THE INCLUSION AND IMPLEMENTATION OF INTEGRATED WATER RESOURCES MANAGEMENT UNDER SOUTH AFRICAN WATER LAW AND POLICY

by

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Submitted in partial fulfilment of the requirement of the
degree of Master of Laws (LLM)

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Pietermaritzburg
December 2012

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Acknowledgments

I would like to thank my supervisor, Professor Michael Kidd for his assistance in this dissertation. I would also like to thank the University of KwaZulu-Natal for allowing me the opportunity to complete this project. Lastly I would like to thank my family for their support and encouragement in my studies.

Abstract

South Africa is a dry, water-stressed country which faces many water management challenges. Some of these challenges are unique to South African freshwater resources management while others are conventional water management problems. In light of these water management problems it is important that South Africa manages its scarce water resources effectively and efficiently. Integrated Water Resources Management (IWRM) is regarded internationally as the best way to manage freshwater resources as it provides for the holistic management of land and water while taking into account various other factors such as sustainable development. Although there have been some difficulties in finding international consensus on the precise meaning of IWRM there are a number of defining aspects which are common place in the development of this concept. From an analysis of environmental law and policy relating to freshwater resources it is clear that South Africa has included many of these aspects of IWRM into its own freshwater resources management. In fact there are few short comings in the provision for IWRM under South African law and policy. South Africa's problems, however, lie in the implementation of its provision for IWRM. By looking at various reports, statistics, strategies, commentaries and other documents relating to the status of freshwater resources it becomes clear that although progress has been made in realising implementation of South Africa's water law since 1994 there are still many core areas of freshwater management which are far from being implemented. If South Africa is to achieve true IWRM it will need to address its implementation short comings.

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1. INTRODUCTION

'Freshwater resources are an essential component of the Earth's hydrosphere [1] and an indispensable part of all terrestrial ecosystems.' [2] Life depends on the availability of freshwater resources.[3] Water is important for a number of vital activities which include; domestic uses such as drinking water and basic sanitation; agriculture which provides, *inter alia*, the food we eat; industry; the production of electricity; tourism; and for recreational purposes.[4] Freshwater resources are clearly of great importance to any country regardless of the quantity of water they are naturally endowed with; accordingly they must be managed and protected effectively.

South Africa is a water scarce country,[5] with an average annual rainfall of just over half of the world annual average rainfall.[6] In addition to this South Africa is a country with a high degree of spatial and seasonal variance in rainfall[7], meaning that some areas of South Africa receive considerably more water than others. This in turn means that there are some parts of South Africa which struggle to naturally meet their freshwater requirements. In the face of this lack of water availability, in 2005 South Africa had already allocated 95 percent of its available water,[8] indicating that supply almost meets demand. Again, on a regional scale there are some areas which have water deficits.[9] Not only does South Africa struggle to meet its water requirements in terms of availability, it is also faced with various other water management challenges such as declining water quality, [10] protection of freshwater

[1] Hydrosphere: discontinuous layer of water at or near the Earth's surface. It includes all liquid and frozen surface waters, groundwater held in soil and rock, and atmospheric water vapour (Hydrosphere. Encyclopaedia Britannica. http://www.britannica.com/EBchecked/topic/279025/hydrosphere Accessed 25/09/2012).

[2] Agenda 21, Integrated Water Resources Manage Development and Management. Available at http://www.un.org/esa/dsd/agenda21/res_agenda21_18.shtml Accessed 25/8/2012.

[3] Ibid.

[4] The Importance of Freshwater, Freshwater Life. Available at http://new.freshwaterlife.org/the-importance-of-fresh-waters. Accessed 25/9/2012.

[5] M, Claassen. 'How Much Water Do We Have?' in *A CSIR Perspective on Water* (2010) 4.

[6] Department of Water Affairs and Forestry (DWAF). *National Water Resources Strategy* (2004) 1st ed 15.

[7] Ibid.

[8] P, Oberholster. 'The Current Status of Water Quality in South Africa' in *A CSIR Perspective on Water* (2010) 8.

[9] Ibid (see note 36 below).

[10] A, Steiner. H, Martonakova. Z, Guziova. *Environmental Governance Sourcebook* (2003) 32.

ecosystems and flow modification.[11] In light of water availability, quality and other challenges facing the management of freshwater resources in South Africa, it is important that effective water management principles are applied to the administration of water and that these principles are implemented effectively.

Increasing international opinion and understanding suggests that freshwater resources can only be managed successfully if the natural, social, economic and political environment in which water occurs and is used is taken into account.[12] This has led to the development of the concept of Integrated Water Resources Management (IWRM). Although there is no internationally accepted definition of IWRM, it is most commonly defined as;

> ...a process which promotes the coordinated development and management of water, land and related resources in order to maximise economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems and the environment.[13]

IWRM is now internationally accepted as the best approach to the management of freshwater resources within a country or region.[14]

Accordingly, South Africa has chosen to address its water management challenges by, *inter alia*, making use of the principles of IWRM.[15] South Africa includes the elements and principles of IWRM in its water law and policy and into its environmental law generally. The inclusion of IWRM on paper under South African law is generally regarded as comprehensive or near complete. However, its implementation seemingly leaves a lot to be desired. The inclusion and the implementation of the IWRM principles will be assessed below.

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[11] Ibid.

[12] Ibid (note 6 above; 10).

[13] Global Water Partnership: What is IWRM? http://www.gwp.org/The-Challenge/What-is-IWRM/. Accessed 27/08/2012.

[14] G, Gooch. A, Rieu-Clarke. P, Stalnacke. 'STRIVER in The Context of Integrated Water Resources Management' in G, Gooch. A, Rieu-Clark. P, Stalnacke. *Integrating Water Resource Management: Interdisciplinary Methodologies (2010)* 1.

[15] White Paper National Water Act 36 of 1998: Preamble; National Water Act 36 of 1998: Section 6(l); Department of Water Affairs and Forestry (DWAF). *National Water Resources Strategy* (2004) 1st ed 10.

2. WATER MANAGEMENT CHALLENGES: A SOUTH AFRICAN CONTEXT

2.1 Introduction

Freshwater is vital for the survival of all life on earth,[16] thus it is important that South Africa manages its freshwater resources in an effective manner, addressing all the various challenges associated with freshwater generally, and challenges unique to South Africa. South Africa faces various challenges in respect of freshwater management; these include water availability, 'flow modification, water pollution, destruction or degradation of habitat, invasion by exotic species and climate change'.[17] These problems are exacerbated by poverty,[18] lack of education and insufficient environmental control.[19] The concept of IWRM, if implemented effectively will go a long way in assisting South Africa to overcome these challenges.

2.2 Water Availability

South Africa is a dry, water-stressed country[20] which borders on water scarcity.[21] On average South Africa receives a rainfall of 450mm per year,[22] which is well below the world annual average of 860mm per year.[23] Accordingly South Africa ranks as the 30th driest country in the world.[24] Not only does South Africa receive limited rainfall but it is also 'characterised by an

[16] Ibid (note 3 above; 18,2).

[17] J, Nel. 'Sustainable Water Ecosystems' in *A CSIR Perspective on Water* (2010) 26.

[18] Development Bank of South Africa; Water Security in South Africa. Available at http://www.dbsa.org/Research/DPD%20Working%20papers%20documents/DPD%20No12.pdf Accessed 11/09/2012 [11].

[19] M, Kidd. *Environmental Law* 2ed Juta (2011) 266.

[20] Department of Environmental Affairs South Africa. 'Inland Water' in *2012 South African Environmental Outlook*; *Draft 2* (2012) 3.

[21] Water scarcity, according to UNEP, is any country with less than 1100m^3 of available water per person per annum. South Africa's available water is currently at 1100 m^3. State of the environment 2012 draft; Vital Water Graphics. Available at http://www.unep.org/dewa/vitalwater/index.html. Accessed 29/08/2012.

[22] Ibid (note 20 above; 3).

[23] M, Claassen. 'How Much Water Do We Have?' in *A CSIR Perspective on Water* (2010) 4.

[24] Department of The Presidency, South Africa. *National Planning Commission, Diagnostic Overview* (2010) 18. Available at http://www.info.gov.za/view/DownloadFileAction?id=147192 Accessed 29/08/2012.

uneven, poorly predictable and highly seasonal rainfall',[25] which essentially means that South Africa has a high spatial and seasonal variability in rainfall.[26] This spatial variability is evident by comparing the annual average rainfall on the west coast of South Africa (less than 100 mm per year), with the annual average rainfall on the east coast of South Africa (1500 mm per year).[27]

In addition to this, South Africa has no large lakes or rivers;[28] in fact the total combined flow of all the rivers in South Africa is less than half of the flow of water in the Zambezi River.[29] Accordingly, South Africa relies on the use of rivers, dams and groundwater to meet its freshwater requirements.[30] The strong reliance on dams is evident by the 569 large dams which hold 66 percent of the mean total runoff.[31] Although the quantities of groundwater are not accurately known,[32] it accounts for 13 percent of South Africa's water supply and is particularly important among rural users.[33]

Combined with this lack of rainfall, and the seasonal and spatial variance in rainfall which it experiences, South Africa also has a growing population and economy which places increased pressure on its stressed freshwater resources supply.[34] Currently 95 percent of the country's freshwater resources have been allocated,[35] indicating that the future of water

[25] J, Nel. (note 17 above; 26.).

[26] Ibid (note 6 above; 15).

[27] Umgeni Water. M, Summerton 'A Preliminary Assessment of the Impact of Climate Change on the Water Resources of the Mgeni Catchment' (2008).

[28] N, King. G, Maree. A, Muir. 'Freshwater Systems' in H, Stydom. M, King. *Fruggle and Rabie's Environmental Management in South Africa* Juta 2ed (2009) 427.

[29] Ibid. (note 6 above; 15).

[30] N. King…et al. (note 28 above; 427).

[31] P, Oberholster. (note 8 above) 14; N. King…et al. (note 28 above; 433).

[32] Africa Earth Observatory Network; *University of Cape Town. H20 – CO2 Energy Equations for South Africa; Present Status, Future Scenarios and Proposed Solutions*. Available at http://us-cdn.creamermedia.co.za/assets/articles/attachments/31044_2010-energy_report_series_2_2010_lores.pdf. Accessed 29/08/2012.

[33] C, Bosman. M, Kidd. 'Water Pollution' in H, Stydom. M, King. Fruggle and Rabie's (ed) *Environmental Management in South Africa* 2ed (2009) 630; 635.

[34] P, Oberholster. (note 8 above; 8).

[35] Ibid.

supply will be under greater pressure which calls for better and more effective ways of managing water resources. Although South Africa currently meets its water demand, this may not always be the case on a regional basis as there are many water management areas (WMAs) in the country which are in water deficit[36] despite transfers from other WMAs.[37] It of course follows that there are many WMAs which have a considerable excess of freshwater supply.[38] South Africa's water resources are used in a variety of sectors such as agriculture (irrigation), urban usage, rural usage, mining and bulk industry, power generation and afforestation.[39] Irrigation in agriculture accounts for about 62 percent of South Africa's water usage while domestic and urban use accounts for 27 percent, and industry, mining and power generation only account for 8 percent and commercial forestry a mere 3 percent.[40] Thus if something is to be done about limiting water use it seems that it needs to predominantly be addressed in the agriculture, domestic and urban use sectors. However, growing industry could pose further water demand problems in the future.

Considering the lack of freshwater resources and the growing demand as a result of population and economic growth,[41] the future of water supply looks grim. According to information published in the National Water Resources Strategy (NWRS), by 2025 South Africa should, at least, be in a 2 percent water supply deficit.[42] However, it has been said that this is far too conservative and that South Africa may be faced with a 13 percent water supply deficit.[43] Thus, in the next 13 years it is imperative that South Africa manages its water

[36] Such as the Limpopo WMA, the Luvuvhu/Letaba WMA, the Crocodile West and Marico WMA, the Oliphants WMA, the Inkomati WMA, the Middle Vaal WMA, the Lower Vaal WMA, the Umvoti to Umzimkulu WMA, the Lower Orange WMA, the Fish to Tsitsikamma WMA, the Gouritz WMA, the Oliphants Dooring WMA, and the Berg WMA; N. King…et al. (note 28 above; 436).

[37] Ibid (note 20 above; 3); Ibid (note 6 above; 15).

[38] Such as the Thukela, Upper Vaal, Upper Orange and Breede WMAs; N. King…et al. (note 28 above; 437).

[39] N. King…et al. (note 28 above; 437).

[40] Ibid (note 6 above; 15).

[41] Africa Earth Observatory Network; *University of Cape Town. H20 – CO2 Energy Equations for South Africa; Present Status, Future Scenarios and Proposed Solutions* 17. Available at http://us-cdn.creamermedia.co.za/assets/articles/attachments/31044_2010-energy_report_series_2_2010_lores.pdf. Accessed 29/08/2012.

[42] Ibid.

[43] Ibid.

effectively and in an integrated manner so that freshwater resources do not become further strained.

2.3 Flow Modification

In addition to the significant problems of freshwater availability which South Africa faces, it also faces problems relating to flow modification. Flow modifications are any physical changes made to freshwater resources, for example the building of dams, hydroelectric plants, canalisation, flood control mechanisms and improving drainage.[44] These flow modifications create different environmental challenges which must be met in order to ensure South Africa's freshwater resources are protected. These challenges include ecological and geomophological effects.[45] One obvious effect of the development of freshwater resources such as rivers, estuaries and wetlands is that their natural ecosystems are damaged, affecting both fauna and flora.[46]

It has already been mentioned that South Africa has a substantial number of large dams.[47] Dams can be beneficial to the environment by regulating the 'flow of a river, reducing flood damage, and contributing to a perennial flow rather than seasonal flow'.[48] Dams also contribute to the creation of a cleaner freshwater resource by allowing sediment to be deposited on the dam floor and the growth of aquatic plants also means that excess nutrients (which can be a considerable pollutant) are removed from the water.[49] However, there are also significant negative ecological impacts associated with the building of dams; one such problem is the reduction in strong water flow which can cause silting of dams and estuaries,[50]

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[44] A, Steiner. (note 10 above; 32).

[45] CRC for Freshwater Ecology. *Does flow modification cause Geomorphologic and Ecological Response in Rivers? A Literature Review From an Australian Perspective* (2002). Available at http://live.greeningaustralia.org.au/nativevegetation/pages/pdf/Authors%20L/13_Lloyd_et_al.pdf Accessed Accessed 30/08/2012.

[46] J, Day. 'Rivers and Wetlands' in H, Strydom. M, King. *Fruggle and Rabie's Environmental Management in South Africa* Juta 2ed (2009) 850.

[47] N. King…et al. (note 28 above; 427).

[48] Ibid.

[49] N. King…et al. (note 28 above; 437).

[50] Ibid.

which leads to reduced capacity[51] In addition to this dams create artificial barriers which prevent the free movement of plants and animals.[52] They also create artificial ecosystems which are characterised by 'deep, deoxygenated and zero-light sterile zones'.[53] Combined with South Africa's topography and climate, dams often increase evaporation as they are often shallow with a large surface area.[54]

The building of dams is just one example of the effects of flow modification on the environment. In the context of water management, especially IWRM, the building of dams needs to be considered in an integrated manner. This would mean taking into account the ecological, social, and economic advantages and disadvantages of the construction of dams. This approach needs to be applied to all developments mentioned above as most development affecting the flow of a river would have effects on the environment.

2.4 Destruction and Degradation of Habitats

In addition to the problems of freshwater availability and challenges associated with flow modification, the destruction of freshwater ecosystems and habitats is also problematic.[55] Rivers, for the obvious reason that they, *inter alia*, carry the country's waters, are important ecosystems. However, the state of South African rivers is a point of concern with 82% of them being at least threatened. The National Biodiversity Strategy and Action Plan states that 44% of South African Rivers are critically endangered, 27% are endangered, 11% are vulnerable and 18 percent are least threatened.[56] Wetlands are described as 'the world's most productive environments,'[57] providing habitats for many animals and providing at least 4,9 trillion dollars worth of ecosystem services per year.[58] These ecosystem services include; water storage, storm protection and flood mitigation, shoreline stabilisation and erosion

[51] Ibid.

[52] Ibid.

[53] Ibid.

[54] Ibid.

[55] J, Nel. (note 17 above; 26).

[56] Department of Environmental Affairs and Tourism. *National Biodiversity Strategy and Action Plan* (2005) 15.

