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MASTER OF SCIENCE

RESEARCH REPORT (CW/RR)

Does environmental data disclosure drive environmental performance? A case study of water consumption in gold mining in South Africa

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A Research Report submitted to the Faculty of Science, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Master of Science.

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Declaration

I declare that this research report is my own, unaided work. It is being submitted for the Degree of Master of Science at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.

_____

(Signature of candidate)

_____ day of _____ 20 _____ in _____

Abstract

There are various sustainability reporting guidelines that companies can comply with to disclose information to understand their environmental performance. Some guidelines like the Global Reporting Initiative (GRI) may be a requirement for listed companies while other guidelines may be voluntary. While these guidelines are noted for reporting purposes, the inherent benefit will be to therefore manage and reduce impacts as they are being measured.

Therefore, this research was to verify whether the disclosure of annual environmental information led to improved environmental performance over a 5-year period. The specific data that were analysed were consumption and recycling of water from two gold mining companies in South Africa.

Through the perusal of published data, the data were tabled, graphed and trends analysed. It was deduced that there was a relationship between environmental disclosure and environmental performance as the performance of the company could be evaluated based on the disclosure of environmental data. There had also been an improvement in the quality of data and more importantly in the environmental performance in the companies selected which was driven by the disclosure requirements for each reporting guideline. The improvement in the readability of the reports over the 5-year research period was also noted and the information disclosed was extensive in the aim to meet the various guideline requirements.

From the interview process, it was clear that reporting to different guidelines is a lengthy process and for that the International Council on Mining and Metals water guideline was the most preferred option for both mining companies. The information was tedious to collect but the understanding and willingness to be as transparent as possible was noted. Both companies listed data to highlight the variances but noted that improvement was driven from their respective operational mining sites.

While the relationship was demonstrated to be positive between the environmental disclosure and environmental performance, significant improvement in the water data published was not found. There would need to be a stronger focus on objectives and targets as required by the CDP water questionnaire and the ISO 14001 management system to drive environmental improvement that has an impact on the natural surroundings.

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Abbreviations

CDP Water	Carbon Disclosure Project Water
CEO	Chief Executive Officer
CWM	CEO Water mandate
ICMM	International Council on Mining and Metals
GRI	Global Reporting Initiative
UNGC	United Nations Global Compact
MCA-WAF	Mineral Council of Australia Water Accounting Framework

Chapter 1: Introduction

Sustainability disclosure is on the increase where business reports on environmental, social and economic data. The data encompasses that which are crucial to the business operations in terms of materiality and stakeholder expectations.

One of the motivations for disclosure of environmental indicators are that this will encourage companies to understand their performance and assist in setting objectives and targets (GRI, 2015). Therefore, sustainability reporting is to encourage continual improvement over time.

However, after approximately 20 years of the Global Reporting Initiative (GRI) reporting, there are still questions about whether and how the environmental reporting influences environmental performance and many criticisms of the GRI reporting format have emerged. There are arguments that indicate the report is not a holistic view of environmental performance and that issues of concern cannot be measured (Gürtürk & Hahn, 2015).

Evidence of this are the number of top environmental reporters that have major lawsuits against them for environmental legal non-compliances. For example, in South Africa the following listed companies, praised for their reporting, also had significant environmental breaches (Dasnois, 2015):

- Lonmin which has many environmental non-compliances and have repeated offences;
- ArcelorMittal omitted criminal investigations from the Department of Environmental Affairs regarding operations at the Vanderbijlpark and Vereeniging plants in their report;
- DRDGold which has numerous environmental non-compliances to legislation and to permits;
- Harmony Gold that was found to be guilty on several charges of spillages and high dust emissions.

Mining, specifically gold mining has many environmental impacts. One significant environmental impact is the high consumption of water resources. The current state of the South African water resources is of concern. South Africa shares river basins with surrounding countries and 4 of these are under severe pressure as each country aims to increase their economic status and meet societal requirements (Ashton *et al.*, 2008). In addition, the concerns from the past in South Africa are to address the basic need for access to water and to ensure development occurs in a sustainable manner. This was due to the previous stance of mining, specifically gold mines, which were given rights to access water and dispose of it without stringent control as the priority was to maximise profits (Adler *et al*., 2007).

Gold and coal mining are regarded as a substantial threat globally and specifically to South Africa's freshwater systems due to the impacts of acid mine drainage (Ochieng *et al*., 2010). Therefore, the concern in the aspect of water is related to quantity and quality which affects human health and food security. It is evident that as the aspect of water is of global and national importance, reporting on the use of and impact on water resources becomes critical for sustainability. However, there are reporting tools that can be utilised for ensuring transparency and accuracy of water indicators.

This study therefore aimed to assess this relationship between environmental reporting and environmental performance, focussing on the environmental aspect of water in two South African gold mining companies. Water is a material issue in the mining sector and a specific concern in South Africa, a semi-arid country. Improved water management may thus be a consequence of various drivers, reporting being just one, hence the focus of this research.

1.1 Aim, objectives and research questions of this study

The aim of this study was to assess whether there is a relationship between environmental reporting/disclosure and performance, using the case study of water consumption for two gold mining companies in South Africa.

This research is based on the premise that the reporting tools and the process to gather and disclose information is adequate. It will not question the quality of the tools, but rather focus on that data that is disclosed and if improvement in environmental performance is noted. It is acknowledged that this may be a limitation of this study. However, it is felt that the tools and standards used to disclose environmental data are robust and have been in place for several years. These reporting reports are reviewed and updated regularly. They are utilised by many global companies and recognised by a number of institutions, such as the United Nations Global Compact and stock exchange listings.

Therefore, the objectives of the study were to:

1. Understand the various tools used to disclose environmental information and how these are used to disclose water data;

2. Assess whether, and how, disclosure drives environmental performance.

To ensure the objectives were adequately addressed, the following research questions were formulated:

1. What are the reporting tools that are available for the disclosure of water data and are the two gold mining companies disclosing their water data in accordance to these tools?

2. Was there an improvement in water consumption and water management activities reported by the two companies between 2013 - 2017?

3. How do the employees responsible for water management and/or reporting at various levels within the company perceive the relationship between environmental disclosure and environmental performance?

These questions were answered in the Results section and further elaborated on in the Discussion section of this study.

1.2 Research Focus

Companies have included environmental and social data in their financial reporting from a GRI perspective since 1999. The GRI has developed over years

to standardise the data and provide a holistic view of the company in an integrated manner. The current version of GRI 4 is being used globally together with other guidelines for disclosure of environmental data and specifically water.

Due to rapid growth of environmental reporting, there has been concerns in implementation due to different criteria and methodology (Siew, 2015) .From a mining perspective, companies are aligning to the GRI reporting tool in order to conform to other requirements, such as those of the International Council on Mining and Metals (ICMM). This is despite gaps in information and methodology problems. GRI has encouraged verification of the reports to ensure accurate data however auditors are unable to rectify misinformation like optimistic statements and incorrectly aggregated data (Fonseca *et al.*, 2014).

The GRI is currently in its 4th revision with a current revision underway. This guideline has clearly gone through a metamorphosis over time and depicted and also highlights that there were concerns for these revision processes to have been initiated. The GRI is considered to be a generic reporting guideline and does not provide financial analysts with the information that is required for varying sectors. This was compared to the CDP reporting guideline which is more focussed (Levy *et al.*, 2010).

The comparison could be as CDP initially was focussed on energy and was broadened to include water questionnaires. The origin of the CDP is also due to the initiation of investors highlighting the dissatisfaction of the GRI. The inability of the GRI 4 to integrate indicators and disregard for temporal orientation is of concern specific to the mining sector. This is due to the promotion of consideration of effective legacy effects and it is predicted to be addressed in future revisions of the GRI (Fonseca *et al*., 2013).

Despite these concerns, this research aims to understand only if there is a relationship between environmental disclosure and environmental performance and if such disclosure drives enhancements/improvements in environmental performance. The quality of the reporting tools will not be assessed further.

1.3 Methodological approach

This research focussed on gold mining only as access to information was available and due to the size of the project. This is a representative sample of the gold mines in South Africa as two of the four JSE listed companies is included in the study. The findings of this research however are not limited to gold mining and will be applicable to other commodities. The aspect of water was considered for this study due to the additional information available from the CDP as well as the consideration that South Africa is a water scarce country. While water was assessed for this research, other environmental impacts can be reviewed over time to understand environmental performance. The data was collated from Annual Reports and CDP water submissions for a 5-year period. Interviews were also held with employees that were responsible for submitting and collating the information. Ethics clearance was obtained from the University of Witwatersrand's Human (non-medical) Ethics Committee (clearance number HA1807).

1.4 Layout of research report

The chapters of this report were structured to follow the aims and objectives of the report and include data in the chronology in which it was obtained.

Chapter 1 included an introduction to the study as well as the aims and objectives of the research.

Chapter 2 provided the literature review, which highlighted the growing global trend towards environmental disclosure, the existing guidelines for environmental disclosure and concerns around these guidelines. These concerns related into environmental disclosure versus environmental performance and the comparability of environmental performance between the companies.

Chapter 3 summarised the methodology used for this research and Chapter 4 presented the results obtained.

Chapter 5 included a Discussion in terms of the results and answered the research questions, objectives and aim of the study. Finally, Chapter 6 provided

recommendations for future research in determining the role of environmental disclosure for promoting improved environmental performance.

A reference list follows the last chapter, and appendices are found at the end of this research report. Figures and tables are numbered consecutively throughout the report.

Chapter 2: Literature Review

2.1 Growing trend towards environmental disclosure

Sustainability reporting is voluntary however there is increased pressure worldwide towards understanding environmental impacts and the broader social responsibility, in addition to the financial performance (Farooq & De Villiers, 2018 & Crowther, 2017).

