

Investigate the disclosure of water practices in the platinum mining industry

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ABSTRACT

Increased population growth and urbanisation has led to significant stress on natural resources, in particular water resources. Various mining related operations, especially the platinum industry, are located in underdeveloped and remote areas, which can lead to unsustainable water management practises. This study's objective is to investigate the disclosure of water practises within the platinum mining industry.

A disclosure index was developed based on researched literature, mainly pertaining to standards set out in the Global Reporting Initiative (GRI) framework. The research methodology involved the implementation of a mixed method approach, whereby content analysis was applied to the water disclosures in integrated and sustainability reports of platinum mining companies.

The results in the developed disclosure index focussed on three pillars, namely: compliance, frameworks and risks factors. The total level of compliance for the different platinum mining companies indicated a full compliance level of 42%, 16% to partial compliance, 32% displayed no compliance, and 10% of the disclosure index was not applicable to the reports analysed. Furthermore, it was noted that for topic specific disclosures, a higher level of compliance was identified for water consumption, whereas the lowest level was noticed for water discharges. The compliance between the various companies indicated a substantial difference between full compliance and low levels of compliance. The GRI, CDP and ICMM indicated to be frequently used disclosure frameworks. Two main risk factors, physical and regulatory, were identified with regards to water principles within the various reports analysed.

It is recommended that a standardised framework be developed and implemented by platinum mining companies, in order to improve comparability and transparency within the industry.

ABBREVIATIONS

ACCA	Association of Chartered Certified Accountants
AMD	Acid Mine Drainage
BBC	British Broadcasting Corporation
CDP	Carbon Disclosure Project
CERES	Coalition for Environmentally Responsible Economies
CPA	Chartered Professional Accountants of Canada
CSR	Corporate social responsibility
GRI	Global Reporting Initiative
GSSB	Global Standards Sustainability Board
IFC	International Finance Corporation
IIRC	International Integrated Reporting Council
JSE	Johannesburg Stock Exchange
RSPF	Russian Union of Industrialists and Entrepreneurs
SDWF	Safe Drinking Water Foundation
SEDAR	System for Electronic Document Analysis and Retrieval
TBL	Triple Bottom Line
TDS	Total Dissolved Solid's
UN	United Nations
UNEP	United Nations Environment Programme
WEF	World Economic Forum
WPIC	World Platinum Investment Council
WWF	Worldwide Fund for Nature

KEYWORDS

Platinum mining industry, water principals, sustainability reporting frameworks, reporting and disclosure of water, compliance, risk factors.

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CHAPTER 1: NATURE AND SCOPE OF THE STUDY

1.1 INTRODUCTION

Water is one of the most essential natural resources that humans depend on to flourish now and into the future. In addition, water is profoundly imperative for sustainable development, within the business framework. According to Radif (1999) and Xu, *et al.* (2002), sustainable water management is a major challenge for decision makers. What enhances the complexity issue even further between human and natural water systems is the increase in population and urbanization (Evers, *et al.*, 2017).

It has been reported by the World Economic Forum (WEF, 2018) that four of the top five greatest risk factors in terms of impact on society are associated with water. Gleeson, *et al.* (2012) state that over 1.7 billion people live in regions where surface water is over exploited, while 4 billion people live in areas of water scarcity for at least a month per year (Mekonnen & Hoekstra, 2016).

Since the 1980s, water scarcity research has attracted considerable political and public attention, since it has developed into one of the foremost socio-economic constraints (Liu, *et al.*, 2017). As stated by the World Wide Fund (WWF, 2015) rapid growth within the developing economies over the last few decades, especially within the mining, agricultural and manufacturing sectors, has come at a high cost towards the environment, particularly within the water resources and management fields.

The mining industry is of critical importance, when considering the high volume of fresh water it uses, and the negative environmental concerns related to this activity. According to the Department of Water and Sanitation (DWS, 2017), water percentage usage of South African mining accounts for roughly 5%, but the potential regional impacts associated could pose a completely different picture (Harding, *et al.*, 2016). There is a need for adequate measures to comprehend what water related practises the mining industry performs. For the purpose of this research study, a review of the water practises and related reporting processes within the platinum mining industry will be dealt with.

1.2 BACKGROUND TO THE STUDY

Numerous mining-related operations, both at present and historically, are located in developing nations or in largely inaccessible areas. These activities outpace the expansion of surrounding infrastructure, causing insufficient sustainable water management practises (McIntyre, *et al.*, 2015). This situation is earmarked in particular within the platinum mining industry, where between 80-90% of the global platinum operations are situated in semi-rural regions of South Africa, Zimbabwe and Russia, as stated by the World Platinum Investment Council (WPIC, 2018). The mining sector is depended on the location where the ore bearing reefs are located, often in areas of water constraints or underdeveloped regions, unlike for example the manufacturing sector which is flexible in location.

Mining and processing of ore produces a high number of wastewaters which is then due for discharge either to storage dams, recycling and reuse or discharge into the environment. As this commodity sector is a water intensive industry, several anthropogenic factors are associated with it that negatively affect the surrounding human and natural capital (Jenkins, 2017). According to Safe Drinking Water Foundation (SDWF, 2017) four main impacts that platinum mining has on water resources include:

- Acid Mine Drainage (AMD);
- Heavy Metal Contamination and Leaching;
- Processing Chemicals Pollution; and
- Erosion and Sedimentation.

These environmental issues associated with mining result in extensive economical, health and financial repercussions for organizations, communities surrounding these industries and, ultimately, governmental departments.

Thus, the need for improved compliance, monitoring and reporting in terms of water management and its associated risks in the mining sector is ever increasing, especially from investors, society and regulators. Hence the concept of 'The Triple Bottom Line' (TBL), has been introduced to broaden the business focus towards mining's non-financial aspects of environmental and social concerns (Elkington, 1994). The necessity for reporting on natural and human capital in terms of environmental impact and social responsibility, should be viewed as important because of the crucial role it plays in the economic value of any business (Kenton, 2019). This practice can lead to improved

understanding of the degree to which mining-related companies' water standards and actual processes exist and are reported upon regarding water practices.

Several guidance and disclosure frameworks have been established to create reliable and dependable mechanisms for industries, including mining-related companies, to report and disclose information on these concepts, through a holistic integrated report or within their respective sustainability report. The frameworks to support and to disclose water related information in existence include, but are not limited to:

- Global Reporting Initiative (GRI);
- United Nations (UN) Sustainable Development Goals;
- The Ten Principles of the UN Global Impact;
- Ceres Aqua Gauge;
- The CEO Water Mandate;
- Pacific Institute;
- Carbon Disclosure Project; and
- Global Disclosure Project.

The Global Reporting Initiative (GRI), which is a globally recognised independent organisation based in Amsterdam that assists organizations with communication in order to achieve effective and sustainable reporting procedures. The standards involve two main divisions; the universal standards and a topic specific standard (GRI, 2018). The universal standards pertain to the foundation phase, general disclosure and management approaches, important for all sectors of reporting. The specific standard varies between the economic, environmental and social disclosures, whereby the GRI 303: Water and Effluent Standards under the environmental branch is of importance for water related reporting. These standards ultimately form part of mining houses' ability to demonstrate their role in sustainable reporting and empowers them to reflect on their footprint on many water management issues, to be clearer on the risks associated with them and the affect such behaviour can encompass. These processes ultimately form a framework whereby reporting and disclosure can be measured tangibly against set industry standards.

1.3 PROBLEM STATEMENT

Since freshwater scarcity is on the rise and potable water is decreasing as a result of several natural and human-related factors, the effects of platinum mining and mineral processing could further enhance these negative consequences on fresh water.

According to Ochieng *et al.* (2010) mining activities alongside streams and rivers in South Africa threaten the water resources, because the discharge of water used during mining activities, lowers the water quality and, ultimately, contributes to human health and food security concerns. It was reported by the British Broadcasting Corporation (BBC) in 2016 that the Russian platinum and palladium producer Norilsk Nickel polluted a river with heavy minerals after one of its tailing dams burst, causing the river to turn bright red due to the presence of contaminated water.

It is suggested by Warhurst (1999) that mining and the associated natural environment is almost always antithetical. Several factors contribute directly and indirectly to the environmental implications associated with mining activities from the prospecting phase, to construction, operations, and finally decommissioning (Haddaway, et al., 2019). Stakeholders and potential shareholders or investors will find it hard not knowing what the company's stance on water reporting and disclosure protocols is if the company does not practice integrated and sustainable reporting in order to address water concerns. Several guidelines and frameworks have been developed, assisting organizations on sustainable reporting, specifically related to water.

Nonetheless, the majority of listed companies do report and disclose, as per requirements and guidelines. However, the extent of sustainable reporting, especially on water related principles needs to be investigated. Since companies use a diverse set of guidelines and frameworks, it has resulted in a lack of a uniform disclosure index used by diverse companies in various industries to disclose on their water related principles.

1.4 OBJECTIVES OF THE RESEARCH

1.4.1 Main objective

The main goal of this research study is to investigate the disclosure and reporting on water practises, for companies within the platinum mining industry, in terms of regulatory guidelines and standards.

1.4.2 Secondary objectives

The literature review objectives for the research are:

- To identify from reviewed literature the importance of sustainable reporting and disclosure of water practices in the platinum mining industry.
- To establish from the reviewed literature what the guidelines for disclosure and reporting on water parameters are in the platinum mining industry.
- To identify from the reviewed literature risk factors related to water within the platinum mining sector.

The empirical study objectives for the research are:

- To identify the research method, for the investigation into water practices in the platinum mining industry.
- To compare current disclosure and compliance levels of water principles in the platinum mining sector, with a developed disclosure index, primarily related to the GRI 303: Water and Effluents Standards.
- To identify frameworks used by different platinum mining organizations, for reporting and disclosure on water principles.
- To identify risk factors reported and disclosed by the different platinum mining companies.
- To make recommendations and conclusions based on the main results, regarding the disclosure of water principles in the platinum mining industry.

1.5 RESEARCH METHODOLOGY

1.5.1 Literature study

The literature review undertaken in support of this research study will comprise the interrogation of material taken mainly from open journals, reports, books and guideline initiatives that are found in the public domain. A guideline report from the Global Report Initiative (GRI) will form the framework around which the research will be focussed.

Secondly, integrated and sustainability reports will be utilized for the analysis of the platinum mining companies, because this approach is a prerequisite for public listed organizations.

Additionally, the literature review will investigate the holistic environmental challenges related to the water traits within the platinum mining sector, which currently are the challenges and concerns outlined in this segment.

1.5.2 Empirical study

The study will follow a mixed method approach, whereby quantitative and qualitative data sets, will be analysed.

1.5.3 Research method

The method that will be utilized in this research study is content analysis. Ultimately this approach will allow for a mixed method, where all the different quantitative and qualitative data sets gathered, be compared with industry standards and guidelines.

1.5.4 Study population

The population group targeted in this research study will be drawn from the major platinum mining companies worldwide.

1.5.5 Sample

The sample size will involve the largest producers of platinum with the total output of tonnage and ounces used as an indicator for the sample size. The study sample exclude companies in platinum recycling. The proposed platinum mining companies that will be analysed in the study will involve organisations from South Africa, Zimbabwe, Russia and North America.

1.5.6 Collection of data

The data sets will be gathered by means of the public reports of each platinum mining company published on their website or other electronic sources. This data can be in the form of audited integrated or sustainability reports, focussing on the most recent reports of no later than 2017.

1.5.7 Analysis of data

The data from the reports will be analysed by means of content analysis. The reports will be compared to a checklist compiled from literature with the disclosures found in the narrative reports. Descriptive statistics will be used to indicate the different frequencies, means and standard deviations based on the data analysed.

1.6 LIMITATIONS OF STUDY

Since mining is associated with several environmental problems, this study which investigates the degree of disclosure and sustainable reporting on water practises within the platinum mining industry, may to some extent be overlooked as a means of achieving a company's main objectives of revenue and growth. Thus, the data conveyed in the integrated reports can sometimes generate a false sense of what the true elements may be, especially because some organisations do not report at all on these factors.

1.7 OVERVIEW OF THE STUDY

The layout of this research study will be presented within five chapters, starting with the background of the study, through the analysis, presentation of results and conclusions, as follow:

- **Chapter 1: Introduction**

This chapter will present the background of the study, together with the main research problem, objectives, and research design.

- **Chapter 2: Literature review**

This chapter places focus on the literature available based on the keywords used for research involving water reporting and disclosures, reporting and disclosure frameworks, and risk factors associated with water in the platinum mining industry.

- **Chapter 3: Empirical analysis and results**

The research methodology analysis and results will be presented within this section of the study. The empirical research will follow a content analysis approach, comparing various platinum mining companies, with reference to the GRI 303: Water and Effluents Standard and guidelines.

- **Chapter 4: Recommendations and conclusion**

After the results have been analysed, the conclusions regarding the focus and objective of the study will be presented, followed by critical recommendations.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

The focus of this chapter will involve the first section of the secondary objectives detailed in chapter 1, comprising of a review of literature on water reporting and disclosure in the platinum mining industry.

The first part of the literature review focusses on sustainable reporting and disclosure, within industry framework guidelines and requirements in relation to water practises, primarily at platinum mining producers. While the latter section conceptualizes previous research undertaken within the platinum mining industries' water practises, followed by risk factors associated with water in this industry.

2.2 REPORTING AND DISCLOSURE

2.2.1 Reporting

The term reporting can be described as the action of compiling data into a document containing information on tangible and intangible material observed or investigated (Business Dictionary, 2019).

Within the business context, reporting can be conducted on several features of an organisation, in the form of mandatory to discretionary reporting, for example integrated-, sustainable- or internal management reporting. Transparency and accountability are two fundamental issues stakeholders attempt to manage in reporting (Couldridge, 2015), while they exhibit interest in both the financial and non-financial side of reporting and what risks could be associated with these forms of reporting (Hoque, 2017).

Business reporting is fundamental to organizations, for sustainable growth, financial markets and economies according to the International Federation of Accountants (IFAC, 2019). The IFAC further suggests that business reporting assists organizations to exhibit a consistent account of their respective organisations and allows for a clear communication channel between internal and external stakeholders.

The reason why there is a need for reporting relates to the accountability of a company to both its internal and external stakeholders. Reporting and accounting in a sustainable manner enables a company to offer proof of its accountability.

The concept of accountability is supported by numerous theories, which include the stakeholder and the legitimacy theories. The need for a company's survival is affirmed by the legitimacy theory and, therefore, accountability to society is compulsory to legitimise its existence. Such legitimacy is enabled by sustainable accounting and reporting. In contrast, the stakeholder theory emphasises that for a company to prolong its existence it should effectively manage the different stakeholders. Specific environmental issues concern each stakeholder in a different way in relation to its own situation. Improved disclosure requirements, as well as a rise in sustainability reporting, is the result of an increasing need for information related to corporate sustainability practices (Stratling, 2007) and (Botha & Middelberg, 2016).

2.2.2 Disclosure

Disclosure within the business environment can be viewed as the act of releasing all relevant information that may positively or negatively influence an organization (Segal, 2019). Furthermore, disclosure in law refers to the notion that in the interest of fairness, all relevant parties should have equal access to the same set of facts.

Disclosure reports are mainly produced for internal and external stakeholders, to showcase a company's business activity and performance (Kluwer, 2019). This practice is essential for existing and prospective investors or stakeholders, to ensure continuous awareness of the company's current status of affairs. In addition, disclosure reporting is for the most part compulsory, especially for public listed companies on certain operational aspects as set out by regulators.

All reporting organisations, both internally and externally, should benefit from an active sustainability reporting process and disclosure cycle (GRI, 2019). Such reporting comprises a systematic programme involving collecting data, communicating, and responding thereto that results in the following internal benefits for participating organizations and companies (GRI, 2019):

- Enhancing understanding of opportunities and risks,
- Highlighting the relation between non-financial and financial performance,
- Reducing costs, simplifying processes, and increasing efficiency,

- Influencing continuing management policies and strategies, as well as business plans,
- Assessing and setting guidelines for sustainability performance in relation to laws, codes, norms, voluntary initiatives and performance standards,
- Avoiding implication in publicized governance, environmental and social failures and
- Being able to evaluate performance both internally as well as between sectors and organisations.

The following list delineates the external benefits of active sustainability reporting (GRI, 2019):

- Alleviating undesirable environmental, governance and social effects,
- Enhancing brand loyalty and reputation,
- Empowering external stakeholders to comprehend the company's actual value, and tangible and intangible assets,
- Displaying the manner in which the company influences, and is influenced by, expectations regarding sustainable development.

2.2.3 Integrated reporting

According to the International Integrated Reporting Council (IIRC, 2013) the concept of integrated reporting originated from the principal of intellectual thinking. This practice further transpires to the certain value creation over a period that an organisation achieves through continuous intermittent reporting. Within the context of reporting on an integrated scale, several aspects of an entity's business environment are communicated, ranging from strategy, governance and prospectus, both short and long term, within and outside the organisation. Integrated reporting is an approach whereby a combination of the historically focussed financial income statements and balance sheets, are combined with sustainability reporting, to form an integrated holistic method to disclose information on all levels of businesses.

