



**THIRD ANNUAL REPORT:
THE ENVIRONMENTAL RESEARCH REGISTER (ERR) FOR
THE 2020/21 FINANCIAL YEAR**



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AGRICULTURE AND RURAL DEVELOPMENT
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EXECUTIVE SUMMARY

In response to a lack of reporting tools on environmental research that is conducted in Gauteng Province, the Gauteng Department of Agriculture and Rural Development's Environmental Policy Planning and Coordination Directorate had developed and is maintaining the Gauteng Environmental Research Register (ERR). It was developed in 2018 with the first annual report approved in March 2019. The updating and maintenance of the database then commenced after the first approved report, with the second annual report approved on the 20th of June 2020.

The details provided on the ERR intend to guide the user on the information available in the ERR as well as customised reports. As such the ERR does not only serve as a benchmarking tool, but it also serves as a monitoring & reporting tool to capture data and to produce reports on research carried out by various institutions.

It contains author's contact details, institution as well as verified links to each study captured in the ERR amongst other details, which makes it useful for stakeholders who are interested in following up on a study (s). It also contains links to download the studies or notes on PDF versions that can be shared upon request from the users. It also can be used to produce reports on various economic sectors, impacts, location of study areas versus the studies conducted, the changes in research focus areas versus time (year).

It is a living document that presents studies environmental studies carried out in Gauteng Province from 2007- to date.

The register and approved reports will be shared with stakeholders outside the departments using various fora. This will promote collaboration and partnership with research institutions, evidence-based selection of new research and more effective implementation of research outcomes.

1. PURPOSE

The aim of this report is to serve as a third annual report of the Gauteng Environmental Research Register (ERR) and provide progress of the database since the approval of the second annual report on the 20th of June 2020 by the Head of Department, Gauteng Department of Agriculture and Rural Development (GDARD) as the designated accounting officer, Ms. Matilda Gasela.

This project is part of Gauteng Department of Agriculture and Rural Development (GDARD)'s Annual Performance Plan for the 2020/21 financial year, under the Environmental Policy, Planning and Coordination (EPPC) Directorate.

2. BACKGROUND

The ERR objectives are as follows:

- To establish and maintain a database that can be used as a benchmark for researches conducted in Gauteng province to support government, research institutions, private sector and Non-Governmental Organisations (NGOs);
- To provide essential information to decision makers;
- To track information required by different statutory bodies and stakeholders;
- To provide annual progress reports to the provincial government departments regarding the number of environmental research projects undertaken;
- To ensure that the research data and reports are saved on the departmental server and accessible to all stakeholders; and
- To facilitate research collaboration between various research institutions and provincial government.

The ERR is being updated and refined internally on a regular basis to include up to date studies as well as ensure that it effectively serves the purpose that it was established for as explained above.

It can assist in generating Key Performance Indicators reports, annual reports and departmental media releases as well as helping researchers to identify relevant new research areas that can support government decision making.

Reporting can be done on all information that has been captured such as:

- Researcher profile (names, contact details, the institution that they are affiliated with, etc.)
- The title and nature of the research work,
- Geographic location of the study,
- Intended impact of the study,
- Types of source used for disseminating research outcomes,
- The type of outcomes.

Below is information on what to expect in the new report, what areas can be improved on as well as a detailed explanation of the process of the creation of the ERR and how the ERR is currently looking.

3. WHAT'S NEW IN THE 2020-21 VERSION OF THE ERR?

The ERR has matured from being developed to being maintained through updating by adding new studies and having annual reports drawn from analysing the data contained in it. The improvement of the ERR during 2020-21 financial year can be noted as follows:

- The following institutions have been added in the list of host institutions since the approval of the second approved report: University of Nottingham located in the United Kingdom; the Department of Environment, Forestry and Fisheries (DEFF); The Copperbelt University (CU); Elsevier journal (EJ); the South African Geographic Journal (SAGJ); the National Health Laboratory (NHL); South African Weather Services (SAWS); South African Medical Research Council (SAMRC); Imperial College London (ICL); Central University of Technology (CUT); University of Limpopo (UL); Helmholtz Centre for Environmental Research—UFZ; and Mangosuthu University of Technology (MUT).