As sustainability reports are the most publicized documents, environmental disclosure is included in these reports and there has been an increase in such disclosure over the past 2 decades (Jenkins & Yakovelva, 2006). Despite this, companies do not provide much environmental data as the focus is qualitative rather than quantitative (Jenkins & Yakovleva, 2006). As a company increases its maturity in terms of environmental disclosure, there has been separate environmental reports; thereafter health, safety and environmental reports and currently sustainability reports which includes environmental, health, safety and the social aspects of the organisation (Jenkins & Yakovelva, 2006).

A study of global companies in 2010 included various developing and developed countries highlighted that environmental disclosure has not only increased but the level of information has also increased in terms of inclusion in sustainability reports over the last few years (Junior, *et al*., 2014). It is important to understand that how the various environmental disclosure guidelines have grown from a statistical point of view. The institutions that govern and promote such guidelines publish such information online to encourage further disclosure to their respective format.

Th 2030 Agenda for Sustainable Development was proposed by the United Nations and all member states adopted the 17 sustainable development goals (SDGs) to ensure preservation of humans and the planet Earth (UN, 2019). The SDGs that are environmentally related and are:

- SDG 6 – Clean water and sanitation;
- SDG 7 – Affordable and clean energy;
- SDG 12 – Responsible consumption and production;

- SDG 13 – Climate action;
- SDG 14 – Life below water;
- SDG 15 – Life on land.

Countries and companies within the United Nations' member states promotes and derive projects with these SDG's as outcomes and reports on progress. According to UN (2019), the global population having access to clean drinking water has increased from 61 percent in 2000 to 71 percent in 2015. In addition, UN (2019) reported that from 172 countries, 80 percent have better water resource management and this performance is due to donors from governmental and private companies.

The GRI has reported (as at 21 August 2017) that the number of sustainability reports produced in 1999 was merely 12 and this increased to 6 248 in 2016 (GRI, 2018). This has also resulted in an increase in the number of companies using externally independent parties to assure their sustainability reports (KPMG, 2011). A study undertaken between the Fortune Global 100 indicated that while sustainability reporting has increased over time globally, the assurance percentages did not increase. Further, that the quality of the data can thus be regarded as questionable in conjunction with other statements in the reports (Junior *et al*., 2014 & Braam *et al, 2016*).

An analysis of GRI sustainability reports from 1999 to 2011 looked at various sectors and their adoption of the GRI guideline. It was found that the energy sector disclosed in terms of the GRI due to their high pollution impacts, visibility and presence in the international market while the financial sector preferred the GRI to restore the credibility of the market and attract new investors (Alonso-Almeida *et al*., 2013). The GRI is the most widely used sustainability reporting guideline (Brown *et al*., 2009; Levy *et al*., 2010).

The International Council on Mining and Metals (ICMM) water guideline was published in March 2017 hence one cannot compare the rate of increase of disclosure. However, it must be noted that there are 27 members in 2018 and all members are required to report on these water indicators (ICMM, 2018). Assurance

is also required by the ICMM by the member companies where an Assurance procedure has been published.

The Carbon Disclosure Project (CDP) water template requires certain information to be disclosed and annually a report is produced to collate the data from a global perspective. For the research period, the number of companies that completed the information increased from 1 432 in 2013 to 2025 in 2017. The completeness and progress of time is also scored and rated and there was an increase from 25 companies achieving a 'A' rating to 74 (CDP, 2013 & 2017). The CDP rating is a point-based system according to the responses from companies. This is achieved through a scoring methodology for companies to be classified from Disclosure, Awareness, Management and finally Leadership as the highest level which is rated 'A' (CDP, 2019).

The increase in reporting in CDP water and the rating system highlights also that it is just not about reporting all information but that environmental performance i.e. water objectives/targets and programs are initiated and improved over time. Again, the rise in disclosing environmental information can be noted from a CDP water perspective (CDP, 2013 & 2017).

The Chief Executive Officer (CEO) water mandate (CWM) is a subscription organisation. It does not require data to be disclosed in detail as that to the GRI and CDP water guidelines. There are no separate sustainability reports that are being produced however the website is updated on endorsing companies and the year that they subscribed. It was therefore accessible to verify the increase over the research period. The increase was significant where there were only 81 endorsing companies in 2013 and this rose to 138 endorsing companies in 2017. As an update, there were 8 more companies that subscribed in 2018 leaving the total number of endorsing companies to 146 (CWM, 2018).

Sustainability reports are aimed at improving the businesses reputation by highlighting their transparency of accurate data and internal environmental measurement processes to exert management control where required. Therefore, verified data allows for integration into decision making and management strategies (Gùrturk and Hahn, 2016). This is important to take into consideration when the

organisation sets objectives and progress made to highlight improvement on the previous years' performance.

From the above statistics for each guideline, there has been a significant growing trend towards environmental disclosure, specifically water and this is very likely to continue in the future. This will be as the need for limited resources grows with increased production, competition with other companies, investment requirements and the support from communities.

2.2 Guidelines for environmental disclosure

2.2.1 GRI G4

The GRI G4 guidelines will be discussed as it is the most common reporting used globally (Levy *et al*., 2010) and the two companies' sustainability reports used in this research are in line with it. Most data will be extracted from these sustainability reports to demonstrate environmental reporting and performance over time.

GRI G4 highlights the need for transparency in all data in order to understand the performance and strategic direction of the organisation. It considers the environmental, economic and social aspects to provide stakeholders the opportunity to understand the sustainability of the business (GRI, 2013).

The water aspect is merely one consideration under environmental (GRI, 2013). Reporting on water metrics and the choice of these metrics are dependent on the materiality (importance) of it.

Companies undergo a materiality assessment that highlights the significant environmental risk and impacts experienced. In addition, any specific concern that any stakeholder is documented to be reported on. Thereafter, a decision is taken on whether to report on 'Core' elements which are key elements of the sustainability reporting or the 'Comprehensive' option which builds on the Core reporting (GRI, 2013). However, the difference is that there is more information requiring to be disclosed and this would be the elements such as strategy and analysis which will be able to provide a more detailed understanding of the operations (GRI, 2013).

The fundamental difference from a reporting perspective is that the Core option allows for selection of only one indicator for a material aspect such as water whilst the comprehensive option require all indicators in the guidelines to be reported on. While the aspect of water in the guideline only includes 3 indicators, a broader perspective of direct and indirect impacts on water will include further aspects and therefore indicators (GRI, 2013).

There are 2 types of assurance i.e. reasonable assurance (providing a high confidence level) but not absolute and limited assurance (smaller scope) (GRI, 2013). The difference is also in the intensity of the auditing of the data. Such assurance can be provided by specialist consultants or accounting firms. Assurance, especially where it can be declared as reasonable, are regarded as more satisfactory for sustainability data if such assurance is provided by an accounting firm (Hodge *et al*., 2009).

2.2.2 CEO Water Mandate

The CEO Water Mandate, launched in 2007, as part of the United Nations Global Compact (UNGC), focuses on the reporting improvement of water risk management. Companies that endorse (join) the mandate must be signatories of the UNGC. Continuous progress of the following six elements must be demonstrated: Direct Operations, Supply Chain and Watershed, Collective Action, Public Policy, Community Engagement and Transparency as well as a commitment to the adherence to the mandate (CWM, 2018).

The CWM is not as widely used as the GRI (CWM, 2018: GRI, 2018). This was highlighted earlier in this section where online published statistics and the number of companies conforming to each disclosure guideline were highlighted. Compliance to the above CWM requirements is generally included in the Sustainability Reports that complies with GRI.

2.2.3 CDP Water

The CDP Water reporting tool, launched in 2009, is aimed at reducing environmental impact and risk through reporting of information on a questionnaire. The list of questions is aimed at understanding the operations water management strategy and plans. The reporting framework was initiated by investors and participation is via a request from the CDP water project however suppliers or clients can request that a company be included to participate (CDP, 2013).

There is a response required in terms of objectives and targets and this is monitored over time that the objectives are met. The following reporting year will therefore require another objective and target to be set and this is one of the ways in which progress over time is monitored and required by the reporting guideline (CDP, 2013).The approach that the CDP has undertaken is that as a company moves from the Disclosure bracket to Leadership, it highlights that via the responses the company is committed to environmental stewardship and improving environmental performance. Lastly, top management involvement is vital to the success of management of such impacts as this is the level where approval of capital and human resources is allocated. The methodology therefore aims for improvement over time as a company discloses information and the maturity level of the company from a performance perspective increase (CDP, 2013).

2.2.4 International Council for Mining & Metals

The ICMM is an international organisation that drives safety, fairness and sustainable development in the mining and metals sector. It strives through the collaboration of many role-players to strengthen the environmental and social performance of the sector (ICMM, 2017).

The ICMM water reporting guideline, published in 2017, is the latest tool for water disclosures. It considers that globally the threat of water availability is a reality and the aim to reduce risk specifically in the mining and metal industry. The ICMM water guideline is not merely a list of data but also includes the description and context of the mines which includes underground operations. It provides a broad perspective

on current scenario and that adequate instrumentation and methodology be utilised in collating data to ensure accurate data and analysis thereof (ICMM, 2017).

Appendix A of the guideline details the comparison to the other reporting guidelines: GRI G4, ICMM, CEO water mandate and the CDP water. The four water metrics required for disclosure are withdrawal, discharge, consumption and efficiency. There is a high degree of similarity between the reporting guidelines. The 2 disparities noticed are that the definition of consumption only does not correlate with GRI G4 and the efficiency is not considered in the CDP water questionnaire (ICMM, 2017).

2.3 Environmental disclosure versus environmental performance

Clarkson *et al*. (2011) highlights that there is a relationship between environmental performance and environmental disclosure. Their study concluded that there were companies that had a poor environmental performance that disclose more environmental information that is verifiable in comparison to companies that do perform well from an environmental perspective. They deduced that this is because of community pressure and to mitigate the negative reputation that is associated with their environmental performance.

This contrasts with an earlier study by Clarkson *et al*. (2007) that highlighted while there is also a relationship between environmental disclosure and environmental performance, there is greater environmental disclosure from industries that have a high environmental performance. It is however important to note this study and the advancements made over time in understanding the relationship between environmental disclosure and environmental performance.