According to Main & Eric (2012), a company is enabled to better understand and manage various dimensions of value through utilising integrated reporting.

2.2.3.1 Sustainability reporting

Sustainable development is of fundamental importance to an organisation because it describes the progress accomplished to-date, without compromising the future needs and generation of resources according to the United Nations (UN, 1987). This type of reporting is predominately attentive to the surroundings and influences of the organization's economy, compared to the purely focussed financial capitals that look at the organization's financial health in traditional reporting frameworks.

The primary function within a sustainability report, is highlighted by the attention given to reporting and disclosing on aspects involving its natural, social and relationship capitals, in relation to its operating enactment (Gamage & Sciulli, 2016).

Furthermore, the GRI (2016) stated that together with these three listed aspects companies should follow a set of recognised guidelines in reporting the positive and negative affects towards sustainable development. The positive effect of sustainability reporting additionally inspires greater accountability, assists in identifying and alleviating risk factors and provides a platform for organisations to consider other prospects (Blasco & King, 2017).

The comprehensibility and creditability of sustainability reports have been questioned because of the growing demand for this information. The transparency of sustainability reports can be associated with the dependability, inclusiveness and creditability of the information disclosed (Boiral, 2013).

The different concepts that exhibit similarities within sustainability reporting include the Triple Bottom Line (TBL), Corporate Social Responsibility (CSR) and any other non-financial reporting or capitals (GRI, 2019).

2.2.3.2 Integrated reporting capitals

Integrated reporting's primary purpose is to explain to financial capital providers how an organization creates value over time. The best way to provide this information is through a combination of quantitative and qualitative information, a process known as the six capitals (IIRC, 2013).

According to Serafy (1996) capital is one of the fundamental ideas within the field of economics, because it is a catalyst for growth within businesses, moving goods or

services around and producing them further, as a form of stock with volume. The value creation process over time is best described by reporting on the financial capital of a company, with a combination of the different capitals, as the six different capital model suggests (IIRC, 2013). This process is further assisted by looking at a mixture of quantitative and qualitative information obtained from this development. The different capitals in integrated reporting include those listed here and demonstrated below in Figure 2-1:

- Financial Capital
- Manufactured Capital
- Intellectual Capital
- Human Capital
- Social & Relationship Capital
- Natural Capital

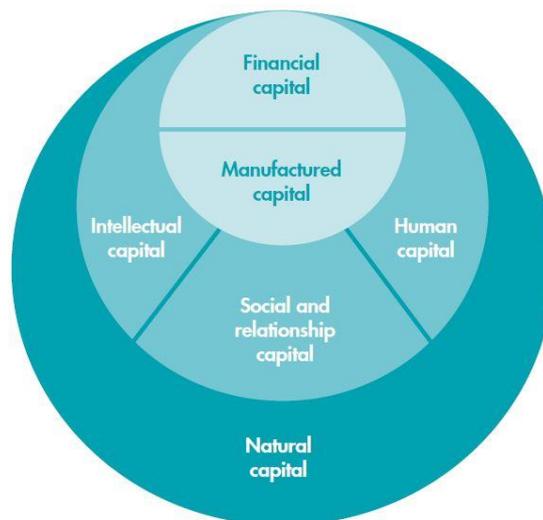


Figure 2-1 Displaying the six capitals within the broader framework of integrated reporting. Source IIRC (2013).

2.2.3.3 Natural capital

For this study, the focus will reside within the natural capital field because, as already stated, the aim is to investigate the reporting and disclosure of water practises within the platinum mining industry. Natural capital essentially involves the utilization of ecosystems services and the benefits humans extract from them.

According to De Groot, *et al.* (2003), natural capital can be defined as any stock of natural - or environmental - resource in the form of soil, water, atmosphere and ecosystems etc. Thus with an eventual aim to ensure the provision of a flow of useful goods or services currently and into the future (Pearce & Turner, 1990; Daly, 1994 and Van Diere, 1995). Natural capital can act as a symbol of importance, by performing or producing several elements for the purpose of improving human civilisation (Ekins, *et al.*, 2003). With reference to integrated and sustainability reporting, companies should distinguish between what type of natural capital resources are evident and upon which they have the greatest dependency. The natural capital framework has been summarized in Table 2-1 in terms of its outline, categorization, and description (IIRC, 2013):

Table 2-1 Natural capital framework outline, categorisation, and description.

Prototype Framework	Suggested alternative	Notes on description	Additional notes
<p>Natural capital: Natural capital is an input to the production of goods or the provision of services. An organization's activities also impact, positively or negatively, on natural capital. It includes:</p> <ul style="list-style-type: none"> • water, land, minerals and forests; • biodiversity and eco-system health. 	<p>Natural capital: All renewable and non-renewable environmental stocks that provide goods and services that support the current and future prosperity of an organization. It includes:</p> <ul style="list-style-type: none"> • air, water, land, forests and minerals • biodiversity and ecosystem health. 	<p>Indicates that both current and future organizational prosperity fundamentally depend on natural capital, which is essential to the provision of goods and services.</p>	<p>The definition of natural capital as renewable or non-renewable is dependent upon the stock under consideration at a given point in time, its estimated use and replenishment levels, e.g., fish may fall into either definition depending upon the fish stock being considered.</p> <p>Natural capital may also be defined as biotic (living/organic) and abiotic (non-living/inorganic) entities. These definitions are often used in preference to renewable and non-renewable resources for natural capital such as fish which would always be defined as biotic.</p>

Source (IIRC, 2013).

2.2.3.4 Water as a form of natural capital

Natural capital provides benefits to people which results from the interaction and spatial configuration of elements in nature, i.e. soils and rocks, animals, plants and water. The hydrological cycle is a good example of the interaction and spatial configuration of the elements of nature that produce stores of water in lakes, rivers and aquifers.

However, for people situated a distance from the resource to benefit from a distributed water supply, a pipeline (manufactured capital) needs to be built, with money to fund it (financial capital), humans to manage it (human capital) and a procedure of collaboration with customers (social capital). This concept identifies the dependencies amongst capitals (David, *et al.*, 2017).

There is a group of environmental threats that present unique challenges for the water industry. One prominent challenge is the degradation of ecosystems that function as important water sources. In addition, climate change is causing seasonal and annual irregularities in water supply, which along with increasing resource scarcity, demands a reassessment of the current design of infrastructure and operations. Many companies are investigating alternate decision-making and risk management procedures, in addition to investing in energy and material efficiency as well as leakage reduction. One invention is the integration of natural capital into decision-making and strategy procedures (Ermgassen & Rogers, 2016).

2.2.3.5 Water reporting

Water related reporting and disclosure in terms of integrated and sustainable reporting falls under natural capital and can be described as the application of a consistent and structured approach to identify, measure and report water resource information (Garstone, *et al.*, 2017).

According to the International Council on Mining and Metals (ICMM, 2017), water reporting can also be described as the disclosure outside of a company's water management performance, risk opportunities exposure and strategic response. Water reporting, therefore, establishes a vital information base for both internal and external stakeholders' key decision-making measures.

Water use statistics have been increasingly reported upon by the mining industry within their environmental management and corporate sustainability reporting. Such disclosures

mainly include mandatory reporting, mostly through environmental compliance reports to the relevant regulating authorities. On the other hand, some mining companies use initiatives such as corporate sustainability reporting to voluntarily disclose their water use data (Northey, *et al.*, 2019).

Consistent water reporting in the mining industry is crucial for transparency, and entail the following four key elements (ICMM, 2017):

1. Authorizing a minimum reporting and disclosure standard;
2. Outlining an applicable set of standardised water reporting and disclosure parameters;
3. Formulating concrete guidelines for water reporting; and
4. Preserving agility in the framework used for water reporting.

Numerous reporting and disclosure frameworks on water related issues have been developed by several different stakeholders to provide a standard and more structured manner of reporting and disclosure. Examples include: The Global Reporting Initiative (GRI), Carbon Disclosure Project (CDP), The Ceres Aqua Gauge and CEO Water Mandate. These frameworks are being used to aid in reporting and disclosure on water principles. However, they are not to be utilized only in isolation or one over the other, but rather form part of an alignment for a holistic and transparent water reporting structure. This practice is evident with the GRI and CDP frameworks, whose users have signed an agreement to align areas of reporting (GRI, 2014). The lack of a uniform language, structure and procedure for water reporting creates a need for a meaningful and systematic reporting framework, as stated by the CEO of the CDP (Botha & Middelberg, 2016).

A framework for corporate sustainability reporting is provided for by the GRI to aid in the assertion of a company's economic, social and environmental performance. Major companies have had a strong uptake of the GRI based sustainability reporting, even though it is a voluntary initiative (Northey, *et al.*, 2019). To improve the quality of disclosures made by the mining sector, several reporting supplements have been made available to the industry.

According to ICMM (2007), both mining and metals companies are more capable of meeting the information requirements of various stakeholders, comprising company and

external decision makers through quantifiable reporting of the industry's water footprint and disclosure of material risks and water management plans.

The WEF's Global Risk Report (WEF, 2015) recognizes the water crisis as the largest societal and economic global risk for the following decade in terms of probable impact. According to Tewari (2009) the increase in urbanisation and industrialisation has led to the projection that by 2025 South Africa could deplete its water resources. Africa is the second-most arid continent after Australia, and as climate changes and population growth continues to alter rainfall patterns, water shortages have come to be a crucial issue, a fact which is particularly concerning for platinum mining producers, because the majority is located within Africa.

The mining companies' concern is related to both the quality and quantity of available water. The effect of water scarcity has a significant impact on any business's strategic plan formulated within a water-constrained future and, therefore, is a vital aspect that needs to be reported on. Consideration of this information makes it apparent that the long-term viability of a business is affected by the way in which corporations report and manage their available natural capital (Main & Eric , 2012).

Global incentives for more holistic reporting have been provided by the increasing awareness of substantial environmental, social and political pressures which modern organisations are facing (Carels, *et al.*, 2014). If current organisations are to encourage principles of sustainable business practice and stakeholder accountability successfully in their everyday operations, integration of non-financial and financial information is of supreme importance. Mining companies in South Africa are no exception to this requirement since this industry subsidises the country's employment, gross domestic product and international capital inflows (Carels, *et al.*, 2014).

CSR together with the sustainability disclosures' prospects within the formerly state controlled Soviet Union/Russia while still truncated are increasing because there is a holistic change towards more transparency for non-financial disclosures within business (Fifka & Pobizhan, 2014). Sustainability disclosures, particularly on water reporting are supported by frameworks involving the GRI Sustainability Reporting Standards and Mining & Metals Sector Supplement.

The United Nations (UN) acknowledges the access to fresh water as a human right, since its availability is essential for human life and welfare. As part of the 2030 Agenda for Sustainable Development, the UN has adopted Sustainable Development Goals, of which

Goal 6 specifically addresses sustainable water management and states the following 'Ensure accessibility and sustainable management of water and sanitation for all'. As a result of Goal 6 targets have been set to address the water scarcity issues, to enhance water quality and to provide worldwide access to safe and affordable drinking water (GRI, 2018).

According to GRI (2018) water associated effects are localized, subsequently water is a shared resource leading to businesses being progressively urged to:

- Focus on the local setting through looking at localized environmental and social impacts;
- Water scarce or deficient areas need prioritized actions;
- The needs of all water users within adjacent areas should be respected and users should be assisted in terms of their water concerns and needs; and
- Through the implementation of effective public policies, businesses can aim at aligning their methods and joint actions with other water users.

Once mining companies recognise the comprehensiveness of their water use, it enables them to determine their overall impact on water resources, their effect on other water users as well as on their own business. Therefore, through utilizing this available information effective water management in a predominantly water-concentrated business, can be reached, reported on and disclosed.

2.2.4 Previous research on sustainable reporting and disclosure on water practises within the platinum mining industry

The key difference from the literature noted and the current research undertaken, is that though mining companies have been analysed, none of the researchers have placed their focus solely on platinum mining producers, except for one. Several different methodologies and approaches were also noted, with assistance from voluntary to regulatory disclosures. Previous research conducted in the mining sector with reference to water disclosures involved the following literature:

2.2.4.1 Sustainable reporting and the global platinum group metals: A global mining industry leader?

According to Mudd (2012) sustainable reporting remains a challenge for platinum mining producers, even though the reporting of water consumption have improved. Moreover, the study found limited companies report on disclosures involving water indicators, based on the GRI G4 Guidelines related to discharges and recycling.

2.2.4.2 Sustainable water management and improved corporate reporting in mining

This study focussed on water accounting standards reporting and disclosures in the mining sector, with over 359 reports analysed. According to the researchers it was noted that over time, the quality of water disclosures has progressively improved. A key observation from the study reveals that the water reporting and disclosure levels on water withdrawal and water inputs, are far greater than the volume of water discharged or stored on site (tailing dams and evaporation lakes). Additionally, it was noted that within mining operations across various regions, water reporting and disclosures vary considerably (Northey, *et al.*, 2019).

2.2.4.3 Water sustainability reporting on mining companies based on the Ceres Aqua Gauge in 2017

The research was based on South African mining companies, across all commodity sectors, using the four main categories of the Ceres Aqua Gauge (measurement, management, stakeholder engagement and disclosure). The findings indicate that mining companies in general have good disclosures, accountability and stewardship on water related principles. However, low interest was noted in reporting and disclosure on water supply chain management (Askham & Van der Poll, 2017).

2.2.4.4 Water related reporting and disclosure of high impact users in South Africa

Companies assessed in the research formed part of several sectors, across South Africa. Though half of the companies analysed in the research are in the mining sector, the level

of reporting and disclosure on water withdrawal to different source specific water bodies prevailed, compared to other sectors. Key findings on the mining companies revealed that 76% of them identified water as a material topic and showed that the highest dedicated administration teams are in place for governance on water principles. Over two thirds of the mining companies acknowledge the usage of frameworks, such as the CDP, in their water disclosures. Factors involving physical, regulatory, and reputational risks were best recognised within the mining organizations, compared to other sectors (Botha & Middelberg, 2016).

2.2.4.5 Global corporate water reporting on water risks

The research involved several different organizations from all sectors. The mining producers used for this study form part of a diverse mining commodity structure and were not limited to platinum only. Nevertheless, the outcomes showed that the mining industry indicated the highest degree of water disclosures, water related regulatory risks and stakeholder engagement, compared to all other sectors (Barton, 2010).

Further in depth summarized key findings involved the following aspects (Barton, 2010):

- Water accounting disclosure, which uses data on the water consumption, discharge and withdrawal indicated that approximately 77% of mining companies display this data in their respective reports.
- Disclosure of direct operations displayed strong disclosures from the mining sector, because over 72% of companies noted disclosure on water-specific management systems, strategies and/or policies.
- High disclosure levels were noted with stakeholders involving the management of local water resources and conflicts, with over 77% of companies noting such disclosure.

2.3 FRAMEWORKS FOR SUSTAINABLE REPORTING AND DISCLOSURE TOWARDS WATER PRACTISES

As stated before, several frameworks have been developed and recommended to organizations to assist them with their respective sustainability reporting, especially regarding water disclosures. This following section will present an in-depth breakdown on the GRI and what the initiative recommends in terms of water disclosures, followed by a summary of additional industry frameworks also used within the business context.

2.3.1 Global Reporting Initiative (GRI)

Developed in 1997, the GRI is an independent international organization, assisting the private and public sector to understand and communicate its impact on sustainability issues (Paul, 2018). The focus areas of the GRI, identified by the framework are as follows (GRI, 2019):

- Creating standards and guidance for sustainable growth,
- Coordinating and collaborating a sustainable basis between stakeholders,
- Developing efficient and effective sustainable reporting methods and
- Ensuring successful usage of sustainable data for future developments.

The key focus of the GRI is to empower change for the benefit of everyone in the social, environmental and economic segments. Reporting within the GRI framework furthermore assists private and public institutions to understand and to interconnect on serious sustainability features. According to the GRI (2019) several distinctive features of the GRI framework are a result of multi-stakeholder input, a record use of the initiative worldwide and endorsements of it, together with constitutional policy makers and non-governmental, independent organisations. The framework, under the Global Sustainability Standards Boards (GSSB) entity is responsible for formulating the universally recognised standards for reporting on sustainability.

The shared idea of the GRI as a means of attaining sustainability reporting, positively or negatively, is to create a balanced overview and illustration of an organization's development towards sustainability. This vision if globally attained will in future allow stakeholders internally or externally to view the contributions an organization has made towards its sustainability goals and developments. The GRI sets out a common language

for all non-financial reporting, that moves toward organisations achieving a comprehensive issue-based specific sustainability reporting code (Taneva & Bergkamp, 2018).

