



(Indicator 21e) (*Land degradation/over utilisation of resources, number of households, by sex of head of household, national):*

Data available for 2009-2015. Both categories showed the same pattern of a steady increase to reach a high in 2014, followed by a sharp drop in 2015, for a net decrease over the entire time period. The net decrease for female led households was about 400 households and for male led households it was about 500.

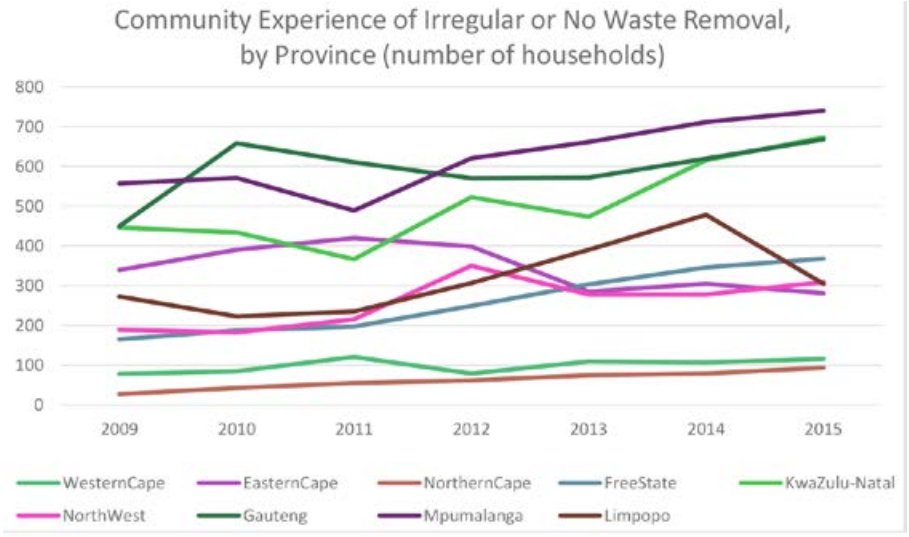
Figure 76: Community Experience of Excessive Noise/Noise Pollution, by Sex (number of households)



(Indicator 21f)*(Excessive noise/noise pollution, number of households, by sex of head of household, national):*

Data available for 2009-2015. Both categories showed a net increase over the period overall, although the trend for female led households had a spike in 2012 which was not mirrored by that of male led households. The net increases were 700 and 800 households for female and male led households respectively.

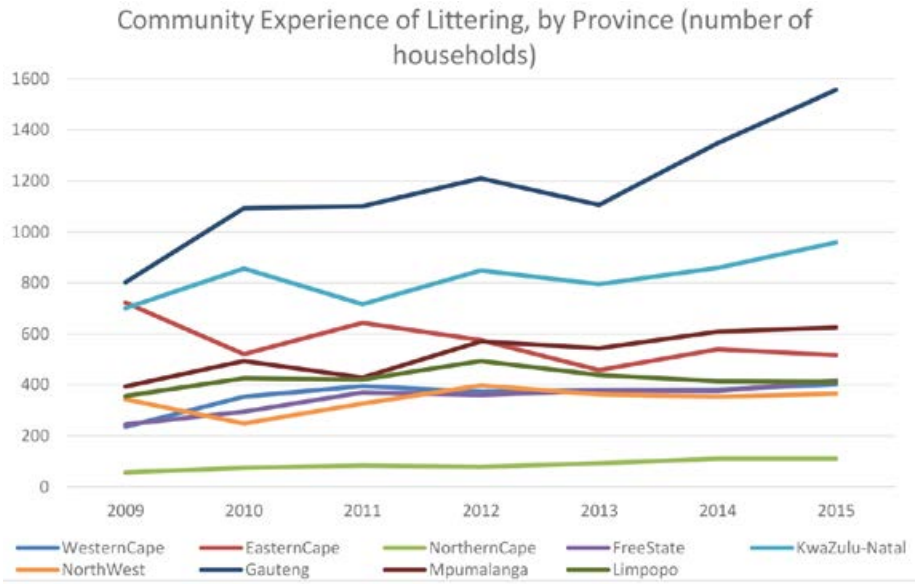
Figure 77: Community Experience of Other Problems, by Sex (number of households)



(Indicator 21g) (*Other problems, number of households, by sex of head of household, national):*

Data available for 2009-2015. Both categories showed noticeable fluctuation, but also a net decrease in the number of households in this category. Female led households showed a net decrease from 70 to 50 households and male led ones a net decline from 150 to 90 households, with both categories having spikes in 2011 and 2013.

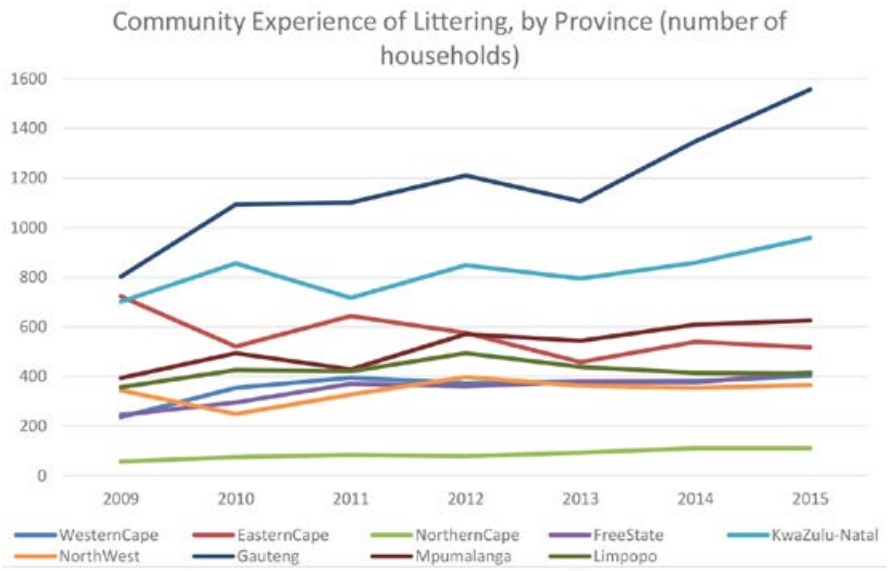
Figure 78: Community Experience of Irregular or No Waste Removal, by Province (number of households)



(Indicator 21h) (*Irregular or no waste removal, number of households, by province):*

Data available for 2009-2015. The two provinces with the least households with this problem were the Western Cape as well as the Northern Cape, which consistently had fewer than 100 households experiencing this problem. The highest values were associated with Mpumalanga and Gauteng provinces which both showed a net increase over the period from less than to more than 600 households. Kwa-Zulu Natal showed the same net increase as Gauteng, from about 500 to 700 households, but was not as consistently high as the other two for most of the period.