Meng *et al*. (2014) describes how the high impact of environmental pollution incidents in China forced the government to issue regulations that forces industry to disclose environmental information as part of and to assist in regulatory control. Considering this change in legal framework, a study of 533 companies was conducted and no relationship was found between environmental disclosure and environmental performance.

It was further found that good performers disclosed more information that was material to highlight relevant data while poor performers also disclosed more

information but more on the softer issues which is typical of green washing of the companies (Meng *et al*., 2014). The emphasis again was the inability to determine the good performer versus the poor performer. There was also a category of mixed performance companies that was considered in the study. These companies published minimal data to comply with the regulations that require environmental information to be disclosed (Meng *et al*., 2014). A study of Swedish companies linked environmental reporting to improved environmental performance however noted that the market share of the companies reduced. This was explained as increased financial resources had to be allocated to ensure positive environmental performance (Hassel *et al*, 2005).

In Malaysia, there was focus on high quality environmental data that was disclosed and determined that these practices produced assured sustainability reports that was positively linked to environmental performance (Iatridis, 2013). Despite companies conforming to the reporting guidelines, there has been little reduction to the physical degradation to the natural environment (Iatridis, 2013). It was found that sustainability managers spend a large amount of their time on gathering the information. There are stringent deadlines and due to time constraints result in a working environment that is not conducive to dealing with improving the quality of data and therefore management of the natural resources (Kitsikopoulosi *et al*., 2018). The concern was the limited human resource capital to take reporting down to operations to ensure improved environmental performance. Therefore, trends can be identified and improved on however there seems to be a lack of top management commitment to drive this process (Kitsikopoulosi *et al*., 2018).

There is a reliance on the assurance process to dictate not just confidence in data but also environmental performance (Lyon & Maxwell, 2011). However, this does not occur and appears to be out of scope for the assurance process. The concern with not detailing the progress of the company in terms of sustainability progress from previous years during the assurance process provides an impression that sustainability issues are not transparent or accurate in the report. Furthermore, this is considered as greenwashing by the company (Lyon & Maxwell, 2011).

Objectives and targets are included as optional and therefore companies are merely exercising the decision to exclude it from the sustainability reports. The CDP water template however specifically requests for this to be filled out by the companies which is regarded as piece meal reporting and companies believe that environmental degradation/performance is not part of their daily tasks (Gear, 2014).

However, Adams (2004) highlights there is a greater need to improve accountability in the reporting of sustainability issues. This was determined whereby the study entailed the analysis of one company where sustainability reporting was reviewed over a 9-year period. The conclusion was that there was little correlation between environmental disclosure and environmental performance.

The ISO 14001 standard is a guideline for companies that want to implement an environmental management system. It was launched by the International Organisation for Standardization in Geneva in October 1996 and reflects a global consensus on improvement environmental management practices that is achievable to organisations globally and matched to similar situations e.g. the mining sector (Link & Naveh, 2006).

A survey amongst 107 multi-national companies conducted in 2002 highlighted that the preference to comply with the ISO 14001 (Environmental) Management Standard results in the better performance than the GRI (Levy & Brown, 2010). ISO 14001 is found to reduce negative impacts of business and improve environmental performance through standardisation and ensuring the requirements of the standard is part of the daily routine environmental tasks (Link & Naveh, 2006).

Comoglio & Botto (2012) discovered that ISO 14001 standards requires legal compliance as a minimum requirement as well as positive impacts on environmental improvement. There was also an increase in the number of companies that were committed to implementing ISO 14001 over time (Comoglio & Botto, 2012).

2.4 Comparability of environmental performance between companies

Despite externally independent verification, it is difficult to draw a distinct comparison between companies due to the complex nature of sustainability and thus environmental assurance (Perego, 2009). Thus, there are variations in the

conclusions and/or final recommendations of the assurance statements (Perego & Kalk, 2012).

However, some comparisons between companies suggest that sustainability disclosure still needs to show environmental improvement over time rather than merely disclosing data (Cho *et al*., 2015). While the GRI has gained momentum in terms of reporting of sustainability data, there has been concern from non-governmental organisations (NGOs) and investors. This is due to the difficulty of comparable data between companies and across sectors (Levy & Brown, 2010).

The CDP has also tried to reduce risks to assist investors to provide the information that is required. The concern with GRI is the framework in comparison to the CDP is a generic reporting tool and cannot provide the sector-specific comparison to make informed decisions (Levy & Brown, 2010)

2.5 Research gap in linking environmental reporting to environmental performance

With the list of environmental disclosure tools described and the current conflicting literature discussed in this Report, it is still unclear whether environmental disclosure is related to environmental performance.

Further literature reviewed data using only one environmental reporting guideline which was generally the GRI guideline and noted whether the performance was positive or not. It was not investigated if the company subscribed to more than one environmental reporting guideline.

Therefore, there is a need to understand the environmental disclosure guidelines that a company subscribes to in its entirety and note if there were any qualitative and quantitative environmental improvements over time.

Chapter 3: Methodology

3.1 Research Approach

To obtain significant information for this research, a case study into the aspect of water was conducted. A selection of the JSE listing's top 2 companies in the gold mining industry was undertaken to compare trends per company and with each other (Basov, 2017). It was important to identify if the companies followed a similar approach in addressing issues and mimicked trends versus an alternative approach and if a high/lower environmental performance was noted.

The case study particularly looked at the aspect of water as the entire environmental spectrum was extremely broad. This would dictate increased in-depth analyses and review of results which was not required for the purpose of a research report.

3.2 Research Design

a) Description of the research site

This research was limited to reviewing published reports over a 5-year period for two gold mining companies, namely Anglogold Ashanti and Goldfields. The aspect of water is a huge concern for gold mines and mining in general and therefore the information that was reviewed was that pertaining to water. The information was analysed to verify if the companies have improved over the 5-year period in terms of disclosure and quantitatively like water consumption.

In addition, interviews were held with personnel from the gold mining industry and not necessary from the respective companies included in this research. This approach was deemed appropriate as the information review was from sustainable reports, CDP water submissions and other information available from the respective company websites and any articles associated with the mines.

According to the Integrated Report and CDP Water submissions for 2017, AngloGold Ashanti was the third largest gold mine world-wide. They have operations in South Africa, Continental Africa, the Americas and in Australasia. In total, there are 18 active gold producing mines which produced 3.7 million ounces of gold in 2016. This was estimated to be 3.5% of the gold produced globally for 2016.

The company was listed on the Johannesburg Stock Exchange (JSE) as well as the following securities exchanges: New York, Australia and Ghana. With relation to water, the company website includes water stewardship specifically under the environmental section in terms of priorities. In addition, there was a water standard that all operations are required to adhere to.

According to the Integrated Report for 2017, Goldfields was also a global player in the gold mining industry. However, they have 7 active gold producing mines in Australia, Ghana, Peru and South Africa. There was 2.2 million ounces of gold produced in 2016. The company was listed in the JSE as well as in New York and in Switzerland. There was clear commitment to the United Nations' Sustainable Development Goals with 'Clean water and sanitation' as well as 'Responsible Consumption and Production' which was believed to be related to water conservation. The company website includes information that was very focussed on water management.

There was further detail in terms of what water stewardship means to the company and inclusion of water management in the environmental policy. There was also a water guideline document that highlighted what the operations should include in their water management system. There was a further mention of water preservation in the top 5 group sustainability goals for the company.

b) Target study population and sampling procedure

As part of the case study, sustainability reports, CDP water submissions and key informant interviews was conducted.

A series of semi-structured key informant interviews were conducted. The aim of the interviews was to understand perceptions around environmental disclosure and environmental performance. Individuals were identified according to their position, roles and responsibilities within the organisation. This encompassed employees that were accountable for water management, environmental disclosure and ensuring performance are measured and possibly improved. There were in total five interviews conducted from two gold mining companies. From the first company, there were two interviewees from the corporate head office and one interviewee was from

an operational site. There were two corporate head office interviewees from the second company.

A questionnaire for the interviews was developed to ensure the responses were comparable and facilitate discussion around received responses so that discussion of such information was correctly perceived. Alternatives to the environmental disclosure and environmental performance relationship were also sought and discussed to understand the broader spectrum from the organisation's perspective as to what drives environmental improvement.

The questionnaire is attached in Appendix 2. Ethics clearance was obtained from the University of Witwatersrand's Human (non-medical) Ethics Committee (clearance number HA1807).

The interviewees were contacted telephonically or via e-mail to request an interview. Thereafter or simultaneously, a participant information sheet, consent form and a copy of the questionnaire were e-mailed. Once approval was obtained via a signed consent form, interviews were conducted telephonically or in a place of business during normal and after business hours, subject to their availability. In total, 5 people were interviewed.

The following GRI environmental (EN) indicators were included in identifying trends and therefore highlighting improvement in environmental performance.

GRI EN8 – Total water withdrawal by source

GRI EN9 - Water sources significantly affected by withdrawal of water

GRI EN10 – Percentage and total volume of water recycled and reused

GRI EN22 – Total water discharge by quality and destination

GRI EN24 - Number and volume of significant spills

GRI EN26 – Identify size, protected status, and biodiversity value of water bodies and related habitats significantly affected by the organisation's discharge of water and run-off

GRI EN29 – Monetary value of significant fines and total number of non-monetary sanctions for non-compliance with environmental laws and regulations

GRI EN34 – Environmental Grievance mechanism

The above data was verified against the sustainability reports to ensure if it was reported (present) or not (absent) and thereafter, if there were any improvements in the recorded data.

In addition, as the case study was focussed on the mining sector, it was vital to include an indicator from the ICMM Water guidelines and therefore water efficiency was also identified as a key indicator to fully analyse water consumption in the companies. Withdrawal, discharge and consumption are addressed under the GRI G4 guideline. However, this was also included in conformance to the ICMM Water guideline.