2.3.1.1 Holistic GRI Standard and Disclosure Guidelines:

Through the years, the GRI have continuously developed and evolved, thus, improving its framework to ensure the standards will be applicable throughout the globe and be incorporated within any industry. Thus, the current GRI G4 Guidelines formerly used by most organizations have been substituted by the GRI Standards, since 1 July 2018, with a final recommended date of execution on 1 January 2021, whilst earlier implementation is recommended (GRI, 2019). The main concepts and disclosures that have been incorporated within the GRI Standards, are based on the G4 Guidelines, hence organizations adhering to the latter will almost fully comply with the new GRI Standards of reporting and disclosures (GlobalReporting, 2018).

It was suggested by Mudd (2012), that a major disadvantage of the GRI G4 Guidelines are only external water quality discharges are taken into consideration. This is critical, as water recycling, reuse and discharges within organisations should be accounted for environmental concerns.

The GRI Standards are designed to assist organizations in all sectors, by means of three universal standards, relevant to all establishments, followed by 33 topic specific standards within the fields of economic, environmental and social fields, as seen below in Figure 2-2. The universal standards include those of the GRI (2018), followed by the topic specific standards:

- **Foundation – GRI 101:** Related to the starting point of the GRI Standards
- **General Disclosure – GRI 102:** Aimed at reporting contextual information about the specific industry.
- **Management Approach – GRI 103:** Specific for reporting on management material topics.

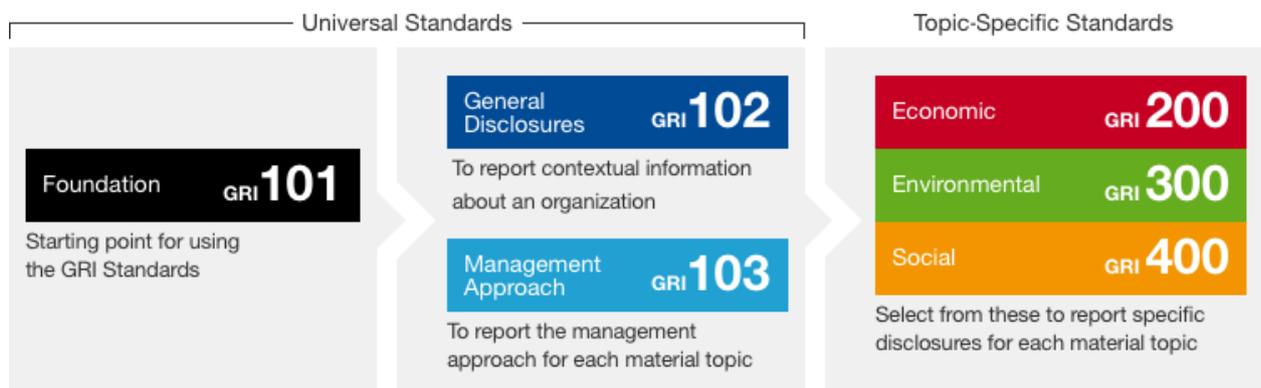


Figure 2-2 Illustrating the GRI framework, from the universal standards to the specific standards topic. Image adapted from BASF (2019).

The topic-specific standards to disclose include:

- Economic Topics - GRI 200:
- Environmental Topics – GRI 300:
- Social Topics – GRI 400:

As a result, the GRI Standards listed eight different areas to concentrate on within the environmental capital specific topic (GRI, 2018) which include:

- GRI 301: Materials
- GRI 302: Energy
- GRI 303: Water and Effluents
- GRI 304: Biodiversity
- GRI 305: Emissions
- GRI 306: Effluent and Waste
- GRI 307: Environmental Compliance
- GRI 308: Supplier Environmental Assessment

For this study’s objective, the focus will be positioned at the GRI 303: Water and Effluents specific topic standard, because this is the key reporting and disclosure framework involving water principles within organizations.

2.3.1.2 GRI 303: Water and Effluents

This standard has been designed for organisations to acknowledge better stewardship over water resources, while understanding the impact of water in the environment at business units and neighbouring communities (Paul, 2018). In the past, the water resource impact across the entire specific business value chain and surroundings has been under reported. The GRI 303: Water and Effluent Standard places greater importance on this specific area of water resources.

This standard furthermore concentrates especially on the water withdrawal, consumption and discharge throughout the entire business chain and the associated impact on risk factors. Moreover, the strong connection among these three elements (water - withdrawal, consumption, and discharge), forces an organization to report on all three-topic specific disclosures within the GRI 303 (GRI, 2018). The standard is designed to be applied by whoever wants to report on water disclosures for any organisation, sector or geographic location, supported by quantitative information with descriptions.

The standard includes two management approaches and three topic specific disclosures, as abstracted from the GRS list (GRI, 2018). Refer to appendix A for GRI 303 Standard.

A. Management approach disclosures: This approach disclosure forms part of the description of how organizations manage the identified material topics, which in this case are water and effluents. The impact associated with the material topics, water stewardship efforts, and the stakeholder's inputs and outputs should be explained thoroughly, based on the disclosure type.

1. Disclosure 303-1 Interactions with water as a shared resource:

- This standard involves the holistic water management disclosure approach, through descriptive reporting on water as a material topic and how the organisation interacts with this resource. The standard furthermore positions organizations on how (a) to address water related impacts and (b) to mention and approach the framework to be used to identify water related impact, together with their respective water goals – both internally and externally.

2. Disclosure 303-2 Management of water discharge-related impact:

- This section entails the regulatory water related Acts (both regional and national) and organizational internally developed standards, with regard to the management of water and discharge of effluents into the environment or elsewhere.

B. Topic-specific disclosures: The topic specific standards comprise of water withdrawal, discharge and consumption from or to specific source sites and disclosing the quantity quantitatively in megalitres. Prominence from water stressed resources should be provide additional disclosure.

3. Disclosure 303-3 Water Withdrawal:

- Water withdrawal disclosures from sensitive areas, indicate organisations potential impact from water stressed areas, especially reporting on sites specific (surface water, groundwater, seawater, produced water and third-party water) water resource withdrawals in megalitres.

4. Disclosure 303-4 Water Discharge:

- Water discharge for organizations is a crucial aspect of the water reporting and disclosure framework, because this information will put the potentially negative effect into perspective that associated organizations have on the environment. Higher discharge rates do not necessarily reflect a negative impact on the environment, because water treatment and quality control can overcome this problem. Disclosure 303-4 sets out the standard on how organisations should disclose the discharge of water bodies to site on sites specific (surface water, groundwater, seawater, produced water and third-party water), followed by the degree of water stress areas and freshwater areas with high Total Dissolved Solid's (TDS) in megalitres.

5. Disclosure 303-5 Water Consumption:

- The term 'consumed water' refers to water bodies not available for ecosystems adjacent to water used by the organization. The disclosure for water consumption refers to the total water consumed by an organization, as well as consumption within water stressed areas. Should water stressed areas be identified, then the change in water should be disclosed. All values should be reported in megalitres.

2.3.2 Additional water reporting and disclosure frameworks

2.3.2.1 Carbon Disclosure Project (CDP)

The CDP houses one of the largest databases on primary climate change in the world, which is also an independent non-profit company. Its water programme was launched in 2010, with the aim of helping business and investment communities to better comprehend the opportunities and risks related with water scarcity and promote other water-associated issues (CDP, 2011). A rising awareness in this field is reflected in the initiative shown within both the business sector and the larger investment community.

When companies are reporting on and managing water resources, Fisher (2007) concurs that there is an absence of consistent structure, language and procedures. Furthermore, the significance of high-value water-related data in supporting decision making is acknowledged by Chalmers, *et al.* (2012) who further state that when addressing water management this type of data is of great importance.

International and South African companies are given the opportunity by the CDP Water Disclosure framework to publicly report on the manner in which their water risks are being managed, thus leveraging opportunities for them to contribute to the general management of the world's freshwater resources (CDP, 2011).

According to the CDP (2018) the fact that companies disclose comparable and standardized data in one place annually, is one of the benefits of reporting through the CDP. A range of different organisations globally uses this data. Information is gathered from numerous high performing international companies by the CDP, which is then accessible to recognised investors to inform their decision making on carbon emission and climate strategies, as well as energy usage and reduction. South African companies, according to the CDP, are both measuring their performance as well as engaging the

phase of progressing their CDP disclosure by taking practical measures to execute reduction solutions.

A competitive advantage can be gained when reporting to the CDP by getting ahead of policy and regulatory changes, recognising and stopping growing risks as well as through discovering new opportunities for actions that are required by customers and investors around the world. The CDP hopes to fulfil the following aims and objectives through the water disclosure procedure and successive assessment (CDP, 2011):

- To enable the transparent reporting of businesses' water associated actions and their impact;
- To encourage enhanced knowledge, management and measures related to opportunity and risk;
- To present the data to stakeholders and investors to enable them to understand international best practise compared to the present degree of response from companies in general together with sector specific responses;
- To provide contextual analysis on the material problems relating to water on both a local and an international level; and
- To present an outlook on company water practices in relation to current policies to decision makers.

The CDP released a water report of South Africa in 2013 whereby they combined different business sectors, by requesting a water related questionnaire for high impact users. The results indicated that the mining sector had the highest number of respondents, with over 75% displaying quantitative targets and water related risk factors associated with its operations. However, response on the supply chain risks in the mining sector, indicated that less than 50% identified risks in the supply chain and require suppliers to disclosure on water principles (CDP Water Programme, 2012).

2.3.2.2 Ceres Aqua Gauge

Investors are enabled to scorecard a company's water management activities against comprehensive definitions of leading practice through the Ceres Aqua Gauge which is an adjustable Excel-based tool (Ceres, 2011). The Ceres Aqua Gauge was built on the foundation of the Ceres Roadmap for Sustainability which also focusses on activities of

stakeholder engagement, management and governance in addition to disclosure. For each activity, a company's progress can be assessed against the following four stages:

- No action: Limited action taken by the organisation;
- Initial steps: Organization only involved in the initial phase of action;
- Advanced progress: Action has been taken, but still needs to be improved; and
- Leading practice: Action taken correctly, and full compliance noted.

The Ceres Aqua Gauge is not another path of business disclosure nor a survey. The primary aim of this directive is to provide guidance to equity investors through evaluation and interpretation of data on a business's management of its water related issues, as well as to present a structure that guides stakeholder engagement and discussions with companies. Apart from assisting shareholders, the Ceres Aqua Gauge also benefits businesses in the following ways (Ceres, 2011):

- Provides them with a comprehensive picture of primary practice in water management;
- Offers a source to assist them in informing and improving their own water management approaches; and
- Provides a procedure for evaluating their performance and guidelines for improvement.

2.3.2.3 CEO Water Mandate

Business leaders are mobilized on Sustainable Development Goals (SDGs), water and sanitation through the CEO Water Mandate which is a United Nations Global Compact initiative (UN Global Compact, 2007).

Supporters of this mandate are dedicated to constant improvements through six fundamental aspects of stewardship in order to recognize and control their own water risks. The six commitment areas of this mandate include the following (UN Global Compact, 2007):

- Transparency;
- Public Policy;

- Direct Operations;
- Collective Action;
- Community Engagement; and
- Supply Chain & Watershed Management

Designed as a private-public programme, the mandate was launched at the Leaders' Summit in July 2007 with an emphasis being made on creating strategies and solutions which will add constructively to the rising global water crisis. Furthermore, this mandate will, in order to address this challenge, seek to involve a crucial mass of businesses worldwide which are inclined to embark on serious efforts in collaboration with other investors (UN Global Compact, 2007).

This UN project will manage efforts and work with current water programmes whenever possible, on a local as well as global scale, to enable an extended positive impact on the rising global water crisis (UN Global Compact, 2007).

2.3.2.4 International Council on Mining and Mineral (ICMM)

The International Council on Mining and Minerals (ICMM) has noted the increased interest from regulators, civil society and investors on mining companies' water related principles of reporting and disclosure. However, inconsistent reporting on these water related areas have forced the ICMM to develop their own minimum water disclosure standards, with assistance from the Mineral Council of Australia's Water Accounting Framework. As the ICMM is of the opinion that even though the CDP, GRI and CEO Water Mandate have considerably improved water use disclosure standards, it has its limitations (ICMM, 2017).

The guide developed by the ICMM comprises four elements, which include: (1) Mandating the minimum disclosure, (2) Defining standardised water reporting metrics, (3) Providing practical guidelines and (4) Maintaining flexibility in the approach. The guide's structure is then further sub-divided into three sections of which the first one includes consistent water reporting, followed by the internal and external water compilation referred to in sections 2 and 3 respectively (ICMM, 2017).

2.3.3 Geolocations requirements and/or guidelines for sustainable reporting

The global drive for sustainability, transparency and stewardship of natural resources are increasing, especially for platinum mining produces, which is water intensive from mining to processing. This further renders to idea of disclosing water principles, for most listed requirements. Since each country has its own water related challenges, followed by key role players regulatorily requirements.

Mining companies located in South Africa, which are listed on the JSE, have to follow the KING (booklet of guidance in corporate governance in south Africa) codes recommendations of adopting the GRI Standards of corporate reporting and disclosing on water related principles (Rea, 2012). This forms part of the holistic approach of the TBL for financial and non-financial transparency, within an annual, integrated or sustainability report.

According to the Chartered Professional Accountants of Canada (CPA, 2013) multiple guidelines and standards have been developed for sustainable reporting, from globally recognised to industry specific standards including the GRI, CDP and the Mining Association of Canada's Towards Sustainable Mining principles. The frameworks provide a methodical method for reporting and disclosures on sustainability of non-financial concepts, even though they vary of specific recommendations. This, companies use a combination of the frameworks, to report and disclose on all sustainability significances operating within Canada.

Sustainability reporting in Russia is supported by the Russian Union of Industrialists and Entrepreneurs (RSPP), by serving as a foundation for sustainable development in the country. In addition, the non-financial material reported and disclosed is put through a public verification process, as the RSSP utilised as an independent validation tool on public reports (RSPP, 2019). The GRI Sustainability Standards and specific Mining & Metals Sector Standard recommendations is widely used as a framework for sustainability reporting within the Russian Federation (Schwery, 2017).

2.3.4 Linking of frameworks

The linkages between the different frameworks are evident, because they all aspire for a common goal of improved sustainable reporting on water practises, with key similarities.

This fact is highlighted by the establishment of the GRI, which has its roots in the Coalition for Environmentally Responsible Economies (CERES), partnered with the United Nations Environment Programme (UNEP) (Global Reporting, 2019).

With the objective being to align the areas of their reporting frameworks, an agreement was signed in 2013 between the GRI and the CDP (GRI, 2014). The Chief Executive Officer of the CDP, Simpson, stated that there is a need for systematic and meaningful reporting on water internationally. Furthermore, the linkages between the GRI and the CDP are well documented because the organizations work together to bring disclosure metrics into line, while ensuring that the replication of disclosure standards is limited (GRI, 2018).

2.4 WATER RISK FACTORS PERTAINING TO PLATINUM OPERATIONS

The way mining companies safeguard and utilize water sources is seen currently as a crucial issue given the need of water for all life on the planet, as well as its significance for mining operations. In Africa especially, water scarcity and water resources are a growing area of concern, since operations both depend upon and impact on these resources. There is a continuous increase in demand for water while water availability is also affected by potential impacts of climate change, according to the International Finance Corporation (IFC, 2014). Both the efficiency of an operation as well as the kind of the mining activity taking place will have an impact on its water use.

The level of companies' preparation for uncertainty can be demonstrated to stakeholders through their being clear about the main risks their operations are facing, as well as the plans in place to mitigate these risks. This information is of specific importance when investors use the completeness of a company's risk assessment plans to evaluate how well a company is managed, according to the Association of Chartered Certified Accountants (ACCA, 2013).

Business feasibility can be negatively affected over both the short and long term when companies are subjected to water-related risks. According to Barton (2010), CIMA (2011) and CDP (2012), five broad categories can be utilized to group water risks, such as regulatory risks, physical risks reputational risks, financial risks and litigation risks.

1. Regulatory risks:

- these include for instance matters such as rates regulating water withdrawal, water permits and distribution, and discharge amounts as well as limitations on pollutant levels and types.

2. Physical risks:

- these are related to occurrences when there is water stress (water shortages), pollution (decline in water quality) and flooding (increase in water).

3. Reputational risks:

- these develop when water capacity and accessibility results in pressure amongst local communities and companies.

4. Financial risks:

- these risk factors are related to costs involved for the treatment and conversion of water.

5. Litigation risk:

- these risks involve the growing competition, whereby adjacent companies can influence one another over legal regulatory water rights, with could entail legal encounters restraining operations.