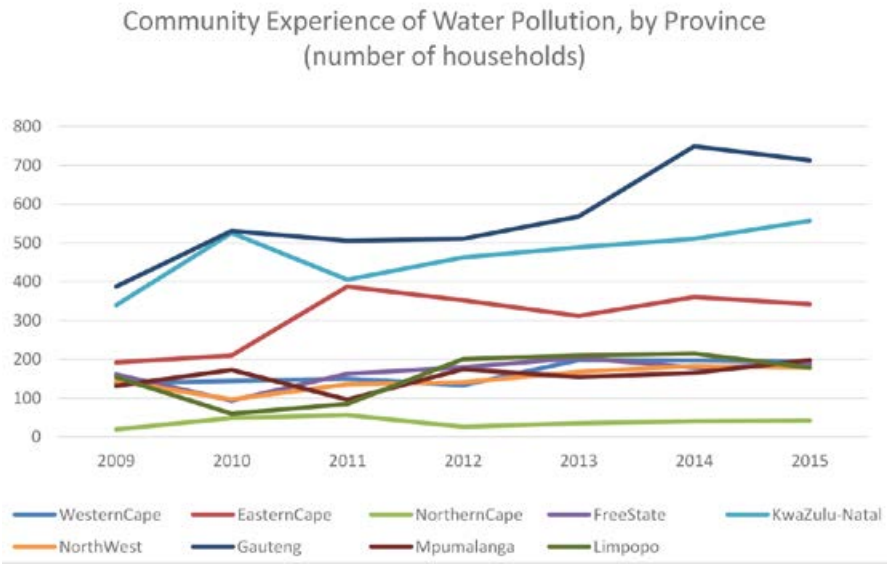
Figure 79: Community Experience of Littering, by Province (number of households)



(Indicator 21i) (*Littering, number of households, by province):*

Data available for 2009-2015. The Northern Cape, with consistently fewer than 100 households reporting an experience of littering had the lowest values. All the provinces except two, Gauteng and Kwa-Zulu Natal showed no significant net change. Gauteng showed an increase from about 700 households in 2009 to over 1500 in 2015.

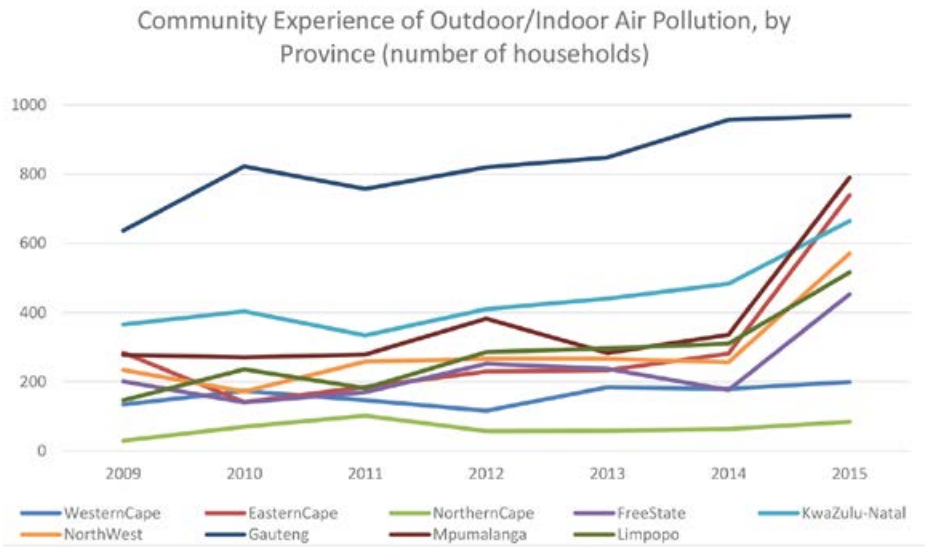
Figure 80: Community Experience of Water Pollution, by Province (number of households)



(Indicator 21j) (*Water pollution, number of households, by province):*

Data available for 2009-2015. The provinces with noticeably high values were Gauteng, Kwa-Zulu Natal and Eastern Cape provinces, in descending order, for most of the period. The Northern Cape, with less than 100 households experiencing water pollution, had the lowest values.

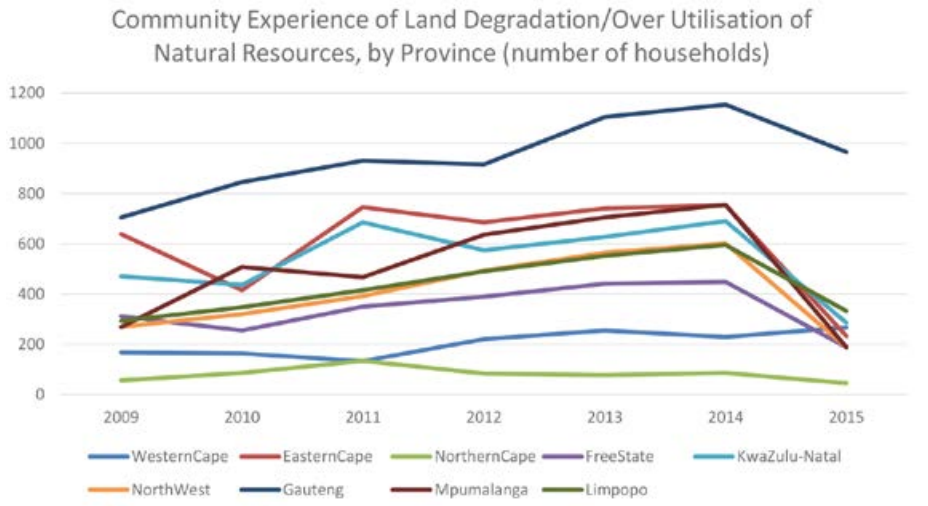
Figure 81: Community Experience of Outdoor/Indoor Air Pollution, by Province (number of households)



(Indicator 21k) (*Outdoor/indoor air pollution, number of households, by province):*

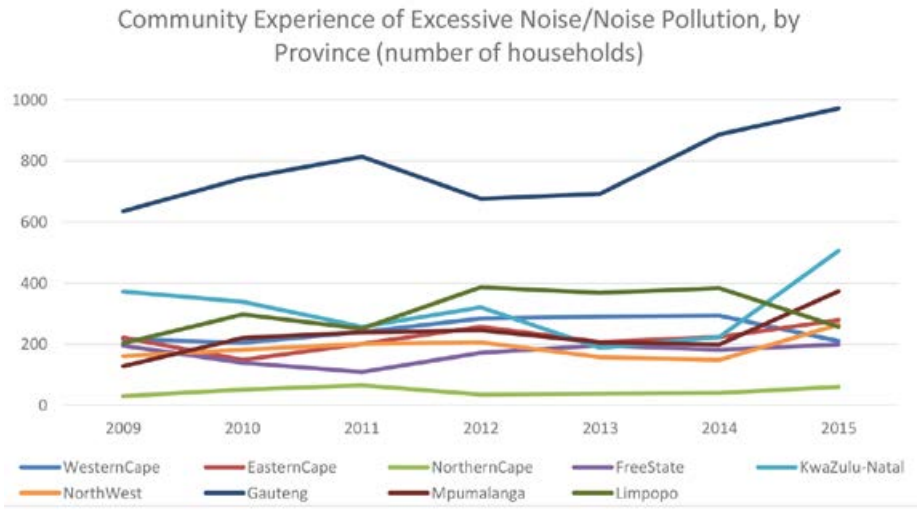
Data available for 2009-2015. Gauteng had significantly higher values than any other province, and showed a net increase from 600 to 1000 households. The other provinces showed no major change until 2014 when they all showed a marked increase in number of households with this problem. The exceptions to this were the Western Cape and the Northern Cape which showed no net increase.