[57] Ramsar Convention on Wetlands. *Ramsar Information Paper; What are Wetlands?* (1971). Available at http://www.ramsar.org/pdf/about/info2007-01-e.pdf. Accessed 26/09/2012.

[58] Ibid.

control, groundwater recharge, groundwater discharge, water purification and stabilisation of local climates. Most wetlands in South Africa have been modified and are under threat.[59] Rivers and wetlands are clearly both highly important ecosystems and both are also ecosystems which have been considerably degraded.

'Rivers and wetlands are affected by most of the activities that humans carry out in their catchments.'[60] The destruction of freshwater ecosystems and habitats is as a result of numerous factors, some of which have been discussed under separate headings.[61] Destruction and degradation of freshwater ecosystems includes direct and indirect changes to ecosystems.[62] Direct destruction would be the destruction of a river or wetland by physically changing it, for example developing on it or planting a crop over it (This is sometimes called the 'hard engineering of rivers'[63]).[64] Indirect destruction or changes of rivers include alterations to the surrounding land in the catchment which has an effect on the river; an example of this would be clearing of natural vegetation resulting in increased erosion.[65] Rivers and wetlands are also damaged or degraded by the loss of water (due to abstraction, storage and export),[66] and water pollution (dealt with below).[67]

There are clearly many factors which contribute to the destruction of freshwater ecosystems; in fact all of the water management challenges discussed herein have the propensity to damage freshwater ecosystems. Accordingly South Africa must take all of these factors into account when managing freshwater ecosystems as they provide valuable ecosystem services.

[59] Ibid (note 20 above; 3); Ibid (note 6 above; 36).

[60] J, Day. (note 46 above; 850).

[61] Such as flow modification, water pollution and the problem of alien invasive species.

[62] J, Nel. (note 17 above; 26).

[63] J, Day. (note 46 above; 850 - 851).

[64] Ibid.

[65] Ibid.

[66] Ibid.

[67] Ibid.

2.5 Invasion by Exotic Species

Another water management challenge is the problem of invasive alien species.[68] Invasive alien species are species of fauna and flora which have spread outside of their natural ranges; this spreading is often aided by humans.[69] Such species are at times able to thrive outside of their natural range because they are no longer controlled by the same biological constraints, allowing such species to spread unrestrained.[70] Both invasive alien plants and animals are problematic to the environment; plants such as water hyacinth and water milfoil spread quickly in rivers and wetlands, causing blockages in channels and covering the surface waters.[71] This has the effect of deoxygenating freshwater which in turn causes fish to die and plants to decompose (adding to the nutrient problems already experienced as a result of agriculture).[72]Aquatic invasive alien plants are not the only cause for concern; terrestrial invasive alien plants are also problematic as they can reduce stream flow because of the large quantity which they take up and transpire.[73] This essentially results in loss of water from the catchment. One programme which is doing good work in an attempt to eradicate invasive alien species is Working for Water.[74] Invasive alien fauna (mostly fish) are also problematic in South Africa as many alien species of fish have been introduced to South African rivers.[75]

2.6 Climate change

'Climate change is likely to have an effect on water supply, quality, agriculture, biodiversity and poor communities'.[76] Some of the observed climate change effects are an increase in atmospheric temperature which is responsible for many of the following effects; an increase in surface water temperature, causing reductions in dissolved oxygen content, mixing patterns and self purification; a rise in sea level, causing salination of coastal aquifers; shifts in

[68] J, Nel. (note 17 above; 26).

[69] J, Day. (note 46 above; 850 - 854).

[70] Ibid.

[71] Ibid.

[72] Ibid.

[73] Ibid.

[74] Working for Water. Available at http://www.dwaf.gov.za/wfw/ Accessed 25/07/2012.

[75] Environmental Impact Assessment of Proposed Eradication of Invasive Alien Fisheries From Selected Rivers in the Cape Floristic Region. Available at http://www.capenature.co.za/docs/1962/EIA%20exec%20summary.pdf Accessed 20/11/2012.

[76] E, Archer. 'Climate Change and Water' in *A CSIR Perspective on Water* (2010) 24.

precipitation patterns causing changes in water availability; increase in inter-annual precipitation variability, causing increased difficulty in flood control; increased evapotranspiration, causing water availability reductions, salination and lower groundwater availability; more frequent and intense extreme events such as flooding which affects water quality, infrastructure, and erosion. And on the other extreme, droughts, which reduce water availability.[77]

Climate change's effects on freshwater resources will in turn have negative effects on agriculture and biodiversity.[78] Changes in frequency and seasonal rainfall may mean that areas that were once suitable for agriculture, or a particular type of agricultural activity, may no longer be suitable.[79] The increased frequency of extreme weather events such as droughts and flooding will have obvious negative effects on agriculture. Increased evapotranspiration may result in higher irrigation requirements and have a negative effect on arid land.[80] Lastly, with increased temperatures livestock will require greater amounts of water and be susceptible to heat stress.[81] Biodiversity is also set to become even more vulnerable in light of the aforementioned stresses.[82]

The effects of climate change are predicted to compound the challenges associated with freshwater resources management. Accordingly South Africa must integrate the challenges relating to climate change into its planning, development and water policy, it will need to adapt to changes in order to ensure that its water quality and availability are not problematic in the future.[83]

[77] Intergovernmental Panel on Climate Change; *Climate Change and Water* (2008) 82. Available at http://www.ipcc.ch/pdf/technical-papers/climate-change-water-en.pdf. Accessed 26/09/2012.

[78] E, Archer. (note 76 above; 24).

[79] Ibid.

[80] Ibid.

[81] Ibid.

[82] Ibid.

[83] Ibid.

2.7 Water Quality (Pollution)

'The biggest threat to a sustainable water supply in South Africa is not a lack of storage, but the contamination of available water resources through pollution'[84]

'Water quality refers to the physical, chemical and biological characteristics of water and describes how suitable water is for its intended use.'[85] Although water quality may be degraded by anthropogenic influences and natural conditions,[86] it is predominantly anthropogenic influences (or water pollution) which is the main contributor to water quality problems.[87] Water pollution is caused by a variety of different sources and affects both surface water and groundwater.[88] The largest challenges in terms of freshwater pollution in South Africa emanate from the mining, urban development, industrial, and agricultural sectors.[89] These challenges are; eutrophication, nitrification, microbiological contamination, salination and acid mine drainage.[90]

'Eutrophication refers to the enrichment of water with plant nutrients, nitrates and phosphates.'[91]This is caused by, *inter alia*, the over application of fertilisers in agriculture, domestic waste water treatment, and industrial and mining processes.[92] Eutrophication encourages the excessive growth of microscopic aquatic plants such as algae and cyanobacteria.[93] This causes oxygen depletion causing mortalities among freshwater biota,[94] especially fish. It can also cause the water to become toxic and unfit for recreational, irrigation and domestic use.[95] Currently 35% of South Africa's total storage is eutrophic or hypertrophic (extremely nutrient rich), and 60 percent of total storage is affected by

[84] M, Claassen. (note 23 above; 5).

[85] Ibid (note 20 above; 3); Ibid (note 6 above; 12).

[86] Ibid.

[87] Ibid.

[88] C, Bosman. M, Kidd. (note 33 above; 636).

[89] Ibid (note 20 above; 13).

[90] C, Bosman. M, Kidd. (note 33 above; 636).

[91] Ibid (note 20 above; 3); Ibid. (note 6 above; 12).

[92] Ibid.

[93] C, Bosman. M, Kidd. (note 33 above; 636).

[94] Ibid (note 20 above; 13).

[95] C, Bosman. M, Kidd. (note 33 above; 636).

eutrophication.[96] Eutrophication is a key example of the need for an integrated approach, incorporating land based problems and activities into freshwater management.

Nitrification is the contamination of water with increased levels of nitrate.[97] Nitrification is caused by, *inter alia*, ineffective sewage treatment, poor or non-existent sanitation and the overuse of fertilisers.[98] The presence of nitrates in drinking water may be problematic for human health; once nitrates are ingested they readily convert to nitrite in the gastrointestinal tract.[99] Nitrites are absorbed and combine with the haemoglobin in red blood cells, forming methemoglobin which results in blood being unable to carry oxygen.[100] Increased nitrates may also contribute to stomach cancer.[101] As seen above nitrification is also a primary cause of eutrophication. Nitrification is a considerable danger to human health and to the health of the environment. Its effects also seem to be underestimated[102] however; it is clearly a considerable problem for water quality and human health.

Another primary pollutant of water in South Africa is microbacterial or microbiological pollutants.[103] Micro-bacteriological contamination is primarily caused by the coliform bacteria and faecal coliforms[104] which indicate that mammalian faeces have polluted a water resource.[105] This is a problem caused by a number of factors including the lack of effective sanitation (especially in informal residential areas)[106], ineffective sewerage treatment and overflowing sewerage facilities.[107] Bacterial pollution of this nature results in freshwater not

[96] B, Harding. 'Eutrophication; Microscope Refocused on SA Water Quality Threat' (2008) 5 (7) *The water wheel* 15.

[97] C, Bosman. M, Kidd. (note 33 above; 636).

[98] Ibid.

[99] C, Bosman. M, Kidd. (note 33 above; 637).

[100] Ibid.

[101] Ibid.

[102] C, Bosman. M, Kidd. (note 33 above; 633).

[103] Department of Environmental Affairs South Africa. Ibid (note 20 above; 3); Ibid. (note 6 above; 15).

[104] Which is indicated by the presence of *Escheichia coli.*

[105] C, Bosman. M, Kidd. (note 33 above; 638).

[106] Ibid.

[107] Ibid.

being suitable for drinking without proper treatment and causes diseases such as cholera, typhoid, diarrhoea, skin infection, and bilharzia.[108]

Mining activities and metal and mineral processing activities often result in salination of freshwater resources and what is known as acid mine drainage.[109] When water enters a mine, either through the mining operation or through the usual flow of water into the mine, it becomes polluted with substances such as hydrocarbons, suspended solids which then seep out of the mining pits and into the environment, contaminating both groundwater and surface water.[110] Firstly mining activities cause salination of freshwater resources; this is as a result of the salts which water picks up when it moves through an area that has been mined.[111] Salination poses problems for fresh water organisms and for human consumption (i.e. the cost of desalination).[112]

Acid Mine Drainage (AMD) is caused by water coming into contact with partially excavated rock which has become oxidised due to exposure to the atmosphere.[113] When water comes into contact with oxidised substances it forms sulphuric acid. When this acidic water is created it enhances the propensity for heavy metals, sulphides and salts to be dissolved in water,[114] which can be toxic to humans and have other negative effects on the environment and human health.[115] There have even been problems such as deformed babies in areas which experience problems with acid mine drainage and it is suggested that this is due to increased presence of radioactive substances.[116]

[108] Ibid.

[109] Ibid. (note 6 above; 24)

[110] Acid Mine Drainage in South Africa. Available at http://www.csir.co.za/nre/docs/BriefingNote2009_2_AMD_draft.pdf Accessed 07/05/12.

[111] Ibid.

[112] C, Bosman. M, Kidd. (note 33 above; 639).

[113] C, Bosman. M, Kidd. (note 33 above; 639).

[114] Ibid. (note 110 above). Acid Mine Drainage in South Africa.

[115] C, Bosman. M, Kidd. (note 33 above; 639).

[116] C, Bosman. M, Kidd. (note 33 above; 639).

As mentioned above water pollution poses a considerable threat to a sustainable water supply in South Africa.[117] Water pollution emanates from a wide variety of sources, many of which have not been covered here. As water runs throughout the country it picks up various pollutants on land, in the atmosphere, they are also discharged into bodies of water. The vast sources of water pollution show that water cannot be managed in an exclusive manner, instead it must be managed taking into account land, water and atmospheric challenges.

2.8 Conclusion

The management of freshwater resources in South Africa is by no means an easy task. The largest challenge being the lack of water availability which is further compounded by problems associated with flow modification, destruction of freshwater habitats and ecosystems, alien invasive species, climate change, and the considerable problem of water pollution. These challenges may be perceived as purely environmental concerns that are not as pressing as the need for socio-economic development; however, the protection of freshwater resources and their environments is crucial to the current and future freshwater availability (supply) and quality. Water is inseparable from the environment it is in and thus demands a 'holistic approach' to be taken in its management.[118] Alongside the environmental challenges are the current water needs of South Africa. With a growing population and growing economy there is a drive for development. In accordance with the principles of sustainable development,[119] South Africa must strike a balance between the need to protect the environment (which is crucial to future water supply) and the need for development.

[117] M, Claassen. (note 23 above; 5).

[118] Ibid (note 2 above).

[119] National Environmental Management Act 107 of 1998; s1.

3. DEFINING INTEGRATED WATER MANAGEMENT

The principles and processes of IWRM are widely accepted as the best manner of managing freshwater resources; however there is still no unanimous and internationally accepted definition of IWRM.[120] Before we can assess the extent to which South Africa incorporates and implements the concept of IWRM into its environmental law and policy relating to the management of water it is important to assess its historical development and the importance of IWRM globally. An assessment of the historical development of IWRM will assist in understanding the precise definition of IWRM as it is accepted today. It may however at this point be important to consider the dictionary definition of 'integrated', which can be described as 'combining or coordinating separate elements so as to provide a harmonious, interrelated whole.'[121]

IWRM is not a new concept; instead its development can be traced back many centuries.[122] In the tenth century Spain set up 'multi-stakeholder, participatory water tribunals,'[123] an indication of the integrated approach to water management being implemented at an early stage in history. Spain then further organised its water management regime on the basis of river basin management;[124] a system of localised water management that has now become part of IWRM both internationally[125] and in South African policy.[126] Many sources however, seem to trace the roots of IWRM to the establishment of the Tennessee Valley Authority (TVA) in 1933.[127] The TVA, part of the 'New Deal',[128] was created by the United States

[120] G, Gooch…et al. (note 14 above; 1); N, Funke. S, Oelofse. J, Hattingh. P, Ashton. A, Turton. 'IWRM in developing countries: Lessons from the Mhlatuze Catchment in South Africa' 32 (2007) *Physics and Chemistry of the Earth* 1237; 1240.

[121] 'Integrated'. Available at http://dictionary.reference.com/browse/integrated. Accessed 27/08/2012.

[122] O, Varis. M, Rahaman. V, Stucki. 'Integrated Water Resources Management Plans: The Key to Sustainability' in M, Kumma. M, Keskinen. O, Varis. *Modern Myths of the Mekong* (2008) 174.

[123] Ibid.

[124] Ibid. Spain was perhaps the first country to begin the basin based approach to river and freshwater management.

[125] Ibid (note 2 above).

[126] National Water Act 36 of 1998; s6(1)(c) provides for the establishment of water management areas which will be managed by catchment management agencies according to section 77 of the Act.

[127] IWRM: for Sustainable Use of Water 50 Years of International Experience with the Concept of Integrated Water Management. Available at http://www.fao.org/ag/wfe2005/docs/IWRM_Background.pdf 4. Accessed 25/08/2012.

congress to deal with 'a wide range of environmental, economic, and technological issues'.[129] The TVA essentially linked environmental, economic and social policy to achieve IWRM through the creation of 'multi-functional bureaucracies' that managed an entire river basin.[130] In addition to this the TVA 'integrated the functions of navigation flood control and power production while addressing the issues of erosion control, recreation, public health and welfare'.[131] The TVA contains remarkable similarities to today's formulation of IWRM in that it attempted to integrate all facets of water management while taking into account socio-economic and environmental objectives.[132] The success of the TVA was no doubt influential in taking the concept of IWRM forward.

There have been various other examples of an early integrated approach [133] to the management of freshwater resources. The developments in Ontario, Canada are particularly important and have become leading examples of IWRM today.[134] In Ontario, in 1946, Conservation Authorities were established; these were 'river basin organisations, based on partnership with municipalities and the provincial government'.[135] They encouraged a basin-based, integrated approach[136] to the management of land, water and related resources.[137] IWRM has also seen development through Canada's 'Comprehensive River Basin Planning and Management'[138] in the late 1960's.[139] This Comprehensive River Basin Planning and Management approach was developed in order to; 'enhance experience in using river basins as the basis for planning and management; explicitly incorporate environmental

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[128] J, Warner. *Multi-Stakeholder Platforms for Integrated Water Management* Ashgate (2007) 32.

[129] From New Deal to New Century. Available at http://www.tva.com/abouttva/history.htm Accessed 17/07/12.

[130] J, Warner. (note 128 above; 32).

[131] Ibid (note 127 above).

[132] Ibid.