The CDP water completion and grading of response was used to identify adherence to this tool. This was to verify the completeness of information, the progress and improvements over time. Lastly, the CEO water mandate was considered by ensuring that the statement committing adherence to the mandate and that all 6 Elements were included in the reports.

c) Data collection tools

The detailed methodology per question is set out in Table 1. In summary, it was to involve identifying and obtaining company documents and reports disclosing water consumption and water management released between 2013 and 2017. These were 10 official documents for each company that were reviewed; and relevant indicators, results and initiatives were identified and noted. These data were analysed for trends, graphed and discussed to identify increasing/decreasing water consumption at each of the companies over time. This approach was deemed appropriate as the data included in the research was available on-line and accessible to the public, verified by a third party and therefore credibility to the data published. The trends and any other information utilised would be a realistic overview of the performance of each company.

The data from the interviews were noted and compared in order to identify common themes. Their perspective of whether there is a relationship between environmental disclosure and environmental performance and if disclosure drives performances were noted.

Table 1 – Interviewee list

	JOB LEVEL	CORPORATE/OPERATIONS
Interviewee 1	Specialist – collating and analysing environmental data for internal and external reporting.	Corporate
Interviewee 2	Executive – approval of all sustainability data before sign-off from the CEO	Corporate
Interviewee 3	Junior Management – monitoring and recording of all environmental data for internal reporting at Business Unit and to Corporate office.	Operations
Interviewee 4	Senior Manager – collating and analysing water data for internal and external reporting	Corporate
Interviewee 5	Executive - approval of all sustainability data before sign-off from the CEO	Corporate

d) Data Analysis

The data sources that was reviewed for this research are detailed in Table 1.

Table 2 – Data Sources to be analysed in response to research questions

Research Question	Data source	Analysis and output
What are the reporting tools that are available for the disclosure of water data and are the two gold mining companies disclosing their water data in accordance to these tools?	a. Identify reporting tools (building on literature review), and listing specific requirements of these for water disclosure (see Table 4 below) b. Through review of online and publicly available reports identify which of the tools and requirements from (a) have been included in reporting from each company. Company reports included: • Sustainability reports from 2013 -2017 • CDP water submissions for from 2013-2017 • Company website • Community and/or site-specific meetings	Discussion and list of the various ways that the companies disclosed their environmental performance
Is there an improvement in water consumption and water management activities reported by the two companies between 2013 and 2017?	The following data has been obtained from the reports listed above: • Water consumption measurements (total, per site, per unit of production etc.) • Water management plans that may be in place. • Fines, warnings and compliance-notices • Awards	Figures were graphed and compared between years and between companies – findings were discussed Initiatives and management plans were reviewed and related to consumption and context (e.g. changing legislation, drought conditions, and community concerns), compared and discussed.
How do the employees of various designations responsible for water management and/or reporting within these companies perceive environmental disclosure and environmental performance?	Open-ended key informant interviews with 5 mining employees, at various management levels, responsible for disclosure and/or water management.	Transcripts were reviewed and assessed for emerging themes. These were compared across organisations and different levels within organisations

e) Methodology Opportunities and Challenges

This methodology approach was suitable for this Research. However, there were challenges in ensuring that interviewees were available. Only five environmental experts were interviewed. Four of these were from the corporate head office and one operational staff member. The original intention was to interview four corporate and six operational staff members however this was not achieved due to staff unavailability and research time constraints. Should the full list of ten interviews were held, this may have produced a more diversified or again reinforced the outcome of this study. This would have also guided finer details from an operational environmental improvement perspective versus a guideline/requirement from the Head Office for external reporting.

The documentation was not limited, and it was information that was disclosed in accordance to the environmental guidelines and readily available on both companies' websites.

Chapter 4: Results

This research was to define if via environmental disclosure, organisations will drive environmental performance. To present the results, this section is divided to answer the 3 research questions presented in Chapter 1.1 of this report.

4.1 Reporting tools that were utilised for the disclosure of water

The applicable reporting tools for water were identified as the guidelines of the GRI G4, CEO Water Mandate, CDP Water and the ICMM Water guidelines.

Table 3 – Reporting Tools used for Water Disclosure

Guideline	Anglogold Ashanti	Goldfields
GRI G4 guidelines	Yes	Yes
CEO Water Mandate	Yes	No
CDP Water	Yes	Yes
ICMM Water guidelines	Yes	Yes

For the CDP water reporting year of 2017, both Goldfields and Anglogold Ashanti achieved an A-.

4.2 Objectively assessing the water disclosure indicators

The water aspect disclosure indicators in the GRI are:

- GRI EN8 - Total water withdrawal by source
- GRI EN9 - Water sources significantly affected by withdrawal of water
- GRI EN10 - Percentage and total volume of water recycled and reused

4.2.1 Case Study 1 – AngloGold Ashanti

Table 4 – Reported data for each reporting tool and associated indicators used for water disclosure

Guideline	Specific indicator/ requirement	2013	2014	2015	2016	2017
GRI G4 guidelines	GRI EN8 – Total water withdrawal by source (ML)	63916	63721	59601	50716	52219
	GRI EN9 – Water sources significantly affected by withdrawal of water	Partially reported	Partially reported	Partially reported	Partially reported	Partially reported
	GRI EN10 – Percentage and total volume of water recycled and reused (ML)	Not reported	Not reported	247774 No % is included	260286 No % is included	259534 No % is included
	GRI EN22 – Total water discharge by quality and destination	Partially reported	Partially reported	Partially reported	Partially reported	Partially reported
	GRI EN24 – Total number and volume of significant spills	10** Volume not included	5** Volume not included	4** Volume not included	1** Volume not included	3** Volume not included
	GRI EN26 – Identify, size, protected status, and biodiversity value of water bodies and related habitats significantly affected by the organisation's discharge of water and run off	Not reported	Not reported	Not reported	Not reported	Not reported
	GRI EN29 – Monetary value of significant fines and total number of non-monetary sanctions for non-compliance with environmental laws and regulations	No fine and 0	No fine and 0	No fine and 0	No fine and 0	No fine*** and 0
	GRI EN34 – Environmental Grievance Mechanism (only water related complaints will be considered)	0∞	0∞	0∞	0∞	0∞

CEO Water Mandate	A statement that commits the company of continual support for the UN Global Compact's CEO Water Mandate	Yes	Yes	Yes	Yes	Yes
	Details of the policies and actions that have been undertaken to comply to the 6 elements as below: Element 1 – Direct Operations	Yes	Yes	Yes	Yes	Yes
	Element 2 – Supply Chain and Watershed Management	Yes	Yes	Yes	Yes	Yes
	Element 3 – Collective Action	Yes	Yes	Yes	Yes	Yes
	Element 4 – Public Policy	Yes	Yes	Yes	Yes	Yes
	Element 5 – Communication Engagement	Yes	Yes	Yes	Yes	Yes
	Element 6 - Transparency	Yes	Yes	Yes	Yes	Yes
CDP Water	Completeness of Information	Yes	Yes	Yes	Yes	Yes
	Progress and Improvements over time	Yes	Yes	Yes	Yes	Yes
ICMM water guidelines	Withdrawal	As EN8	As EN8	As EN8	As EN8	As EN8
	Discharge	Partially reported	Partially reported	Partially reported	Partially reported	Partially reported
	Consumption	Yes	Yes	Yes	Yes	Yes
	Efficiency (kl)	0.63	0.6	0.64	0.59	0.61

** Not all incidents recorded the volume of spillage. The spillage did not record an estimate volume could be contributed to the overflow from the return water and tailings dam.

*** While the sustainability reports indicated no fines were received, there is mention of a fine for a violation to the total of USD 225 000 in the CDP water questionnaire.

∞ Despite the GRI G4 context index for 2017 highlights indicates there is evidence of environmental grievance mechanisms were on P49 and P50 of the Sustainable report, no evidence was found on reading these pages. The spillages were recorded and measures that were/will be undertaken was noted. It is not highlighted that the spills became evident via the grievance mechanism.

The water withdrawal figure was reduced over the research period. It must be noted that the aspect of water was highlighted as a material issue/risk to the organisation and therefore there was initiation of recycling initiatives in 2015 which increased the amount of water re-used/recycled to 2017.

The number of reportable incidents decreased from 10 in 2014 to 3 in 2017.The lowest number of incidents being recorded in 2016 which was 1 incident. The report structure in this regard improved over time. In 2013 and 2014, the number of reportable incidents was listed in the sustainable reports but no details could be provided. In 2015, details of incidents were recorded and approximation of the amount of spillage was included. In 2016 and 2017, the approximation was not included and this could be attributed to the difficulty of recording such overflows from dams. Assurance of such figures would not be provided unless adequately calculated.

Reviewing information improved over the research period for the sustainable reports and additional details was provided specifically in terms of water use and efficiency. This could be due to the risk being rated higher over the years as well which indicates that the materialiaty risk assessment is being completed with a high degree of accuracy.

In the instance of a mechanism for environmental grievances referred to the significant incidents recorded, there is room for improvement in terms of detailing the mechanism and also listing the number of environmental complaints received during the year. It cannot therefore be assumed that all complaints received was as a result of spillages but perhaps to other operational/weather conditions. This can be improved over time.

There were sustainability reporting for the entire research period which also indicates the maturity of the company in terms of reporting and the snapshot from a sustainability overview does indicate the environmental performance and measures to improve it.

The CDP water questionnaires responses were also availabe for the reporting period. Objectives and targets were identified and responses were written out clearer

over time in 2017 in comparison to the 2013 report. Updates were provided in subsequent years in terms of progress.

One concern noted that was not highlighted in the sustainability reports was the receipt of a fine of USD 225 000 for the violation of water and other environmental regulations. While the CDP water 2017 report also highlighted no fines were received, a section for further information was completed with this information. The company is contesting the fine and violation however it was received and should have been noted in the reports as such with the provision that both the fine and violation is being challenged. The update should come in the 2018 reports. While the information was disclosed, no further information on the detail of the violation were included.