A study by Barton (2010), which involved a diverse set of mining companies' disclosure of risk assessment, pertaining to physical, regulatory, reputational and litigation risks. The research concluded that all mining company's make disclosures on physical and regulatory risks, while only 33% and 66% report on their reputational and litigation risks, respectively

According to the CDP (2011) both a widespread and a substantial level of opportunities and risks were reported by South African respondents. The top three risks identified for direct operations by respondents included the following: high water prices (42%), physical scarcity of water (85%) and declining water quality (42%). Furthermore, the top risks relating to the supply chain included: declining water quality (15%), physical water scarcity (35%) and reputational damage and inadequate infrastructure (8%).

Water is a dependant factor for all stages of mining operations, from exploration to rehabilitation, as well as the requirement of water for drinking and other purposes by employees of the mine as well as surrounding communities (IFC, 2014). The alteration of water streams has been a result of water requirements for operations. The fact that many large-scale mining companies operate in water scare areas has been a major cause of increased conflict between the mining companies and local communities.

Since many areas in Africa either face drought or flooding, or both, it has resulted in high water-related risks. African related water risks include the following, according to the IFC, (2014):

- Decreased freshwater availability;
- Desertification;
- Flooding;
- Droughts;
- Deforestation; and
- Health challenges relating to water challenges.

Mitigation and management measures that companies can implement to reduce the risks associated with water include: preventing water pollution, reusing contaminated water, reusing treated water, treating unreclaimable water as well as safely releasing excess water. Companies can also try, through their community involvement, to provide safe drinking water to the people residing within the area of the mine (IFC, 2014).

According the GRI (2018) risks associated with water withdrawal, consumption and quality of discharge, have all implications for the environment connected to it. Social and economic cost could be involved should the quality of a specific environment be negatively affected by the mines' operational water practises.

2.5 CONCLUSION

The literate review had three objectives, as specified within Chapter 1. The first was to establish the importance of water related reporting, within the holistic context of sustainability and integrated reporting. It was noted that water related reporting is viewed

as a key concern for users, policy makers and all stakeholders associated with the value chain, especially for mining organisations, because the majority are located within water scarce environments.

A secondary objective of this literary review was to identify the frameworks in place in accordance with water reporting and disclosures. The GRI, CDP and ICMM are a few frameworks noted in the reporting and disclosure sphere, while key initiatives on mandatory reporting stipulate and recommend the above-mentioned frameworks.

A third objective is to identify risks factors related to water in the mining industry. Five broad risk factors were recognised of which physical risk factors be most concerning.

After the literature study, a disclosure index was developed. Although several frameworks and guidelines exists, the most widely used one was the GRI 303. Therefor the disclosure index as developed are mostly based on that standard.

CHAPTER 3: EMPIRICAL STUDY

3.1 INTRODUCTION

The objective of the study is to investigate the reporting and disclosure on water principles, for companies within the platinum mining industry, in terms of regulatory guidelines and standards.

A disclosure index was developed in order to analyse the chosen companies, from the research literature in Chapter 2. The GRI 303 Standards formed the basic framework of the index, for the analysis of the different reports by the platinum mining producers. The research methodology for the empirical study is explained in this chapter, followed by the results and discussion.

3.2 RESEARCH METHODOLOGY

The process whereby scientific information is assembled, by means of different methods and techniques can be defined as research methodology (Welman & Kruger, 2002). The nature of the research question and subject will influence the research methodology or strategy chosen (Denzin & Lincoln, 2005).

3.2.1 Research design

The method the researcher select in order to achieve the objective of the study, can be described as the research design. Likewise, the research design acts as a guideline or plan for choosing the method of data collection (De Vos, *et al.*, 2011).

Research approaches generally consist of quantitative and qualitative research, with a third paradigm involving a combination of the two, known as a mixed method approach (Creswell, 2014). According to Lucas-Alfieri (2015) quantitative research is a method measuring variables by means of a numerical system. In contrast, the qualitative research approach entails gathering of non-numerical data, which seek to understand meaning from the data (Crossman, 2019). The third method, a mixed method approach involves the research and gathering of information utilizing a combination of quantitative and qualitative research into a single study (Johnson & Onwuegbuzie, 2014).

In this study, a combination of quantitative and qualitative research methods were utilized. The reports from the platinum producers, were analysed by focussing on the narrative (qualitative) as well as the quantitative disclosures involving water items being reported. Moreover, the narrative data involves companies reporting and disclosing on management approaches, governance of water aspects and the various water risk factors.

The data of the two approaches (quantitative and qualitative) were thus collected concurrently, analysed independently and incorporated into the results by merging and/or convergence (Creswell & Plano Clark, 2011). The combined and mixed approach are called a convergent parallel mixed method (Creswell, 2014; Morse, 1991).

3.2.2 Data collection

The data used for the analysis form part of the platinum mining producers' reports, that include the annual, integrated, sustainability or specific water capital report. The main sources of the reports are on each individual organization's websites or other reputable providers of annual reports.

3.2.3 Methods of analysis

Research involving social, environmental, and economical content, in accounting and business studies are frequently investigated by a method involving content analysis (Krippendorff, 2004). The content to be analysed can be categorised into several measures, by coding the specific text in question related to the research (Neuman, 2003). Water will be the key text code in the analysis of the publicly available reports of the sample population, based on the specific developed disclosure index parameter.

3.2.3.1 Content analysis

In summary, content analysis is a research method that involves quantifiable, qualitative and mixed methods of research, which are highly flexibly on varying aims and objectives (White & Marsh, 2006). According to Krippendorff (2004), content analysis can be defined as a research procedure that comprises methodically and empirically assembling interpretations, based on precise features as text. It further involves the systematic

analysis of texts, but not necessarily only those produced by the researcher. A researcher will assemble assumptions from one independent domain, namely the text, to another domain - the context, because these two spheres are independent of each other.

3.2.3.2 Quantifiable and qualitative content analysis

The research on water disclosures involves both quantifiable and qualitative data and is therefore recognised as a mixed method approach. These two data types have their respective difference in content analysis, but four common fundamentals have been distinguished (Krippendorff, 2004):

1. Using the sample text and noticing what is evident for the research;
2. Selecting only context necessary for the research;
3. Reviewing what is new in the context, and what is already known; and
4. Focusing on similar research projects or aligned questions.

The relevance of the sample text to each data set, involving the quantifiable and qualitative method, places emphases on the importance of the purpose of the text. Thus, the distinctiveness of the text is significant to qualitative data, because many different interpretations can be deduced from the text, compared to the purely numeric data that is associated with quantifiable data (Krippendorff, 2004).

3.2.3.3 Data analysis based on the content analysis

Thus, for the empirical research, the context and text refer to the platinum mining producers mandatory and voluntary reports with specific items related to water disclosures. The disclosure index developed from literature and predominately based on the GRI 303: Water and Effluents Standards, were compared and analysed.

The disclosure index comprises of seven main sections (A-G), below in Table 3-1. The first two sections (A and B) deal with narrative (qualitative) information. The last two sections (F and G) are also disclosed in a narrative way by addressing the various frameworks used as well as the different risks. Section C, D, and E deal with more quantifiable characteristics.

Therefore the analysis was divided into two parts:

- Section A-E
- Section F-G

Table 3-1 The disclosure index seven main sections.

Section	Disclosure Index Summary	Data Format:
A	GRI 303 – 1: Management Approach	Qualitative
B	GRI 303 – 2: Management of Water Discharges	
C	GRI 303 – 3: Water Withdrawal	Quantitative
D	GRI 303 – 4: Water Discharges	
E	GRI 303 – 5: Water Consumption	
F	Frameworks and Governance Reporting and Disclosures	Qualitative
G	Water Risk Factors Reporting and Disclosures	

Source: Own Compilation

Analysis of section A-E:

On examination into the disclosures from the various platinum mining producers’ reports, the level of compliance was investigated for each individual water section as stated in the disclosure index developed. The compliance and coding parameters used for these sections (A-E) is explained in the next paragraphs.

3.2.3.4 Compliance

Compliance can be defined as ‘the act of obeying an order, rule or request or the ability to act according to an order, set of rules or request’ (Cambridge Dictionary, 2019; ICA, 2018). Compliance reporting involves reports formulated by organizations that comply with regulatory requirements, governmental agencies and industry framework recommended standards (Kluwer, 2019).

The level of compliance for this research study has been divided into four sections for the purpose of the analysis. The researcher divided the sections (A-E) into four criteria in order to evaluate the compliance level based on the disclosure index. The levels include:

- **Full Compliance:** Disclosure in question displayed full compliance with the reporting framework or disclosures stated in the GRI 303: Water and Effluents.
- **Partial Compliance:** The framework disclosure is partially compliant, thus some aspects were not fully stated according to the specific GRI 303 parameters. For example, a company disclosed its water discharges, but not in megalitres or gave its total water withdrawal disclosure but not its site source specific water withdrawals.
- **No Compliance:** No compliance or disclosure was found in the reporting framework, against the GRI 303 Standard in question.
- **Not Applicable:** When a guideline or standard stated in the GRI is not relevant to the specific topic for inland based mining operations, for example water withdrawal from seawater.

3.2.3.5 Coding

The data points for each mining house were captured on a excel spreadsheet for section A to G, as shown in Table 3-1 above. For the study, a code or number of either 3, 2 or 0 was assigned, based on the developed disclosure index parameter in question, against the reported disclosure by a particular mining company.

Full compliance disclosures were assigned a number 3, while partial compliance a number 2. No compliance was given a number 0, while not applicable was mentioned where necessary.

The disclosure index visually presents each number with a circle and specific colour. The colour codes linked to number are as follow:

- 3 – Green circle: Full Compliance
- 2 – Orange circle: Partial Compliance
- 0 – Red circle: No compliance

Analysis of section F and G:

Section F and G of the disclosure index involves the frameworks noted and different risk factors reported by the platinum mining companies.

3.2.4 Research sample

The sample population include the major platinum mining organisations by output of tonnage and ounces throughout the globe, with the majority located within Southern Africa, and a few within North America and Russia.

Table 3-2 Displaying the different platinum mining companies and respective reports used in the study.

Platinum Mining Producer	2017 - 2018: Publicly Available Reports Used				
	Annual & Integrated Report	Sustainability Report	Supplementary Report	Natural Capital Specific Report	Framework Specific Report (GRI etc.)
Northam Platinum	x				x
Royal Bafokeng Platinum	x				
Impala Platinum	x	x			
Lonmin Plc	x	x			
Anglo Platinum	x		x		
Sibanye Stillwater	x				
Platinum Group Metals	No reports found				
Sedibelo Platinum	Reports found outdated from 2010-2011				
African Rainbow Minerals	x	x			
Eastern Platinum	x				
Wesizwe Platinum	x				
Glencore	x	x		x	x
Bauba Platinum	x				
North American Palladium	No reports found				
Vale Sa		x			
NorNickel		x			

Source: Own Compilation

The sample size was determined by means of a non-probability method (Maree & Pietersen, 2012). This was done through purposeful selection, as no random companies

where chosen, only companies by largest output of tonnage & ounces and that publish their reports. A total number of sixteen (16) companies have been incorporated in the investigation during which their 2017-2018 compulsory and voluntary public available reports and disclosures were analysed and displayed in Table 3-2. However, the data of three (3) companies out of the 16 was not used, because two (2) had no public domain reports available and one (1) presented an outdated 2010 Annual Report.

3.2.5 Validity and Reliability

In research, validity is a measure of how thorough the research is, which is applicable to both the design and methods in the research. It further can be described as one of the key factors related to research, as multiple factors can affect the research and contradict the results (Seliger & Shohamy, 1989).

The consistency of the research refers to reliability or the uniformity of a measuring test. There are two types of reliability in research, internal and external (Mcleod, 2013). The internal part involves the consistency of results within a measure, compared to the extent of variation from one user to another for different measures, for external reliability. In quantitative research, the development of a disclosure index affects the reliability, while in qualitative research, it's up to the researcher interpretation (Patton, 2002).

Therefore for this research associated to the investigation of water disclosure in platinum mining producers, a disclosure index was developed from literature, of which the GRI Standards formed the framework. This will ensure the measuring instrument for the analysis, could both be valid and reliable for the research undertaken.

3.3 EMPIRICAL RESULTS

The empirical results are discussed in the following paragraphs based on the disclosure index developed. The first part will involve the compliance level based on GRI 303 Standards for the different companies mentioned in the sample population. The second and third part will reveal the results on the narrative reporting of governance issues, pertaining to industry frameworks used, followed by critical risk factors associated with water in the platinum mining industry which will conclude the chapter.

3.3.1 Compliance levels based on the developed Disclosure Index

The results of the analysis will be presented based on the level of compliance, first looking at the general overview GRI 303 compliance, followed by a detailed analysis of sections A and B of the disclosure index, involving the Management Approach and Topic Specific Disclosure respectively. Finally, the compliance level of each disclosure in the index according to the GRI 303: 1-5 will be presented, followed by the compliance level for each platinum mining company.

3.3.1.1 Total compliance level of the GRI 303: Water and Effluents Standards

- **Objective**

The objective of this section is to determine the total compliance to the disclosure index section A-E, based in the GRI 303 Standards. This is followed by the total compliance level of part A and B in the index, concerning to the Management & Discharge Approach and Topic-Specific Approach, respectively.

- **Results**

The combined compliance level for all platinum mining producers, based on the GRI 303: Water and Effluents Standards are illustrated in Figure 3-1. Full compliance regarding the framework is approximately 42%, whilst 16% and 32% are attributed to partial and no compliance, respectively. Standards recommended by the framework that were not applicable for reporting and disclosures attributed to 10%.

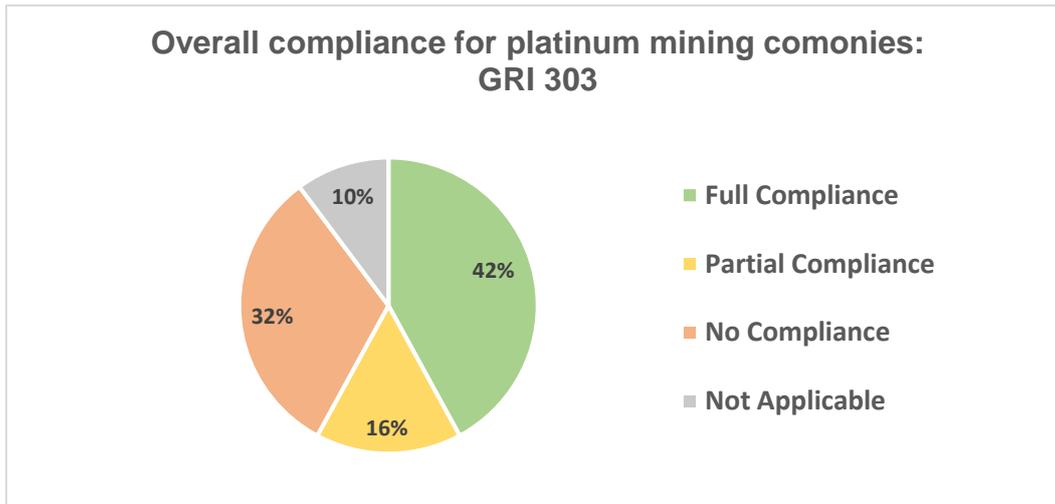


Figure 3-1 Compliance level of platinum producers, based on the GRI 303 Framework. Source: Own compilation.

The overall full compliance levels for section A – Management & Discharge Approach Disclosures, involving the qualitative data, were greater than for B - Topic Specific Disclosures, involving the quantitative data, as shown in Figure 3-2.

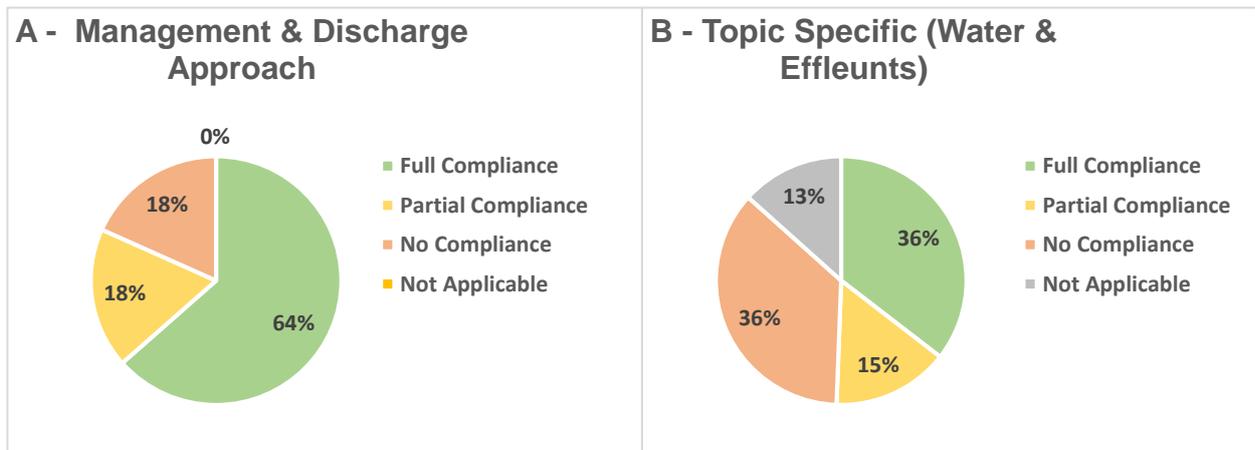


Figure 3-2 The compliance levels of the GRI 303: A. Management & Discharge Approach vs B. Topic Specific disclosure levels. Source: Own compilation

- **Discussion**

The major difference in compliance levels between the Management Approach Disclosures and the Topic Specific Disclosures can be attributed to the number of data points per section. The Management Approach contains a third of the data points, compared to the Topic Specific Disclosures, which could make the disclosures disproportionately difficult to compare. Another factor causing the difference could be due

to the one section being focussed on qualitative reporting of water management principles, while the other involves quantitative data reporting and disclosures.