Figure 82: Community Experience of Land Degradation/Over Utilisation of Natural Resources, by Province (number of households)



(Indicator 21l) (*Land degradation/over utilisation of natural resources, number of households, by province):* Data available for 2009-2015. Gauteng showed the largest values of all the provinces over the entire period, increasing past 1000 households before settling at 1000 from an initial value of about 700 households in 2009. The other provinces showed very slight increases to highs in 2014 before decreasing noticeably, as well as 'bunching up' in 2015.

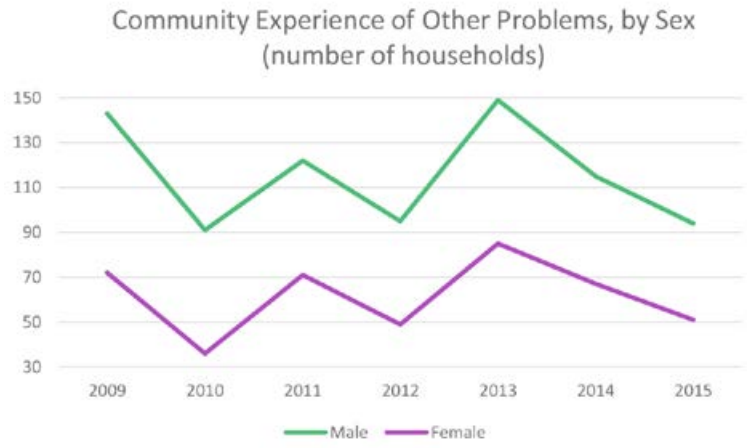
Figure 83: Community Experience of Excessive Noise/Noise Pollution, by Province (number of households)



(Indicator 21m) (*Excessive noise/noise pollution, number of households, by province):*

Data available for 2009-2015. Gauteng was the only province to have values above 500 households over the entire period. All the other provinces were consistently below 400 households until 2015, when some increased to about 500 households.

Figure 84: Community Experience of Other Problems, by Province (number of households)



(Indicator 21n) (*Other problems, number of households, by province):*

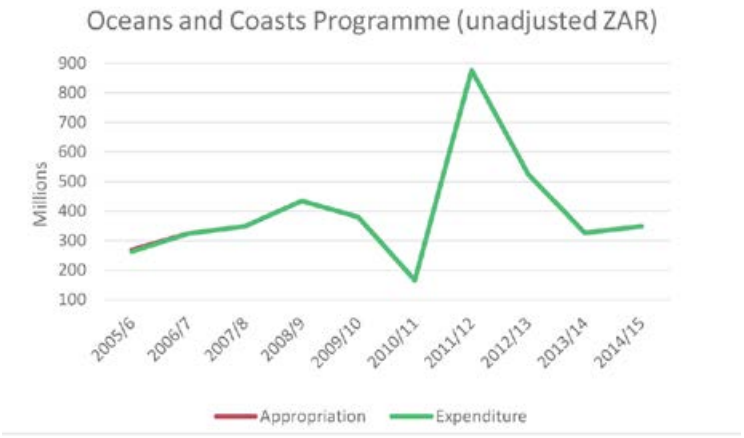
Data available for 2009-2015. Albeit with significant fluctuations, which were not matched by other provinces, Gauteng had the highest values over the whole period, with a negligible net increase. The other provinces were all consistently below 40 households, with some consistently below 20.

(Indicator 22) Governmental Funding Allocated to the Department of Environmental Affairs (DEA)

Source: Department of Environmental Affairs Annual Reports (www.environment.gov.za/documents/reports);

Description: As the most significant department involved directly in the environment, the budget of the DEA gives an indication of government's commitment to the environment. A breakdown of DEA spending into different areas shows governmental priorities and potential areas of environmental concern. Variables include the amount of funds spent on *DEA legal, authorisation and compliance, Oceans and Coasts, Climate Change and Air Quality, Biodiversity and Conservation, Environmental Programmes,* and *Chemicals and Waste Management*.

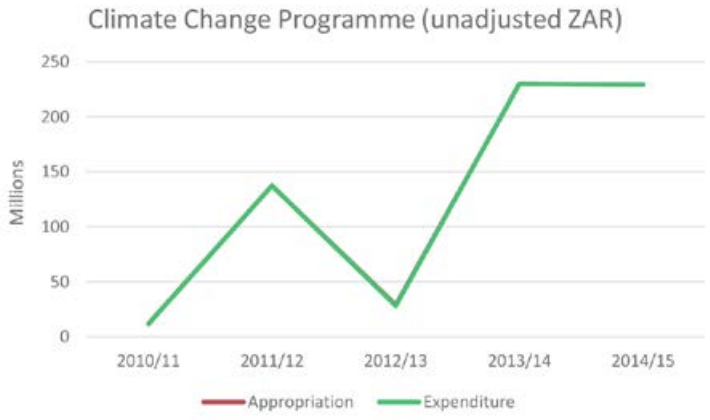
Figure 85: Oceans and Coasts Programme (unadjusted ZAR



(Indicator 22a) *(Oceans and coasts, unadjusted ZAR):*

Data available for 2005/6-2014/15. Appropriation and expenditure were exactly matched throughout the period and showed a slight net increase of just under R100 million, with a very large spike in 2011/12 at R900 million and a dip in 2010/11 to just under R200 million from an initial value of about R280 million in 2005/6.

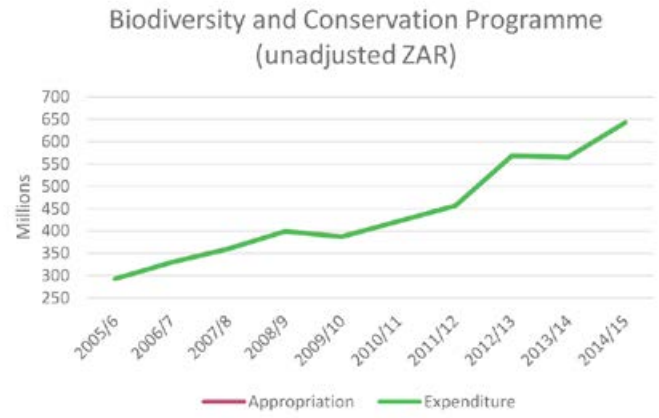
Figure 86: Climate Change Programme (unadjusted ZAR)



(Indicator 22b) *(Climate change, unadjusted ZAR):*

Data available for 2010/11-2014/15. Appropriation and expenditure were exactly matched for the entire period. The net increase in allocation over the whole period was on the order of R220 million, from just over R10 million in 2010/11 to nearly R230 million in 2014/15, with a dip to about R25 million in 2012/13.

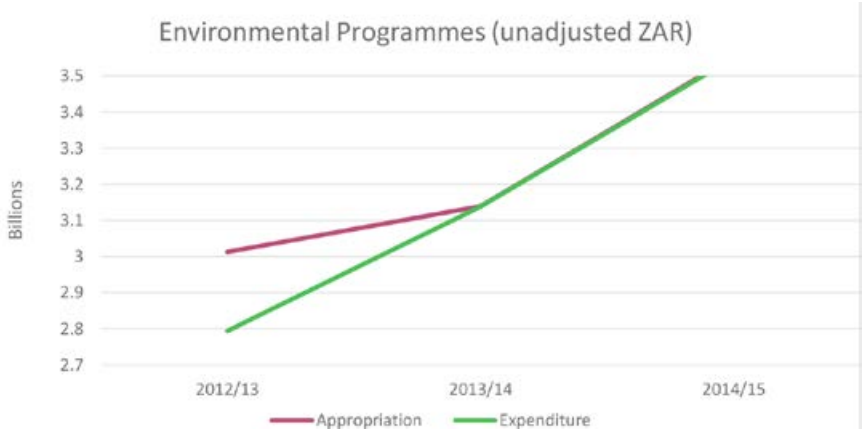
Figure 87: Biodiversity and Conservation Programme (unadjusted ZAR)



(Indicator 22c) *(Biodiversity and conservation, unadjusted ZAR):*

Data available for 2005/6-2014/15. Allocation and expenditure were exactly matched throughout the period and showed a steady increase from R300 million to R650 million in 2014/15.