Below are graphical representations of the 2 water disclosure indicators. The data for Anglogold Ashanti were manipulated as follows for the purposes of this research: the water recycled was reported in kl and this was converted to ML to allow for comparability and ease for analysis for any trends.

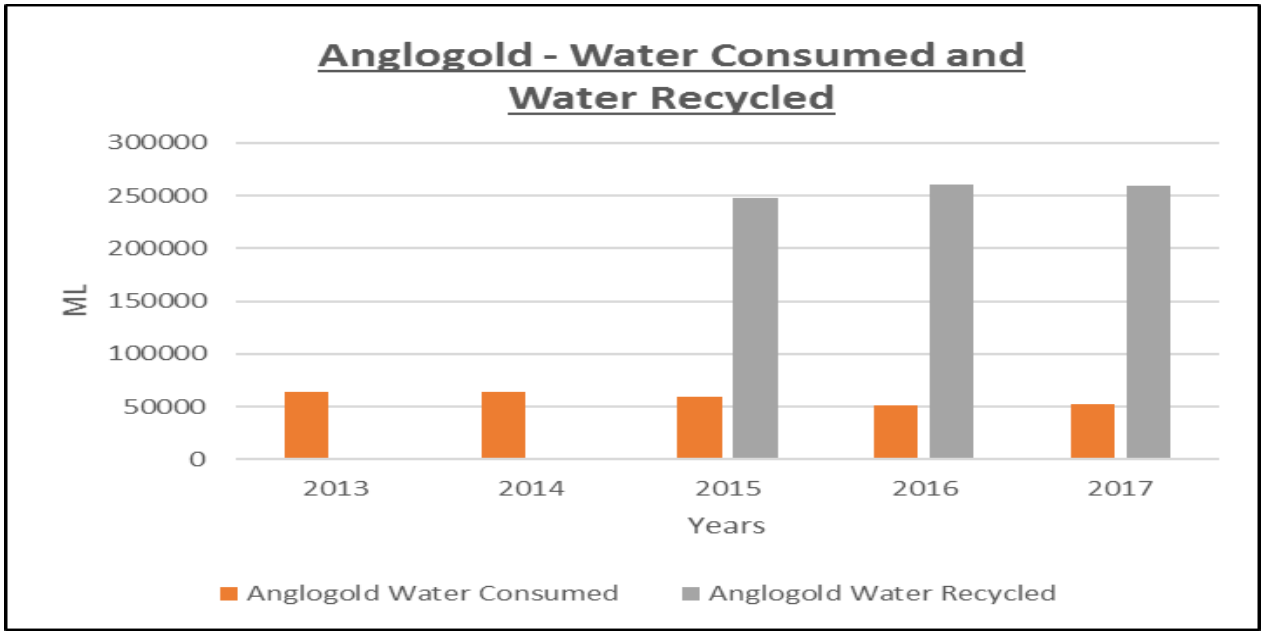


Figure 1 – Water consumed and recycled over a 5-year period for Anglogold Ashanti

*Note that Anglogold Ashanti did not report on water recycled for 2013 and 2014.

Figure 1 highlights Anglogold Ashanti water consumption from 2013 – 2017. It highlights that the average consumption has remained more or less constant from 2013 to 2015 and thereafter there was a slight decrease in the overall water consumption. There are also at Anglogold no definitive objective and targets for reduction of water consumption whereas there have been broader objectives and targets related to overall Group's water management focus.

The graph also includes Anglogold Ashanti water recycled over the same time period. However, thereafter from the baseline of the 2015 figure, there has been an increase in water recycling due to operational improvements.

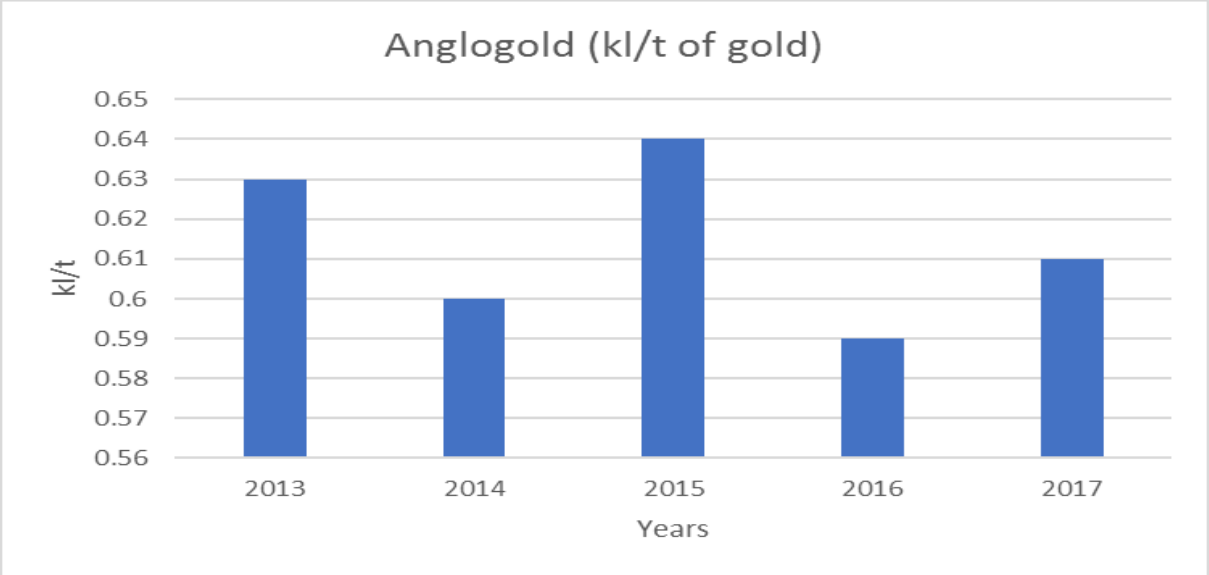


Figure 2 – Comparison over a 5 year period for water efficiency for Anglogold Ashanti

Anglogold Ashanti water efficiency figures over the years cannot also produce a consistent trend. Figure 2 records increases in efficiency that can be recorded for 2014 and 2016. However, overall, there is a increase in efficiency from 2013 to 2017. Therefore, the environmental performance for Anglogold using water efficiency as an indicator can be recorded as an improvement.

4.2.2 Case Study 2 – Goldfields

Table 5 – Reported data for each reporting tool and associated indicators used for water disclosure

Guideline	Specific indicator/ requirement	2013	2014	2015	2016	2017
GRI G4 guidelines	GRI EN8 – Total water withdrawal by source (ML)	30302	30207	35247	30321	32985
	GRI EN9 – Water sources significantly affected by withdrawal of water	Not reported	Not reported	Not reported	Not reported	Not reported
	GRI EN10 – Percentage and total volume of water recycled and reused (ML)	33453 No % is included.	42409 No % is included.	43120 No % is included	44274 No % is included	43289 No % is included
	GRI EN22 – Total water discharge by quality and destination	Not reported	Not reported	Not reported	Not reported	Not reported
	GRI EN24 – Total number and volume of significant spills	3 Volume not included	4 Volume not included	5 Volume not included	3 Volume not included	2 Volume not included
	GRI EN26 – Identify, size, protected status, and biodiversity value of water bodies and related habitats significantly affected by the organisation's discharge of water and run off	Not reported	Not reported	Not reported	Not reported	Not reported
	GRI EN29 – Monetary value of significant fines and total number of non-monetary sanctions for non-compliance with environmental laws and regulations	R0 and 0	R0 and 0	R0 and 0	R0 and 0	R0 and 0
	GRI EN34 – Environmental Grievance Mechanism	Not reported	Not reported	Not reported	Not reported	Not reported

	(only water related complaints will be considered)					
CEO Water Mandate*	A statement that commits the company of continual support for the UN Global Compact's CEO Water Mandate	N/A	N/A	N/A	N/A	N/A
	Details of the policies and actions that have been undertaken to comply to the 6 elements as below: Element 1 – Direct Operations	N/A	N/A	N/A	N/A	N/A
	Element 2 – Supply Chain and Watershed Management	N/A	N/A	N/A	N/A	N/A
	Element 3 – Collective Action	N/A	N/A	N/A	N/A	N/A
	Element 4 – Public Policy	N/A	N/A	N/A	N/A	N/A
	Element 5 – Communication Engagement	N/A	N/A	N/A	N/A	N/A
	Element 6 - Transparency	N/A	N/A	N/A	N/A	N/A
CDP Water	Completeness of Information	Yes	Yes	Yes	Yes	Yes
	Progress and Improvements over time	Yes	Yes	Yes	Yes	Yes
ICMM water guidelines	Withdrawal	Same as EN8	Same as EN8	Same as EN8	Same as EN8	Same as EN8
	Discharge	Not reported	Not reported	Not reported	Not reported	Not reported
	Consumption	Yes	Yes	Yes	Yes	Yes
	Efficiency (kl)	15.01	13.16	15.77	13.67	14.78

* Goldfields does not subscribe to the CEO water mandate.

As indicated in Table 5, Goldfields can be noted with no significant environmental improvements in the performance based on the reported indicators. Water withdrawal increased overall from 2013 to 2017 despite the significant increase in recycling/reuse of water and water efficiency over the research period.

The number of spills increased from 2013 - 2015 and thereafter decreased in the 2016 and 2017 reporting period. Overall, there was a reduction by 1 incident. Details of the incidents were provided in the sustainability reports. Despite not subscribing to the CEO water mandate, the sustainability reporting included some aspects (by considering GRI G4) of all 6 elements. The main omission was the statement of commitment to the CEO water mandate due to the decision not to subscribe to the CWM. The CDP water questionnaires for the research period was also detailed and objectives and targets were recorded. Progress was monitored over time and reported in subsequent years.