However, it is noted that the quantitative data, involving the actual water withdrawal, consumption and discharge numbers, are regarded as being more important, because a company's compliance can then be measured against regulatory requirements and framework guidelines, based on actual data. On the other hand, the qualitative reporting of water management principles could reflect positively on public domain reports for investors or stakeholders but this may not necessarily be the case. This fact is emphasised for example by Anglo Platinum's 2018 Supplementary Report, which reported and disclosed on the impact of all water management and disclosures but admitted excess water discharges at an operational unit was not yet incorporated into holistic reporting framework.

3.3.1.2 Compliance level for the Management Approach GRI 303-1

- **Objective**

The objective of this section is to determine the total compliance to the disclosure index section A, for the GRI 303-1 Management Approach.

- **Results**

This disclosure forms part of the qualitative descriptions of the holistic water resources value chain, from organizational interactions with the water resources to how water related impacts are addressed, followed by water related goals and targets.

The compliance level in Figure 3-3 below for the Management Approach amounted to 75% fully, while 15% to 10% compliance was noted as partial- to no compliance, respectively. Thus it was noted that in general, most platinum mining companies report readily on these recommended disclosures, with only one company not reporting on the Management Approach to water and another company partially affirming its interactions with water as a shared resource.

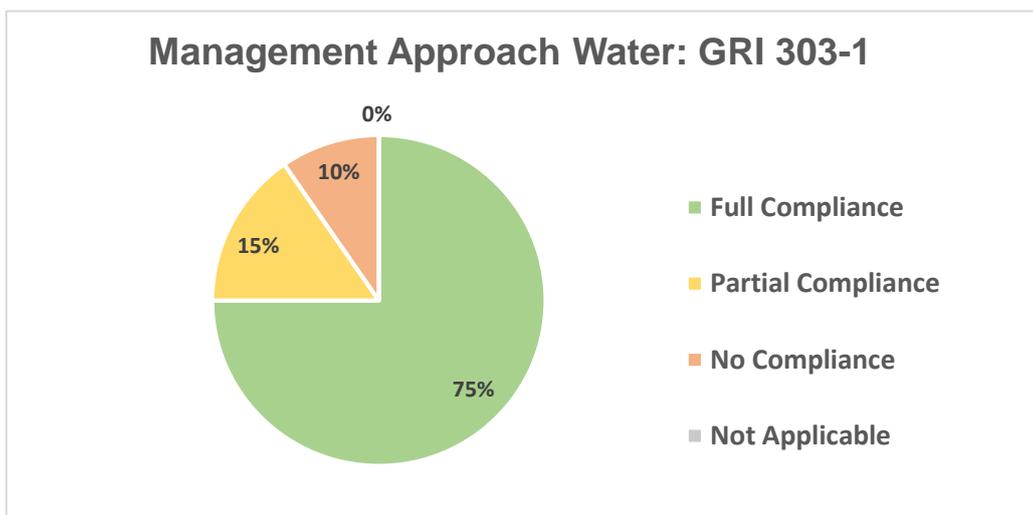


Figure 3-3 The compliance level for the GRI 303-1 Management Approach to Water as a shared resource. Source: Own compilation.

- **Discussion**

The Management Approach compliance level was almost doubled compared to that of the Topic Specific Disclosures based on the full compliance. This fact was noted by several companies including Northam Platinum, Royal Bafokeng Platinum, Lonmin Plc, Sibanye Stillwater and NorNickel, all of which had full compliance on the Management Approach disclosure but lacked reporting on Topic Specific Disclosures. A factor which could explain this discrepancy is that companies probably found reporting on qualitative data easier compared to the actual metrics of water withdrawal, consumption and discharges.

3.3.1.3 Compliance level for the Management Discharge Approach: GRI 303-2

- **Objective**

The objective of this section is to determine the total compliance to the disclosure index section B, for the GRI 303-2 Management Discharge Approach.

- **Results**

This disclosure involves the minimum standards recommended for the management of quality of water effluent discharges. The compliance levels noted for the GRI 303-2, as seen in Figure 3-4, indicated 52% full compliance, 21% partially compliance and 27% no

compliance. Three companies did not disclose any water discharge management practices and quality control. Furthermore, all other companies reported qualitatively on this GRI Standard, involving regulatory standard adherence to internally developed standards.

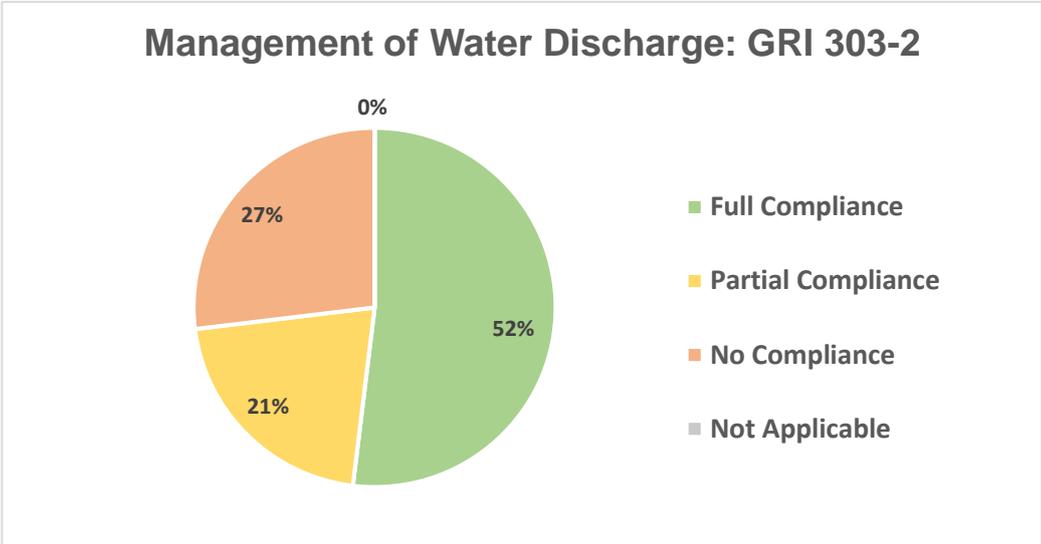


Figure 3-4 The management approach fragment of the GRI 303-2. Source: Own compilation.

- **Discussion**

The compliance for water management of discharges decreased significantly, compared to the holistic management approach. This can be attributed to certain companies lack in reporting of water body discharges, regarding how specific sites with no regulatory requirement discharges are carried out, or the absence of any internally water quality developed framework reported on.

3.3.1.4 Compliance level for the Water Withdrawal: GRI 303-3

- **Objective**

The objective of this section is to determine the total compliance with the disclosure index section C, for the GRI 303-3 Water Withdrawal.

- **Results**

The compliance levels for water withdrawal indicated only 38% full compliance, 15% partial compliance, 34% no compliance and 13% not applicable, (see Figure 3-5 below). It was noted that only 2 companies had full compliance for the water withdrawal standards of the GRI 303, out of the 13 companies analysed. Compliance was affected by the fact that many companies did not report and disclose water withdrawal from site specific sources or water withdrawal from water stressed areas. This problem was further increased by a lack of disclosures on water withdrawal quality in terms of TDS, for fresh and other water sources.

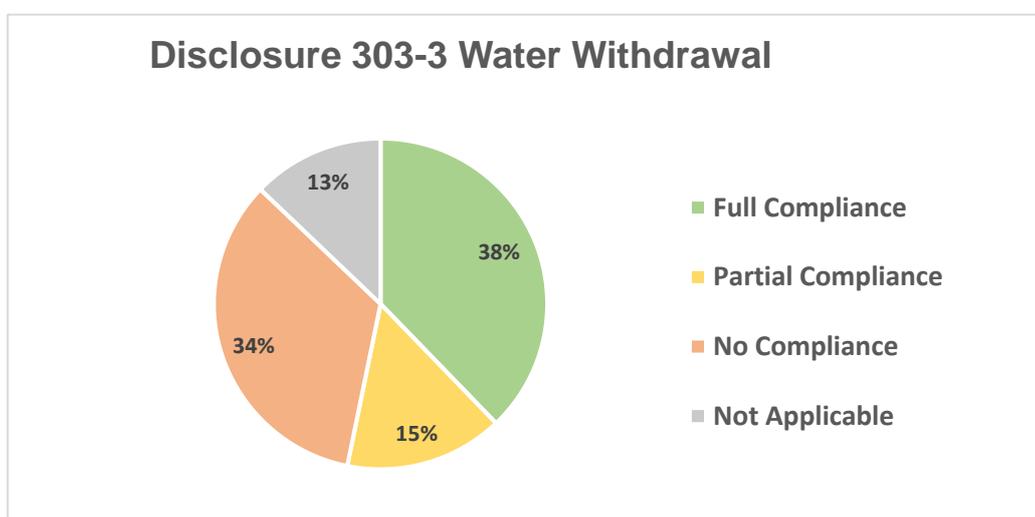


Figure 3-5 The GRI 303-3 water withdrawal standard. Source: Own compilation.

3.3.1.5 Compliance level for the Water Discharge: GRI 303-4

- **Objective**

The objective of this section is to determine the total compliance with the disclosure index section D, for the GRI 303-4 Water Discharge.

- **Results**

Full compliance for water discharge was only 29%, while 14% of companies showed partial compliance and 39% indicated no compliance. 18% of the GRI 303-4 Standards were not applicable to the respective company reports, as is noted in Figure 3-6 below.

The fact that 3 companies indicated that no water bodies are discharged into the environment, resulted in the high number of not applicable data. A total of 6 companies reported on water discharges qualitatively, but without providing actual quantifiable data. The partial compliance on water discharged can be attributed to companies that do not fully report on all discharges including site specific and water stress area discharges and also do not disclose the data in megalitres as recommend by the GRI 303. The priority substance of concern reporting and disclosures related to water discharges indicated an improved compliance level, since only 3 companies from the 13 analysed had no compliance in this area.

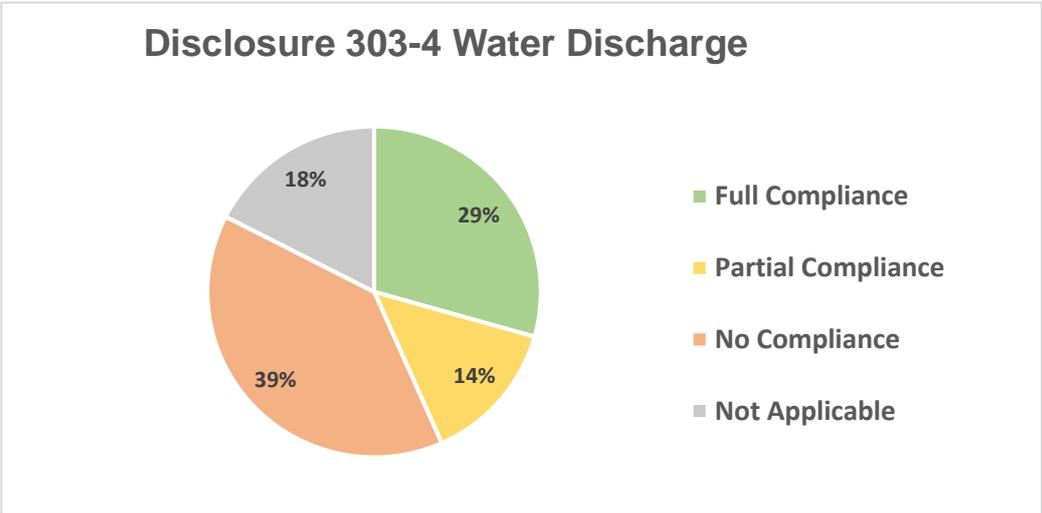


Figure 3-6 Illustrating the GRI 303-4 water discharge. Source: Own compilation.

3.3.1.6 Compliance level for the Water Consumption: GRI 303-5

- **Objective**

The objective of this section is to determine the total compliance with the disclosure index section E, for the GRI 303-5 Water Consumption.

- **Results**

Compliance on consumption of water (Figure 3-7) for the platinum mining producers resulted in 49% full-, 18% partial- and 33% no compliance. No compliance on water consumption standards was noted for 2 of the 13 companies analysed. It was generally

noted that the level of compliance decreased when companies disclose on water consumption from water stressed areas, followed by the change of water storage in the specific area, calculated as the difference between the end and beginning of the storage reporting period.

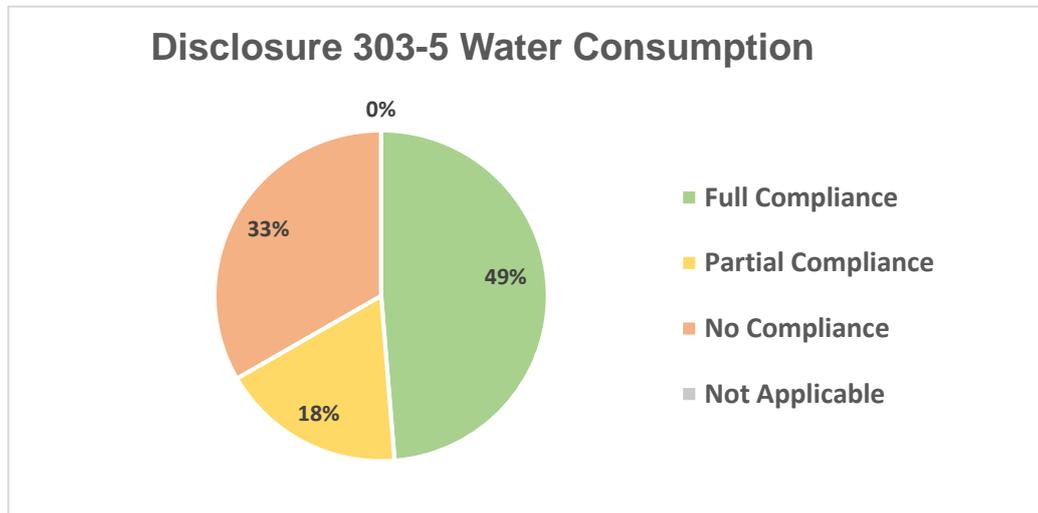


Figure 3-7 Showing the GRI 303-5 water consumption. Source: Own compilation.

- **Discussion: Water Withdrawal, Consumption and Discharge**

A misconception between water withdrawal and water consumption was noted, because many companies solely reported and disclosed on water usage. As per the GRI glossary, water withdrawal involves the total water drawn from all sources, including surface, ground, third party etc., over the reporting period, while water consumption refers to the sum of all water withdrawn for production purposes which is not suitable for other users upon release. This situation was noted for Northam Platinum, which reported on the total usage of water, with no clear separation of the two concepts described above.

The GRI 303-4 water discharge standard compliance performed the worst out of the five main standards in the GRI 303 framework. It was noted that several companies stated in their respective reports that no water bodies are discharged into the environment, only recycled for reuse or stored in tailing facilities or storage dams. Likewise, certain companies stated that their water discharges are licensed by regulators or that no discharges occurred, but disclosed no quantifiable numbers or quality, even though the discharges are made into a tailing storage facilities or waste dams.

Furthermore on the analysis of the reports, a not applicable indication was given for 3 companies' water discharge disclosures. However, the fact that some companies indicated that no water bodies are discharged into the environment, could potentially enhance the no compliance reporting and disclosure, because essentially no water principles were reported on. For example, Impala Platinum indicated no quantifiable water discharge information, only mentioning that all its respective water discharges are licensed and, additionally, that it is planning to create discharge wetlands in the future for improved quality of water.

The above situation is concerning, because the effect of water discharges into the environment usually creates additional complications which, in turn, involve not only the mining company, but adjacent communities and/or stakeholders.

3.3.1.7 Platinum mining producer's total combined compliance level: GRI 303

- **Objective**

The objective of this section is to determine the total compliance to the disclosure index, for the different platinum mining companies, based on the GRI 303 Standard.