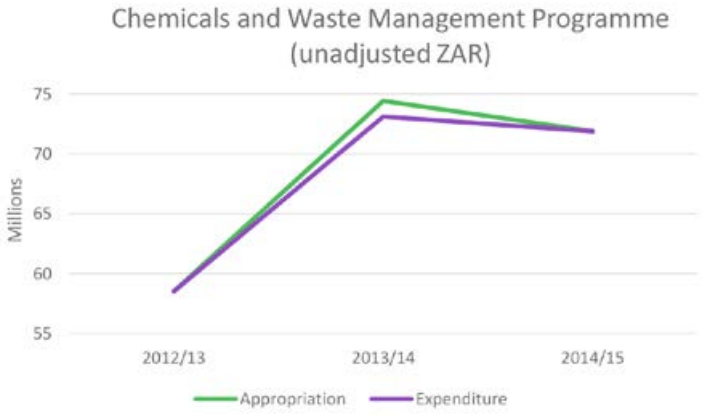
Figure 88: Environnemental Programmes (unadjusted ZAR)



(Indicator 22d) *(Environmental programmes, unadjusted ZAR):*

Data available for 2012/13-2014/15. Appropriation and expenditure were matched from 2013/14 onward, with expenditure trailing by almost R200 thousand in 2012/13. Expenditure showed a steady increase from R2.8 million to R3.5 million over the period.

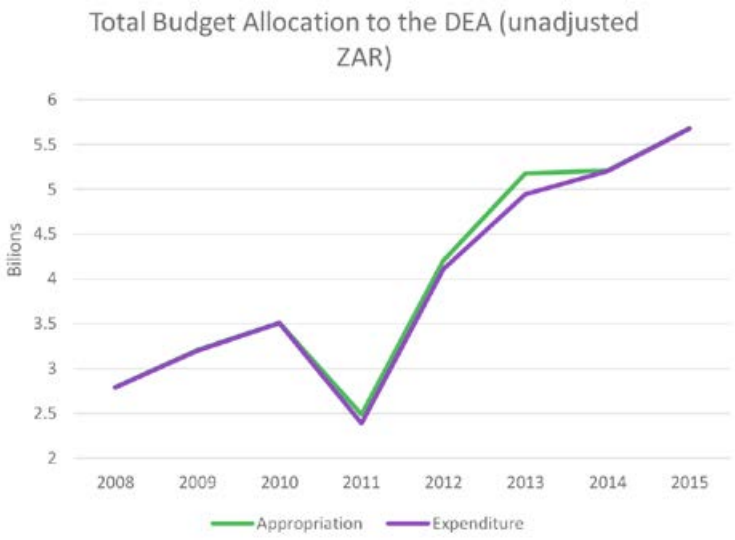
Figure 89: Chemicals and Waste Management Programme (unadjusted ZAR)



(Indicator 22e) *(Chemicals and waste management, unadjusted ZAR):*

Data available for 2012/13-2014/15. Except for 2013/14 where appropriation less than R1 million higher, expenditure and appropriation were matched. Overall, they showed an increase from R58 million in 2012/13 to R72 million in 2014/15.

Fig



(Indicator 22f) *(Total budget allocation to the DEA, unadjusted ZAR):*

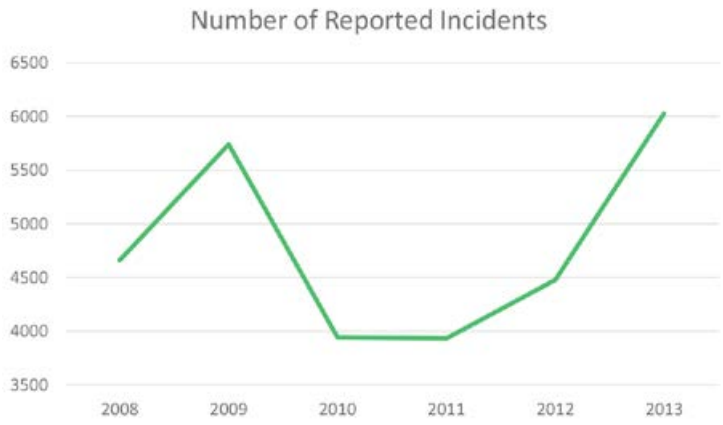
Data available for 2008-2015. For the duration of the period between 2008/09 and 2014/15 financial years, the Department of environmental affairs has consistently spent within 90% of its allocated budget. Depicted in the figure is a net increase over the entire period of about R 2.5 billion from an initial allocation of R 3 billion in 2008. The overall pattern was a steady increase with the exception of 2011, which saw a sharp decline in the allocation to slightly under R 2.5 billion. Holistically, this pattern largely speaks well of the Department's financial management environment although the inevitable return of funds to the National Revenue Fund resulting from less than 100% expenditure requires further improvement.

(Indicator 23) Environmental Infringements

Source: Department of Environmental Affairs National Environmental Compliance and Enforcement Reports (www.environment.gov.za/otherdocuments/reports#legal)

Description: This indicator potentially shows the government's commitment to enforcing state of environment rights in the real world. It may also be a reflection of the understanding of the right to environment amongst people in South Africa. However, it is important to remember that this is not a comprehensive indicator, as access to the resources required to lodge complaints and pursue legal remedies is limited. This indicator considers the following variables; *Number of Reported Environmental Incidents, Total Number of Arrests* and *Number of Inspections Conducted*. With the provisos already mentioned, these variables combined indicate the state of environmental right enforcement in South Africa.

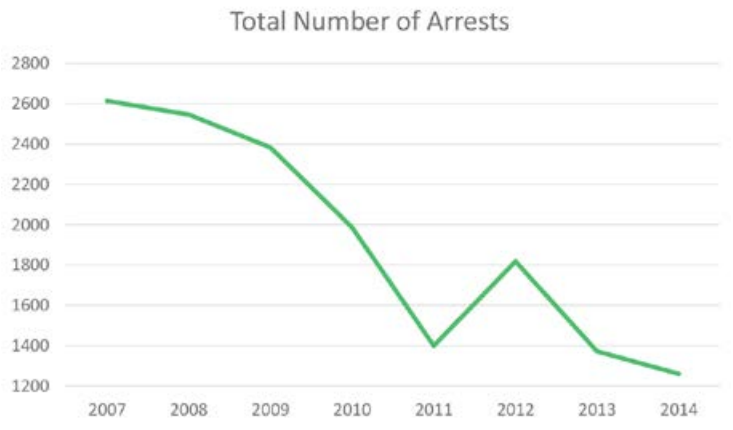
Figure 91: Number of Reported Incidents



(Indicator 23a) *(Number of reported incidents):*

Data available for 2008-2014. The total number of reported incidents showed a net increase just over 4500 incidents to 6000 incidents reported in 2013. There were significantly fewer incidents than this reported in 2010 and 2011, with a trough at about 4000 incidents.