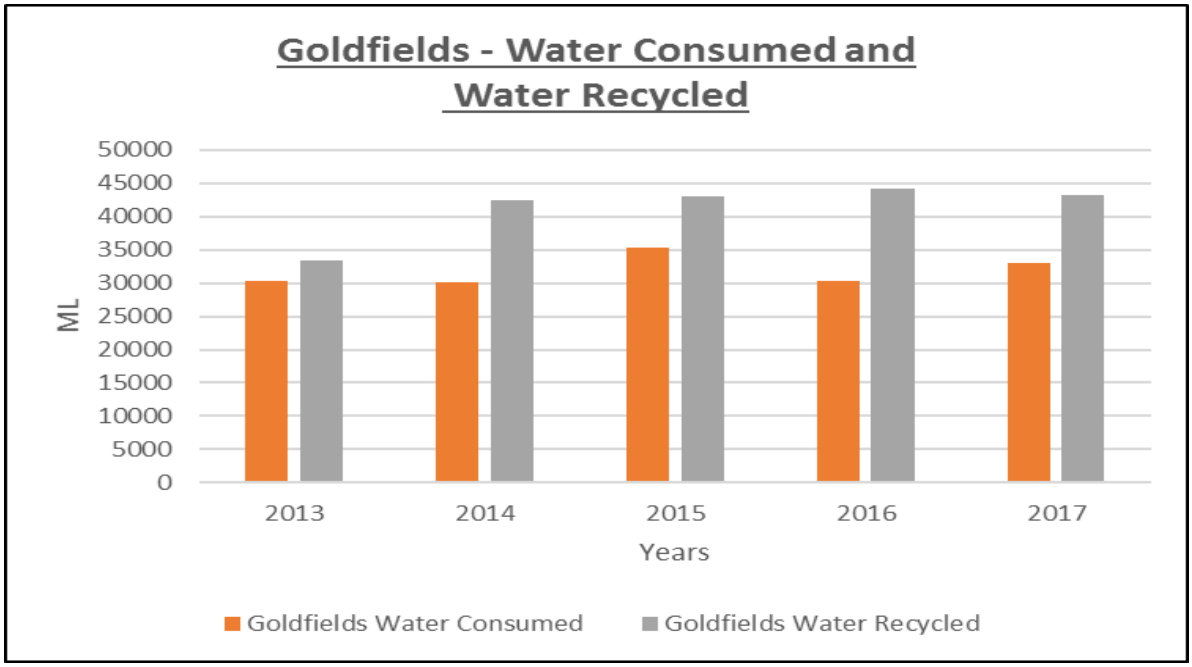


Figure 3 – Water consumed and recycled over a 5-year period for Goldfields

Figure 3 highlights Goldfields' water consumption from 2013 – 2017. It highlights that the average consumption has remained more or less constant and there was no consistent trend over the time period. Overall, analysing the time period, there is a slight increase in water consumption. This denotes a negative environmental

performance as the trend was highlighting that water consumption will increase over time.

The graph also includes Goldfields water recycled over the same time period. There was a considerable increase in water recycling from 2013-2014 which in the sustainability reports attributes this due to operational changes.

However, thereafter the figures have remained also more or less constant. During the 5 year period, it was noted that there is a increase in water recycling which denotes a positive environmental performance.This inability to decrease water consumption and substantially increase water re-use/recycling post 2014 is explained in the sustainability reports due to the decreasing rainfall that was experienced. There was also an increase in overall production in 2017 recorded.

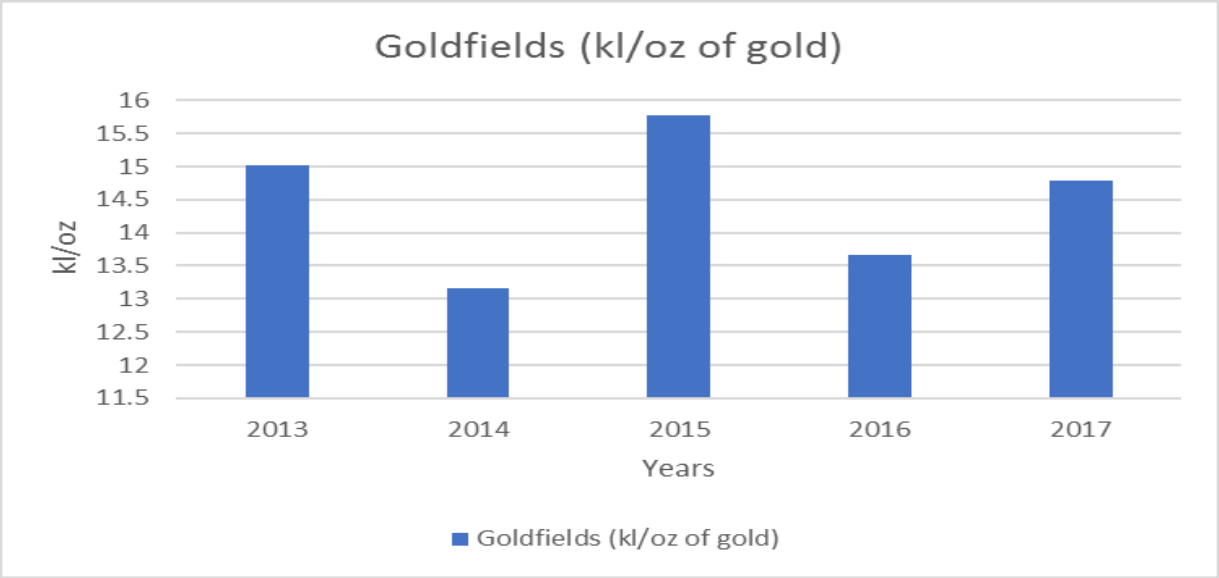


Figure 4 – Comparison over a 5 year period for water efficiency for Goldfields

Goldfields water efficiency figures over the years as captured in Figure 4 cannot also produce a consistent trend however increases in efficiency can be recorded for 2014 and 2016. However, overall, there is a marginal increase in efficiency in the production rates. This is noted even though there was a marginal increase in production from 2013-2017 as reported in the sustainability reports and this contributes to environmental improvement.

4.2.3 Comparison between Goldfields and Anglogold Ashanti

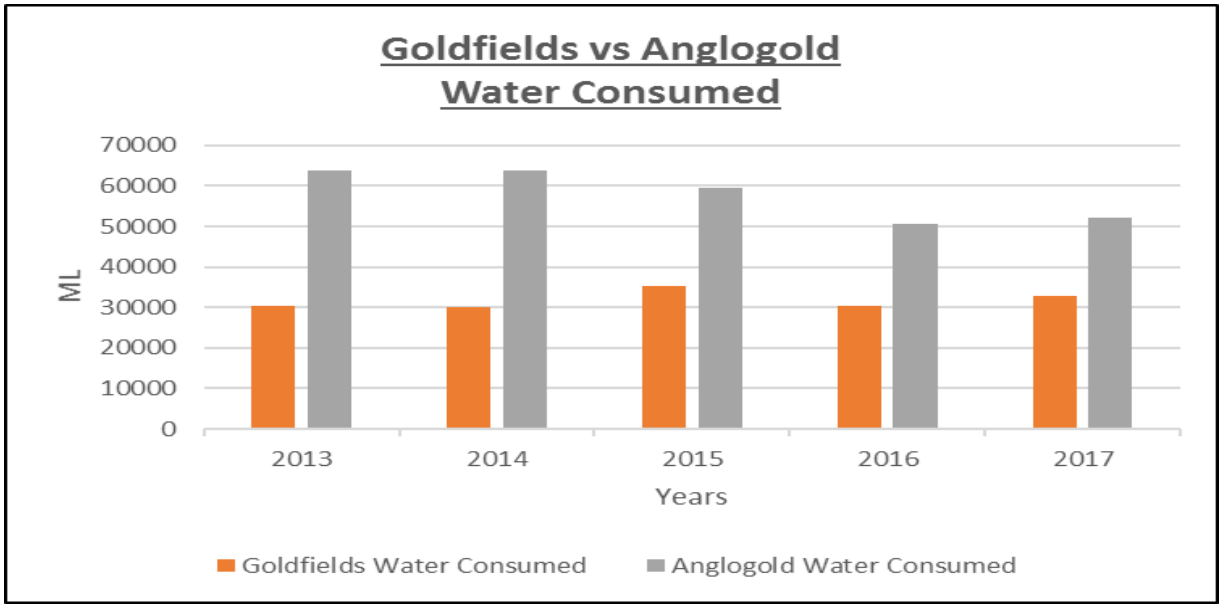


Figure 5 – Comparison over a 5-year period for water consumed between Goldfields and Anglogold Ashanti

Figure 5 shows the differing water consumption between the companies. It highlights that Anglogold Ashanti has reduced their water consumption over the research period. However, Goldfields over the same period has recorded a slight increase in water consumption. This highlights that Anglogold Ashanti has made considerable effort in improving their environmental performance. Figure 5 is comparable with Figure 2 where the water efficiency showed improvement over the research period.