- **Results**

The level of compliance for the platinum mining companies are illustrated below on the radar chart depicted on Figure 3-8 below. The companies that displayed the highest overall compliance percentage according to the GRI 303 Standards, was Glencore, followed by African Rainbow Minerals and Anglo Platinum, all of these scoring over 74% full compliance. Companies with a full compliance percentage in the middle regions (between 30% to 65%) involved, in decreasing order of compliance, Impala Platinum, NorNickel, Sibanye Stillwater, Lonmin Plc, Royal Bafokeng Platinum, Vale SA and Northam Platinum. Full compliance percentages of under 10%, consisted of Wesizwe Platinum, Bauba Platinum and Eastern Platinum, respectively.

Platinum Mining Companies Compliance: GRI 303 Framework

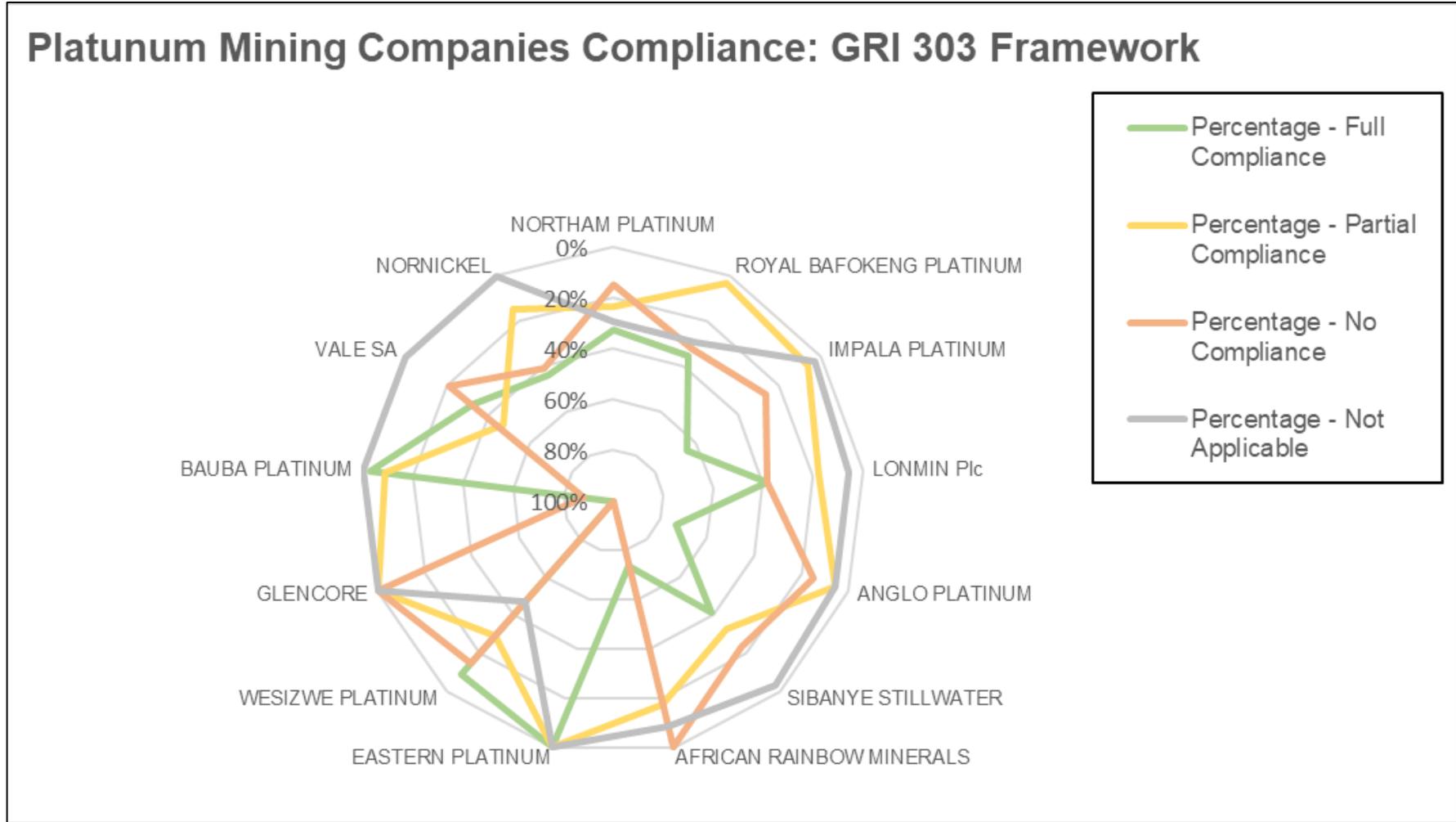


Figure 3-8 The radar chart displays the overall compliance levels for the platinum mining companies analysed. Source: Own compilation.

- **Discussion**

It was noted that Royal Bafokeng Platinum, Northam Platinum and Wesizwe Platinum had a relatively high percentage of not applicable data points, which considerably affected the total compliance levels. The data points which were excluded from the content analysis could potentially increase noncompliance for these companies. This is largely because of these companies reporting of no water discharges into the environment occurs but only the existence of recycled water, which in reality might not be the actual case.

Companies with a high partial compliance level of approximately over 30%, involved Vale SA, Wesizwe Platinum and Sibanye Stillwater. Although the Wesizwe Platinum compliance level could be affected by the explanation mentioned above, Vale SA and Sibanye Stillwater compliance level could potentially increase, with slightly improved reporting and disclosures. For example, Vale SA compliance level was affected by the disclosure of water discharges figures, due to not fully specifying the site-specific discharges, but only the total discharges. Similarly, Sibanye Stillwater stated its total treated water disclosures per operational unit but did not specify site-specific discharges. Another factor for lower compliance levels is that a number of companies disclosed their respective numeric data in volume and not according to the GRI 303 Standard in megalitres.

Compliance trends between platinum mining companies located and listed in different regions and stock exchanges, respectively, are clearly visible. However, most of the companies analysed are located in South Africa and listed on the JSE, while one company operates in Russia and another in North America. The resultant limited data made compliance comparisons difficult and thus inadequate.

3.3.2 Governance and frameworks

In order to attain their goal of being socially accountable, organizations should recognise and acknowledge the social responsibility between stakeholders and themselves (Askham & Van der Poll, 2017). This goal will ultimately be achieved by means of collective reporting and disclosure on natural capital (Antonites & de Villiers, 2003). Based on an analysis of the data sets, the following frameworks were reported and disclosed accordingly, as seen in Figure 3-9.

3.3.2.1 Frameworks reported and disclosed by platinum mining companies

The Northam Platinum 2018 Annual Report stated that their specific reporting framework is based on the G4 Sustainability Guidelines, which have now been replaced with the GRI Standards. Additionally, this mining company participates in voluntary submission of water disclosures related data to the CDP.

Royal Bafokeng Platinum specified in its 2018 Annual Report, that the company also provides voluntary water disclosures to the CDP.

In its Sustainable Development Report of 2018, Impala Platinum declared that it participates in the annual climate change and water disclosures of the CDP. Additionally, the use of the GRI Specific Standard was also noted within its public domain reports. A critical factor for this company's operations will remain the usage of water, because it aims to ensure environmental compliance, with reporting and disclosure in years to come being a key driving ambition.

Lonmin Plc acknowledges the International Council of Mining and Metals (ICMM) reporting framework, while at the time of issuing the sustainability report, formulated an inhouse developed framework, with assistance from the GRI. Additionally, the company contributes to the CDP, through its water management programme.

Anglo Platinum stated in its 2018 Supplementary Report, that while its previous emphasis was on water-saving projects, a modern risk-based approach to water management is now being used, in line with global best practice and the International Council on Mining and Metals (ICMM) reporting guidelines. The GRI Standards were also noted, with a specific index section based on this framework which was not limited to water reporting and disclosures.

Sibanye Stillwater noted water as a critical resource and indicated that for its business strategy an integrated water management approach is used, particularly in terms of the water infrastructure system for reporting and disclosures. The company utilizes a combination of frameworks which includes the GRI Standards, International Council on Mining and Metals (ICMM) and the 10 Principles of the United Nations Global Compact.

In Wesizwe Platinum's 2018 Annual Report, it was noted that the company aligned its reporting to the GRI G4 Standards. Although, it was stated that as the current operation is still in the capital development or project phase, not all disclosures are applicable at this stage.

African Rainbow Minerals also utilises a voluntary reporting process on a combination of different frameworks, including the GRI, CDP and ICMM Water Accounting Framework. It was additionally noted, that the company reports especially on a GRI index, aligned to each disclosure segment.

Specific water related reports were presented by Glencore Plc, one with a database on GRI references on the GRI Standards and a water 'stand-alone' specific report. This company's water related reporting is completed with the assistance of the Water Accounting Framework of the Minerals Council of Australia in order to enhance its understanding of the said Minerals Council's water principles.

Vale SA recorded in the 2018 Sustainability Report its adoption of several frameworks and programmes for its disclosure of water related topics, which include the CDP, the GRI, the Aqueduct Tool, adherence to the principles of the International Council on Mining and Metals (ICMM) and reliance on the Target Water Programme.

It was noted that NorNickel in part used the GRI framework for reporting on its water disclosures, as well as its alignment of the United Nations (UN) Global Compact principles towards achieving the UN Sustainable Development Goals up to 2030.

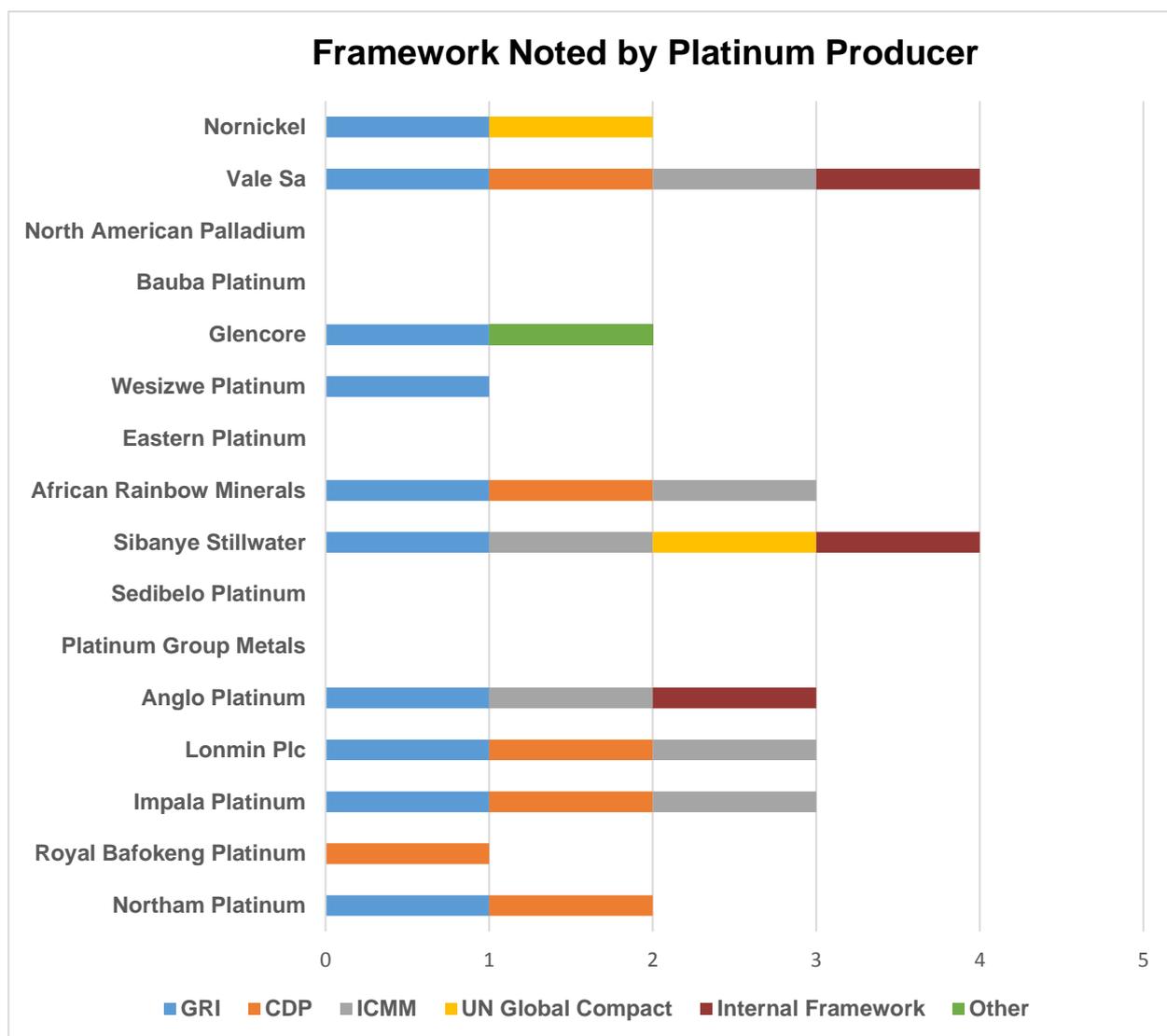


Figure 3-9 Indicating the frameworks disclosed by the platinum mining organization. Source: Own compilation.

- **Discussion**

It is noted in Figure 3-9 that platinum mining companies predominately reported and disclosed on the GRI Standards, while the CDP and ICMM frameworks are also used, aligning the reporting and disclosures. This demonstrate a positive tendency, as mining companies in general have an appropriate understanding of utilizing different frameworks for sustainability reporting. This is highlighted by previous research, which found the mining sector with the highest compliance with guidelines frameworks, compared to other industries outside of mining.

3.3.3 Risk factors disclosed

The section investigated the risk factors reported and disclosed by the different mining companies. The five broad risk categories mentioned in Chapter 2, were used to group the risks identified by the analysed companies, as displayed in Table 3-3 below.

3.3.3.1 Risk factors reported and disclosed by platinum mining companies

The need for the availability of a continuous source of water was highlighted by Anglo American Platinum as a sole key risk factor in its operations, while secondary off-site factors included the uncontrollable discharge of water into the environment (Anglo American Platinum, 2018).

In addition, Anglo Platinum stated in its 2018 Supplementary Report that both the lack of an assured water supply and having all its operations located in water scarce environments as its primary water-related risk. This problem could potentially limit the production or growth of mining operations, thus the mine is implementing holistic innovative technologies to ensure future water efficiencies.

According to the Royal Bafokeng Platinum's 2018 Annual Report, water risks pertaining to the company can limit its production growth or, in a worst-case scenario, prevent it from operating. This problem occurs because the company is situated within an arid and water-scarce region where the future decrease in the annual rainfall is expected, together with progressively hot and dry periods.

General water risks experienced by Sibanye Stillwater as stated in their 2018 Integrated Report included the following:

- Lack of sustainable water in the North West Province of South Africa for continuous and prolonged operations;
- Acceptance of water licences and amendments taking extensive time due to slow response by regulators;
- Global warming and climate change effects; and
- Latent and residual responsibilities.

According to African Rainbow Mineral's Sustainability Report (2018), water risks pertaining to the operations in Mpumalanga (Modikwa and Nkomati Mines) entail

excessive water in the mining areas, whereas water risks pertaining to the Northern Cape mines include uncertainty regarding the availability of a continuous water supply.

While the demand for water is increasing, together with increased pollution levels, water is becoming an ever-scarcer resource. Lonmin reported in their 2018 Sustainability Report that a balance needs to be reached between conserving water and the management of water demands. The report further stated that for a scarce resource such as water it is extremely important to constantly seek and utilise opportunities relating to it. One of the mine's attempts to reduce its freshwater intake is through utilizing backfilled opencast pits as a primary water source, since these depressions can store substantial amounts of water. Furthermore Lonmin (2018) stated that the utilisation of input resources needs to be optimised for mining operations, especially since they are located in an area where the water supply is exceeded by demand and, consequently, the lack of a secure water supply is a potential risk. Six of the seven environmental incidents reported by Lonmin Plc during 2018, have a potential surface-related water impact. All of these incidents occurred at smelter and concentrator facilities.

Glencore's 2018 Water Report indicated that Glencore acknowledges water as a shared and limited resource. It was further stated that Glencore is aware of the cumulative concerns raised by local water users and stakeholders regarding the availability and quality of water within the area, as well as the likelihood of a probable negative impact on the water supply.

The most substantial environmental concern identified in Impala Platinum's 2018 Sustainability Report is water. This report stated that the mine faces the following primary risks in terms of water:

- Potential operational disruptions due to water stress;
- Growing costs relating to water recourses and management;
- Uncontrollable discharge of contaminated water into the environment; and
- Dissatisfaction amongst the local community and reputational risks.