[133] Including Germany's 1960 implementation a version of IWRM in Hessen where water management planning was conducted on 'a basis of multi-disciplinary integrated approach'; J, Warner. (note 128 above; 32).

[134] J, Warner. (note 128 above; 32).

[135] B, Mitchell. IWRM in Practice: Lessons from Canadian Experience (2006) 135 *Journal of Contemporary Water Research and Education* 51; 51.

[136] J, Warner. (note 128 above; 32).

[137] B, Mitchell. (note 135 above; 51).

[138] Ibid.

[139] Ibid.

considerations into planning, and; incorporate public participation in a systematic manner'.[140] These examples in Canada strongly represent the general notion of IWRM as it is commonly accepted internationally today.[141]

Considering these early, localised examples of an integrated approach to the management of freshwater resources which closely resemble the concept of IWRM as it is accepted today, it is clear that IWRM is by no means a new concept. Instead it has been developing over many years; some writers suggest that one could even go back centuries or millennia to find examples or facets of IWRM in development.[142]

It was not until 1977 that IWRM became an international concern where it was addressed at the International Water Conference in Mar del Plata.[143] In the resulting document, The Mar del Plata Action Plan[144], it was recognised that there was a need for co-ordination within the water sector and that;

> '-institutional arrangements adopted by each country should ensure that the development and management of water resources take place in the context of national planning and that there is a real coordination among all the bodies responsible for the investigating and development of water resources.[145]

The Mar del Plata Action Plan clearly calls for a management of freshwater resources in a coordinated manner, taking into account multiple competing users.[146] It also dealt with, irrigation, water supply, pollution, shared water resources and natural hazards and contained other provisions that are still relevant today.[147]

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[140] Ibid.

[141] Ibid (note 13 above); the Global Water Partnership definition of IWRM is probably the most well accepted definition internationally.

[142] O, Varis...et al. (note 122 above; 174).

[143] Ibid.

[144] United Nations Water Conference, 1977 (Resolutions). Available at http://www.ielrc.org/content/e7701.pdf Accessed 17/08/2012.

[145] Ibid; Recommendation 2.

[146] M, Rahaman. O, Varis. 'Integrated Water Resources Management: Evolution, Prospects and Future Challenges' (2005) 1(1) 1.

[147] Ibid (note 127 above).

Although water seemingly disappeared from the international agenda during the 1980's[148] there were some highly important developments in the field of international law generally which have played a role in the development of IWRM. One such development was the 1987 Brundtland Commission Report (WCED) which gave rise to the concept of sustainable development,[149] a concept 'which seeks to meet the needs and aspirations of the present without compromising the future'[150] while taking into account the need for socio-economic development and the need to protect the environment.[151] The Brundtland Commission identified sustainable development as the cornerstone for international environmental policy[152] and paved the way for its inclusion in the 1992 United Nations Conference on Environmental Development (UNCED) in Rio 1992.[153] Sustainable development has now become a well accepted principle of environmental management,[154] and has many similar elements to IWRM in that it provides for the 'integration of social, economic and environmental factors into planning, implementation and decision making so as to ensure that development serves future and present generations.'[155]

Following the Brundtland Commission and the introduction of the concept of sustainable development, parties met in Dublin for the 1992 International Conference on Water and the Environment.[156] The Dublin Conference was a preparatory meeting to the UNCED and resulted in a document known as the Dublin Statement,[157] a document which provides for four principles in respect of freshwater resources management.[158] The first principle concerned the need for a holistic approach to the management of freshwater resources;[159] the

[148] M, Rahaman…et al. (note 146; 15).

[149] Ibid (note 127 above).

[150] Report of the World Commission on Environment and Development; Our Common Future, 1987. Available at http://conspect.nl/pdf/Our_Common_Future-Brundtland_Report_1987.pdf. Accessed 27/08/2012.

[151] Ibid.

[152] O, Varis...et al. (note 122 above; 174).

[153] UNCED. Available at http://www.un.org/geninfo/bp/enviro.html/ Accessed 23/07/2012.

[154] P, Birnie. A, Boyle. C, Redgewell. *International Law and the Environment* 3rd ed Oxford (2009) 53.

[155] Ibid (note 119 above; s1).

[156] O, Varis...et al. (note 122 above; 174).

[157] The Dublin Statement on Water and Sustainable Development. Available at http://www.wmo.int/pages/prog/hwrp/documents/english/icwedece.html#p1 Accessed 23/07/2012.

[158] Ibid (note 157 above; Principles 1 – 4.).

[159] Ibid (note 157 above; Principle 1).

second principle provides that the development and management of freshwater resources should be based on a participatory approach.[160] The third principle states that women should play a central role in the management and safeguarding of freshwater resources;[161] and the fourth and final principle states that water should be recognised and managed as an economic good.[162] The Dublin Statement does not specifically mention IWRM; instead it states that in light of the life-sustaining value of water it is a resource which must be managed effectively.[163] '"Effective management" demands a holistic approach, linking social and economic development with the protection of natural ecosystems' and 'links land and water uses across the whole of a catchment area or groundwater aquifer'.[164] This concept or definition of effective freshwater management has been influential in the development of what is now called IWRM, which is evident from the wording and elements that have been carried through into subsequent writings such as Agenda 21,[165] the Global Water Partnership Toolbox[166] and even South Africa's National Water Resources Strategy[167] (all of which will be discussed below).

In 1992 172 states met in Rio de Janeiro for the UNCED Earth Summit, which was an extraordinary conference in both size and scope.[168] One of many important documents to come out of UNCED was Agenda 21.[169]Agenda 21 is 'a comprehensive plan of action to be taken globally, nationally and locally by organizations of the United Nations System, Governments, and Major Groups in every area in which human impacts on the environment,'[170] and endorsed by 178 states.[171] Chapter 18 of Agenda 21 deals with the 'Protection of the Quality and Supply of Freshwater Resources: Application of Integrated

[160] Ibid (note 157 above; Principle 2).

[161] Ibid (note 157 above; Principle 3).

[162] Ibid (note 157 above; Principle 4).

[163] Ibid (note 157 above; Principle 1).

[164] Ibid (note 157 above); Principle 1).

[165] Ibid (note 2 above).

[166] Ibid (note 13 above).

[167] Ibid (note 6 above).

[168] United Nations Conference on Environment and Development http://www.un.org/geninfo/bp/enviro.html. Accessed 27/08/2012.

[169] Ibid (note 2 above) Agenda 21, Integrated Water Resources Development and Management.

[170] Ibid.

[171] O, Varis...et al. (note 122 above; 174).

Approaches to the Development, Management & Use of Water Resources'.[172] Sub-Heading 'A' of this chapter specifically deals with 'Integrated Water Resources Development and Management (IWRD/M)';[173] this was possibly one of the first times that IWRM was referred to and defined on an international level.

Agenda 21 emphasises the importance of the holistic management of water and the integration of sectoral water plans and programmes within the framework of national economic and social policy.[174] It contains extensive information relating to the objectives of IWRM, various activities that could be implemented for the achievement of IWRM and various means of implementing IWRM.[175] The overall objective of IWRD/M according to Agenda 21 is to 'satisfy the freshwater needs of all countries for their sustainable development.' [176] This indicates the close link between the concept of sustainable development and IWRM. In this light Agenda 21 also points out the need for striking a balance between protection of aquatic ecosystems and needs for water in human activities, and also the need to strike a balance between developing and using water, basic needs and safeguarding ecosystems.[177] The objectives then go on to provide that IWRM should be carried out at a catchment or basin level, which is seemingly an integral element of IWRM as it has been carried through the development of water management issues from the early 1900's.[178] Agenda 21 contains many other objectives and guides relating to IWRM that will be dealt with below when dealing with South Africa's inclusion of IWRM. However, for the purposes of this chapter it suffices to know that Agenda 21 clearly contains extensive information regarding the ambit and meaning of IWRM and what it should achieve.

The next development in IWRM came at the Second World Water Forum which took place at The Hague in 2000.[179] This conference consisted of a range of participants who made up

[172] Ibid (note 2 above) Agenda 21, Integrated Water Resources Development and Management.

[173] Ibid.

[174] Ibid.

[175] Ibid.

[176] Ibid.

[177] Ibid.

[178] J, Warner. (note 128 above; 32).

[179] World Water Council, Second Water Forum. Available at http://www.worldwatercouncil.org/index.php?id=16. Accessed 27/08/2012.

various stakeholders relating to water,[180] perhaps indicating the international community's striving for achieving an integrated approach to the management of freshwater resources, even at an international scale. At the Second Water Forum the following issues were raised;

> water privatisation and public private partnerships; charging the full cost for water services along with appropriate subsidies to the poor; right to access water and land as a means to breakdown poverty trap and social inequity; transparent water governance, and meaningful participation of all stakeholders[181]

The Water Forum resulted in a Ministerial Declaration of the Hague on Water Security in the 21st Century.[182] This document proposes certain measures in order to deal with freshwater management set out in the document, stating that those measures are based on IWRM. It further states that IWRM includes 'planning and management of water resources, both conventional and nonconventional, and land'[183] and 'take[ing] account of social, economic and environmental factors and integrates surface water, groundwater and the ecosystems through which they flow'.[184] The Ministerial Declaration then states that IWRM depends on collaboration, partnerships between all stakeholders, the need to overcome fragmentation and lastly political commitment to achieve awareness, need for water security and sustainable development.[185] Although this outline of IWRM is similar to what has been described by previous writings, such as Agenda 21 and the Dublin Statement, it does serve to clarify and emphasise some of the elements of IWRM. This conference was also considered a success because it put IWRM on the political agenda and because of the manner in which it endorsed active participation of the developing world's water stakeholders.[186]

The next development in IWRM came at the Bonn International Conference of Freshwater, in 2001. [187] This was a preparatory conference to the World Summit on Sustainable

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[180] O, Varis...et al. (note 122 above; 174).

[181] Ibid.

[182] Second World Water Forum, Ministerial Declaration of Hague on Water Security in the 21st Century http://www.idhc.org/esp/documents/Agua/Second_World_Water_Forum%5B1%5D.pdf. Accessed 27/08/2012.

[183] Ibid.

[184] Ibid.

[185] Ibid.

[186] M, Rahaman. O, Varis. 'Integrated Water Resources Management: Evolution, Prospects and Future Challenges' (2005) 1(1) 15.

[187] International Conference on Freshwater. Available at http://www.thirdworldcentre.org/freshwater.PDF Accessed 28/08/2012.

Development which would be held in Johannesburg in 2002.[188] One of the documents which came out of the Conference was the Bonn Keys[189] which stated that water could be managed in a more effective manner, and that a better management of water would be a major step toward the achievement of sustainable development.[190] This again highlights the relationship between IWRM and sustainable development.

According to the Bonn Keys, the keys to the achievement of better water resources management are as follows; to meet the water security needs of the poor; decentralisation of water resources management to a local scale; the formulation of new partnerships; and stronger, better-performing governance arrangements.[191] Finally the Bonn Keys expressly make reference to IWRM by stating that 'we need integrated water resource management to bring all water users to the information sharing and decision making tables,'[192] and that 'we must increase cooperation within river basins, and make existing agreements more vital and valid.'[193] This reference to IWRM serves to explain the need for an integrated approach to decision making and planning relating to water and also highlights the need for local co-operation on a basin level.

At the World Summit on Sustainable Development (WSSD), in 2002, IWRM was put at the top of the international agenda.[194] The WSSD Plan for Implementation[195] states that IWRM should be developed and provides that it is one of the key components in achieving sustainable development.[196] The WSSD plan of Implementation however, does not attempt to define IWRM, instead it provides extensively for how it should be implemented and various

[188]International Conference on Freshwater. Available at http://www.thirdworldcentre.org/freshwater.PDF Accessed 28/08/2012.

[189] M, Rahaman…et al. (note 146; 17).

[190] Water – Key to Sustainable Development: The Bonn Keys http://www.earthsummit2002.org/ic/freshwater/Bonn%20Keys.pdf. Accessed 28/08/2012.

[191] Ibid.

[192] Ibid.

[193] Ibid.

[194] M, Rahaman…et al. (note 146; 17).

[195] Plan of Implementation of the World Summit on Sustainable Development. Available at http://www.un.org/esa/sustdev/documents/WSSD_POI_PD/English/WSSD_PlanImpl.pdf Accessed 26/09/2012.

[196] M, Rahaman…et al. (note 146; 17).

strategies, plans and programs associated with IWRM.[197] Similarly at the Third World Water Forum in Kyoto, 2003,[198] it was again recommended that IWRM be used as a tool towards the achievement of sustainable development. The Forum also highlighted the importance of facilitating participation, partnerships, a river basin approach and good governance in the pursuit of IWRM.

IWRM is a concept which has developed over many years and many documents have attempted to define it. However, there still appears to be no unanimous, internationally accepted definition of IWRM. The most commonly used and well accepted definition however, can be found in the Global Water Partnership (GWP) Toolbox.[199] The GWP defines IWRM as the following;

> Integrated Water Resources Management (IWRM) is a process which promotes the coordinated development and management of water, land and related resources in order to maximise economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems and the environment.[200]

Although this seems to be the first authoritative definition of IWRM there is still much debate regarding its ability to be implemented and whether it is sufficiently defined.[201]

From a brief overview of the history of international environment and water conventions and forums, it is clear that an integrated approach to the management of freshwater resources is a long standing principle. It is also evident that IWRM is a principle which has been repeatedly recommended as the most effective manner of managing freshwater resources, this despite its lack of definitional certainty. The above assessment however, does not leave us empty-handed in terms of our understanding of the concept of IWRM. There are many crucial elements of IWRM which can be outlined which are;

- IWRM involves a regional, basin based approach to the management of fresh water resources.

[197] Ibid.

[198] Ibid.

[199] Ibid (note 13 above).

[200] Ibid.

[201] Ibid (note 127 above).

- IWRM involves the management of river basins through river basin organisations based on partnerships with municipalities and the provincial government.
- IWRM links environmental, economic and social policy.
- IWRM integrates all facets of water management while taking into account socio-economic and environmental objectives.
- IWRM incorporates environmental considerations and public participation in planning in a systematic manner.
- IWRM requires co-ordination between all bodies responsible for development of freshwater resources.
- IWRM is strongly related to the concept of sustainable development in that they both seek the integration of social, economic and environmental factors into planning, implementation and decision making.
- IWRM provides for a holistic approach to the management of freshwater resources.
- IWRM states that water should be recognised and managed as an economic good
- IWRM links land and water uses across the whole of a catchment area or groundwater aquifer.
- IWRM integrates surface water, groundwater and the ecosystems through which they flow.
- IWRM provides for increased co-operation in the management of entire river basins
- IWRM requires integration of sectoral water plans and programmes within the framework of national economic and social policy.
- The overall objective of IWRD/M according to Agenda 21 is to satisfy the freshwater needs of all countries for their sustainable development.[202]

Lastly it is notable that Agenda 21 has provided for extensive objectives and guidelines on sustainable development and IWRM, however, we (the international community) do not seem to pay sufficient enough attention to Agenda 21 when searching for the definition of IWRM. It is disappointing that these objectives, which seem to be considerably more practical and achievable than the definition under the GWP, have not been held in higher regard.

[202] In summation of the above discussion.

4. SOUTH AFRICAN WATER LAW, POLICY AND IWRM

4.1 Introduction

In order to meet the aforementioned water management challenges South Africa has an extensive body of environmental law and policy which has an influence on the management of freshwater resources.[203] These include, *inter alia*, the Constitution of South Africa,[204] the National Environmental Management Act (NEMA),[205] the National Water Act,[206] the Water Services Act,[207] conservation legislation,[208] land use planning laws, mining legislation[209] and relevant regulations and policy documents.[210] Together these documents provide for the management of South Africa's freshwater resources. An analysis of this legislation and policy, and a comparison with the concept of IWRM as discussed above will enable an assessment of the extent to which South Africa includes the concept of IWRM into its water management regime as it appears on paper.

4.2 The Constitution and IWRM

The Constitution is the supreme law of South Africa.[211] It contains fundamental rights[212] which have an impact on water management and contributes to South Africa's inclusion of IWRM into its law and policy. One of the main objectives of IWRM, as stated above, is to satisfy the freshwater needs of all people.[213] Similarly the Constitution provides for the right to access to sufficient water[214] and that the state must take measures within its means to achieve the progressive realisation of this right.[215] This is a remarkably similar objective to

[203] This is evident by the amount of legislation governing the environment.