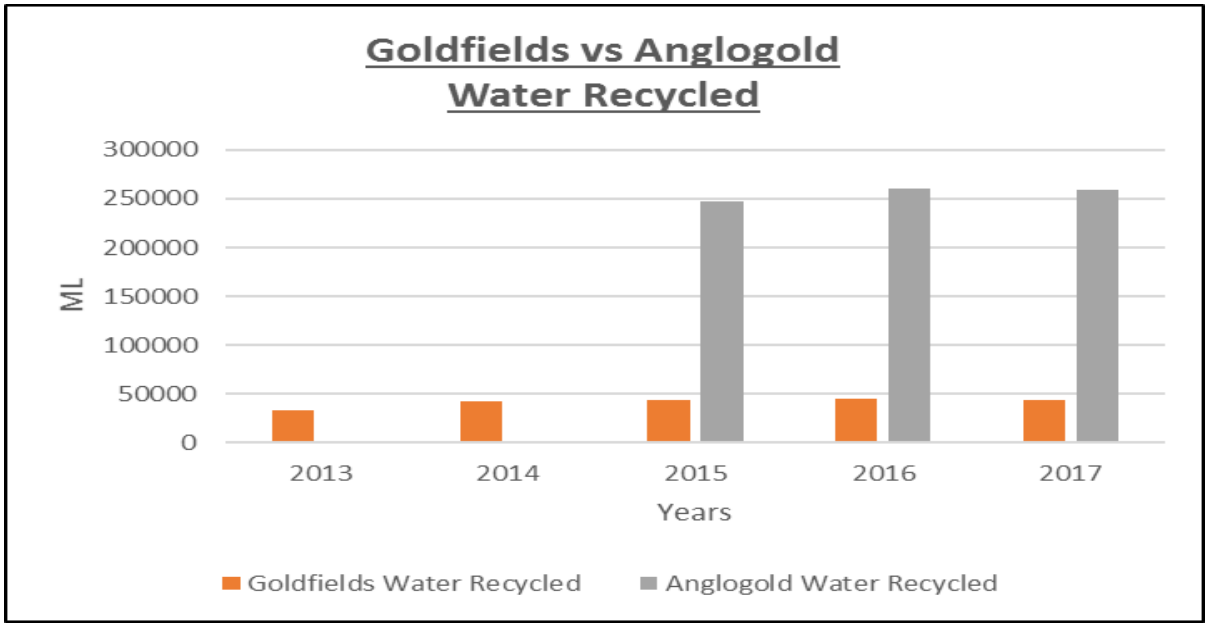


Figure 6 – Comparison over a 5-year period for water recycled between Goldfields and Anglogold Ashanti

Figure 6 illustrates the differing water recycling between the companies. Goldfields has reported on water recycled during the entire 5 year period and there has been an increase in the amount of water that was recycled. Anglogold Ashanti started publishing water recycled data from 2015 and there has also been an increase in water recycled denoted.

Significant incidents were reported e.g. spillages into rivers and overflow of dams. Details on the incident are explained with related impacts and remediation/prevention measures were disclosed for both companies. While improvements were noted in terms of the number of incidents for both companies, there were increases within the research period. Therefore, reporting does not seem to have played a reduction role in the number of incidents.

In terms of verifying compliance, there was no mention of compliance to legislation and specifically water use licences as a priority. It is therefore assumed that there was compliance to the licences and legislation for both companies. It could be clearer should statements in this regard not be left for interpretation that there was compliance to legislation and licences. There was a fine issued to Anglogld Ashanti and while this was only declared in the CDP water questionnaire due to the contesting of the fine.

However, this should have been incorporated in the sustainability reports as there is a possibility of the fine not being withdrawn and this can be perceived as using subjective opinion on compliance.

Both companies opted for reporting on the Core option of the GRI G4 and therefore only one indicator on a Material aspect was needed to be reported on. There was no commitment from either company that the Comprehensive option will be reported on in the future which will provide further data in terms of the aspect of water. There was also no grievances detailed by either company. However, it was reported that stakeholder inclusiveness with specific reference to water was highlighted as important by both companies.

4.3 Employee perceptions regarding environmental disclosure and performance

Five interviews were held, and the outcomes are summarised below. Three interviews were undertaken telephonically while 2 were conducted at the respective place of business.

There was consensus from all participants that there is a relationship between environmental reporting and environmental performance. However, there was no consensus in terms of that environmental reporting drives environmental performance. Three participants believed that environmental reporting does drive environmental performance, and this was limited to the one person in operations that was interviewed and the 2 senior executives at Group level. The remaining two participants indicated that reporting just highlights what the environmental performance was for the reported year and these individuals were specialists at Group level. It seemed to highlight that reporting and internal verification does take up much time which do not allow for focussing on better environmental performance as was highlighted in the study by Kitsikopoulos *et al*., (2018).

The importance of reporting water (environmental) indicators were agreed on by each participant in that it was a requirement of being a listed international company, enhancing reputation by providing information to stakeholders, specifically regulators, shareholders and communities. One participant highlighted that

sustainability reports of other mining companies are also read to ensure that there is some sort of uniformity in the reporting that this individual is responsible for.

However, there was also clear commitment from top management in terms of reporting that it was extremely prudent in the mining sector to be '*transparent*' and not enabling '*green washing'* of the reports. Environmental improvement was noted as being driven from complying to guidelines and reporting requirements as well as the company values of protecting the environment by not wasting water. There was specific mention 'to be one of the leading gold mining companies' and 'you manage what you measure' which highlights that there is realisation that environmental improvement must be on the agenda.

It was further elaborated that even though the environmental reporting is up to standard, it does not mean that company is performing well from an environmental perspective. The reason for environmental/water reporting is due to it being a corporate requirement which is set out in both the company values. This is undertaken from an operations perspective and not at Group level via the ISO 14001 Environmental Management System where monitoring of environmental data is required. This also supports the conclusions by Levy & Brown, (2010) that ISO 14001 make a concerted effort to improving environmental performance in comparison to reporting in terms of the GRI.

It is believed the water use (consumption) and water use efficiency are vital indicators. It also demonstrates the performance of the company as this is already being monitored. The environmental improvement is considered to be embedded in the ISO 14001 management system as it requires continual improvement to be considered and implemented. There is also a further awareness in terms of water consciousness due to water scarcity. Water is also considered a business risk as mining in water intensive so there is a drive to minimise and consume the water resource conservatively.

Companies strive to do better, and reporting tends '*to act like a watchdog'* where published information are scrutinised so there must be improvement noted. The belief to report on indicators is to be transparent and highlight that the company is displaying to be '*a corporate citizen'*. While the water indicators do highlight the

performance of the company, there are further efforts to be undertaken to fine tune the water indicators. It is hoped that moving forward; there is an alignment between the ICMM water guideline and the GRI G4 reporting guidelines to allow for improved reporting of data.

Chapter 5: Discussion

This discussion follows the research objectives that was highlighted in Chapter 1 of the research report and based on the literature review and results answer each of the components.

There were 2 research objectives that were considered in the research report.

5.1 Understand the various tools used to disclose environmental information and how these are used to disclose water

The reporting tools/guidelines identified were the GRI G4, CDP water, ICMM water guidelines and the CEO water mandate. Both companies conformed to the GRI G4 Core format and have assured data for the period of reporting. In addition, the completed CDP water questionnaire was rated A for their responses, indicating top management commitment to address the issue of water.

Angogold Ashanti is an endorsing company for the CEO water mandate while Goldfields did not endorse the mandate. Anglogold Ashanti and Goldfields include conformance to the ICMM in the GRI G4 sustainability reports however the ICMM water guideline is relatively new and full conformance to the indicators could not be verified. In particular, the definition of efficiency in the ICMM water guidelines versus the data that were reported do not match. This will probably improve over time as the ICMM water guideline is implemented and the collation of required data is improved over time.

The question may arise if Goldfields should change the stance and become an endorsing company of the CEO water mandate to be more transparent. The response is simple in that, apart from the statement committing subscription to the CEO water mandate, all information required for the six elements in the mandate is included in the CDP water questionnaire. As Goldfields also obtained an ‘A’ for their reporting, indicating a high level of completeness of information, it is not necessary to become an endorsing company, one can merely use these guidelines as a tick box to conform to. This may change should there be external pressure to conform to this reporting guideline.

Based on the GRI EN indicators and reporting, it highlighted that the companies do report on issues however are selective of the reporting format of the GRI. Both reports indicate that the reports are in accordance with the 'Core' option and therefore full disclosure is not required by GRI or given by the company as described by Levy & Brown, (2010).

5.2 Assess whether, and how, disclosure drives environmental performance.

Goldfields water consumption marginally increased over the period from 2013 to 2017. However, it must be also noted that the amount of water recycled/re-used increased and the water use efficiency (kl/oz of gold) also increased for the same period. Drought played a major role in the inability to decrease water consumption as rainfall is captured on-site and recycled/re-used as explained in the sustainability reports for both companies. It was noted that Goldfields increased their production from 2013 of 2.022 million ounces of gold to 2.2 million ounces of gold in 2017. However, Anglogold Ashanti decreased their production from 3.94 million ounces of gold in 2013 to 3.7 million ounces of gold in 2017. This highlights that environmental performance is complex as described by Perego, (2009) and Perego & Kalk, (2012).

Anglogold Ashanti reduced their water consumption over the research period significantly and this correlated with their increase in recycling/re-using of water resources. Their interpretation of the water use efficiency was the same as Goldfields and they recorded an improvement in this indicator as well. The companies displayed transparency in discussing the water issues throughout the Group via the regional sites of the operating mines.

This inability to further decrease water consumption and increase water re-use/recycling is also explained in the sustainability reports due to the regional rainfall decline over the time period. The decrease in water consumption could be attributed to the decrease in production of ore as stated in the sustainability reporting. These drought conditions experienced seem inhererent in the industry as the inability to inadvertently increase water recycling. This is noted when the Goldfields recycling volumes in Figure 5 is compared to Firgure 3. However, this can be perceived as an excuse for not actively identify water management initiatives and merely disclosing data as illustrated by Cho et al, (2015).

It can be deduced that both companies reported adequately on the aspect of water which included that indicators as well as the supporting information in the document. The CDP water questionnaires highlighted in more detail the various programmes in place and the improvement in performance where deficiencies were translated into objectives and targets.

Five interview sessions were held. Three interviewees perceived that environmental disclosure had improved the quality of data and therefore provided the baseline for which environmental performance is improved through the operational objectives and targets and the implementation of the environmental management system ISO 14001. This is in line with the findings of Levy & Brown, (2010) after a survey of 107 multi-national companies which supports the methodology to include surveys for this Research.

Therefore, there was a perceived positive relationship between environmental disclosure and environmental performance. This was categorised by the 1 operational individual and the 2 senior executives at Group level.

Two interviewees perceived that while the environmental disclosure has improved the quality of the data, this reporting is merely being transparent with verified accurate data. While there is a relationship with environmental performance in that the current status quo is recorded and understood, environmental disclosure does not drive environmental performance.