According to the Northam Platinum's 2018 Annual Report, an identified risk is the necessity for significant amounts of water for the mining and processing of minerals, which could lead to the loss of production through operational downtime because of water supply constraints. This identified risk has the possibility of leading to increased production costs, negatively affecting water related licences, and compromising

profitability. To address this identified risk Northam Platinum focuses on both conserving water and having a demand management programme in place. Furthermore, it strives to improve its water usage through recycling, establishing water storage facilities on site and incorporating water management in its sustainability strategies. Additionally, longer term risk management plans identified in the Annual Report include climate change, because most of Northam Platinum’s operations are located within water stressed regions, where the lack of a reliable and sustainable water supply could affect its operations and future growth.

Table 3-3 Indicating the mining company, compared to the different risk factors stated.

Platinum Mining Company	Risk Factors Categories				
	Regulatory	Physical	Reputational	Financial	Litigation
Northam Platinum	X	X	X	X	
Royal Bafokeng Platinum	X	X		X	
Impala Platinum	X	X	X	X	
Lonmin Plc	X	X		X	
Anglo Platinum	X	X			
Sibanye Stillwater	X	X	X		
Platinum Group Metals	<i>No reports found</i>				
Sedibelo Platinum	<i>Reports found outdated from 2010-2011</i>				
African Rainbow Minerals	X	X			
Eastern Platinum		X			
Wesizwe Platinum					
Glencore	X	X	X		
Bauba Platinum					
North American Palladium	<i>No reports found</i>				
Vale Sa		X			
NorNickel		X			
Combined Total (%) Risks	29%	41%	15%	15%	

Source: Own compilation

Eastern Platinum stated in its 2017 Annual Report, that water is a risk factor due to its operations being located in arid and dry regions, resulting in the lack of a reliable water supply.

NorNickel stated in its 2018 Sustainability Report, that climate change could adversely affect the risk of insufficient water resources at all its operations.

Vale SA demonstrated on a schematic map in its 2018 Sustainability Report the categories of water risks, which affect its various operations throughout the globe.

3.3.3.2 Discussion

The different risk factors reported by the platinum mining companies had one similar trend, because most operations' water sustainability could potentially be affected by climate issues, pertaining to physical risk factors (41%). The majority of these mining companies are located in arid to dry regions, with a lack of reliable and sustainable water sources, which could further progress to water deficient operations.

The second highest risk factor observed was regulatory risk factors (29%), reported by the mining companies. Water use licenses, water -withdrawal, -discharge and -consumption limits and limitations on pollution restrictions all contribute to this factor.

3.4 CONCLUSION

The main objective of the empirical study was to establish the compliance levels of disclosures based on the developed disclosure index, constructed from the GRI 303: Water and Effluents Standard. Secondly, the key frameworks and risk factors noted by the mining companies were also observed.

A key finding in the content analysis, was that the majority of mining companies have a higher compliance level when reporting on the management of water resources compared to the provision of quantifiable data of actual water withdrawal, consumption and discharges, based on the disclosure index developed.

The GRI framework was noted as the main standard used throughout the platinum mining sector, but not limited to it only. A leading risk factor observed involves the majority of the platinum producers foreseeing water scarcity and lack of reliability affecting its operations short to long term, due to climate risks, which falls broadly under physical risk factors.

CHAPTER 4: CONCLUSION AND RECOMMENDATIONS

4.1 INTRODUCTION

This research study involved investigating the disclosure levels of water principles in the platinum mining industry. The methodology adopted involved a literature review and empirical study analysing the integrated and sustainable reports of 16 different platinum producers.

In this chapter, the key findings will be mentioned, according to the objectives set out in Chapter 1. Recommendations and possible further research will conclude this chapter.

4.2 REVIEW OF RESEARCH OBJECTIVES AND FINDINGS

The secondary objectives for the research and its key findings, based on Chapters 2 and 3 are as follows:

The literature review objectives for the research were:

- **To identify from reviewed literature the importance of sustainable reporting and disclosure of water practices in the platinum mining industry.**
 - The reporting and disclosure of sustainability, concerning water in the platinum mining industry was identified as an important factor. These aspects ultimately formed part of the companies' non-financial reporting, and the necessity of displaying CSR, to further demonstrate to stakeholders and investors, a clear picture of the organization's transparency and accountability towards the environment. As noted with the stakeholder and legitimacy theories, different environmental issues concern stakeholders in a different way, this the increasing manner of disclosure on such, is essential for corporate sustainability.

- **To establish from the reviewed literature what the guidelines for disclosure and reporting on water parameters are in the platinum mining industry.**
 - From the literature reviewed it was noted that several guidelines and frameworks have been developed to improve sustainable reporting, specifically towards water management and disclosures. These guidelines

are mostly aligned, subsequently meaning that companies can utilize several frameworks for support in reporting and disclosures of water principles.

- Sustainable reporting is mostly discretionary depending upon where mining operations are located, but initiatives such as the GRI Standards are typically recommended for assistance and alignment of water reporting and disclosures.
- **To identify from the reviewed literature risk factors related to water within the platinum mining sector.**
 - Risk factors pertaining to water in the platinum mining industry formed part of five broad categories in the reviewed literature, which include: regulatory, physical, reputational, financial, and litigation risks.
 - Furthermore, risk factors reported by the different platinum mining companies included water shortages and a lack of reliable sources as mutual concerns, highlighting the possible affects of future climate changes.

The empirical study objectives for the research were:

- **To identify the research method, for the investigation into water practices in the platinum mining industry.**
 - A mixed method research approach was used for the empirical study, as it involved both quantitative and qualitative data to be investigated. The method of analysis was carried out by content analysis, whereby information from the different mining organizations were compared with a disclosure index developed from literature.
- **To compare current disclosure and compliance levels of water principles in the platinum mining sector, with a developed disclosure index, primarily related to the GRI 303: Water and Effluents Standards.**

- The full compliance level for the qualitative reporting section of the disclosure index, compared to the quantitative disclosures, were almost double.
 - The compliance levels based on the disclosure index water withdrawal, consumption and discharges indicated the highest level of full compliance for water consumption, and the lowest for water discharges.
 - Compliance levels for the platinum mining companies according to the GRI 303 constructed disclosure index indicated Glencore, Anglo Platinum and African Rainbow Minerals as the top organizations in terms of compliance, at over 74%. Additionally, compliance with other companies is lacking far behind, with over half of these companies sitting below the 50% full compliance with the GRI 303 Water and Effluents Standards.
 - A trend in compliance of reporting and disclosure of water principles, based on the disclosure index from different mining companies is clearly evident. However, no clear indication per geolocation can be interpreted, because the data analysed from certain locations is limited.
- **To identify frameworks used by different platinum mining organizations, for reporting and disclosure on water principles.**
 - It was noted that most platinum mining companies acknowledge certain frameworks, usually involving a combination of two and more. In general, the GRI Standards were used most often, followed by the CDP and the ICMM.
 - It must be noted, that though a certain framework was utilized for reporting and disclosures, compliance levels with the recommendations did not always fully resemble those of the chosen framework.
- **To identify risk factors reported and disclosed, by the different platinum mining companies.**
 - The two main risk factors from the five categories analysed were identified with regards to water principles within the various platinum mining reports.

- Physical risk factors amounted to 41%, which is mainly affected by climate related issues. These include the location of mining operations which is mainly located in arid to dry regions, resulting in a lack of sustainable water resources.
 - Regulatory risks had an overall score of 29%, which is mainly affected by regulatory requirements such as water use licenses, water - withdrawal, - discharge and -consumption limits and limitations on pollution restrictions.
- **To make recommendations and a conclusion based on the main results, regarding the disclosure of water principles in the platinum mining industry.**
 - **Recommendations:** Stricter adherence to compliance and monitoring standards needs to be implemented at operational units within the platinum mining industry. Water discharges were identified as a key aspect of the reporting and disclosure framework being neglected to a certain extent, based on the available quantifiable data. Thus, discharges of water bodies should be reported and disclosed, to the fullest extent possible. Improved compliance in terms of water discharge and quality control is required.

Improve reporting and disclosure on site specific data, should a company have more than one operational unit. This would allow for better transparency, identifying high impact water users and low compliance level with the specific framework reporting on.
 - **Conclusion:** The low-level disclosures of water discharges into the environment were identified as the key area lacking for full compliance levels in the platinum mining industry.

The majority of platinum mining companies identified water as one of the fundamental key risk factors for the sustainability of their operations, and thus they ought to keep on improving their standard of reporting and disclosures, while ensuring improved compliance levels with industry frameworks and recommendations.

4.3 FUTURE RESEARCH

- Future researchers could possibly focus on the water disclosures, specifically at the different business units within a mining organization, involving the mining, processing, and smelting operations. Additionally, this could enhance the trustworthiness of the data disclosed if the researcher forms part of the reporting practices of a company, eliminating a limitation to the current study.
- Moreover, the GRI specific standards for water and effluents were introduced on 1 July 2018, with an implementation date of January 2021, while earlier adoption is encouraged. Future researchers could re-analyse compliance based on the amended version of the GRI G4 Guidelines, currently used by most companies. However, the main concepts and disclosures that have been incorporated within the GRI Standards, are based on the G4 Guidelines, hence organizations adhering to the latter will almost fully comply with the new GRI Standards of water reporting and disclosures.

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APPENDIX A: GRI 303 WATER & EFFLUENTS FRAMEWORK

GRI 303: Water and Effluents: Adapted from the (GRI, GRI 303: WATER AND EFFLUENTS, 2018).

1. Management approach disclosures

- **Disclosure 303-1 Interactions with water as a shared resource:**

The reporting organization shall report the following information:

- a) A description of how the organization interacts with water, including how and where water is withdrawn, consumed, and discharged, and the water-related impacts caused or contributed to, or directly linked to the organization's activities, products or services by a business relationship (e.g., impacts caused by runoff).
- b) A description of the approach used to identify water-related impacts, including the scope of assessments, their timeframe, and any tools or methodologies used.
- c) A description of how water-related impacts are addressed, including how the organization works with stakeholders to steward water as a shared resource, and how it engages with suppliers or customers with significant water-related impacts.
- d) An explanation of the process for setting any water-related goals and targets that are part of the organization's management approach, and how they relate to public policy and the local context of each area with water stress.

- **Disclosure 303-2 Management of water discharge related impacts**

The reporting organization shall report the following information:

- a) A description of any minimum standards set for the quality of effluent discharge, and how these minimum standards were determined, including:
 - i. how standards for facilities operating in locations with no local discharge requirements were determined;
 - ii. any internally developed water quality standards or guidelines;
 - iii. any sector-specific standards considered;

- iv. whether the profile of the receiving waterbody was considered.

2. Topic-specific disclosures

- **Disclosure 303-3 Water withdrawal**

The reporting organization shall report the following information:

- a) Total water withdrawal from all areas in megaliters, and a breakdown of this total by the following sources, if applicable:
 - I. Surface water;
 - II. Groundwater;
 - III. Seawater;
 - IV. Produced water;
 - V. Third-party water.
- b) Total water withdrawal from all areas with water stress in megaliters, and a breakdown of this total by the following sources, if applicable:
 - I. Surface water;
 - II. Groundwater;
 - III. Seawater;
 - IV. Produced water;
 - V. Third-party water, and a breakdown of this total by the withdrawal sources listed in i-iv.
- c) A breakdown of total water withdrawal from each of the sources listed in Disclosures 303-3-a and 303-3-b in megaliters by the following categories:
 - I. Freshwater ($\leq 1,000$ mg/L Total Dissolved Solids);
 - II. Other water ($> 1,000$ mg/L Total Dissolved Solids).
- d) Any contextual information necessary to understand how the data have been compiled, such as any standards, methodologies, and assumptions used.

- **Disclosure 303-4 Water discharge**

The reporting organization shall report the following information:

- a) Total water discharge to all areas in megaliters, and a breakdown of this total by the following types of destination, if applicable:
 - I. Surface water;
 - II. Groundwater;
 - III. Seawater;
 - IV. Third-party water, and the volume of this total sent for use to other organizations, if applicable.
- b) b. A breakdown of total water discharge to all areas in megaliters by the following categories:
 - I. Freshwater ($\leq 1,000$ mg/L Total Dissolved Solids);
 - II. Other water ($> 1,000$ mg/L Total Dissolved Solids).
- c) Total water discharge to all areas with water stress in megaliters, and a breakdown of this total by the following categories:
 - I. Freshwater ($\leq 1,000$ mg/L Total Dissolved Solids);
 - II. Other water ($> 1,000$ mg/L Total Dissolved Solids).
- d) Priority substances of concern for which discharges are treated, including:
 - I. how priority substances of concern were defined, and any international standard, authoritative list, or criteria used;
 - II. the approach for setting discharge limits for priority substances of concern;
 - III. number of incidents of non-compliance with discharge limits.
- e) Any contextual information necessary to understand how the data have been compiled, such as any standards, methodologies, and assumptions used.

- **Disclosure 303-5 Water consumption**

The reporting organization shall report the following information:

- a) Total water consumption from all areas in megaliters.
- b) Total water consumption from all areas with water stress in megaliters.
- c) Change in water storage in megaliters, if water storage has been identified as having a significant water-related impact.
- d) Any contextual information necessary to understand how the data have been compiled, such as any standards, methodologies, and assumptions used, including whether the information is calculated, estimated, modelled, or sourced from direct measurements, and the approach taken for this, such as the use of any sector-specific factors.

APPENDIX B: DISCLOSURE INDEX

SECTION	LEGEND:			DISCLOSURE INDEX: INVESTIGATING DISCLOSURE OF WATER PRINCIPLES IN PLATINUM MINING											
	3	FULLY COMPLIANCE	REPORTS NOTED	GEOGRAPHIC LOCATION				SOUTH AFRICA							
	2	PARTIALLY COMPLIANCE	YES	MINING COMPANY				NORTHAM PLATINUM	ROYAL BAFOKENG PLATINUM	IMPALA PLATINUM	LONMIN Plc				
	0	NO COMPLIANCE	NO	FY YEAR REPORTED/DISCLOSED				2018	2018	2018	2018				
N/A	NOT APPLICABLE	NO													
1. MANAGEMENT APPROACH DISCLOSURES															
A	DISCLOSURE 303-1 INTERACTION WITH WATER AS SHARED RESOURCE	INTERACTIONS WITH WATER AS A SHARED RESOURCE	A	A description of how the organization interacts with water, including how and where water is withdrawn, consumed, and discharged, and the water-related impacts caused or contributed to, or directly linked to the organization's activities, products or services by a business relationship (e.g., impacts caused by runoff).	●		●		●		●				
			B	A description of the approach used to identify water-related impacts, including the scope of assessments, their timeframe, and any tools or methodologies used.	●		●		●		●				
			C	A description of how water-related impacts are addressed, including how the organization works with stakeholders to steward water as a shared resource, and how it engages with suppliers or customers with significant water-related impacts.	●		●		●		●				
			D	An explanation of the process for setting any water-related goals and targets that are part of the organization's management approach, and how they relate to public policy and the local context of each area with water stress.	●		●		●		●				
B	DISCLOSURE 303-2 MANAGEMENT OF WATER DISCHARGE IMPACT	MANAGEMENT OF WATER DISCHARGE RELATED IMPACTS	A	A description of any minimum standards set for the quality of effluent discharge, and how these minimum standards were determined, including:											
				How standards for facilities operating in locations with no local discharge requirements were determined;	●		●		●		●				
				Any internally developed water quality standards or guidelines;	●		●		●		●				
				Any sector-specific standards considered;	●		●		●		●				
			Whether the profile of the receiving waterbody was considered.	●		●		●		●					
2. TOPIC - SPECIFIC DISCLOSURES															
C	DISCLOSURE 303-3 WATER WITHDRAWAL	WATER WITHDRAWAL	A	Total water withdrawal from all areas in megalitres, and a breakdown of this total by the following sources, if applicable:	Surface water	●		●		●		●			
					Groundwater	●		●		●		●			
					Seawater	N/A		N/A		N/A		N/A			
					Produced water	●		●		●		●			
			B	Total water withdrawal from all areas with water stress in megalitres, and a breakdown of this total by the following sources, if applicable:	Surface water	●		●		●		●			
					Groundwater	●		●		●		●			
					Seawater	N/A		N/A		N/A		N/A			
					Produced water	●		●		●		●			
			C	A breakdown of total water withdrawal from each of the sources listed in Disclosures 303-3-a and 303-3-b in megalitres by the following categories:	Freshwater (<1000 mg/L TDS)	●		●		●		●			
					Other water (>1000 mg/L TDS)	●		●		●		●			
					Third-party water	●		●		●		●			
					D	Any contextual information necessary to understand how the data have been compiled, such as any standards, methodologies, and assumptions used.									
			D	DISCLOSURE 303-4 WATER DISCHARGE	WATER DISCHARGE	A	Total water discharge to all areas in megalitres, and a breakdown of this total by the following types of destination, if applicable:	Surface water	●		●		●		●
								Groundwater	●		●		●		●
								Seawater	●		●		●		●
								Third-party water	●		●		●		●
B	A breakdown of total water discharge to all areas in megalitres by the following categories:	Freshwater (<1000 mg/L TDS)				●		●		●		●			
		Other water (>1000 mg/L TDS)				●		●		●		●			
		C				Total water discharge to all areas with water stress in megalitres, and a breakdown of this total by the following categories:	Freshwater (<1000 mg/L TDS)	●		●		●		●	
		Other water (>1000 mg/L TDS)					●		●		●		●		
D	Priority substances of concern for which discharges are treated, including:	how priority substances of concern were defined, and any international standard, authoritative list, or criteria used;				●		●		●		●			
		the approach for setting discharge limits for priority substances of concern;				●		●		●		●			
		number of incidents of non-compliance with discharge limits.				●		●		●		●			
		E				Any contextual information necessary to understand how the data have been compiled, such as any standards, methodologies, and assumptions used.									
E	DISCLOSURE 303-5 WATER CONSUMPTION	WATER CONSUMPTION	A	Total water consumption from all areas in megalitres.	●		●		●		●				
			B	Total water consumption from all areas with water stress in megalitres.	●		●		●		●				
			C	Change in water storage in megalitres, if water storage has been identified as having a significant water-related impact.	●		●		●		●				
			D	Any contextual information necessary to understand how the data have been compiled, such as any standards, methodologies, and assumptions used, including whether the information is calculated, estimated, modelled, or sourced from direct measurements, and the approach taken for this, such as the use of any sector-specific factors.											
F	Frameworks and Governance Reporting and Disclosures				GRI	●		●		●		●			
					CDP	●		●		●		●			
					ICMM	●		●		●		●			
					UN GLOBAL COMPACT	●		●		●		●			
					INTERNAL	●		●		●		●			
					OTHER	●		●		●		●			
G	Water Risk Factors Reporting and Disclosures				Regulatory	●		●		●		●			
					Physical	●		●		●		●			
					Reputational	●		●		●		●			
					Financial	●		●		●		●			
					Litigation	●		●		●		●			