[204] The Constitution of South Africa 1996.

[205] National Environmental Management Act 107 of 1998.

[206] National Water Act 36 of 1998.

[207] Water Services Act 108 of 1997.

[208] Such as the National Environmental Management Biodiversity Act 10 of 2004; and the National Environmental Management: Protected Areas Act 53 of 2003.

[209] Such as the Mineral and Petroleum Resources Development Act 28 of 2002.

[210] Such as the National Water Resources Strategy (NWRS) and the National Biodiversity Framework (NBF).

[211] Ibid (note 2 above) Agenda 21, Integrated Water Resources Development and Management.

[212] Ibid (note 204 above) Chapter 2.

[213] Ibid (note 2 above) Agenda 21, Integrated Water Resources Development and Management.

[214] Ibid (note 204 above; s27(1)(b)).

[215] Ibid (note 204 above; s27(2)).

the overall objective of IWRM as stated in Agenda 21.[216] This Constitutional provision further provides that the state is under a duty to take reasonable measures to achieve access to sufficient water; accordingly, there is a duty on the state to take reasonable measures to achieve one of the primary goals of IWRM.

The Constitution also contains South Africa's environmental right,[217] stating 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;
> (ii) Promote conservation; and
> (iii) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.[218]

Environmental management, including the management of freshwater resources, is guided by this environmental right.[219] Section 24(b) is of most importance to IWRM; it essentially states that the state is under a duty to protect the environment through reasonable measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development of natural resources while promoting justifiable economic and social development.[220] This section provides for protection of the environment and sustainable development,[221] and as seen above these are integral aspects of IWRM. IWRM *inter alia* requires the freshwater resources be developed and maximised, taking into account socio-economic factors while protecting the environment.[222] This is essentially the sustainable development of freshwater resources. The inclusion of some of the most crucial elements of IWRM in the South Africa's environmental right is a positive sign for the inclusion of IWRM in South African water law.

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[216] Ibid (note 2 above).

[217] Ibid (note 204 above; s24).

[218] Ibid.

[219] Ibid.

[220] Ibid (note 204; s24(b)).

[221] M, Kidd. (note 19 above; 81).

[222] Ibid (note 13 above).

Importantly these Constitutional provisions relate to the protection of the environment as a whole; every aspect of the environment should be protected and managed in a sustainable manner. Thus if land, water and other resources were all managed accordingly then land based pollution and effects on freshwater resources would be taken into account when deciding how to develop land. In this way the Constitutional provisions above indirectly provide for linkages between land and water based management, a strong element of IWRM.

4.3 The National Environmental Management Act and IWRM

The National Environmental Management Act[223] (NEMA) gives effect to section 24 of the Constitution.[224] It seeks to achieve 'co-operative environmental governance'[225] and to provide a framework for integrated environmental management in all decisions and development in South Africa.[226] Sustainable development is a strong feature of NEMA,[227] where it is described as the 'integration of social, economic and environmental factors in the planning, implementation and evaluation of decisions to ensure that development serves present and future generations.'[228] Again one can see the similarities in the principles of IWRM and the provision for sustainable development in both NEMA and the Constitution.

NEMA, being South Africa's framework legislation for environmental management, contains many provisions relevant to the management of freshwater and in turn IWRM. Firstly, NEMA provides for a set of Environmental Management Principles,[229] which are important considerations to take into account in all environmental decisions.[230] The application of these principles is extensive; they apply throughout the republic to all actions of all organs of state that may significantly affect the environment;[231] serve as a framework upon which

[223] Ibid (note 205 above).

[224] M. Van der Linda. National Environmental Management Act 107 of 1998 in H, Strydom. M, King. *Fruggle and Rabie's Environmental Management in South Africa* Juta 2ed (2009) 197.

[225] Ibid (note 205 above; Long Title).

[226] M. Van der Linda. (note 224 above; 197).

[227] Ibid (note 205 above; Preamble).

[228] Ibid.

[229] Ibid (note 205 above; s2).

[230] M. Van der Linda. (note 224 above; 197).

[231] Ibid.

environmental management and implementation plans must be based on;[232] they serve to guide the exercise of any function when making decisions in terms of NEMA;[233] and lastly they serve to guide the interpretation, administration and implementation of any laws concerned with the protection of the environment.[234]

The NEMA principles are extensive in content and contain many provisions which are relevant to the management of freshwater resources and in particular IWRM. The NEMA principles state that environmental management 'must place people and their needs at the forefront of its concern' [235] while serving their 'physical, psychological, developmental, cultural and social interests equitably'.[236] This provision speaks of many elements of IWRM; as seen above the overall objective of IWRM was to provide sustainable water to people,[237] this would be placing people's needs at the forefront of its concern. This principle also alludes to a holistic approach to environmental management, taking into account and balancing all contributing factors, another core principle of IWRM canvassed above.[238]

The NEMA principles, like the Constitution, provide for sustainable development.[239] However, the principles expand the concept of sustainable development by stating that it is a concept which requires consideration of all relevant factors.[240] In particular the principles state that sustainable development requires that where there are negative impacts on the environment these should be avoided and where they cannot be avoided, they are minimised and remedied.[241] The principles further state that the development or use on renewable resources should not exceed the level which would put them at jeopardy.[242] As mentioned above there are great similarities between the concepts of IWRM and sustainable

[232] Ibid (note 205 above; s2(1)(b)).

[233] Ibid (note 205 above; s2(1)(c)).

[234] Ibid (note 205 above; s2(1)(e)).

[235] Ibid (note 205 above; s2(2)).

[236] Ibid (note 205 above; s2(2)).

[237] Ibid (note 2 above).

[238] Ibid (note 157 above; Principles 1 – 4).

[239] Ibid (note 205 above; s2(3)).

[240] Ibid (note 205 above; s2(4)(a)).

[241] Ibid (note 205 above; s2(4)(a)(i)-(v)).

[242] Ibid (note 205 above; s2(4)(a)(vi)).

development. The manner in which it is included in the NEMA principles not only reinforces this factor, but also adds to the understanding of the extent of considerations that need taken in achieving sustainable development. Notably sustainable development has very similar elements to IWRM and it is also a goal of IWRM.[243]

Another NEMA principle which deals with a core element of IWRM is section 2(4)(b) which, *inter alia*, states that 'environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated...'[244] One of the defining elements of IWRM is that there must be recognition and links between the management of water, land and other resources,[245] which NEMA provides for explicitly. This is a particularly important principle in the context of freshwater resources management as it is well accepted that water cannot be manage in isolation from the environment in which it exists and the people that interact with it.[246]

There are many other NEMA principles which relate directly to the concept of IWRM including public and stakeholder participation in environmental governance; [247] 'intergovernmental co-ordination and harmonisation of policies, legislation and actions relating to the environment;'[248] the polluter pays principle;[249] and the need to specifically protect sensitive, vulnerable, highly dynamic or stressed ecosystems. [250] The NEMA principles accordingly introduce many aspects of IWRM into South African environmental law and management which will obviously also relate to the management of freshwater resources, thus South Africa's water legislation and management must be guided by these principles. The importance of these principles lies in the extent to which they apply and in the value of their content.

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[243] See discussion above; Report of the World Commission on Environment and Development; Our Common Future, 1987. Available at http://conspect.nl/pdf/Our_Common_Future-Brundtland_Report_1987.pdf. Accessed 25/11/2012.

[244] Ibid (note 205 above; s2(4)(b)).

[245] Ibid (note 157 above; Principle 1).

[246] Ibid (note 2 above).

[247] Ibid (note 205 above; s2(4)(f)).

[248] Ibid (note 205 above; s2(4)(l)).

[249] Ibid (note 205 above; s2(4)(p)). Related to treating water as an economic good.

[250] Ibid (note 205 above; s2(4)(r)).

One of the goals of IWRM is to overcome the fragmented management of freshwater resources.[251] This is also one of NEMA's primary objectives in respect of environmental management generally. In order to deal with fragmentation NEMA provides for co-operative governance.[252] In addition to the aforementioned NEMA provisions relating to co-operative governance NEMA contains a chapter dealing with 'Procedures for Co-operative Governance' [253] Section 11 of NEMA essentially provides that certain government departments must prepare environmental implementation plans[254] and further, that certain departments must prepare a consolidated environmental implementation plan.[255] These plans should be made with the view of achieving consistency among plans.[256] One can see that the purpose of these provisions is to, i*nter alia*, 'co-ordinate and harmonise the environmental policies, plans, programmes and decisions of the various national departments that may affect the environment'.[257] IWRM seeks to achieve co-ordinated development and planning; plans such as these (if implemented) will undoubtedly help to achieve a truly integrated environmental and water management.

Lastly, NEMA also has its purposes in achieving integrated environmental management.[258] It does so by the inclusion of a chapter on this topic, the purpose of this chapter is to promote the application of appropriate environmental management tools in order to ensure the integrated environmental management (IEM) of activities'. [259] It further states that the objective of IEM is to promote the integration of the NEMA principles in all decision making that may significantly affect the environment;[260] to identify, predict and evaluate the actual and potential impacts of the environment, socioeconomic conditions and cultural heritage so that these impacts can be minimised while the benefits are maximised;[261]to ensure that the

[251] Ibid (note 2 above).

[252] Ibid (note 205 above; Preamble).

[253] Ibid (note 205 above; Chapter 3).

[254] Ibid (note 205 above; s11(1)(2)).

[255] Ibid (note 205 above; s11(3)).

[256] Ibid (note 205 above; s11(4)).

[257] Ibid (note 205 above; s12(a)).

[258] Ibid.

[259] Ibid (note 205 above; s23(1)).

[260] Ibid (note 205 above; s23(2)(a)).

[261] Ibid (note 205 above; s23(2)(b)).

effects of activities having an effect on the environment receive adequate consideration before such actions are taken;[262] to ensure public participation;[263] and to identify the best environmental management for a particular activity, in accordance with the NEMA principles.[264] These goals have many similarities with the above outlined elements of IWRM. One can see that both IEM in (terms of NEMA) and IWRM both seek to achieve a holistic management model.

NEMA seeks to achieve IEM through environmental authorisations.[265] In this regard NEMA states that the 'potential consequences for impacts on the environment of listed activities or specified activities must be considered, investigated, assessed and reported to the competent authority.'[266] Thus, where a person wishes to conduct a listed or specified activity they must apply for an environmental authorisation, the applicant must follow the procedure outlined in the 2010 Environmental Impact Assessment Regulations.[267] Section 24F prohibits a person from commencing a listed or specified activity without the requisite authorisation. This process ensures that at least in respect of listed or specified activities environmental concerns will be taken into account if the process is followed in a suitable manner. Section 24 previously stated that any activity that may significantly affect the environment should be subject to environmental authorisation.[268] This is perhaps more appropriate if one looks at the requirements and application of the NEMA principles, it would also ensure greater protection of the environment and in turn water.

NEMA has clearly introduced some of the core characteristics of IWRM into South African environmental law and management which will in turn have a direct influence on the water management policy of South Africa. The fact that NEMA applies to the environment as a whole is also important in the context of IWRM as IWRM seeks to integrate the management of all resources so that water can be effectively protected, thus by having one overreaching piece of legislation that guides all other environmental legislation is already a step towards

[262] Ibid (note 205 above; s23(2)(c)).

[263] Ibid (note 205 above; s23(2)(d)).

[264] Ibid (note 205 above; s23(2)(f)).

[265] Ibid (note 205 above; s24).

[266] Ibid (note 205 above 24 (1)).

[267] GNR 543 of GG 33306, 18/06/2010.

[268] M, Kidd. M, Kidd. (note 19 above; 239).

achieving IWRM in South Africa. However, in order to completely assess South Africa's inclusion of IWRM we must assess the relevant sectoral legislation.

4.4 The National Water Act and IWRM

The National Water Act (NWA)[269] is South Africa's primary legislation dealing with the management of freshwater resources. The preamble of the Act recognises that South Africa is a water scarce country with many water management challenges.[270] It recognises that the ultimate aim of freshwater resources management 'is to achieve the sustainable use of water for the benefit of all users',[271] it recognises the need to protect the quality of water resources to ensure sustainability,[272] and the need for 'integrated management of all aspects of water resources' and lastly, it recognises the need for regional management of water resources on a catchment level.[273] Although these provisions are contained in the preamble of the Act and are thus not enforceable, they do point out the objectives of the Act all of which greatly resemble the principles of IWRM as discussed above.

The NWA's purposes are to 'ensure that the nation's water resources are protected, used, developed, conserved, managed, and controlled in ways which take into account amongst other factors;'[274]

(a) Meeting the basic human needs of present and future generations;

(b) Promoting equitable access to water;

(c) Redressing the results of past racial and gender discrimination;

(d) Promoting the efficient, sustainable and beneficial use of water in the public interest;

(e) Facilitating social and economic development;

(f) Providing for growing demand for water use;

(g) Protecting aquatic and associated ecosystems and their biological diversity;

(h) Reducing and preventing pollution and degradation of water resources;

[269] National Water Act 36 of 1998.

[270] Ibid (note 269 above; Preamble)

[271] Ibid.

[272] Ibid.

[273] Ibid.

[274] Ibid (note 269 above; s2).

(i) Meeting international obligations;

(j) Promoting dam safety;

(k) Managing floods and droughts.[275]

These factors for consideration bear a similar resemblance to many of the core principles of IWRM.[276] The NWA here provides for a list of considerations which need to be taken into account in every aspect of freshwater resources management.[277] The list itself is extensive, containing a variety of considerations however; this is not a closed list indicating that all other relevant considerations should be taken into account in the management of freshwater resources. This approach is reminiscent of sustainable development in terms of NEMA and IWRM's holistic approach to the management of freshwater resources. Although not specifically mentioned, it is clear from the application and content of these considerations that the NWA seeks to achieve an integrated approach to freshwater resources management.

In order to achieve the purposes of the Act,[278] the NWA provides for the establishment of water management strategies.[279] Firstly, the Act provides for the establishment of the National Water Resources Strategy[280] (NWRS), which provides for guidance on the management of freshwater resources across the country as a whole.[281] It also serves as a framework for regional, or catchment level management of freshwater resources.[282] The NWRS deals with very similar content to the NWA; however it gives effect to and expands on its provisions. The NWA also provides for the establishment of catchment management strategies[283] (CMSs); these strategies are to be developed for the management of freshwater resources on a regional or catchment level.[284] CMSs must be in harmony with the NWRS, one of the main objectives of the development of CMSs is to seek co-operation and

[275] Ibid (note 269 above; s2(a)-(d)).

[276] As discussed and outlined in the previous chapter, Defining IWRM.

[277] Ibid (note 269 above; s2).

[278] Ibid (note 269 above; s6(1)(a)(i)).

[279] Ibid (note 269 above; Chapter 2).

[280] Ibid (note 269 above; s5).

[281] Ibid (note 269 above; Chapter 2 Part 1).

[282] Ibid.

[283] Ibid (note 269 above; s8).

[284] Ibid (note 269 above; Chapter 2 part 2).

agreement on water-related matters from various stakeholders and interested persons.[285] Not only are these strategies themselves inclusions of IWRM principles, but one can also see that the integrated approach in the aforementioned legislation must be passed down to regional policy. These strategies will be dealt with in detail below.

Chapter 3 of the NWA provides for the protection of freshwater resources;[286] it does so through the introduction of a classification system,[287] the establishment of the Reserve,[288] provisions relating to the prevention of pollution,[289] and provisions relating to emergency incidents.[290] These provisions provide extensively for a framework for the protection of freshwater resources in South Africa, a primary goal of IWRM. However, the provisions relating to the classification of freshwater resources and the establishment of the Reserve require a great deal of implementation in the form of promulgation of regulations. These will only be effective if put into place by DWAF.

Section 19 in Chapter 3 of the NWA is of particular importance to IWRM. Section 19 essentially provides that any owner of land, person in control of land or a person who occupies land on which an activity, processes or situation has caused or is likely to cause the pollution of a water resource, must take all reasonable measures to prevent such pollution from occurring, continuing or reoccurring.[291] This provision is similar to section 28 of NEMA and a person found to be in contravention of this provision can be made to cover the cost of remedying the effects of pollution.[292] This is an important provision in the context of

[285] Ibid (note 269 above; Chapter 2 Part 2).

[286] Ibid (note 269 above; Chapter 3).

[287] Ibid (note 269 above; Chapter 3 part 1).