Figure 92: Total Number of Arrests



(Indicator 23b) *(Total number of arrests):*

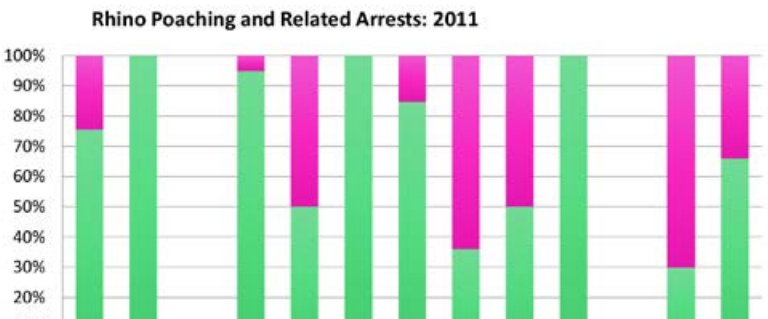
Data available for 2007-2014. There was a steady decrease to a low of 1400 arrests in 2012 followed by and increase to 1800 in 2013 and a decline to 1400 in 2015 for a net decrease over the whole period of 1200 arrests.

Figure 93: Number of Inspections Conducted

(Indicator 23c) (Number of inspections conducted): Data available for 2009-2014.

The number of inspections conducted showed a net increase of 400 inspections from an initial value of 2400 in 2009, with the lowest value overall being 1700 inspections in 2011. Environmental Inspectors undertake a range of monitoring and investigative work. The indicators above and below reflect an improvement in the overall number of inspections but complementary to that are the often low arrest rates. This is especially evident in relation to the numbers of rhinoceros poached in 2011 and 2014 against the associated arrests for rhino-related crimes. Nationally in 2011, a total of 448 rhinos poached was met with 232 related arrests while in some provinces such as the Western Cape no arrests were made in spite of 6 poaching reports in the same year. In 2014 the total numbers of rhinos poached were at a staggering 1244 with 386 related arrests. In recent years the capacity of the inspectorate has received significant media coverage and political attention given the importance of the species. In 2014, the Integrated Strategic Management Approach was approved by Cabinet, enhancing current anti-poaching interventions in South Africa.

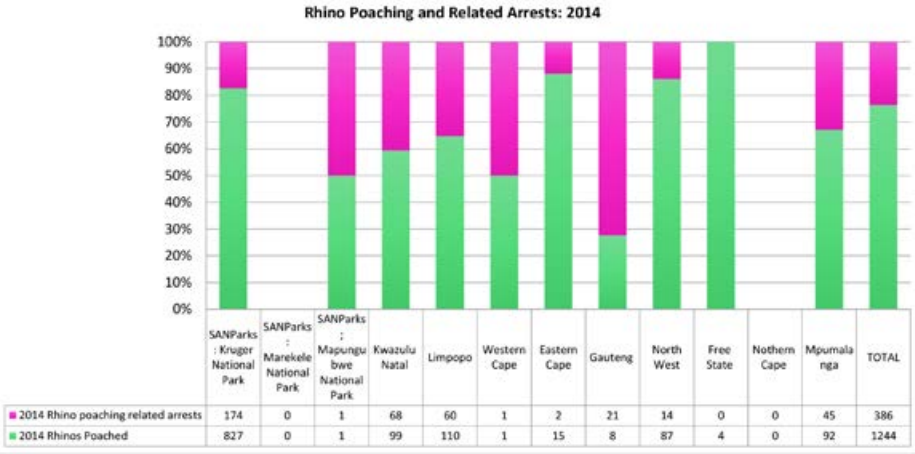
Figure 94: Number of Rhinos Poaced and related Arrests (2011)[152]



	SANParks: Kruger National Park	SANParks: Marekele National Park	SANParks; Mapungubwe National Park	Kwazulu Natal	Limpopo	Western Cape	Eastern Cape	Gauteng	North West	Free State	Nothern Cape	Mpumalanga	TOTAL
2011 Rhino poaching related arrests	82	0	0	4	34	0	2	16	21	0	0	73	232
2011 Rhinos Poached	252	6	0	74	34	6	11	9	21	4	0	31	448

152 Note: This figure is designated indicator but serves to provide an example of the work of environmental inspectors (Green Scorpions) across various national institutions

Figure 95: Number of Rhinos Poaced and related Arrests (2014)[153]



	SANParks : Kruger National Park	SANParks : Marekele National Park	SANParks : Mapungubwe National Park	Kwazulu Natal	Limpopo	Western Cape	Eastern Cape	Gauteng	North West	Free State	Nothern Cape	Mpumalanga	TOTAL
2014 Rhino poaching related arrests	174	0	1	68	60	1	2	21	14	0	0	45	386
2014 Rhinos Poached	827	0	1	99	110	1	15	8	87	4	0	92	1244

153 Source: 'Green Scorpions' National Environmental Compliance and Enforcement Report 2014/15 www.environment.gov.za/sites/default/files/reports/201415_necer_report.pdf

CHAPTER 5

Conclusion: The status of the right to a healthy environment

This report has highlighted both positive and negative trends reflected in policy and (some) budget responses to promoting environmental protection, human wellbeing and sustainable development. South African legislation in relation to the management, governance and protection of the environment since 1994 has been praised within the region and internationally. In keeping with national priorities for redress, equity and access, it is in the recognition of the nexus between social and ecological justice that the constitutional right guaranteed by Section 24 is considered particularly progressive in some respects. Households' levels of access to municipal waste collection, basic sanitation, electricity and clean water have increased in all provinces.

5.1 General Findings and Recommendations

It is still apparent; however, that much must still change before the right to a clean, healthy and protected environment can begin to be a reality for all who live in South Africa. Gender, race and geographic disparities still exist. The allocation of national resources shows a clear under-prioritisation of environmental programmes. Municipalities are still not adequately supported to fulfil monitoring and delivery functions in spite of progressive, supportive policy and legislative frameworks.

A fundamental shift in the interpretation and delineation of the right itself is required. There needs to be a radical shift in the implementation of environmental policy and enforcement of legislation that seeks to protect precious resources and, by extension, ecosystem services and human wellbeing. Municipalities and provincial entities must be provided with adequate technical capacity to fulfil core environmental management requirements. To do this not only must the South African government allocate sufficient funds but related strategic planning must be SMART and responsive to a dynamic delivery environment. It can no longer be business as usual across DEA departments and affiliated entities. This change is required particularly in those programmes mandated to ensure that waste management is effective, pollution is minimised and climate change innovation transcends mere promises in policies. Climate change innovation and adaptation must happen at a pace aligned with the international agreements that South Africa has ratified at the very least. All departments must take steps to ensure that environmental governance is integral to their operations as envisioned in policies such as the Department of Health's Environmental Health Policy. For this to happen, the Environmental Health Policy must become a costed, implemented plan, for instance.

Water scarcity is a significant threat with 98% of water resources in the country already allocated. The indicators discussed in this report highlight many sources of pressure and potential tipping points. Most pressing are increased GHG emissions, water contamination and land degradation. Minimal funding for environmental affairs results in constrained target-setting and will have negative impacts on personnel-heavy, socially-oriented programmes such as the WfW and WoW programmes. While these programmes are not intended to offer permanent employment nor particularly regular employment – their social impact is unrivalled particularly in provinces with high unemployment and rich biodiversity in need of protection.