SECTION	LEGEND:			DISCLOSURE INDEX: INVESTIGATING DISCLOSURE OF WATER PRINCIPLES IN PLATINUM								
	3	FULLY COMPLIANCE	REPORTS NOTED	GEOGRAPHIC LOCATION								
	2	PARTIALLY COMPLIANCE	YES	MINING COMPANY		ANGLO PLATINUM	SIBANYE STILLWATER	PLATINUM GROUP METALS	SEDIBELO PLATINUM			
	0	NO COMPLIANCE	NO	FY YEAR REPORTED/DISCLOSED		2018	2019	2019	2010			
N/A	NOT APPLICABLE											
1. MANAGEMENT APPROACH DISCLOSURES												
A	DISCLOSURE 303-1 INTERACTION WITH WATER AS SHARED RESOURCE	INTERACTIONS WITH WATER AS A SHARED RESOURCE	A	A description of how the organization interacts with water, including how and where water is withdrawn, consumed, and discharged, and the water-related impacts caused or contributed to, or directly linked to the organization's activities, products or services by a business relationship (e.g., impacts caused by runoff).	●	●			NO INTEGRATED REPORT NOTED	INTEGRATED REPORT OUTDATED, ONLY 2010 FOUND IN PUBLIC DOMAIN		
			B	A description of the approach used to identify water-related impacts, including the scope of assessments, their timeframe, and any tools or methodologies used.	●	●						
			C	A description of how water-related impacts are addressed, including how the organization works with stakeholders to steward water as a shared resource, and how it engages with suppliers or customers with significant water-related impacts.	●	●						
			D	An explanation of the process for setting any water-related goals and targets that are part of the organization's management approach, and how they relate to public policy and the local context of each area with water stress.	●	●						
B	DISCLOSURE 303-2 MANAGEMENT OF WATER DISCHARGE RELATED IMPACT	MANAGEMENT OF WATER DISCHARGE RELATED IMPACTS	A	A description of any minimum standards set for the quality of effluent discharge, and how these minimum standards were determined, including:	●	●						
				How standards for facilities operating in locations with no local discharge requirements were determined;	●	●						
				Any internally developed water quality standards or guidelines;	●	●						
				Any sector-specific standards considered;	●	●						
			Whether the profile of the receiving waterbody was considered.	●	●							
2. TOPIC - SPECIFIC DISCLOSURES												
C	DISCLOSURE 303-3 WATER WITHDRAWAL		A	Total water withdrawal from all areas in megalitres, and a breakdown of this total by the following sources, if applicable:	Surface water	●	●					
					Groundwater	●	●					
					Seawater	N/A	N/A					
					Produced water	●	●					
			B	Total water withdrawal from all areas with water stress in megalitres, and a breakdown of this total by the following sources, if applicable:	Surface water	●	●					
					Groundwater	●	●					
					Seawater	N/A	N/A					
					Produced water	●	●					
			C	A breakdown of total water withdrawal from each of the sources listed in Disclosures 303-3a and 303-3b in megalitres by the following categories:	Freshwater (<1000 mg/L TDS)	●	●					
					Other water (>1000 mg/L TDS)	●	●					
			D	Any contextual information necessary to understand how the data have been compiled, such as any standards, methodologies, and assumptions used.								
			D	DISCLOSURE 303-4 WATER DISCHARGE		A	Total water discharge to all areas in megalitres, and a breakdown of this total by the following types of destination, if applicable:	Surface water	●	●		
								Groundwater	●	●		
Seawater	●	●										
Third-party water	●	●										
B	A breakdown of total water discharge to all areas in megalitres by the following categories:	Freshwater (<1000 mg/L TDS)				●	●					
		Other water (>1000 mg/L TDS)				●	●					
C	Total water discharge to all areas with water stress in megalitres, and a breakdown of this total by the following categories:	Freshwater (<1000 mg/L TDS)				●	●					
		Other water (>1000 mg/L TDS)				●	●					
D	Priority substances of concern for which discharges are treated, including:	how priority substances of concern were defined, and any international standard, authoritative list, or criteria used;				●	●					
		the approach for setting discharge limits for priority substances of concern;				●	●					
		number of incidents of non-compliance with discharge limits.				●	●					
E	Any contextual information necessary to understand how the data have been compiled, such as any standards, methodologies, and assumptions used.											
E	DISCLOSURE 303-5 WATER CONSUMPTION					A	Total water consumption from all areas in megalitres.	●	●			
			B	Total water consumption from all areas with water stress in megalitres.	●	●						
			C	Change in water storage in megalitres, if water storage has been identified as having a significant water-related impact.	●	●						
			D	Any contextual information necessary to understand how the data have been compiled, such as any standards, methodologies, and assumptions used, including whether the information is calculated, estimated, modelled, or sourced from direct measurements, and the approach taken for this, such as the use of any sector-specific factors.								
F	Frameworks and Governance Reporting and Disclosures		GRI	●	●							
			CDP	●	●							
			ICMM	●	●							
			UN GLOBAL COMPACT	●	●							
			INTERNAL	●	●							
G	Water Risk Factors Reporting and Disclosures											
G			Regulatory	●	●							
			Physical	●	●							
			Reputational	●	●							
			Financial	●	●							
			Litigation	●	●							

SECTION	LEGEND:			DISCLOSURE INDEX: INVESTIGATING DISCLOSURE OF WATER PRINCIPLES IN PLATINUM								
	3	FULLY COMPLIANCE	REPORTS NOTED	GEOGRAPHIC LOCATION								
	2	PARTIALLY COMPLIANCE										
	0	NO COMPLIANCE	YES	MINING COMPANY		EASTERN PLATINUM	WESIZWE PLATINUM	GLENCORE	BAUBA PLATINUM			
N/A	NOT APPLICABLE	NO	FY YEAR REPORTED/DISCLOSED		2017	2018	2018	2019				
1. MANAGEMENT APPROACH DISCLOSURES												
A	DISCLOSURE 303-1 INTERACTION WITH WATER AS SHARED RESOURCE	INTERACTIONS WITH WATER AS A SHARED RESOURCE	A	A description of how the organization interacts with water, including how and where water is withdrawn, consumed, and discharged, and the water-related impacts caused or contributed to, or directly linked to the organization's activities, products or services by a business relationship (e.g., impacts caused by runoff).	●	●	●	●				
			B	A description of the approach used to identify water-related impacts, including the scope of assessments, their timeframe, and any tools or methodologies used.	●	●	●	●				
			C	A description of how water-related impacts are addressed, including how the organization works with stakeholders to steward water as a shared resource, and how it engages with suppliers or customers with significant water-related impacts.	●	●	●	●				
			D	An explanation of the process for setting any water-related goals and targets that are part of the organization's management approach, and how they relate to public policy and the local context of each area with water stress.	●	●	●	●				
B	DISCLOSURE 303-2 MANAGEMENT OF WATER DISCHARGE IMPACT	MANAGEMENT OF WATER DISCHARGE RELATED IMPACTS	A	A description of any minimum standards set for the quality of effluent discharge, and how these minimum standards were determined, including:	●	●	●	●				
			How standards for facilities operating in locations with no local discharge requirements were determined;	●	●	●	●					
			Any internally developed water quality standards or guidelines;	●	●	●	●					
			Any sector-specific standards considered;	●	●	●	●					
Whether the profile of the receiving waterbody was considered.	●	●	●	●								
2. TOPIC - SPECIFIC DISCLOSURES												
C	DISCLOSURE 303-3 WATER WITHDRAWAL		A	Total water withdrawal from all areas in megalitres, and a breakdown of this total by the following sources, if applicable:	Surface water	●	N/A	●	●			
					Groundwater	●	N/A	●	●			
			B	Total water withdrawal from all areas with water stress in megalitres, and a breakdown of this total by the following sources, if applicable:	Seawater	●	N/A	●	●			
					Produced water	●	N/A	●	●			
					Third-party water	●	●	●	●			
					Surface water	●	N/A	●	●			
					Groundwater	●	N/A	●	●			
					Seawater	●	N/A	●	●			
			C	A breakdown of total water withdrawal from each of the sources listed in Disclosures 303-3-a and 303-3-b in megalitres by the following categories:	Freshwater (<1000 mg/L TDS)	●	●	●	●			
					Other water (>1000 mg/L TDS)	●	●	●	●			
			D	Any contextual information necessary to understand how the data have been compiled, such as any standards, methodologies, and assumptions used.								
			D	DISCLOSURE 303-4 WATER DISCHARGE		A	Total water discharge to all areas in megalitres, and a breakdown of this total by the following types of destination, if applicable:	Surface water	●	●	●	●
								Groundwater	●	●	●	●
								Seawater	●	●	●	●
						B	A breakdown of total water discharge to all areas in megalitres by the following categories:	Freshwater (<1000 mg/L TDS)	●	●	●	●
								Other water (>1000 mg/L TDS)	●	●	●	●
C	Total water discharge to all areas with water stress in megalitres, and a breakdown of this total by the following categories:	Freshwater (<1000 mg/L TDS)				●	●	●	●			
		Other water (>1000 mg/L TDS)				●	●	●	●			
D	Priority substances of concern for which discharges are treated, including:	how priority substances of concern were defined, and any international standard, authoritative list, or criteria used;				●	●	●	●			
		the approach for setting discharge limits for priority substances of concern;				●	●	●	●			
		number of incidents of non-compliance with discharge limits.				●	●	●	●			
E	Any contextual information necessary to understand how the data have been compiled, such as any standards, methodologies, and assumptions used.											
E	DISCLOSURE 303-5 WATER CONSUMPTION		A	Total water consumption from all areas in megalitres.	●	●	●	●				
			B	Total water consumption from all areas with water stress in megalitres.	●	●	●	●				
			C	Change in water storage in megalitres, if water storage has been identified as having a significant water-related impact.	●	●	●	●				
			D	Any contextual information necessary to understand how the data have been compiled, such as any standards, methodologies, and assumptions used, including whether the information is calculated, estimated, modelled, or sourced from direct measurements, and the approach taken for this, such as the use of any sector-specific factors.								
F	Frameworks and Governance Reporting and Disclosures		GRI		●	●						
			CDP									
			ICMM									
			UN GLOBAL COMPACT									
			INTERNAL									
OTHER		●										
G	Water Risk Factors Reporting and Disclosures		Regulatory			●						
			Physical	●		●						
			Reputational			●						
			Financial									
Litigation												

SECTION	LEGEND:			DISCLOSURE INDEX: INVESTIGATING DISCLOSURE OF WATER PRINCIPLES IN PLATINUM MINING INDUSTRY						
	3	FULLY COMPLIANCE	REPORTS NOTED	GEOGRAPHIC LOCATION		SOUTH AFRICA	NORTH AMERICAS		EASTERN EUROPE	
	2	PARTIALLY COMPLIANCE		MINING COMPANY		AFRICAN RAINBOW MINERALS	NORTH AMERICAN PALLADIUM	VALE SA	NORNICKEL	
	0	NO COMPLIANCE	YES	FY YEAR REPORTED/DISCLOSED		2018	2018	2018	2018	
	N/A	NOT APPLICABLE	NO							
1. MANAGEMENT APPROACH DISCLOSURES										
A	DISCLOSURE 303-1 INTERACTION WITH WATER AS SHARED RESOURCE	INTERACTIONS WITH WATER AS A SHARED RESOURCE	A	A description of how the organization interacts with water, including how and where water is withdrawn, consumed, and discharged, and the water-related impacts caused or contributed to, or directly linked to the organization's activities, products or services by a business relationship (e.g., impacts caused by runoff).						
			B	A description of the approach used to identify water-related impacts, including the scope of assessments, their timeframe, and any tools or methodologies used.						
			C	A description of how water-related impacts are addressed, including how the organization works with stakeholders to steward water as a shared resource, and how it engages with suppliers or customers with significant water-related impacts.						
			D	An explanation of the process for setting any water-related goals and targets that are part of the organization's management approach, and how they relate to public policy and the local context of each area with water stress.						
B	DISCLOSURE 303-2 MANAGEMENT OF WATER DISCHARGE IMPACT	MANAGEMENT OF WATER DISCHARGE RELATED IMPACTS	A	A description of any minimum standards set for the quality of effluent discharge, and how these minimum standards were determined, including:						
				How standards for facilities operating in locations with no local discharge requirements were determined;						
				Any internally developed water quality standards or guidelines;						
				Any sector-specific standards considered;						
				Whether the profile of the receiving waterbody was considered.						
2. TOPIC - SPECIFIC DISCLOSURES										
C	DISCLOSURE 303-3 WATER WITHDRAWAL		A	Total water withdrawal from all areas in megalitres, and a breakdown of this total by the following sources, if applicable:	Surface water					
					Groundwater					
					Seawater	N/A				
					Produced water					
					Third-party water					
			B	Total water withdrawal from all areas with water stress in megalitres, and a breakdown of this total by the following sources, if applicable:	Surface water					
					Groundwater					
					Seawater	N/A				
					Produced water					
					Third-party water					
C	A breakdown of total water withdrawal from each of the sources listed in Disclosures 303-3a and 303-3b in megalitres by the following categories:	Freshwater (<1000 mg/L TDS)								
		Other water (>1000 mg/L TDS)								
D	Any contextual information necessary to understand how the data have been compiled, such as any standards, methodologies, and assumptions used.									
D	DISCLOSURE 303-4 WATER DISCHARGE		A	Total water discharge to all areas in megalitres, and a breakdown of this total by the following types of destination, if applicable:	Surface water					
					Groundwater					
					Seawater	N/A				
					Third-party water					
			B	A breakdown of total water discharge to all areas in megalitres by the following categories:	Freshwater (<1000 mg/L TDS)					
					Other water (>1000 mg/L TDS)					
			C	Total water discharge to all areas with water stress in megalitres, and a breakdown of this total by the following categories:	Freshwater (<1000 mg/L TDS)					
					Other water (>1000 mg/L TDS)					
			D	Priority substances of concern for which discharges are treated, including:	how priority substances of concern were defined, and any international standard, authoritative list, or criteria used;					
					the approach for setting discharge limits for priority substances of concern;					
number of incidents of non-compliance with discharge limits										
E	Any contextual information necessary to understand how the data have been compiled, such as any standards, methodologies, and assumptions used.									
E	DISCLOSURE 303-5 WATER CONSUMPTION		A	Total water consumption from all areas in megalitres.						
			B	Total water consumption from all areas with water stress in megalitres.						
			C	Change in water storage in megalitres, if water storage has been identified as having a significant water-related impact.						
			D	Any contextual information necessary to understand how the data have been compiled, such as any standards, methodologies, and assumptions used, including whether the information is calculated, estimated, modelled, or sourced from direct measurements, and the approach taken for this, such as the use of any sector-specific factors.						
F	Frameworks and Governance Reporting and Disclosures			GRI						
				CDP						
				ICMM						
				UN GLOBAL COMPACT						
				INTERNAL						
			OTHER							
G	Water Risk Factors Reporting and Disclosures			Regulatory						
				Physical						
				Reputational						
				Financial						
				Litigation						