- Included in the report are studies drafted by institutions such as Elsevier, which are well known journal publishers who have just recently had their own research publications.
- The Focus areas of the studies captured now include Fourth Industrial Revolution (4IR) and innovation studies in one column due to similar outputs.
- There's are new entries on sustainable development as an additional focus area. These were added to ensure that the studies that look at smart cities, alternative technologies, methods and techniques are properly recognised.

4. DISCUSSION

The establishment of the ERR was in response to the lack of GDARD's centralised database for environmental researches conducted in the Gauteng Province. The ERR not only allows the GDARD officials with easy access to research information, but also assists external stakeholders, particularly academia and the general public.

According to Gaille (2018) the main advantage of having a centralised database is allowing for working on cross-functional projects that minimise duplications and giving a more complete picture. He also states that a centralised database reduces conflict in saturated research areas and helps to shift focus to areas where there is a need for more knowledge.

The ERR assists in identifying research areas, as well as making it easier to share and follow up on findings within the research community. However, any centralised database has the risk of loss when it is maintained within an individual institution, as well as ongoing costs for the hosting body. To reduce the above risk and to ensure greater exposure and wider use of the ERR, the hosting of the ERR by the University of Johannesburg is being discussed. The Memorandum of Agreement for hosting and other mutually beneficial activities has been approved on 27 January 2021.

The information captured on the ERR, is as follows:

- Project title;
- Names of researcher(s);

- Year of publication;
- Contact details (i.e. telephone number, fax and or email);
- Research objectives/ project description;
- Economic sector (i.e. standardised economic sectors as per the National GDP);
- Focus Areas (i.e. Agriculture, Air Quality, Disaster management, Ecological research: Biodiversity, Ecological research: Ecosystems, Energy, Environment, GIS, Health, Industries, Infrastructure, Mining, Transport, Waste, Water, 4IR & Innovation, Sustainable development)
- Area of implementation;
- Host institution;
- Geographic area (i.e. The municipality in which the project/study focused on);
- Status (i.e. completed, ongoing or discontinued);
- Accessibility of the project (i.e. yes or no);
- The output source (i.e. Journal, Institution's online library, Map, Government publications, forum/ seminar/ conference, other website/ online source);
- Output type (i.e. Paper in Journal, Thesis, Government report, Research Report, Conference proceedings, policy/ strategy/framework, survey, paper in website);
- Brief description of output/s (Abstract); and
- Link to abstract or research study/ name of source.

4.1. METHODOLOGY

The process of updating the ERR included the following:

a) Data Collection

Various types of data (research projects) were collected from the sources such as, three spheres of the government, private sector and academia/research institutions, NGOs as well as international institutions that had their case studies or study areas as Gauteng Province.

This was done using mainly the desktop technique. This refers to the use of internet searches with the aim of collecting information. In this database, this technique was supplemented by visits to institution's libraries (e.g. Ekurhuleni Metropolitan Municipality) in the previous financial year to collect information from their intranet. In this financial year no institution was visited physically as a result of the COVID regulations in place.

As part of the data collection process, the objectives and project descriptions were summarized after reading the research report to clearly depict what the study hoped to achieve.

b) Data Management

Data and relevant records, such as research papers and links to the research studies were captured and stored during the register compilation process and have been saved on the GDARD shared folder to enable access to interested stakeholders. This process is repeated annually.

c) Data Quality

The Research and Development unit is responsible for updating and maintaining the database. Data collection procedures and quality control measures to ensure data accuracy and integrity are being considered in the updating of the ERR. The latest version of the ERR underwent internal and external reviewing for comments and suggestions for improvement.