Funding for Conservation and Biodiversity is also being systematically reduced over the years. This budget reprioritization also has direct impacts on conservation activities which will in turn impinge on current and future generations enjoyment of the right to a healthy environment.

There is a definite need for the South African government to elevate funding levels for environmental affairs to match policy commitments and ever-increasing pressure from key drivers such as urbanization, increasing household demand for services and increasing, poorly regulated industrial growth. In addition to possible advocacy for more funds via the DoRA, the DEA itself must seek to find innovative ways to increase revenue collection to invest back into conservation.

In spite of the expressed need for one of the world's top 20 GHG emitters to transition towards cleaner, more sustainable energy generation, South Africa is in fact set to increase its GHG emissions over the next two decades. The DEA and associated departments must actively seek ways to ensure that responses to a coal-hungry economy do not set the country back from COP21 and specifically the Paris Agreement at the expense of human wellbeing and at the highest possible cost to the environment on which we all depend for food, water, shelter, clean air and general wellbeing.

Ultimately it will be of little significance that South Africa is a leading voice in global climate and environment agreements if such pioneering work and legislation does not translate to responsive funding and prioritisation at all levels of government.

It is within the realm of South African courts to aid the process of more comprehensively defining the entitlements provided for by Section 24. To what standards are citizens (as rights holders) able to hold their government to account in fulfilling this right? To acknowledge its complexity and need for interdepartmental involvement is not an adequate response to South Africans who continue to live under conditions that adversely affect their physical health and overall wellbeing and whose environment is neither protected nor healthy.

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ANNEXURE 1: Details of Main Programmes of the Department of Environmental Affairs

Programme	Projected Year-on-year Change in Budget Allocation[61] 2016/17 and 2017/18	Programme Objectives/Purpose
1: Administration	Increase	-"provide leadership, strategic, centralised administration, executive support, corporate services and facilitate effective cooperative governance, international relations and environmental education and awareness."
2: Legal Authorisations Compliance and Enforcement	Increase	-promote the development and implementation of an enabling legal regime and licensing/ authorisation system to ensure enforcement and compliance with environmental law.
3: Oceans and Coasts	Decrease	-"promote, manage and provide strategic leadership on oceans and coastal conservation. The programme is made-up of five sub programmes which are as follows: (1) Oceans and Coasts Management (2) Integrated Coastal Management (3) Oceans and Coastal Research (4) Oceans Conservation (5) Specialist Monitoring Services"
4: Climate Change and Air Quality Management	Decrease	-"improve air and atmospheric quality, lead and support, inform, monitor and report efficient and effective international, national and significant provincial and local responses to climate change. The programme is made-up of seven sub programmes which are as follows: (1) Climate Change Management (2) Climate Change Mitigation (3) Climate Change Adaptation (4) Air Quality Management (5) South African Weather Service (6) International Climate Change Relations and Negotiations (7) Climate Change Monitoring and Evaluation'
5: Biodiversity and Conservation	Decrease	-"ensure the regulation and management of all biodiversity, heritage and conservation matters in a manner that facilitates sustainable economic growth and development. The programme is made-up of eight sub programmes which are as follows: (1) Biodiversity and Conservation Management (2) Biodiversity Planning and Management (3) Protected Areas Systems Management (4) iSimangaliso Wetland Park Authority (5) South African National Parks (6) South African National Biodiversity Institute (7) Biodiversity Monitoring and Evaluation (8) Biodiversity Economy and Sustainable Use"
6: Environmental Programmes	Increase	-"facilitate the implementation of expanded public works and green economy projects in the environmental sector. The programme is made-up of eight sub programmes: (1) Environmental Protection and Infrastructure Programme (2) Working for Water and Working on Fire (3) Green Fund (4) Environmental Programmes Management (5) Information Management and Sector Coordination'
7: Chemical and Waste Management	Increase	-" and ensure that chemicals and waste management policies and legislation are implemented and enforced in compliance with chemicals and waste management authorisations, directives and agreements. The programme is made-up of five sub programmes which are as follows: (1) Chemicals and Waste Management (2) Hazardous Waste Management and Licensing (3) General Waste and Municipal Support (4) Chemicals and Waste Policy, Evaluation and Monitoring (5) Chemicals Management"

ANNEXURE 2: Environmental Infrastructure Grant by Budget Vote

(source: National Treasury)

Energy (Vote 26)	Integrated National Electrification Programme (Municipal) Grant	To implement the Integrated National Electrification Programme by providing capital subsidies to municipalities to address the electrification backlog of occupied residential dwellings, and the installation of bulk infrastructure.
Water and Sanitation (Vote 36)	Water Services Infrastructure Grant	To facilitate the planning and implementation of various water and sanitation projects to accelerate backlog reduction and improve the sustainability of services in prioritised district municipalities, especially in rural municipalities; provide interim, intermediate water and sanitation services that ensure provision of services to identified and prioritised communities, including through spring protection, drilling, testing and equipping of boreholes and on-site solutions; to support drought relief projects in affected municipalities.
	Regional Bulk Infrastructure Grant	To develop new, refurbish, upgrade and replace ageing infrastructure that connects water resources to infrastructure serving extensive areas across municipal boundaries or large regional bulk infrastructure serving numerous communities over a large area within a municipality; to develop new, refurbish, upgrade and replace ageing waste water infrastructure of regional significance; to pilot regional Water Conservation and Water Demand Management projects or facilitate and contribute to the implementation of local Water Conservation and Water Demand Management projects that will directly impact on bulk infrastructure requirements.

ANNEXURE 3: CPI Table

		2010	2011	2012	2013	2014	2015	2016	Base year 2012
Index		88.2	92.6	97.8	103.4	109.7	114.7	120.7	
Percentage change		4.3	5.0	5.6	5.7	6.1	4.6	6.3	
Available online: www.statssa.gov.za/publications/P0141/CPIHistory.pdf									

ANNEXURE 4: Indicator Details and Analysis

Access indicators

Access to Mains Electricity: People with access to mains electricity tend to burn far less fossil fuels. As such, access to mains electricity can significantly reduce local air pollution. Access to mains electricity also reduces the amount of deforestation and damage to flora, as energy generation without electricity tends to involve the burning of combustible material, including wood and grass. In addition, the use of mains electricity also reduces the amount of air pollution (especially indoor air pollution), and can significantly improve human health. The extent to

which access to mains electricity reduces pollution is highly dependent on the source of the energy.

Access to Basic Sanitation: Access to sanitation significantly improves local environmental quality and human health. Sanitation is defined as the "*collection, removal, disposal or treatment of human excreta and domestic wastewater, and the collection, treatment and disposal of industrial wastewater where this is done by or on behalf of a water services authority.*"[154] The proper treatment and disposal of faecal waste made possible by access to basic sanitation, reduces water and land pollution and significantly reduces the risk of cholera and other diseases. Therefore, access to basic sanitation is vital for an environment that is healthy and promotes human and natural wellbeing.

Access to Water: Access to water leads to a significant improvement in human health. Properly provisioned water from a sustainable source also decreases potential strain on river and other water systems. It is significant to note that there are some concerns with the quality of access provided. In some instances, infrastructure provided on paper is in reality "*broken or dysfunctional*".[155] Not only does non-functioning infrastructure negatively impact on human access, poorly constructed and badly maintained results in loss and waste of water, which impacts on sustainability and increases strain on already limited natural water resources.