[288] Ibid (note 269 above; Chapter 3 part 2); 'The Reserve' according to section 1 of the NWA 'means the quantity and quality of water required *(a)* to satisfy basic human needs by securing a basic water supply, as prescribed under the Water Services Act, 1997 (Act 108 of 1997), for people who are now or who will, in the reasonably near future, be (i) relying upon; (ii) taking later from; or (iii) being supplied from the relevant water resource; and *(b)* to protect aquatic ecosystems in order to secure ecologically sustainable development and use of the relevant water resource'.

[289] Ibid (note 269 above; Chapter 3 part 3).

[290] Ibid (note 269 above; Chapter 3 Part 4).

[291] Ibid (note 269 above; s19(1)).

[292] Ibid (note 269 above; s19(2)).

IWRM as it recognises the influence of land based activities on freshwater resources, a characteristic of IWRM's holistic approach.

Notably, in the context of IWRM, the NWA provides for the establishment of water management areas [293] which are to be controlled by catchment management agencies,[294](CMAs) according to their CMS's.[295] These WMAs have been defined and expanded upon in the NWRS.[296] One of the most notable features of IWRM, even in its early development in Spain and with the TVA, is the concept of regional/basin/catchment based management of freshwater resources.[297] In addition to this another feature of IWRM is that these areas be managed by regional organisations who would partner with municipalities and provincial government.[298] South Africa's inclusion of both of these aspects of regional freshwater management is one of its core inclusions of IWRM.

The NWA contains many more provisions relating to IWRM, however many of these are dealt with in greater detail in the NWRS which will be discussed below.

4.5 The National Water Resources Strategy

As mentioned above the NWA provides for the establishment of the NWRS,[299] which seeks to achieve three fundamental objectives;[300] equitable access to water and the benefits of the use of water; the sustainable use of water by striking a balance between water requirements and the need to protect water resources; and efficient, effective water use for maximum socio-economic development.[301] The NWA also provides that the NWRS must, *inter alia*, 'promote the management of catchments within a water management area in a holistic and

[293] Ibid (note 269 above; s6(1)(c)).

[294] Ibid (note 269 above; s77).

[295] Ibid (note 269 above; s8).

[296] Ibid. (note 6 above; Appendix D).

[297] O, Varis...et al. (note 122 above; 174).

[298] B, Mitchell. (note 135 above; 51).

[299] Ibid (note 269 above; s6).

[300] C, Bosman. M, Kidd. 'Water Pollution' in H, Stydom. M, King. Fruggle and Rabie's (ed) *Environmental Management in South Africa* 2ed (2009) 630; 655.

[301] Ibid (note 269 above; s7).

integrated manner.'[302] These objectives are all characteristics of IWRM and it is clear that South Africa seeks to manage its water in a manner consistent with many of the principles of IWRM. Importantly the NWRS informs all aspects of freshwater resources management throughout the country thus its principles should be widely applied. [303]

The first edition of the NWRS came into effect in September 2004.[304] It is an extensive document on the management of freshwater resources in South Africa; containing an extension of many provisions in the NWA. It provides for a brief overview of water policy and law in South Africa,[305] an overview of South Africa's water situation or challenges,[306] it provides for different water resource management strategies,[307] complimentary strategies[308] and for the planning, co-operation and international co-ordination in the management of freshwater resources.[309] Various provisions in this document will be assessed to determine the extent of its inclusion of IWRM; however its provisions will by no means be covered comprehensively.

The NWRS is perhaps the first document to expressly include the concept of IWRM into South African water law and policy. Firstly the NWRS recognises that water cannot be separated from the rest of the environment,[310] and that there are many dimensions to the management of freshwater systems.[311] Accordingly it recognises that 'water resources can be successfully managed only if the natural, social, economic and political environments in which water occurs and is used are taken fully into consideration.'[312] The NWRS further defines IWRM as 'a process which promotes the co-ordinated development and management of water, land and related resources in order to maximise the resultant economic and social

[302] Ibid (note 269 above; s6(1)(i)).

[303] Ibid (note 269 above; s5(3)).

[304] C, Bosman. M, Kidd. (note 300 above; 655).

[305]Ibid (note 6 above; Chapter 1).

[306] Ibid (note 6 above; Chapter 2).

[307] Ibid (note 6 above; Chapter 3).

[308] Ibid (note 6 above; Chapter 4).

[309] Ibid (note 6 above; Chapter 5).

[310] Ibid.

[311] Ibid. (note 6 above; 10).

[312] Ibid.

welfare in an equitable manner without compromising the sustainability of vital ecosystems.'[313] This is essentially the GWP definition of IWRM, which, as mentioned above, is regarded as the most well-accepted definition of IWRM today.[314] Previously IWRM's inclusion in South African law was merely implicit by its provision for an integrated approach however; the NWRS's express inclusion of IWRM asserts that IWRM is an official water management policy in South Africa. However, IWRM requires that certain other principles and procedures be put into place in order to achieve effective management of freshwater resources, which must now be assessed.

Chapter 3 of the NWRS deals with 'Strategies for Water Resource Management'[315] and is important in the context of assessing the inclusion of IWRM. As seen above South Africa's freshwater resources are threatened by a variety of problems, especially that of pollution. In order to protect water resources the NWRS provides for resource-directed measures and[316] source directed measures.[317] It also briefly provides for the protection of groundwater resources[318] and wetlands.[319] The protection of freshwater resources is an important aspect of IWRM; not only does IWRM require a balance to be struck between environmental protection and socio-economic development,[320] it also states that freshwater resources need to be protected for their sustainable use into the future.[321] If water resources are degraded today in the name of socio-economic development then South Africa will have an even further limited amount of water of a suitable quality.[322] Thus these strategies are highly important in the context of IWRM.

[313] Ibid.

[314] Ibid (note 13 above).

[315] Ibid. (note 6 above; 55).

[316] 'Measures focus on the quality of the water resource itself;' Ibid (note 6 above: 56).

[317] These measures contribute to defining the limits and constraints that must be imposed on the use of water resources; Ibid. (note 6 above; 56).

[318] Ibid (note 6 above; 60).

[319] Ibid (note 6 above; 61).

[320] Ibid (note 127 above).

[321] Ibid (note 150 above).

[322] This on top of the current water stresses.

Part 2 of chapter 3 deals with 'water use strategies',[323] these strategies are used to control water quality, quantity and condition, and in turn protect freshwater resources. These are essentially the source-directed measures referred to above.[324] Control of water use to protect the environment here is done through the authorisation of water use,[325]this may include general authorisations (for which no licence is required)[326] or authorisations by way of water use licence,[327] which may have a range of conditions attached to it.[328] Water use in terms of the NWA is broadly defined and includes almost any activity in relation to water,[329] thus these strategies are important in controlling how, and how much water is used in South Africa and will accordingly be important in ensuring that South Africa's water is in fact used in a sustainable manner as IWRM requires.

Part 3 of chapter 3 deals with 'water conservation and water demand management'[330] strategies. These are essentially resource-based measures for the protection of freshwater resources.[331] These strategies are based on the following principles; water institutions should seek to provide water efficiently and effectively, minimising losses; water users should strive for efficient water use; and water demand and conservation management should be an integral part of planning for water resources management.[332] These strategies also provide for water conservation and water demand management strategies for various sectors which have a notable affect on freshwater resources, these include; agriculture, mining, industry power generation and education. In addition to providing for the protection of freshwater resources which has been mentioned often, these strategies also provide for the integration of water considerations into different sectors which affect the management of water.

[323] Ibid (note 6 above; 63).

[324] C, Bosman. M, Kidd. (note 300 above; 655).

[325] Ibid. (note 6 above; 64).

[326] Ibid.

[327] Ibid (note 6 above; 65).

[328] Ibid (note 6 above; 66).

[329] Ibid (note 269 above; s2).

[330] Ibid (note 6 above; 66).

[331] Ibid (note 6 above; 78).

[332] Ibid (note 6 above; 79).

One of the key features of IWRM as mentioned above is to treat water as an 'economic good'.[333] The NWRS provides for this to a certain extent in Chapter 3 part 1 which deals with water pricing and financial assistance.[334] This chapter deals with charges for; storing water, stream flow reduction activities and waste discharge.[335] It also deals with water use charges which are sector specific.[336] The inclusion of charges for both water degradation and water use is a good step towards the achievement of IWRM in that it begins to treat water as an economic good as opposed to a free resource to use and pollute.

Part 5 of chapter 3 deals with 'water management institutions',[337] these strategies are important as they provide for the institutional framework for water management.[338] Here the duties and responsibilities of the Minister of Water Affairs and the Department of Water affairs are outlined.[339] Most importantly it provides for the duties and responsibilities of regionally based water management institutions such as catchment management agencies,[340] water user associations and locally based water management institutions. These provisions are particularly important because they, like IWRM, provide for the decentralisation of water management to catchment and basin authorities such as CMAs. In addition to this, these strategies provide that CMAs should manage WMAs in an integrated manner taking into account all stakeholders and forming partnerships with local government, these provisions are remarkably similar to the regional management under IWRM.

The NWRS finally contains a chapter on 'National Planning and Co-Ordination in Water Management'.[341] This chapter describes the relationship between the NWA and other national laws, policies, strategies and programmes.[342] It also highlights the need for co-operative relationships in order to achieve success in freshwater management. Without getting into the

[333] Ibid (note 162 above).

[334] Ibid (note 6 above; 83).

[335] Ibid (note 6 above; 84).

[336] Ibid (note 6 above; 85).

[337] Ibid (note 6 above; 91).

[338] Ibid.

[339] Ibid (note 6 above; 93).

[340] Ibid (note 6 above; 94).

[341] Ibid (note 6 above; 141).

[342] Ibid.

detail of this chapter of the NWRS it is easy to see that it is an important chapter in the context of IWRM. IWRM requires co-ordinated development of all resources and it seeks to overcome fragmented environmental and water governance.[343] In addition to this it seeks to include water considerations in national, provincial and local planning.[344] Accordingly these provisions are of great importance to South Africa's inclusion of IWRM. However, overcoming fragmented governance is no easy task, especially because many government departments have targets which completely oppose one another.[345]

Accordingly one can see that IWRM is a strong feature of the 2004 NWRS. It includes IWRM by explaining the need for IWRM, by defining IWRM, by explaining the characteristics of IWRM, by including many elements of IWRM in its strategies for water management in South Africa and finally by essentially making IWRM a principle in South African fresh water management.[346] These provisions are highly important and influential as the NWRS guides all subsequent plans and strategies relating to water, thus these provisions have the potential to be effective in bringing about IWRM if they are properly implemented in South Africa.

4.6 Catchment Management Strategies and IWRM

It has been established that the regional/basin/catchment based management of freshwater resources is a key element of the concept of sustainable development.[347] The NWA provides for exactly this type of approach through the establishment of WMAs in the NWRS.[348] In South Africa there are currently 19 WMAs,[349] however this is set to be reduced by the new NWRS 2.[350] According to the NWA, each WMA must be managed by a CMA.[351] Each CMA

[343] Ibid (note 2 above).

[344] Ibid.

[345] For example mining and environmental protection.

[346] Ibid (note 6 above; Appendix A, Principle 15).

[347] O, Varis...et al. (note 122 above; 174).

[348] Ibid (note 6 above; Appendix D).

[349] Ibid.

[350] Department of Water Affairs. *Revising Water Management Area Boundaries* (2012). Available at http://www.dwaf.gov.za/nwrs/LinkClick.aspx?fileticket=xQF4Z9OaFvM%3D&tabid=72&mid=435. Accessed 26/09/2012.

[351] Ibid (note 269 above; Chapter 2).

must progressively develop a catchment management strategy (CMS) for the management of freshwater resources within its WMA.[352] This strategy must conform to the provisions of the NWA and be consistent with the NWRS.[353] CMS's must essentially provide for the complete management of freshwater resources in their WMA,[354] in doing so they must take into account; geology, demography, land use, climate, vegetation, waterworks,[355] any relevant national or regional plans,[356] and take into account the needs and expectations of water users.[357] They must also provide for water allocation plans,[358] public and stakeholder participation[359] any institutions to be established.[360]

In the context of IWRM, CMS plans are among the most important documents in South Africa. They are essentially the management plans guiding the direct implementation and operationalisation of South African water policy. Thus they are responsible for ensuring that IWRM, as included in South African water law and policy is included in the management of each WMA. It is unfortunate that CMA and CMS's have been so poorly implemented[361] however; this will be dealt with in greater detail below.

4.7 The Water Services Act and IWRM

The Water Services Act (WSA)[362] essentially gives effect to the right to access to water in the Constitution.[363] It has its objects in, *inter alia*, providing for the right to access to a basic water supply and the right to basic sanitation and for an environment that is not harmful to human health and wellbeing.[364] An important goal of IWRM as seen in Agenda 21 is that 'In developing and using water resources, priority has to be given to the satisfaction of basic

[352] Ibid (note 269 above; Chapter 2 Part 2).

[353] Ibid (note 269 above; s9(a)(b)).

[354] Ibid (note 269 above; s9(c)).

[355] Ibid (note 269 above; s9(d)).

[356] Ibid (note 269 above; s9(f)).

[357] Ibid (note 269 above; s9(h)).

[358] Ibid (note 269 above; s9(e)).

[359] Ibid (note 269 above; s9(g)).

[360] Ibid (note 269 above; s9(i)).

[361] See below under Implementation of IWRM.

[362] Water Services Act 108 of 1997.

[363] M, Kidd. (note 19 above; 81).

[364] Ibid (note 362 above; s2(a)).

needs and the safeguarding of ecosystems.'[365] Thus one can see that the WSA is an important piece of legislation in the context of IWRM and the achievement of its goals. One can also see from this goal of the WSA that it also seeks to achieve a balance between development and the protection of the environment which is one of the core features of IWRM. Accordingly, it is evident that the WSA is an important part of South Africa's inclusion of IWRM.

4.8 National Environmental Management: Waste Act and IWRM

One defining element of IWRM is the link between the management of land based resources and water based resources.[366]South African water law also recognises this point in the NWRS where it is stated that management of water can only be achieved effectively if it is done in a holistic manner which takes into account both land and water based resources.[367] Thus it is important to briefly discuss the effect of land based legislation and the management of freshwater resources and to assess how this contributes to IWRM.

The National Environmental Management: Waste Act[368] (NEMWA) deals with the regulation of waste on land. It has its objects in protecting health, wellbeing and the environment through various measures,[369] ensuring compliance with those measures,[370] ensuring that

[365] Ibid (note 2 above).

[366] Ibid (note 13 above).

[367] Ibid (note 6 above; 10).

[368] The National Environmental Management: Waste Act 59 of 2008.

[369] Such as;

(i) minimising the consumption of natural resources;
(ii) avoiding and minimising the generation of waste;
(iii) reducing, re-using, recycling and recovering waste;
(iv) treating and safely disposing of waste as a last resort;
(v) preventing pollution and ecological degradation;
(vi) securing ecologically sustainable development while promoting justifiable economic and social development;
(vii) promoting and ensuring the effective delivery of waste services;
(viii) remediating land where contamination presents, or may present, a significant risk of harm to health or the environment; and
(ix) achieving integrated waste management reporting and planning;

people are aware of the impact of their waste[371] and to give effect to section 24 of the Constitution.[372] NEMWA provides for an extensive framework for the management of waste on land by making use of principles such as sustainable development;[373] pollution avoidance,[374] minimisation, reduction and reuse;[375] and by seeking to give effect to the environmental right in the Constitution. The protection against land based pollution in this manner will undoubtedly contribute to improved water quality in South Africa as water is easily affected by land based pollutants. In this way NEMWA may potentially contribute to a holistic management of freshwater resources and is accordingly a critical aspect of South Africa's inclusion of IWRM in its environmental management.

On several occasions NEMWA specifically recognises the link between land based pollution and freshwater resources; an important aspect to the concept of IWRM.[376] Section 26 of NEMWA provides for the prohibition of unauthorised disposal of waste 'in or on any land, water body or at any facility unless the disposal of that waste is authorised by law.[377] Section 27 similarly provides for the prohibition on littering or throwing of objects into any stream or water course.[378] These provisions show that NEMWA also seeks to prevent direct pollution of freshwater resources. NEMWA also importantly contains many provisions which provide for the co-operation and consultation with water management authorities.[379] These provisions relate to the management of contaminated land and[380] licensing of waste management activities.[381] In addition to this Chapter 7 of the Act provides for 'compliance with the powers of the Minister of Water Affairs and Forestry' in terms of the National Water Act.[382] These

[370] Ibid (note 369 above; s2(c)).