In addition, the CDP water has aligned its questionnaire to conform to the GRI G4 format and while completed questionnaires were available for the research from 2013 to 2017, this may likely be reduced and eventually eliminated to save resources in human capital as well as time.

The ICMM water guideline has also aligned with the GRI G4 format in terms of indicators. However, the additional information that is crucial to the mining sector can be included in the discussion sections within the sustainability reports.

This will also address concerns from a recent study which showed fatigue and an enormous time and effort focussing on data collection rather than focussing on environmental degradation (Kitsikopoulos *et al*., 2018). This was also a major

concern with the interviewees, especially in the time required to collate data and report on the environmental disclosure guidelines.

While promotion of transparency and top-level support were noted, the reporting into these various environmental disclosure guidelines was perceived to be cumbersome. With specific reference to the reporting of water indicators, there was much anticipation of utilising the ICMM water guideline moving forward.

It is however a concern from the senior executive interview participants that these guidelines will require initially a high capital expenditure to set up the processes to extract the data and well as external specialist expertise to interpret and analyse the data. The ICMM water guideline though will probably see fruition in a few years before reporting will be in full compliance.

Chapter 6 – Conclusion and Recommendations for Future Research

From the Chapter 5 section of this report, the results indicated that there has been improvement in the quality of data. While there was no continuous improvement year on year, overall there was improvement in the indicators. In this instance, while the environmental disclosure did indicate the status of the environmental performance of the organisation, it did not imply that disclosure is driving improved performance. This was due to the explanations provided in the sustainability reports that there were drought conditions experienced or from the interview sessions, that rather ISO 14001 is driving environmental performance.

However, comparing the sustainability reports over time, there was also a significant increase in the discussion and update of environmental performance in both companies. While there may be an argument that this is merely being more transparent, the counterargument is that issues are now being recorded and dealt with in a responsible manner. This is an improvement in terms of environmental performance.

The CDP water questionnaire required objectives and targets to be met and both companies recorded such and actions were taken to meet these objectives. New objectives were found in the reports where the previous year objectives were completed. Some objectives were not met within the targeted duration and was rolled over to the following year. Therefore, reporting in terms of CDP water inadvertently drove environmental performance through this requirement. These companies had to annually develop these objectives, assign a timeframe and report on the progress at the end of the year. Therefore, there was a concerted effort to show improvement over time in this instance.

In the sustainability reports, there were certain broad statements in terms of legislative compliance. There was a great degree of commitment to compliance, however it could not be positively demonstrated in these reports.

There was no clear statement indicating compliance to water use licences/permits and the approved environmental management programme reports or any deviations that may be occurring. This was a major concern as this is a limitation on the

analysis of impacts on the water resources and the values that both companies have in terms of efficiently using water. Compliance to legislation was not addressed appropriately by both companies in the sustainability reports and this is fundamental to not merely recording environmental performance but also preventing environmental degradation.

While legislation and permits are in existence, the enforcement of such permits are not strong which was reinforced during the interview sessions as authorities are not focussed on proactive monitoring of permits. Shortage of appropriately experienced governmental staff numbers are generally the reason for lack of compliance monitoring as suggested by the interviewees due to the high staff turnover. There was no confirmation that either company was complying to the permits that was issued by the regulatory authorities during the interviews.

From the above, environmental disclosure does have a relationship with environmental performance. These 2 companies reported on indicators, provided details e.g. of water spills and completed CDP water questionnaires at a high level of detail. Therefore, the current environmental performance is known, and this was iterated in the reason for the initiation of reporting guidelines as well as the interview sessions where there was 100% consensus.

This conclusion is in line with the findings from Clarkson *et al*. (2009) & Clarkson *et al*. (2011); Meng *et al*., (2014) and Iatridis, (2013) where it was found was environmental disclosure does have a relationship with environmental performance. As companies record their environmental data over time, this is reviewed annually, and trends can be analysed. This allows for investigation into the increases or decreases of use of natural resources and mitigation measures to be undertaken.

In addition, whether there was a positive or negative relationship between environmental disclosure and environmental improvement (in other words, does environmental disclosure drive environmental performance or not) was reviewed. The quantitative data suggest there is a positive relationship in that the indicator performance showed improvements when the trends for water consumption, water re-use/recycled and water use efficiency for the 2 companies were noted and graphed. This deduction was in alignment with Meng *et al*., (2014) and Iatridis,

(2013) where these studies highlighted the environmental disclosure does drive environmental performance.

In addition, as one peruses the sustainability reports from 2013 to 2017, there was significantly more detail providing much context to the business. Data are secularised into regions and it was understood that various sites have different issues which needs to be encapsulated and this is explained in the reports. Water balances as explained during the interview sessions showed some sites as positive while other sites are negative and therefore actions are taken at an operational level as the status quo of risks is best understood at this level.

The inclusion of mining rehabilitation and closure detail was highlighted as an improved environmental performance as the indirect impact on water must be noted. In addition, progressive rehabilitation is prudent in ensuring that there are minimal mining legacies and issues experienced are addressed whilst the mine is operational with an adequate number of staffing complement. The level of details has increased over time and this will be reinforced once the ICMM water guidelines are implemented fully in the mining sector.

In addition, there have been an increased number of companies over time that are conforming to the GRI reporting guideline. Therefore, stakeholders reviewing the sustainability reports have a better understanding of companies' environmental performance that may influence their decisions e.g. customers or investors. Communities are also more aware of the companies' activities and are confident in the verification of data by a third party. This promotes the transparency of companies which communities are striving for. The GRI is currently in the 4th revision and this is due to criticism that indicators are insufficient in denoting environmental performance and that more detail is required. This highlights that over time and with each updated revision addressing concerns from NGO's and other parties, companies will also therefore be required to comply with that revision and implement the necessary measures.

The aligning of all environmental disclosure indicators with specific reference to water highlights that there is understanding that reporting needs to be aligned to minimise reports and saving time and cost. This also highlights that environmental

performance will be at the forefront and more improvements are expected in the future.

Despite this, there are a few recommendations that can be implemented to further enhance environmental performance. The Group officials should play an equal role to operations in determining objectives and targets at site level in terms of quantitative data. This ensures that adequate environmental improvement is noted at each site and while this may not be possible for all indicators, it may possible for some indicators.

In addition, the regional data should be further broken down and made available per mining site. This will provide stakeholders, especially communities, with the information they require that is applicable to them. It will also highlight the better performing sites within the Group. It also allows for specific attention and discussion of improvement strategies and opportunities of the lesser performing sites.

The CDP water questionnaire is in a standard format and Anglogold Ashanti and Goldfields are required to answer the questions. In terms of this reporting guideline, the reports can be comparable. Both companies scored an A- in terms of the CDP scoring methodology.

The sustainability reporting was also comparable as both companies chose the Core option and therefore in terms of water, this was highlighted as a material aspect and a business risk. Therefore, there was more detail pertaining to this. As the research period was over a 5-year reporting period, it is important to note that neither company chose to change the disclosure option to Comprehensive.

This would detail further the environmental performance of the companies and not just an overview of operations. This was explained in terms of environmental grievance mechanisms and complaints. In addition, there was no statement that highlighted the companies were in legal compliance in the countries that they operate. The broad policy statements committed to complying with legislation was made but that does not mean compliance.

Anglogold Ashanti did declare a fine received in 2016 in the CDP water questionnaire but did not include this information in their GRI G4 reporting. This may

be as the fine and violation were being contested. However, this information should be brought to the forefront and updated for the next sustainability reporting period as this is the information that is important to stakeholders.

Anglogold Ashanti provided more information and despite choosing the Core option provided clear reporting compliance to the GRI G4. The level of maturity in terms of reporting was greater with this company. This was noted for the duration of the research period, there was a separate Sustainable Development report. In addition, a further improvement was the GRI context Index 2017 which highlighted compliance to the GRI indicators. This suggests there was a greater effort that was being made to comply with the guideline and allowance for easier reading of the reports. This also allowed for greater reflection on environmental performance and prioritisation of improvement opportunities.

There was no such improvement in reporting for Goldfields and the format of reporting remained the same. Further research into the analysis of sustainability reporting where the comprehensive option in the GRI G4 guideline should be explored. This will provide further data sets that could be analysed in determining environmental performance. In addition, more than two companies should be included in the research which allows for a broader spectrum of interviewees. This will allow for more interview sessions to be undertaken in gaining perceptions in the operational aspects of the business.

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Appendices

Appendix 1: Participant Information Sheet

Does environmental disclosure data disclosure drive environmental performance? A case study of water consumption in gold mining in South Africa

Good day,

My name is Nevashree Moodley. I am currently a part-time Masters student at the University of Witwatersrand. I am conducting a MSc research study that aims to assess whether there is a relationship between environmental reporting/disclosure and performance using the case study of water consumption for two gold mining companies in South Africa.

In addition to reviewing company reports and other information in the public domain I would also like to understand the perceptions around disclosure and performance within the company. As a key role player involved in environmental management and/or reporting for your organization, I am inviting you to be part of this study. If you agree to participate in this study, I would like to interview you, at a location and time convenient to yourself, or telephonically. The interview will take between 40 and 60 minutes. With your permission, the interview will be recorded and documented.

Your participation is entirely voluntary. You may refuse to answer questions about which you feel uncomfortable and you may withdraw from the study at any time. There are no penalties for doing this. Your name and personal details will be kept confidential and no identifying information will be included in the final research report. You will not directly benefit from participating in this study and will not receive any payment.

Appendix 2: Interview Questions

1. What is your role in the organisation in terms of water management/reporting?
2. Why do you believe that your company reports on environmental indicators with specific reference to water indicators?
3. What is your opinion of the water indicators? Does it demonstrate the actual performance of the company?
4. What do you believe drives environmental improvement in terms of water management?
5. What do you believe is the most important driver for improved water management?
6. Any additional comments that could add value to this research?

Appendix 3 – Ethics Clearance Certificate