Access to Waste Removal Services: Access to waste removal reduces local air, land and water pollution as well as improving human health. Statics South Africa highlights the importance of refuse removal to "*maintain environmental hygiene of the households' neighborhoods*".[156] This indicator considers the removal of refuse (whether by municipality or private arrangement) at least once a week. It is important to note that urban and metropolitan areas have a far higher rate of refuse removal than rural areas. Ideally, the data should be considered in terms of rural, urban and metropolitan, however before the *Statistics South Africa General Household Survey 2013* this additional data was not captured. Although refuse removal includes the "proper disposal" of waste, this indicator does not properly consider the management and proper disposal of waste after removal.[157] In this sense, this indicator must be considered along with the adequacy indicator *Waste Recycled*.

Access to Natural Environment: Access to national parks ensures physical accessibility to healthy natural environment as well as increasing biodiversity and is measured by the number of national parks and the number of visitors. Unfortunately this indicator does not properly consider location or the nature of the visitors. Therefore, although the indicator does provide useful data, its significance could be enhanced substantially by increasing the amount of data gathered by SANParks to allow for better disaggregation. This indicator is purely an access indicator of quantity and does not allow for a determination of quality of access.

Adequacy indicators

1. Energy Sustainability: An indicator of sustainable energy generation practices. Sustainable energy generation practices contribute towards environmental sustainability. The use of non-fossil fuels allow for sustainable energy generation. Further, the type of energy generation used, can reduce air, land and water pollution. *Sources of Energy* and *Gross Energy Consumption* are the most useful variables to measure this indicator. The source of energy is important as energy generation is widely considered to be one of the most significant contributors to environmental pollution. The combustion of carbon, in particular the use of 'dirty coal', for power generation leads to high and hazardous amount of air pollution that directly impacts on human and natural health. In the South African context, the emissions from power generation can largely be accounted for by the emissions from Eskom (see the variable *Emissions from Eskom* in the Adequacy indicator *Fine Particulate Matter*). Split into separate indicators for ease of use (and indicators in their own right), a comprehensive understanding of air quality would likely require the Adequacy indicators

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154 Department of Water Affairs and Forestry, Draft White Paper on Water Services: Water is Life, Sanitation is Dignity, Draft for Public Comment, October 2002 www.gov.za/sites/www.gov.za/files/draft_SA_water_services_wp6.1.pdf p iii.

155 South African Human Rights Commission, Report on the Right to Access Sufficient Water and Decent Sanitation in South Africa, 2014: Water is Life. Sanitation is Dignity: Accountability to People who are Poor, 2014 www.sahrc.org.za/home/21/files/FINAL%204th%20Proof%204%20March%20-%20Water%20%20Sanitation%20low%20res%20%282%29.pdf p14.

156 Statistics South Africa, General Household Survey 2013, 18th June 2014 http://beta2.statssa.gov.za/publications/P0318/P03182013.pdf p 49.

157 Ibid

Energy Sustainability to be considered with *Emissions of Greenhouse Gas* and *Fine Particulate Matter* as well as the Quality indicator *Air Quality Impact on Health and Wellbeing*.

2. Waste Recycled: The amount of waste generation directly impacts on environmental and human health and high levels of waste generation are unsustainable. Reducing quantity of waste is important, and the amount of waste recycled as a percentage of total waste reduces pollution and increases sustainability. This indicator is most effective when considered with the access indicator *Access to Waste Removal Services*.

3. Emissions of Greenhouse Gas: Greenhouse gas emission impacts negatively on human and natural health, as well as contributing to climate change and is considered an international issue. The most significant variables in calculating this indicator include *CO2 emissions per capita, CH4 emissions, N2O emissions, HFC emissions, PFC emissions*. This indicator should be considered with the Adequacy indicator *Fine Particulate Matter*, the Quality indicator *Air Quality Impact on Health and Wellbeing* and the variable *Emissions from Eskom* for a more complete assessment of air pollution and greenhouse gas emissions in South Africa.

4. Fine Particulate Matter (PM): PM is a result of the effectiveness of governmental regulation and industry commitment to a clean and healthy environment. Although PM can be considered a greenhouse gas, it is left as a separate indicator due to its significant and lasting human and natural health impacts. PM is a clear indication of the levels of dangerous air pollution, typically caused by the combustion of carbon rich fossil fuels and other carbon emissions from industry and domestic energy consumption. This indicator considers background concentrations of Fine Particulate Matter (PM2.5) and (PM10). PM2.5 should not exceed 10 µg/m3 annual mean and 25 µg/m3 24-hour mean. PM10 should not exceed 20 µg/m3 annual mean and 50 µg/m3 24-hour mean. Multiple studies by the World Health Organisation have determined that PM can "*cause or aggravate cardiovascular and lung diseases, heart attacks, and arrhythmias, affect the central nervous system, the reproductive system and cause cancer*".[158] The variable *Emissions from Eskom* is included in this indicator, as Eskom is the primary energy producer and thus a primary emitter of air pollution; it is important to note that the "*energy sector was by far the largest contributor to the total GHG emissions… providing 85.0% in 2010*".[159 / 160] In addition to this, not only is the energy sector the largest contributor to carbon dioxide emissions, its current growth is indicative of South Africa's under-pricing of this fossil fuel and its coal-dominant electricity production.[161]

5. Water Supply: The quantity and quality of water supply is important in determining environmental sustainability. As a water stressed state, the sustainability of water use is crucial and can be considered using the variables *Renewable Freshwater Resources per Capita,* and *Annual Freshwater Withdrawal as a Percentage of Total Internal Resources*. Ideally, the Strategic Water Source Areas (SWSA) should also be considered along with the Mean Annual Runoff, but unfortunately this information is not regularly updated or available in an adequate form for the methodology in use.[162] The variable *Organic Water Pollutant Emissions per day* shows the level of organic emissions that impact negatively on both human and natural health. Organic water pollutants may lead to harmful algal blooms which reduce the oxygen content of water, thereby destroying healthy natural ecosystems (in particular in South Africa, riverine systems). The variable *Trophic Status of Dams* shows the quality and biological and ecological health of water in dams, and is a direct measure of the health of water sources. The extent to which dams are full can be seen in the variables *Drainage Region Summary - Percentage Full*, *Water Management Areas - Percentage Full* and *Provincial Summary - Percentage Full.* Also consider the Quality indicator *Quality of Drinking Water* and the Access indicator *Access to Water* for a more comprehensive understanding of water issues. This indicator is useful on its own, but should be considered with the Adequacy indicator *Acid Mine Drainage* and the Access indicator *Access to Water* for a more comprehensive overview of water use, health and sustainability in South Africa.