Quality checking included verification of collected data and its relevance. The studies that didn't fit within the defined parameters and scope of the database were removed as well as duplications that results from ongoing capturing of studies. Quality check process is continuous and applied as new information is being captured in the database on regular basis.

d) Data sharing outside the GDARD

The first annual ERR and approved supporting documents (i.e. manual and annual reports) were shared with interested individuals, organisations or institutions outside of the GDARD through meetings and Fora. This raised awareness of the project and helped to promote collaboration and partnership with other research institutions and will reduce duplications in future. The approved annual report for year 2019-2020 was also shared in various bilateral meetings and forums. The register was presented at the plenary session of the 2nd annual Gauteng Environmental Research symposium which was held on 16th October 2020 in a webinar format and attended by a various range of researchers from academia, to NGO's, parastatals etc.

Furthermore, as mentioned above the Department is considering arrangement with the University of Johannesburg to host the ERR on the Africa Centre of Evidence (ACE) website to get a wide cover of stakeholders and promote usage by students and other researchers.

4.2. FINDINGS

In this section, the various economic contributors are first highlighted on; this is then subsequently followed by the analysis of the ERR database.

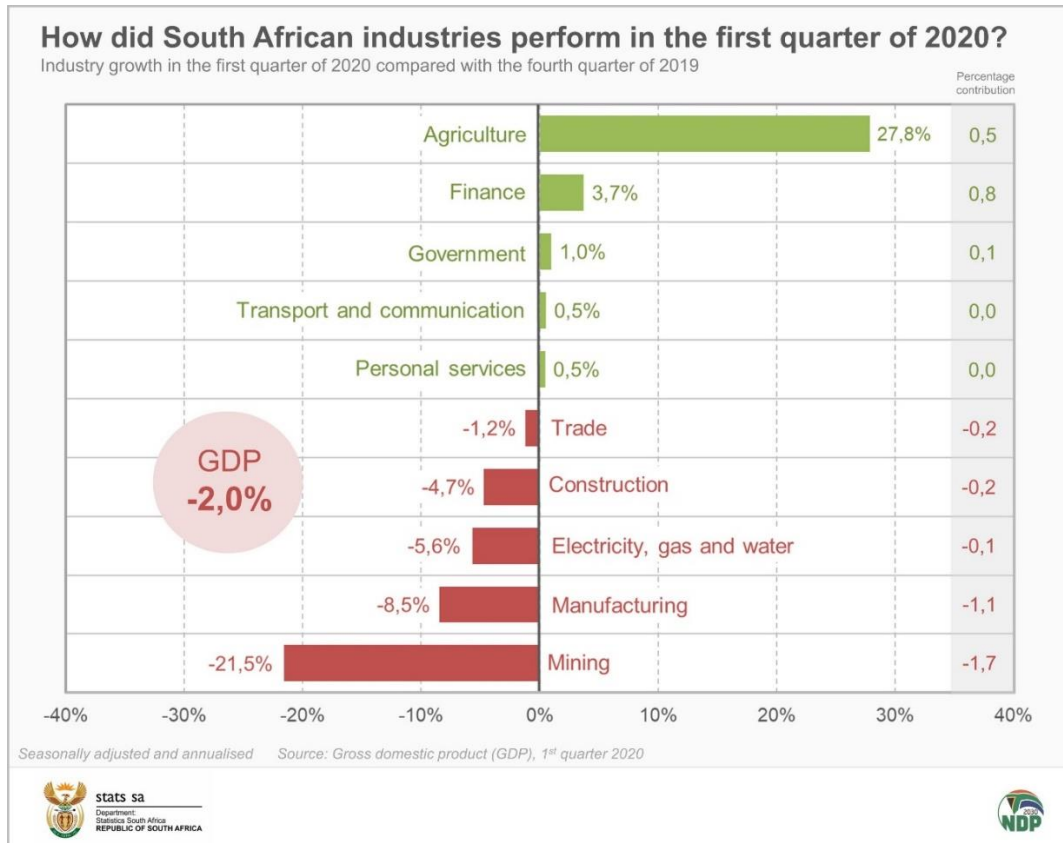
4.2.1 Economic contributors

The below graph illustrates the standard definition of economic sectors that make up the Gross Domestic Product (GDP) of South Africa as well as their performances in the defined periods as indicated below. The results of this analysis can therefore be used to justify the amount of research that goes into each standard economic sector that contributes to the GDP.