[371] Ibid (note 369 above; s2(b)).

[372] Ibid (note 369 above; s2(d)).

[373] Ibid (note 369 above; s2(a)(vi)).

[374] Ibid (note 369 above; s2(a)(ii)).

[375] Ibid (note 369 above; s2(a)(iii)).

[376] Ibid (note 13 above).

[377] Ibid (note 369 above; s26(1)(a)).

[378] Ibid (note 369 above; s27(2)(a)).

[379] Such as the Minister of Water Affairs and Forestry (s36).

[380] Ibid (note 369 above; Chapter 4, Part 7; s36).

[381] Ibid (note 369 above; Chapter 5).

[382] Ibid (note 369 above; s65).

co-operative and co-ordinating provisions are important in achieving a holistic integrated approach to the management of water and are accordingly important in the context of IWRM.

4.9 Conservation Legislation and IWRM

The protection and conservation of freshwater ecosystems is an important driving force behind IWRM.[383] Without adequate protection of freshwater ecosystems our water resources will be degraded and in turn increase the cost of providing clean water and limit the amount of available water in South Africa. Biodiversity in South Africa is managed by the National Environmental Management: Biodiversity Act (NEMBA).[384] This Act has its objects in conserving biodiversity, providing for the sustainable use of the components of biodiversity and fair and equitable sharing of benefits arising from biodiversity.[385] These are important concepts in the context of IWRM, a concept which also states that water should be protected and used in a sustainable manner taking into account all relevant factors.[386] In addition to this, IWRM highlighted the importance of linkages in the management or protection of land and water based resources, describing them as inseparable.[387] In this vein NEMBA is important as it provides for the conservation of all biodiversity; land, water and marine based ecosystems.[388]

NEMBA contains many provisions relevant to the management of freshwater resources and IWRM. Firstly, Chapter 3 provides for biodiversity planning and monitoring[389] which seeks to, *inter alia*, provide for integrated and co-ordinated biodiversity planning.[390] It does so by providing for the establishment of a National Biodiversity Framework (NBF),[391] bioregional plans,[392] and biodiversity management plans[393] and agreements[394]. The Act further provides

[383] Ibid (note 157 above; Principles 1 – 4).

[384] National Environmental Management: Biodiversity Act 10 of 2004.

[385] Ibid (note 384 above; s2).

[386] Ibid (note 13 above).

[387] Ibid (note 157 above; Principles 1 – 4).

[388] Ibid (note 384 above; s1).

[389] Ibid (note 384 above; Chapter 3.

[390] Ibid (note 384 above; s37(a)).

[391] Ibid (note 384 above; s38).

[392] Ibid (note 384 above; s40).

[393] Ibid (note 384 above; s43).

for the co-ordination of these plans and agreements.[395] These provisions help to integrate conservation considerations into national and local planning which is yet another common thread in IWRM. Of particular importance is that bioregional plans provide for regional management of conservation and could possibly be used in conjunction with CMAs to ensure the holistic management of freshwater.

Secondly NEMBA provides for the protection of threatened or protected ecosystems.[396] In terms of these provisions the Minister may list threatened ecosystems and certain threatening activities in respect of those listed ecosystems.[397] Such activities will then require authorisation before they can be commenced in a listed ecosystem.[398] The Minister is also entitled to make plans to take into account listed ecosystems. These provisions also help to integrate conservation considerations into national and local planning. If threatened aquatic ecosystems were listed under these provisions they would see greater protection under this Act.

The National Environmental Management: Protected Areas Act[399] (Protected Areas Act) also provides for conservation in South Africa. It essentially allows areas to be declared as protected areas,[400] where they will thereafter receive higher degrees of environmental protection which will in turn have positive effects on the management of freshwater resources. The Protected Areas Act is not the only piece of legislation which provides for the establishment of protected areas in relation to freshwater, others include, *inter alia*; the Mountain Catchment Areas Act[401] and the National Forests Act.[402] It must be noted that protected areas in South Africa form 6.2 percent[403] of South Africa and accordingly can contribute very little to the management of water in South Africa at present.

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[394] Ibid (note 384 above; s44).

[395] Ibid (note 384 above; s48).

[396] Ibid (note 384 above; s52).

[397] M, Kidd. (note 19 above; 266).

[398] M, Kidd. (note 19 above; 266).

[399] The National Environmental Management: Protected Areas Act 57 of 2003.

[400] Ibid (note 399 above; s17).

[401] Mountain Catchment Areas Act 63 of 1970.

[402] National Forests Act 84 of 1998.

[403] Convention on Biological Diversity. Country Profile – South Africa. Available at http://www.cbd.int/countries/?country=za. Accesssed 27/09/2012.

4.10 Mining Legislation and IWRM

Water is considered 'mining's most common casualty',[404] and as mentioned above, mining is one of the main challenges in respect of freshwater resources management.[405] It is the pollution caused by mining operations which is of particular concern.
Accordingly it is important to briefly assess mining legislation and policy that is relevant to the management of freshwater resources.

The Minerals and Petroleum Resources Development Act (MPRDA)[406] deals with most aspects of mining in South Africa and is said to have 'embraced environmental concerns... by legislating that all requirements are addressed for all future granted, converted and new order rights'.[407] The MPRDA regulates many aspects of mining including applications for and permitting of reconnaissance,[408] prospecting,[409] and mining rights.[410] Section 37 of the MPRDA expressly states that environmental management principles[411] (as mentioned above) must be considered when granting applications for mining licences, this is an important co-ordinating provision which contributes to the drive for sustainable development and in turn IWRM. In addition to this the MPRDA stresses the importance of IEM in the conducting of mining business and the importance of the duty of remediation for those who cause environmental damage.[412] It is provisions such as these[413] which have led to the MPRDA being regarded as an Act which is inclusive of all environmental considerations. These types of considerations, if taken into account, should assist in the protection of the environment and in turn the protection of freshwater resources as this is such a prominent problem in the mining industry.

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[404] J, Wells. L, Van Meurs. M, Rabie. G. Joubert. F, Moir. J, Russel. 'Terrestrial Minerals' in in H, Strydom. M, King. *Fruggle and Rabie's Environmental Management in South Africa* Juta 2ed (2009) 560.

[405] N. King…et al. (note 28 above; 437).

[406] Minerals and Petroleum Resources Development Act 28 of 2002.

[407] J, Wells...et al (note 404 above; 543)

[408] Ibid (note 406 above; s13).

[409] Ibid (note 406 above; s16 - s17).

[410] Ibid (note 406 above; s22 and s23).

[411] Ibid (note 205 above; s2).

[412] Ibid (note 406 above; s38).

[413] Not all of which could be canvassed in this paper.

The National Water Act, and the Minister of Water Affairs and forestry are responsible for the management of freshwater resources in South Africa, this includes the management of water relating to mining operations.[414] Accordingly the Regulations on Use of Water for Mining and Related Activities Aimed at the Protection of Water Resources [415] were promulgated. These regulations provide, *inter alia*, that where there is a proposed mining operation then the proposed EIA or environmental management plan must contain an assessment of the impacts on water management and pollution control.[416] This is just one example of the integration on paper between mining and water management authorities, there are many more provisions relating to co-ordinated management of water and mining in South Africa. In light of NEMA's provisions relating to co-operative governance and the NWA's further stressing of the need for co-ordinated development in freshwater resources management it is unsurprising to find many provisions relating to integration of inter-governmental co-ordination in mining legislation.

On paper mining legislation and policy seems to adequately provide for environmental considerations (including freshwater considerations) to play an important role in the mining process such as applications and granting of licences and conditions associated with mining permits. The regulation of mining in this manner is important to the concept of IWRM because it indicates South Africa's legislative willingness to provide for an integrated approach the management of the environment and the management of the freshwater resources. They also indicate South Africa's commitment to co-ordinated environmental governance (also a feature of IWRM).[417]

4.11 Land-Use Planning Laws and IWRM

Land use planning laws are important in the protection of the environment[418] and in turn the protection and development of freshwater resources in South Africa. There are many pieces of legislation which relate to land use planning in South Africa, these include; the

[414] J, Wells...et al (note 404 above; 561- 563).

[415] GN 77 of GG 20119 04/06/1998.

[416] J, Wells...et al (note 404 above; 566).

[417] United Nations Water Conference, 1977 (Resolutions). Available at http://www.ielrc.org/content/e7701.pdf Accessed 17/08/2012.

[418] M, Kidd. (note 19 above; 81).

Development Facilitation Act;[419] NEMA (as dealt with above); the National Heritage Resources Act;[420] the Conservation of Agricultural Resources Act;[421] the National Water Act (as discussed above); mining legislation (dealt with above); and relevant Land Use Planning Ordinances[422] An assessment of each one of these is beyond the scope of this paper; however it is notable that the NEMA principles must be taken into account in application of all of these pieces of legislation and when decisions are made regarding land use planning.

4.12 Agricultural Legislation and Policy

As mentioned above, the agricultural sector has a substantial impact on freshwater. It uses 60 percent of South Africa's freshwater[423] and significantly contributes to water pollution.[424] The agricultural sector is subject to all the aforementioned environmental law and policy in South Africa however, like mining, the agricultural sector has a sector specific legislation; the Conservation of Agricultural Resources Act (CARA).[425] This Act is relatively old (1983) and does not contain the same emphasis on sustainable development and environmental protection which post 1994 environmental legislation does. In spite of its age the Act does contain some useful provisions relating to IWRM. It deals with the prohibition on spreading of weeds[426] which is important in the context of battling alien invasive species as mentioned above. The minister is entitled to prescribe control measures for land users which may relate to aspects including, *inter alia*, the cultivation of soil, irrigation of land, grazing capacities and protection against pollution.[427] It further provides for maintenance of soil conservation works and[428] conservation committees and regional conservation committees.[429] Under this act there are also many regulations relating to these topics. The inclusion of these considerations in an old piece of legislation such as CARA shows that an integrated approach

[419] Development Facilitation Act67 of 1996.

[420] National Heritage Resources Act 25 of 1999.

[421] Conservation of Agricultural Resources Act 43 of 1983.

[422] Such as the Western Cape Land Use Planning Ordinance 15 of 1985.

[423] Ibid (note 6 above; 20).

[424] C, Bosman. M, Kidd. (note 33 above; 636).

[425] Ibid (note 421 bove).

[426] Ibid (note 425 above; s5).

[427] Ibid (note 425 above; s6).

[428] Ibid (note 425 above; s12).

[429] Ibid (note 425 above; s15 - s16).

to the environment was developing even in the 1980's. CARA does however fall short in that there is not as much emphasis on sustainable techniques and water conservation which IWRM would require. In light of the aforementioned water management challenges it seems that South Africa needs a new sector specific legislation that deals precisely with the problems of irrigation and, fertiliser and pesticide water pollution.

4.13 Overview of South Africa's Inclusion of IWRM

South Africa's inclusion of IWRM appears to be comprehensive as it has included many core elements of IWRM. The Constitution and NEMA include principles of sustainable development, co-operative environmental governance, environmental integration, the recognition that all elements of the environment are interrelated and must be managed accordingly, and the need for public and stakeholder participation in environmental management. All of which are elements of IWRM as mentioned above. The NWA does not specifically mention IWRM as an official policy however, from its provisions it is evident that IWRM is the approach being taken regarding the management of water in South Africa. Importantly, the NWA provides for the decentralisation of water management by providing for a catchment based approach to water management through the introduction of WMAs and CMAs. This type of management is consistent with even the earliest developments in IWRM.

The NWRS goes on to expressly include IWRM as an official policy in South African water law by providing for the GWP definition of IWRM. However, the NWRS expands on this definition by providing for various strategies in order to achieve IWRM. The strategies include the protecting of freshwater resources, water pricing, water use authorisations water conservation and demand management and procedures for intergovernmental co-operation in the management of freshwater resources. All of these strategies are either strong characteristics of IWRM or seek to achieve the objects of IWRM.

There are various other land and water based legislative pieces which relate to IWRM such as; NEMWA, the WSA, NEMBA, the Protected Areas Act and the MPRDA. These documents include elements of IWRM in their text such as the concept of sustainable development, the provision for integrated environmental management and co-ordinated environmental governance. They also seek to manage land based resources in a sustainable

manner in line with the principles of IWRM and accordingly contribute to the holistic management of land and water based resources which IWRM advocates.

Accordingly, South Africa's legislative inclusion of IWRM can be described as comprehensive as it incorporates most of the core aspects of IWRM as listed in the previous chapter. However, the challenge for South Africa is to now implement this framework so as to achieve effective water resources management.

5. IMPLEMENTATION OF IWRM PRINCIPLES UNDER SOUTH AFRICAN LAW

5.1 Introduction

South Africa has a comprehensive, innovative set of environmental laws.[430] However, a set of laws on their own cannot effectively address environmental problems.[431] For legislation and policy to be effective it needs to be implemented adequately,[432] framework legislations need to be expanded and all administrative tasks need to be attended to. If environmental law and policy is not implemented effectively it will not only be unsuccessful in what it seeks to achieve but it may also have the propensity to 'lull the public [or even officials] into a false sense of security that problems are being addressed' whereas there is in fact nothing being done.[433] South Africa is unfortunately a poverty-stricken country and does not always have the necessary resources to effectively implement the comprehensive set of environmental legislation which it has set out for itself.[434] Other factors which hold environmental implementation back are the lack of political will, the under allocation of resources to address environmental concerns[435] and the lack of competent officials to implement and enforce the relevant law and policy.

Similarly, South Africa's inclusion of IWRM was described as comprehensive and 'in theory should result in well-protected ecosystems and a commitment to the protection of biodiversity'.[436] However, without effective implementation of South Africa's water management legislation and policy it will not be successful in achieving an integrated approach which it seeks to achieve through IWRM. It has been 16 years since the introduction of the environmental right contained in the Constitution which effectively changed the way South Africa managed its environment, including water. And it has been 14 years since the introduction of NEMA and the NWA which, as seen above have made great

[430] Y, Burns. M. Kidd. 'Administrative Law and Implementation of Environmental Law' in H, Strydom. M, King. *Fruggle and Rabie's Environmental Management in South Africa* Juta 2ed (2009) 240.

[431] Ibid.

[432] Ibid.

[433] Ibid.

[434] Ibid.

[435] M, Kidd. (note 19 above; 266).

[436] J, Day. (note 46 above; 856).

contributions to the environmental management and the introduction of IWRM. South Africa's freshwater management systems have been in place for a substantial time period, however, if one looks at the water management challenges above and the current state of freshwater resources it is difficult to reconcile the situation with South Africa's impressive legislation concerning freshwater management.

Accordingly, various aspects of South Africa's implementation of IWRM principles will be discussed below.

5.2 Implementation of Holistic Considerations

As seen above, South African water law and policy contains provisions and mechanisms which provide for the integration of various considerations in the management of freshwater resources, these include; socio-economic and environmental considerations; and land water and other resource considerations.[437] It is extremely difficult to measure the extent to which South Africa has implemented these provisions as they are considerations which require balancing of various factors in a similar manner to sustainable development.[438] However, there are some notable points in relation to integration of these considerations. Firstly, NEMA provides for the specific integration of these types of considerations in its EIA process.[439] As mentioned above however, this only applies to listed activities.[440] The 2010 EIA regulations [441] as mentioned above provide for the integration of environmental considerations before listed activities may be authorised and carried out. Without getting into the detail of the 2010 EIA procedures, many of the listed activities (in all listings) relate to the management of water or the possible impact on freshwater resources.[442] The inclusion of water concerns in these listings contributes to enforcing the implementation of holistic principles associated under IWRM and South African environmental management.

[437] As seen in the Constitution, NEMA and other environmental legislation.

[438] NEMA s2, NWA s7, ect.

[439]Ibid (note 205 above; s24).

[440] Ibid (note 205 above; NEMA 24 (1)).

[441] GNR 543 of GG 33306, 18/06/2010.

[442] GNR544 of GG 33306 , 18/06/2010; GNR545 of GG 33306 , 18/06/2010; GNR546 of GG 33306, 18/06/2010.