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158 European Environmental Agency, Exceedance of air quality limit values in urban areas (CSI 004) www.eea.europa.eu/data-and-maps/indicators/exceedance-of-air-quality-limit-3/assessment#toc-4

159 Department of Environmental Affairs, Green House Gas Inventory for South Africa 2000 – 2010 www.environment.gov.za/sites/default/files/docs/greenhousegas_invetorysouthafrica.pdf

160 Note, the variable *Emissions from Eskom* could also be used with the indicator *Greenhouse Gas Emissions*.

161 OECD. 2013. Environmental Performance Reviews: South Africa 2013. OECD Publishing.

162 See http://bgis.sanbi.org/NFEPA/SWSAmap.asp for the Strategic Water Source Area; and www.csir.co.za/rhp/state_of_rivers/state_of_umngeni_02/umngeni.html; and www.csir.co.za/impact/docs/Final_Freshwater_Atlas_Article.pdf; and http://bgis.sanbi.org/nba/NBA2011_SynthesisReport_lowres.pdf for other useful information that is unfortunately not updated regularly.

6. Acid Mine Drainage (AMD): AMD is a serious threat to human and natural health and sustainability, and as such is included separately from other indicators dealing with water. To determine AMD levels, variables such as the *Levels of pH*, *Electrical Conductivity*, *Total Dissolved Solids*, *Sulphate* and *Iron* in water must be considered. AMD has long term effects and although a report was commissioned by Parliament on the 9th of February, 2011 entitled *AMD Report on Mine Water Management in the Witwatersrand Gold Fields with Special Emphasis on Acid Mine Drainage*, the issue still remains a serious threat to natural and human health. This indicator should be considered along with the Adequacy indicator *Water Supply*, the Quality indicator *Quality of Drinking Water* and the Access indicator *Access to Water* for a more comprehensive overview of the state of water in South Africa.
7. Environmental Protection by Government: This indicator shows commitment from government to protecting the health of the natural environment through the following variables:
8. *Percentage of Biome Protected*
9. *Number of Ramsar Sites Protected*: Ramsar sites are designated by the *Ramsar Convention* as sites of particular ecological importance and sensitivity. Some stakeholders are sceptical of the legal protections this affords. However, as it is internationally recognised, it was included in this list of indicators.

- *Number of Biosphere Reserves*
- *Proportion of Terrestrial Areas Protected*
- *Proportion of Marine Areas Protected*
- *Percentage of River Ecosystem Types Protected / Degree of Protection*
- *Wetlands Rehabilitation*
- *Number of Hectares (ha) of Invasive Alien Plants Treated / Cleared*
- *Area (ha) of Land Restored and Rehabilitated*
- *Protection Levels of National Strategic Water Source Areas*
- *Proportion of South African Coastline within Marine Bioregions*
- *Number of Rivers Monitored by the River Health Programme*

Quality indicators

1. Quality of Drinking Water: Measured by the variables *Blue Drop Score* and *Subjective Quality of Drinking Water*, this indicator is determined as a result of municipalities' attempts and commitment to providing a healthy, well organised and maintained source of drinking water. Some stakeholders have expressed concern that the *Blue Drop Score* may not provide a reliable assessment of the actual quality of drinking water, but instead provide a more overall view of the management of drinking water. The *Subjective Quality of Drinking Water* is a subjective outcome of the water distribution and filtration process. Total percentage subjective rating of water quality supply is rated: not safe to drink; not clear; not in good taste; not free from bad smells. Clean drinking water is essential for a healthy human and natural environment. As has been previously explained, this indicator should be considered with the Access indicator *Access to Water*, and the Adequacy indicators *Acid Mine Drainage* and *Water Supply*.
2. Ecological Footprint: A measurement of the amount of biological land required per capita. Note: some stakeholders consider this indicator to no longer be current; however it is included as it may still provide useful information.
3. Biodiversity: An indication of natural ecosystem health, by considering the different types of species and protections afforded to said species. This indicator may also be understood as a means of showing the commitment and success of government in ensuring a healthy natural environment. Biodiversity can be measured by a combination of the *Percentages of Threatened Amphibian, Bird* and *Mammal Species*, as well as number of *Endemically Threatened Taxa*.
4. Responsible Environmental Management (Business): ISO14001 certification requires a business to have a framework for environmental management. ISO 14001 is thus an

indication of private commitment to environmental protection, management and sustainability. It may also show the successes government and civil society have had in advocating for environmental protection, as government and civil pressures may influence business attitudes towards certification. Some stakeholders were critical of the value of ISO 14001, believing it to be a framework without any substantial real-world application. They were therefore sceptical of its actual real-world impact on environmental health.

5. Air Quality Impact on Health and Wellbeing: An indication of the air pollution and its impact on human health. This is considered an outcome as it is a result of government regulation, health care services and commitment by private and government owned companies to reducing air pollution. This indicator can be measured by the *Number of Deaths from TB* (strongly linked to indoor air pollution) and the *Number of Deaths from other Respiratory Causes*. Although air pollution is not the only cause of such deaths, stakeholders have argued that air pollution exacerbates such health issues and is thus a primary, on-going cause. This indicator is considered separately from the Quality indicator *Health* as it highlights the direct relationship between air pollution and human health, but should be considered along with the related Adequacy indicators *Fine Particle Matter* and *Emission of Greenhouse Gases*.

6. Health: Infants are especially vulnerable to pollution related illness, thus an assessment of Infant mortality gives an indication of the general quality of the environment in terms of health and wellbeing. A healthy environment is not the sole determinant of infant mortality; however stakeholders have argued that toxic pollution, unclean drinking water and air pollution have a significant impact on infant mortality.

7. General Environmental Problems Experienced: Measured by the percentage of households who experience specific kinds of environmental problems. Stakeholders were particularly concerned about the inability (mainly caused by a lack of education) of ordinary people to determine environmental rights violations and to understand their right to environment.

8. Food Security: Food security is an outcome of a healthy environment capable of supporting sustainable agricultural practices. The issue of environmental sustainability is bound to food security as without food, South Africa cannot be said to be sustainable.

9. Community Experience of Environmental Problems: A relative, subjective measurement of the health and suitability of the environment as perceived by communities. Provides a potentially significant general overview of environmental problems faced, however it is important to remember that this assessment is not comprehensive and is based upon answers to a questionnaire with prepared, rigid answer options. The issue of understanding and recognition of the right to environment, and the articulation of environmental issues may also lead to unintentional bias. This indicator is split into the following variables:

    - *Irregular or no waste removal*
    - *Littering*
    - *Water Pollution*
    - *Outdoor / Indoor air pollution*
    - *Land degradation / over utilisation of natural resources*
    - *Excessive noise / noise pollution*
    - *Other: Please note that the statistics used are drawn from the Stats SA General Household Report 2013 and this variable is presented without explanation. It likely refers to any other environmental issue that was not considered in the questionnaire.*

- Governmental funding allocated to Department of Environmental Affairs (DEA): As the most significant department involved directly in the environment, the budget of the DEA gives an indication of government's commitment to the environment. A breakdown of DEA spending into different areas shows governmental priorities and potential areas of environmental concern. Variables include the amount of funds spent on *DEA legal, authorisation and compliance, Oceans and Coasts, Climate Change and Air Quality, Biodiversity and Conservation, Environmental Programmes,* and *Chemicals and Waste Management*.

- Environmental Infringements: This indicator potentially shows the government's commitment to enforcing state of environment rights in the real world. It may also be a reflection of the understanding of the right to environment amongst people in South Africa. However, it is important to remember that this is not a comprehensive indicator, as access to the resources required to lodge complaints and pursue legal remedies is limited. This indicator considers the following variables; *Number of Reported Environmental Incidents, Total Number of Arrests* and *Number of Inspections Conducted*. With the provisos already mentioned, these variables combined indicate the state of environmental right enforcement in South Africa.

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