In South Africa GDP is measured by two methods. Production method (see the official GDP figure for 2020 as produced by STATS SA) and the expenditure

method. The production method measures the total value added of all goods and services produced (production method), while the other measures GDP via total spending that has taken place in the economy (expenditure method).

In the absence of a more recent graph showing the contribution of various economic sectors to the GDP the graph showing the performance of each sector to the GDP is used as it clearly demarcates the various economic sectors.



Graph1: Performance of economic sectors that contribute to South Africa’s GDP.

Source: <http://www.statssa.gov.za/?p=13401>

“The South African economy recorded its third consecutive quarter of economic decline, falling by 2,0% (seasonally adjusted and annualised) in the first quarter of 2020-21. This followed a contraction of -1,4% and -0,8% in the fourth and third quarters of 2019, respectively” Statssa (2020).

Besides retail, most activities in the trade industry (food and beverages, wholesale, motor trade, and accommodation) recorded a decline in economic activity by 1,2% in the first quarter.

In terms of performance, the mining and manufacturing sectors were the worst performers in quarter 1 with a negative 21,5% contribution, which is the poorest in the last six years. The second lowest is the manufacturing sector with a decline of 8,5%, which is its third successive quarter of negative growth. This is explained as the decreases in the production of its products such as petroleum, metals and machinery, and transport equipment due to a decrease in demand and maintenance requirements.

There's also been a reduce demand of 5,6 % for electricity and water pulled the electricity, gas and water supply industry. This is followed by a decline of 4,7% in the construction sector due to decreased activities relating to construction works as well as the construction of residential and non-residential buildings.

Five industries made a positive contribution to GDP growth. Both personal services and transport and communications grew by 0,5%. Government activity edged up by 1,0%, partly the result of an increase in employment within provincial government and higher education institutions. The finance industry expanded by 3,7%. The quarter on quarter annualised growth rates (fancy speak for assuming growth in the industry from Q3:2020 over Q2:2020 continued for a full year) for the various sectors of South Africa is summarised below:

Table 1: Summary of economic contribution for 2020- Q2 and Q3			
Economic sector	Q2	Q3	Difference
Finance, real estate and business services	-28.9%	16.5%	12.4%
General government services:	-0.6%	0.9%	0.3%
Trade, catering and accommodation	-67.6%	137%	69.4%
Manufacturing	-74.9%	210.2%	135.3%
Transport, storage and communication	-67.9%	79.3%	11.4%
Mining and quarrying	-73.1%	288.3%	215.2%
Personal services	-32.5%	38.6%	6.1%
Construction	-76.6%	71.1%	5.5.7%
Agriculture, forestry and fishing	15.1%	18.5%	3.4%
Electricity, gas and water	-36.4%	58%	21.6%

The above table is summarised from the source: <https://www.southafricanmi.com/south-africas-gdp.html>.

The overall performance of South Africa's economy declined in the 2nd quarter of 2020 due to the impact of the Covid-19 pandemic and the hard lockdown (Level 5) and the slow and gradual unwinding of lockdown regulations over the last couple of months.

Statssa (2020) reported that as of the “8 September 2020: South Africa's Q2:2020 GDP declined by -51% due to Covid-19. During the 3rd quarter of 2020 most if not all restrictions were lifted and the impact on economic growth is clear. The economy has recovered sharply following the lifting of lockdown restrictions. 8 December 2020: South Africa's Q3:2020 GDP increases sharply 66.1% due lockdown restrictions being lifted”.