The aim of the EIA process as a general concept is to identify 'environmental and social impacts of development activities well in advance of implementation'.[443] These impacts are identified so that potentially negative impacts on the environment can be avoided or reduced.[444] In order for officials to make informed decisions regarding the potential effect on the environment (especially water in this instance), EIA's must be conducted effectively. South Africa's first EIA procedures appeared under the Environmental Conservation Act[445] (ECA). The provisions under the ECA listed activities which required environmental screening, however, these were very broad and in turn, concerns regarding capacity to carry out such screening were raised.[446] In 2006 new regulations under NEMA came into effect,[447] these regulations made use of a listing mechanism to determine which activities should be screened.[448]One notable problem with the 2006 regulations is that there were inconsistencies between different provincial departments.[449] Another problem was that the exemption procedure under the 2006 regulations was incomplete in that it provided for few instances of exemption from the EIA process.[450] The 2010 EIA regulations[451] now govern the EIA process in South Africa; these regulations are substantially longer than any of its predecessors. The 2010 regulations also make use of a listing system whereby certain listed activities are required to undergo different screening processes in order to determine the potential environmental impacts.[452] The EIA process in South Africa could be said to be well implemented in that EIA's are carried out in respect of most activities which affect the environment.

[443] F, Retief. C, Wellman. L, Sandham. 'Performance of Environmental Impact Assessment (EIA) Screening in South Africa: a Comparative Analysis between the 1997 and 2006 EIA Regimes' (2011) 93(2) *South African Geographical Journal* 154.

[444] Ibid.

[445] Environmental Conservation Act 73 of 1989.

[446] F, Retief… et al. (note 443 above; 159).

[447] Ibid.

[448] F, Retief… et al. (note 443 above; 160).

[449] Ibid.

[450] Ibid.

[451] GNR 543 of GG 33306, 18/06/2010.

[452] Ibid.

Secondly integration of these holistic considerations has been specifically mentioned in case law.[453] The case of *Fuel Retailers Association of Southern Africa v Director-General: Environmental Management, Department of Agriculture, Conservation and Environment, Mpumalanga Province*[454] is a good example of our courts dealing with these principles.[455] Here the Constitutional court held that the principles in section 2 of NEMA, such as sustainable development, 'must be observed as they are of considerable importance to the protection and management of the environment.' [456] Although this case involved the application of the NEMA principles and did not specifically relate to the management of freshwater resources, it still makes the point that where there may be significant impacts on the environment then the NEMA principles (many of which are broadly similar to the principles of IWRM) must be taken into account.

Although it is difficult to measure the inclusion of broad principles such as sustainable development and holistic management of water resources DWAF is working on the development of sustainability indicators.[457] However, in light of the current water challenges (as mentioned above) it does not appear that South Africa is successfully implementing these considerations in its water and environmental decision making. If one looks at the state of South African rivers, the impacts of farming and mining activities, the impacts of industry and the lack of sufficient sanitation (especially in rural areas) it is clear that the holistic considerations of environmental management are not always being taken into account in decision making. Instead of a truly holistic approach, which IWRM and South African environmental law provide for, it seems that South Africa's focus is predominantly on socio-economic development at the cost of the environment. Whereas, IWRM and sustainable development suggests that socio-economic development and environmental protection must be considerations in any decision making process affecting the environment, and especially freshwater resources. Although the lack of holistic considerations in decision making may

[453] M, Kidd. (note 19 above; 40).

[454] Fuel Retailers Association of Southern Africa v Director-General: Environmental Management, Department of Agriculture, Conservation and Environment, Mpumalanga Province 2007 (6) SA 4 (CC).

[455] M, Kidd. (note 19 above; 40).

[456] Ibid (note 454 above;)

[457] Department of Water Affairs; Directorate: Resource Directed Measures. Available at http://www.dwaf.gov.za/rdm/RDMC.aspx. Accessed 27/09/12.

contribute significantly to South Africa's lack of IWRM implementation, it is certainly not the sole reason for South Africa's failure to address its water management challenges.

5.3 Implementation of Catchment Management Agencies

A key element to the definition of IWRM is the regional/basin/catchment management of freshwater resources.[458] South Africa has adequately provided for catchment management through the establishment of 19 water management areas[459] which are to be managed by CMAs.[460] CMAs are formed to decentralise water resources management, thus placing its management at a regional or catchment level.[461] An important function of CMAs is to provide for stakeholder participation and partnerships with local government.[462] These institutions are not only important to IWRM generally but also important in a South African context; IWRM requires all aspects relating to freshwater resources management to be taken into account and requires that all stakeholders be included in the management of freshwater resources.[463] This would be almost impossible at a national or provincial level because each region may have different challenges, considerations and different stakeholders. Thus CMAs are vital in achieving IWRM in South Africa. CMAs are also important in the management of South Africa's freshwater resources because, under the NWA and the NWRS, they are responsible for implementing a wide variety of tasks in their respective WMAs; if however, there is no CMA the responsibility will fall on the Minister which is not an ideal situation as it defeats the objects of decentralisation and IWRM.

CMAs are accordingly vital for South Africa's implementation of IWRM; however, to date only four out 19 WMAs have established CMAs.[464] These are the Gouritz Catchment Management Agency,[465] the Oliphants-Doorn Catchment Management Agency,[466] the

[458] B, Mitchell. (note 135 above; 51).

[459] Ibid (note 6 above; Appendix D).

[460] Ibid (note 269 above; Chapter 7).

[461] Ibid (note 269 above; 7 Part 1).

[462] Ibid (note 269 above; Chapter 7 Part 1).

[463] O, Varis...et al. (note 122 above; 174).

[464] Catchment Management: Other. Available at http://www.dwaf.gov.za/Documents/Default.aspx. Accessed 21/09/2012.

[465] GN 902 of GG 29205, 15/08/2006.

[466] GN 903 of GG 29205, 15/08/2006.

Thukela Catchment Management Agency[467] and the Mhlatuze Catchment Management Agency.[468] Thus this aspect of IWRM is not being implemented in at least 15 WMAs in South Africa. Considering the emphasis IWRM and South African water law has placed on a regional or catchment based approach to freshwater resources management it is unacceptable that only four CMAs have been established since 1998. In order to remedy this situation the Minister of Water Affairs has allowed for the number of WMAs to be decreased to 9.[469] However, knowing that IWRM seeks to achieve regional or catchment based management of freshwater resources so that stakeholder participation and considerations of all relevant factors in water management can be fully realised, this seems to undermine the purpose of IWRM.

An inherent problem with the concept of managing freshwater resources on a catchment level is that many CMAs and catchments generally, lie across provincial boundaries.[470] In fact many rivers in South Africa are used to determine provincial and national boundaries. This means that many catchments are divided in two by provincial boundaries. This problem has the effect of making the management of catchments difficult and requires increased co-operative governance between provincial governments if the catchment is to be managed in an integrated manner. This is perhaps why the NWRS 2[471]stresses the importance of CMAs and other bodies 'proactively engaging national and provincial departments and the National Planning Commission.'[472] It also states that all other provincial and national departments who are involved in the management of water should be engaged by CMAs. This approach is likely to make the management of water across provincial and national boundaries substantially easier.

[467] GN 900 of GG 29205, 15/08/2006.

[468] Ibid.

[469] Department of Water Affairs. *Revising Water Management Area Boundaries* (2012). Available at http://www.dwaf.gov.za/nwrs/LinkClick.aspx?fileticket=xQF4Z9OaFvM%3D&tabid=72&mid=435. Accessed 26/09/2012.

[470] Department of Water Affairs and Forestry. Draft NWRS 2. Available at http://www.dwaf.gov.za/nwrs/LinkClick.aspx?fileticket=xQF4Z9OaFvM%3D&tabid=72&mid=435. Accessed 20/11/2012.

[471] Ibid.

[472] Ibid.

With the failure to implement provisions relating to the establishment of CMAs it in turn means that CMS's have also not been developed yet. The overall lack of implementation of CMAs, which are among South Africa's primary tools in the achievement of IWRM, indicates that this aspect of IWRM is not being achieved at all. The concept of IWRM places great emphasis on basin and catchment management, it is regarded as a key tool in achieving integrated management of freshwater resources and it is disappointing that so little has been achieved in this regard.

5.4 Implementation of Resource Directed Measures

Resource-directed measures (RDMs) were described above as those measures which are aimed at addressing the quality of water resources, 'water quality' in this context refers to water quantity, quality, and condition of habitats and distribution of biota.[473] RDMs are accordingly broad in scope. The implementation of RDMs in respect of freshwater resources protection is by no means a new development in South African water policy,[474] this is seen by the various flow-assessments carried out in many South African rivers in the 1990's, before the NWA.[475] The NWA and the NWRS provide that every significant water resource in the country must be classified as; minimally used, moderately use or heavily used. Once this has been done the Reserve should be determined and also the Resource Quality Objectives (RQOs).[476] Jointly these form RDMs in South Africa; they essentially protect the ecosystems by indicating how much is available for use and allow for the placing of conditions on use.[477]

In order to achieve implementation of these RDMs under the NWA DWAF adopted a four phase plan.[478] Phase 1 involves the putting into place of the relevant policies, strategies; systems, methods and guidelines; Phase 2 involves the determining of the preliminary Reserves; Phase 3 comes after the first decade of the NWA and provides for the full realisation of preliminary reserves in selected catchments; and Phase 4 seeks to achieve the full realisation of RDM activities and the development of a water resource classification

[473] Ibid (note 6 above; 56).

[474] J, King. H, Pienaar. (eds) *Sustainable Use of South Africa's Inland Waters* WRC (2011) 82.

[475] J, King. H, Pienaar. (note 474 above; 82 - 83).

[476] J, King. H, Pienaar. (note 474 above; 88).

[477] J, King. H, Pienaar. (note 474 above; 80).

[478] J, King. H, Pienaar. (note 474 above; 88).

system. Guidelines have been established for the classification of freshwater resources within WMAs,[479] however, classification is done by CMAs and because very few have been established the classification system is not close to full implementation with only three WMAs having classified their significant water resources.[480] The classification system is seen as the start of the RDM processes and is accordingly highly important; its lack of implementation does not bode well for the implementation of IWRM in South Africa.

Phase 2 deals with preliminary Reserves. If one looks at the 2010 groundwater[481] and surface[482] water reserve determination maps there are few areas where comprehensive completion has been achieved and many of these only where CMAs have been established. This highlights the importance of the need to implement provisions relating to the establishment of CMAs. The lack of implementation of the Reserve requirements, combined with the lack of classification, makes South Africa's implementation of its freshwater resources management appear increasingly grim at present. In addition to the determination of the Reserve phase 2 also requires the identification of RQOs and Ecological Specifications.[483] RQOs and Ecological Specifications are 'requirements for agreed water quantity, quality, and habitat and biotic integrity to be maintained in aquatic ecosystems.'[484] RQOs only feature in WMAs where there has been intermediate or comprehensive determination of the Reserve;[485] accordingly they too are poorly implemented.

Phases 1 and 2 of the four stage process are clearly not well implemented at present, meaning that the current provision for IWRM in the NWA and the NWRS are far from being

[479] Guidlines for Catchment Management Strategies in South Africa. Available at http://www.dwaf.gov.za/Documents/Other/CMA/CMSFeb07/CMSFeb07Ed1Ch1.pdf. Accessed 23/09/2012.

[480] Oliphants, Oliphants-Doorn and Vaal WMAs. Available at http://www.dwaf.gov.za/Documents/WRC/WRCSBrochure.pdf. Accessed 27/09/2012.

[481] Department of Water Affairs and Forestry: Map of Water Management Areas. http://www.dwaf.gov.za/rdm/Documents/RSA%20Groundwater%20Res%20Det%20map%20A42010final.pdf

[482] Groundwater Map. Available at http://www.dwaf.gov.za/rdm/Documents/RDM%20SW%20Status%20map%20A4%20ver%203%202010%20final.pdf. Accessed 25/09/2012.

[483] J, King. H, Pienaar. (eds) *Sustainable Use of South Africa's Inland Waters* WRC (2011) 96.

[484] Ibid.

[485] Department of Water Affairs; Status of Reserve Determination. http://www.dwaf.gov.za/rdm/Status.aspx. Accessed 23/09/2012.

implemented on the ground. Nevertheless, the four phase plan formulated by the DWA 'has remained on schedule' [486] which leads us to believe that progress is being made in implementing IWRM in South Africa, albeit very slowly. Although the DWA states that it is on track in this regard, the 2012 Draft NWRS states that the provisions relating to water conservation and water demand in the NWRS 1 have not yet been effectively implemented.[487] Accordingly, it further states that moving forward, this is a 'non-negotiable performance area' which 'must be implemented immediately'.[488] It further states that these measures can be quickly implemented at a much lower capital input that introduction of new infrastructure,[489] such as dams and inter basin transfers.

Resource directed measures are hugely important in realising IWRM in South Africa. Many decisions and processes depend on the information made available in RDMs; for example the classification of freshwater resources and the determination of the reserve are important in subsequent decisions and processes regarding freshwater resources such as water licensing. Accordingly, it is important that these are addressed immediately as the NWRS 2 states.

5.5 Source Directed Measures and Water Pricing

Source directed measures seek to define the limits and constraints that must be imposed on the use of water resources to achieve the desired level of protection.[490] These measures include the licensing of water use and placing conditions on water use.[491]The NWA provides for water licences to be issued in respect of certain water uses however, the issuing of these licences is intended to be based on the RDMs but as seen above these are very poorly implemented. Accordingly the Preliminary Reserve was adopted so that applications for

[486] J, King. H, Pienaar. (note 474 above; 106).

[487] Department of Water Affairs and Forestry. Draft NWRS 2, Chapter 6. Available at http://www.dwaf.gov.za/nwrs/LinkClick.aspx?fileticket=0o33BVUosjQ%3d&tabid=72&mid=435. Accessed 20/11/2012.

[488] Ibid.

[489] Department of Water Affairs and Forestry. Draft NWRS 2, Chapter 8. Available at http://www.dwaf.gov.za/nwrs/LinkClick.aspx?fileticket=hc8Wl7kdjh8%3d&tabid=72&mid=435. Accessed 20/11/2012.

[490] Ibid (note 6 above; 56).

[491] Ibid.

water licences would not be held back.[492] This is a particular problem in respect of IWRM because the formulation of the Preliminary Reserve does not necessarily take into account a 'catchment-wide view of water demand and supply or of all biodiversity and social issues'.[493] These are considerations that are at the core of IWRM and for them to not be taken into account in the management of freshwater resources is denying the holistic management of the resource. Accordingly, until the Reserve is fully established this aspect of IWRM implementation will remain poor.

Another major problem with the current situation is that the NWA allows for existing lawful water use,[494] this essentially means where a person lawfully used water in a two year period before the commencement of the Act then such a person may continue to use this water until such time as it can be converted into a licence.[495] This provision was intended to bridge the gap between the old legislation and the NWA, however in terms of IWRM implementation it hinders the ability of the government to control water use to ensure that it is used sustainably and in accordance with IWRM principles.

One of the core principles of IWRM as seen above was to regard water as an economic good. The NWA and the NWRS provide for this in their sections on water pricing. The NWRS provides for water use charges for all water uses, for consumptive use and to discharge effluent into water.[496] It further states that charges may be different for various different sectors,[497] for charges for collecting and disbursing revenue,[498] charges for funding water resource management[499] and so on. Charging users for water use (especially in industry, mining and agriculture) means that water becomes treated as an economic good, as directed by IWRM. However, it must be of sufficient value to have any effect on the management of water.

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[492] J, King. H, Pienaar. (note 474 above; 106).

[493] J, King. H, Pienaar. (note 474 above; 91).

[494] Ibid (note 269 above; s22(1)(a)(ii)).

[495] Department of Water Affairs; How Do We Determine the Extent of Existing Lawful Water Use. Available at http://www.dwaf.gov.za/WAR/determine.aspx. Accessed 23/09/2012.

[496] Ibid (note 6 above; 84).

[497] Ibid (note 6 above; 85).

[498] Ibid.

[499] Ibid (note 6 above: 86).

It was mentioned above that water pricing is a necessary part of IWRM[500] as it has the effect of placing value on water which may translate into it being used more conservatively and efficiently. However, it is important to note that water is also necessary for life and development and its pricing must also take into account water that is necessary for basic life.

The draft NWRS 2[501] indicates that the value of freshwater resources is still a problem today and that it has not been effectively implemented.[502] It does so by stating that 'there is an insufficient appreciation of the value of water, the challenges of the water situation, and the effort required to make water available on a sustained basis'.[503] It goes on to state that the absence of sufficient value can be seen in the manner in which water is wasted, polluted and degraded.[504] This can be seen from the section relating to South Africa's water management challenges above.[505] The fact that water in 2012 is still not valued sufficiently means that current water pricing policies are not being implemented according to the NWA and the NWRS as mentioned above which indicated the need to address water pricing issues so that water would have a particular value.[506] Water charges may be particularly important for those water users who use large quantities or significantly contribute to the pollution of water resources. If South Africa is to effectively implement its inclusion of IWRM then it must engage in placing a value of freshwater through pricing and water allocation. Currently agriculture uses 60 percent of South Africa's freshwater, and contributes significantly to the pollution problem in South Africa through the introduction of nutrients into water.[507] Accordingly, it seems that if South Africa is to address the problem of water use and pollution, addressing agricultural and irrigation techniques may be a good place to start.

[500] Ibid (note 162 above).

[501] Ibid (note 470 above).

[502] Ibid (note 487 above).

[503] Ibid.

[504] Ibid.

[505] See above discussion relating to water management challenges.

[506] Ibid (note 6 above).

[507] Ibid (note 6 above; 20).

5.6 Implementation of Waste provisions Relating to IWRM

As seen above the control of land based pollution is important for the protection of freshwater resources.[508] NEMWA is a relatively new piece of legislation and there are already concerns about the prospects of realising full implementation of this Act,[509] this as a result of lack of capacity and service delivery of many municipalities.[510] This combined with the current lack of implementation of the Act does not bode well for the effective management of waste on land, which is important in the achievement of IWRM. One simply has to look at the state of South African rivers to realise that the new Waste Act has not yet been effective in dealing with waste on land or solid waste. This can be seen by the large quantities of refuse in many urban rivers.

5.7 Implementation of Conservation Provisions Relating to IWRM

As mentioned above there are a number of conservation related provisions that may have an influence on the protection of freshwater resources, one being the National Biodiversity Framework (NBF).[511] The NBF has been established in terms of section 38 of NEMBA., it identifies that one of the major pressures on South Africa's biodiversity is the 'over-abstraction of freshwater resources',[512] accordingly it provides for integrated management of terrestrial and aquatic ecosystems.[513] This type of management is exactly the type of land and water based management that IWRM calls for and is another excellent paper based implementation of IWRM. However, many of the tasks listed in these strategic objectives have not yet been fully implemented, such as the regulations relating to alien and invasive species.[514] Thus, although these are objectives in terms of biodiversity management, they are good steps to be taken towards IWRM however they are currently not being well implemented.

[508] Ibid (note 2 above).

[509] M, Kidd. (note 19 above; 189).

[510] Ibid.

[511] GN 813 in GG 32474, 03/08/2009.

[512] GN 813 in GG 32474, 03/08/2009; 9.

[513] GN 813 in GG 32474, 03/08/2009; 14.

[514] M, Kidd. (note 19 above; 108).

It was also mentioned above that the under NEMBA the minister could establish lists for threatened or protected ecosystems; thus far only terrestrial threatened ecosystems have been listed.[515] This does provide some support for IWRM in as far as water and land resources are inextricably linked but it does not provide for the protection of freshwater resources directly. It is stated that future phases of the listing process will contain listings of threatened freshwater ecosystems, [516] which will go a long way in helping to protect aquatic environments.

It appears that like the water sector, the biodiversity management sector also struggles to implement much of its provisions, especially those relating to aquatic protection. Accordingly at present they have little impact on the holistic management of freshwater resources although they could potentially make a significant contribution in this respect.

5.8 Implementation of Mining Provisions Relating to IWRM

Many of the mining provisions relating to IWRM related to factors that should be taken into account when granting mining permits (including prospecting).[517] It was seen above that legislation, in particular the MPRDA, contained many environmentally related principles.[518] NEMA also contains provisions which relate specifically to mining.[519] Accordingly, without going into every decision it is difficult to assess whether mining and regulations have been specifically promulgated to deal with mining and the use of freshwater resources. Accordingly one would expect that mine water is well regulated and that decision making in respect of mining take into account well established environmental management principles.

However, if one looks at the recent dune mining authorisation given to Exxarro KZN Sands for a proposed mining operation in Mtunzini[520] it is clear that environmental considerations are not being integrated into decision making and mining operations. The proposed mining

[515] South African National Biodiversity Institute; Threatened Ecosystems. Available at http://biodiversityadvisor.sanbi.org/threateco/index.asp. Accessed 27/09/2012.

[516] Ibid.

[517] See above discussion on mining legislation.

[518] Ibid (see note 407 above).

[519] For example section 24 of NEMA.

[520] T, Carnie. Dune Mining Approved Despite Toxicity. Available at http://www.iol.co.za/news/politics/dune-mining-approved-despite-toxic-worry-1.1345590#.UGBA7rIgdLk. Accessed 27/09/2012.

operation was situated 100 meters from a town of Mtunzini and adjoins with the Umlalazi Nature Reserve.[521] In its authorisation DEAT acknowledged that the mining operation will have detrimental effects on the environment and the people of Mtunzini.[522] Here it clearly does not seem that the required considerations relating to environmental management have been taken into account, instead it appears that economic considerations are the driving force behind mining decisions. There are many other examples of mining authorisations which have not had due regard to environmental protection as stipulated under the aforementioned legislation.

Mining operations are almost always subject to water use authorisations in terms of the NWA and relevant regulations, however it appears that at present there are many mining operations operating without water use licences.[523] In 2010 a parliamentary question showed that 125 mines operated without a water use licence,[524] this was reduced to 69 mines in 2011 and to 46 in 2012.[525]Although it appears as if progress is being made in this regard it shows that in conjunction with the aforementioned permitting issues there are also compliance and enforcement problems associated with mining and water use. On this note it would be interesting to assess the extent to which mines are complying with their operational conditions and rehabilitation procedures as they affect water and the environment through acid-mine drainage.

A recent case relating to mining and environmental issues was the case of Maccsand *(Pty) Ltd v City of Cape Town and Others*.[526] Although this case did not relate to water it does make some important points which are relevant to water resources management. In this case

[521] Ibid.

[522] Amended Final Basic Assessment Report; Construction of the Fairbreeze Mine and Related Activities. Available at. http://www.acerafrica.co.za/index.php?option=com_docman&task=doc_download&gid=3176&Itemid=9. Accessed 20/11/2012.

[523] G, Moran. More Than 100 Mines Operating Without Water Licences. Available at http://www.environment.co.za/poisoning-carcinogens-heavy-metals-mining/more-than-100-mines-operating-without-water-licences.html Accessed 27/09/2012.

[524] Ibid.

[525] G, Moran . South Africa: Forty Six Mines Operating Without Water Licences. Available at http://allafrica.com/stories/201208300842.html. Accessed 27/09/2012.

[526] Maccsand *(Pty) Ltd v City of Cape Town and Others* 2012 (4) SA 181 (CC).

the first issue was whether persons granted a mining permit in terms of the MPRDA are entitled to undertake mining operations without authorisation in terms of any Land Use Planning Ordinances. (LUPOs)[527] The second issue in this case concerned whether a person who holds a mining right in terms of the Minerals and Petroleum Resources Development Act[528] (MPRDA) is entitled to commence mining operations without obtaining authorisation in terms of NEMA's EIA regulations.[529] On the first issue the Constitutional Court essentially held that mining operations must comply with zoning laws, such as relevant provincial LUPOs, before engaging in mining activities.[530] From this one can see that land use planning laws are important in ensuring that environmental concerns (especially relating to water) are taken into account when rezoning as they have the potential to ensure that the environment, including freshwater resources are treated in a sustainable manner.

Regarding the second issue, the Constitutional Court refused to pass judgment due to the facts of the case.[531] However, the Court did provide insight into the relationship between the MPRDA and NEMA.[532] The Court stated that both Acts seek to achieve the promotion of the environmental right in the Constitution.[533] The Court explained that there are provisions in both Acts which provide for consultation between departments, especially on proposed environmental management plans (EMP's).[534] The Court then highlighted NEMA's provision for integrated environmental management which requires authorisation to be applied for before certain listed activities may be undertaken.[535] When making such lists NEMA requires a competent authority to be identified in respect of each listed activity.[536] NEMA provides that the competent authority in respect of mining activities should be the Minister of Mineral Resources,[537] meaning he or she will have authority to grant or refuse EIA applications in

[527] In this case the Land Use Planning Ordinance 15 of 1985 (C).

[528] Minerals and Petroleum Resources Development Act 28 of 2002.

[529] Ibid (note 527 above; [1]).

[530] Ibid (note 527 above; [40]- [50]).

[531] Ibid (note 527 above; [53]).

[532] Ibid (note 527 above; [8]).

[533] Ibid (note 527; [8]).

[534] Ibid (note 527; [8]-[9]).

[535] Ibid (note 527; [10]).

[536] Ibid (note 527; [11]).

[537] Ibid (note 527; [11]).

respect of mining activities.[538] Importantly the Court went on to state that NEMA requires that a competent authority (in this case the Minister of Mineral Resources) to comply with NEMA and take into account various factors regarding the protection of the environment.[539] Lastly the Court states that NEMA provides extensively for co-ordination and consultation between government departments such as the department of Mineral Resources and the Department of Environmental Affairs. [540] This encourages co-ordinated, integrated environmental management and development.[541] The Constitutional Court makes it clear that mining activities are subject to NEMA and its regulations in respect of EIA's, meaning that where a mining activity is listed such an activity can only be commenced with authorisation in terms of NEMA.

The *Maccsand* case indicates that although mining is an important economic activity in South Africa it must comply with other relevant laws such as NEMA, the NWA and other relevant legislation. This case is important as it states that mining, as with any activity, is subject to all relevant legislation regardless of whether it has sector specific laws governing its practice. This is not only important in the context of mining but relates to any activity which is regulated by sector specific legislation such as the MPRDA.

As explained above mining often results in acid-mine drainage (AMD). [542] AMD is a particular problem in extensively mined areas such as Gauteng[543] and Mpumalanga.[544] The presence of this problem in the major mining centres shows that in previous years, and even today the mining sector is not implementing IWRM effectively. If IWRM had been implemented effectively in the past and looking to the future the problem of acid-mine drainage would have been avoided and minimised. Looking into the future it is important that the mining sector takes measures to ensure that the problem of AMD is avoided and reduced.

[538] Ibid (note 527; [11]).

[539] Ibid (note 527; [11]).

[540] Ibid (note 527; [13] [14]).

[541] Ibid (note 527; [14]).

[542] C, Bosman. M, Kidd. (note 33 above; 639).

[543] Ibid (note 110 above).

[544] Carolina Residents to Get Clean Water, Court Rules. Available at http://www.wrc.org.za/News/Pages/CarolinaresidentstogetcleanwaterE2%80%93theCourtrules.aspx . Accessed 27/11/2012.

In addition to this it is important, not only that future AMD is prevented, but also that current problems are addressed through various measures.[545]

5.9 Sanitation

It has already been noted that many of South Africa's freshwater systems are polluted by various pollutants.[546] One major contributor to freshwater pollution in South Africa is the lack of adequate sanitation.[547] According to the Constitution[548] and the WSA[549] there is a duty on the state to provide adequate sanitation to the people of South Africa. In 1997 it was estimated that 20 million people did not have adequate sanitation and although this position has improved, there still remains problems with sanitation today.[550] In 2005 ten percent of the population relied on a bucket toilet or had no sanitation.[551]In addition to this South Africa's 2012 Green Drop Report displayed that there are a substantial amount of wastewater treatment plants at critical risk and high risk and that up to 75 percent of South Africa sewage plants are not up to standard.[552] This essentially means that the WSA's provision of the right to access to, *inter alia*, adequate sanitation is not being implemented effectively. The reason for the poor implementation of sanitation legislation perhaps lies in the cost of building and maintaining wastewater treatment plants. Although South Africa does have a good infrastructure generally, they are primarily a product of apartheid and thus are predominantly aimed at providing sanitation for urban white people.[553] In conjunction with this South Africa has failed to continue upgrading and expanding existing infrastructure to meet the growing

[545] See D, Johnson. K, Hallberg. 'Acid mine drainage remediation options: a review' (2005) 338 *Science of the Total Environment* 3 – 14.

[546] See above on section on water pollution.

[547] Ibid (note 6 above; 8).

[548] Ibid (note 204).

[549] Ibid (note 207; s2(a)).

[550] M, Kidd. 'Poisoning the Right to Water in South Africa: What Can the Law Do?'.Available at http://cer.org.za/wp-content/uploads/2011/11/UNE-Paper-Kidd-Final-20110408.pdf. Accessed 27/12/2012.

[551] Ibid.

[552] 2012 Green Drop Progress Report. Available at http://www.ewisa.co.za/misc/BLUE_GREENDROPREPORT/GreenDrop2012/GreenDrop2012_Intro_Background.pdf . Accessed 25/11/2012.

[553] Ibid (note 550 above).

population and urbanisation.[554] The lack of implementation can be seen from the high *e.coli* counts in many rivers in South Africa.[555]

5.10 Conclusion

Although South Africa does have a comprehensive set of laws and policies which provide for IWRM, implementation of these laws and policies seems to be a particular problem. Much of South African water and environmental law, particularly the NWA, is yet to be fully implemented. South Africa's lack of IWRM implementation ranges from the lack of holistic considerations in environmental decision making, to the failure to effectively carry out resource directed measures which are seen as the foundation of South Africa's freshwater resources management, to the almost non-existent implementation of CMAs, to the lack of implementation of waste and conservation legislation relevant to freshwater resources, to the lack of sustainable agricultural practices which result in pollution and to the lack of sustainable mining practices. As seen above the problems surrounding IWRM are not exclusively ground level implementation problems. There are also problems with paper based implementation such as the putting into place of guidelines, policies, strategies and classification documents which inevitably cause the overall ground level implementation of IWRM to become stagnant. Although the DWA says that it is on track in respect of some of these failures, it is clear that IWRM is not being achieved in practice. Some of the reasons for the lack of implementation can be attributed to decision making and the failure to put into place necessary structures. However, IWRM implementation also requires sufficient resources and people with necessary skills, which are ever present problems in South Africa. South African water management woes can also be attributed to poverty and lack of education.

[554] Green Drop Report Released. Available at http://www.watersolutions.co.za/2010/04/29/green-drop-report-released/. Accessed 28/11/2012.

[555] High E.Coli Count Found in Durban Rivers. Available at http://www.iol.co.za/news/south-africa/high-levels-of-e-coli-found-in-durban-rivers-1.387585#.ULXJluSbOsE. Accessed 27/11/2012.

6. CONCLUSION

South Africa faces significant challenges in respect of freshwater resources management; accordingly it must protect and manage its freshwater in a manner which is sustainable. In an attempt to achieve effective and sustainable management of its freshwater resources South Africa has chosen to adopt a policy of integrated water resources management;[556] this is evident from an assessment of South African law and policy relating to environmental management and the management of freshwater. As pointed out above, its inclusions of the various elements and characteristics are comprehensive, even providing for strategies for the achievement of IWRM,[557] which is reminiscent of the manner in which Agenda 21 dealt with the concept of IWRM.[558] Accordingly South Africa's inclusion of IWRM is impressive. If anything it could be said that South Africa's inclusion of IWRM is too advanced for South Africa's means at present.

However, as seen above the implementation of South Africa's freshwater management policy, and many relating environmental laws, has not been effective. The NWA and the NWRS especially, are not close to realising full implementation, this is problematic as these are primary tools in South Africa's IWRM inclusion. One of the largest failures in terms of IWRM implementation is the operationalisation of CMAs which as seen above are at the core of IWRM and South Africa's water management policy. Thus without effective implementation of these institutions it seems that South Africa will continue to fail to successfully implement its provisions and policy relation to IWRM. CMAs, as seen above are not the only area of South Africa's failure to implement IWRM; instead there are a multiplicity of factors contributing to the lack of implementation. The implementation failures of South African water law and policy indicates that South Africa's IWRM achievements for the time being are predominantly limited to paper.

[556] This is evident from the inclusion of IWRM in South African water law and policy.

[557] Evident from the inclusion of IWRM in the NWRS as seen above.

[558] Ibid (note 2 above).

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UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

21 November 2012

Mr Gareth Edward Mauck 208503662
School of Law
Pietermaritzburg Campus

Dear Mr Mauck

Protocol reference number: HSS/1246/012M
Project title: The Inclusion and Implementation of IWRM under South African water law and policy

EXPEDITED APPROVAL

I wish to inform you that your application has been granted Full Approval through an expedited review process.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number. Please note: Research data should be securely stored in the school/department for a period of 5 years.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

.....
Professor Steven Collings (Chair)

/pm

cc Supervisor: Michael Kidd
cc School Admin.: Mr Pradeep Ramsewak

Professor S Collings (Chair)
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