4.2.2 Database analysis

The results presented below are from 285 studies that have been captured in the ERR. Adjustments to the register were continuously made to ensure the register is not only user-friendly and comprehensive, but meets the needs of the institutions that were consulted during the developmental and updating phases.

a) Number of studies per economic sector

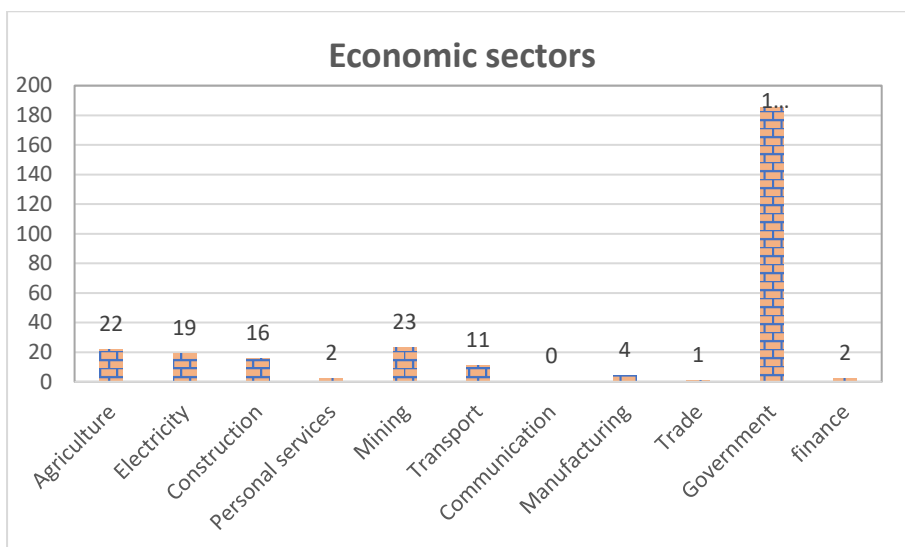
The graph below represents the number of studies captured in the database. The findings are similar to those of the previous financial year; however, the figures have changed due to more studies being added to the database.

It is still found that the government has the highest number of studies captured in the ERR (185 of the 285 studies) due to most selected services (e.g. Air Quality, Disaster management, Health, Waste and Water) being the function of the government sector. This could also be explained by the fact that government services are amongst the top 3 GDP contributors of the country as indicated above.

The mining sector is second (23 of the 285 studies) due to mining being one of the drivers to economic development in Gauteng province. Agriculture is third (22 of the 285 studies) due to importance of food security in Gauteng which is the most

populous province in South Africa. Communication is still the least (no studies) ascended by trade, finance and personal services.

The low number of studies for these sectors is expected as environmental research has little relevance for them. Internationally the Trade and Finance sectors are becoming more cognisant of the environmental challenges and further sources of information and the trade and financial websites will be examined using different range of keywords to find out if there is more research is done for Gauteng province.



Graph 2: Number of studies per economic sector

b) Focus areas

The below graph illustrates the focus areas of the studies that are currently captured on the ERR. The below categories are environmental categories used in the ERR.

Given the economic position of the country as presented above, it is not surprising that the third highest studies conducted studies focuses on energy as most researchers are looking at ways to help “energy poor” population to find alternative or more affordable sources of energy.

The other sector that ranked the second highest in the ERR being waste, this could also be as a result of having more waste generated as a result of the lockdown due to COVID 19, this is also justified by the reasons touched on in the above sections regarding contribution of economic contributors as retail was improving even though other sectors were declining.

Examples of new studies that focused on waste include the following:

- A Review of the Current Municipal Solid Waste Management Practices in Johannesburg City Townships,
- Informal and Unserviceable: The State, Informal Settlement Residents, and Sanitation Management in Western Tshwane City, South Africa,
- Implementation of waste management policy in the City of Tshwane,
- Waste dumping in Sharpeville (Emfuleni Municipality): an investigation of the characteristics and the potential impacts on air quality,
- How do municipalities drive a reuse and recycling economy within their cities/towns?

Examples of studies that seek alternative energy include:

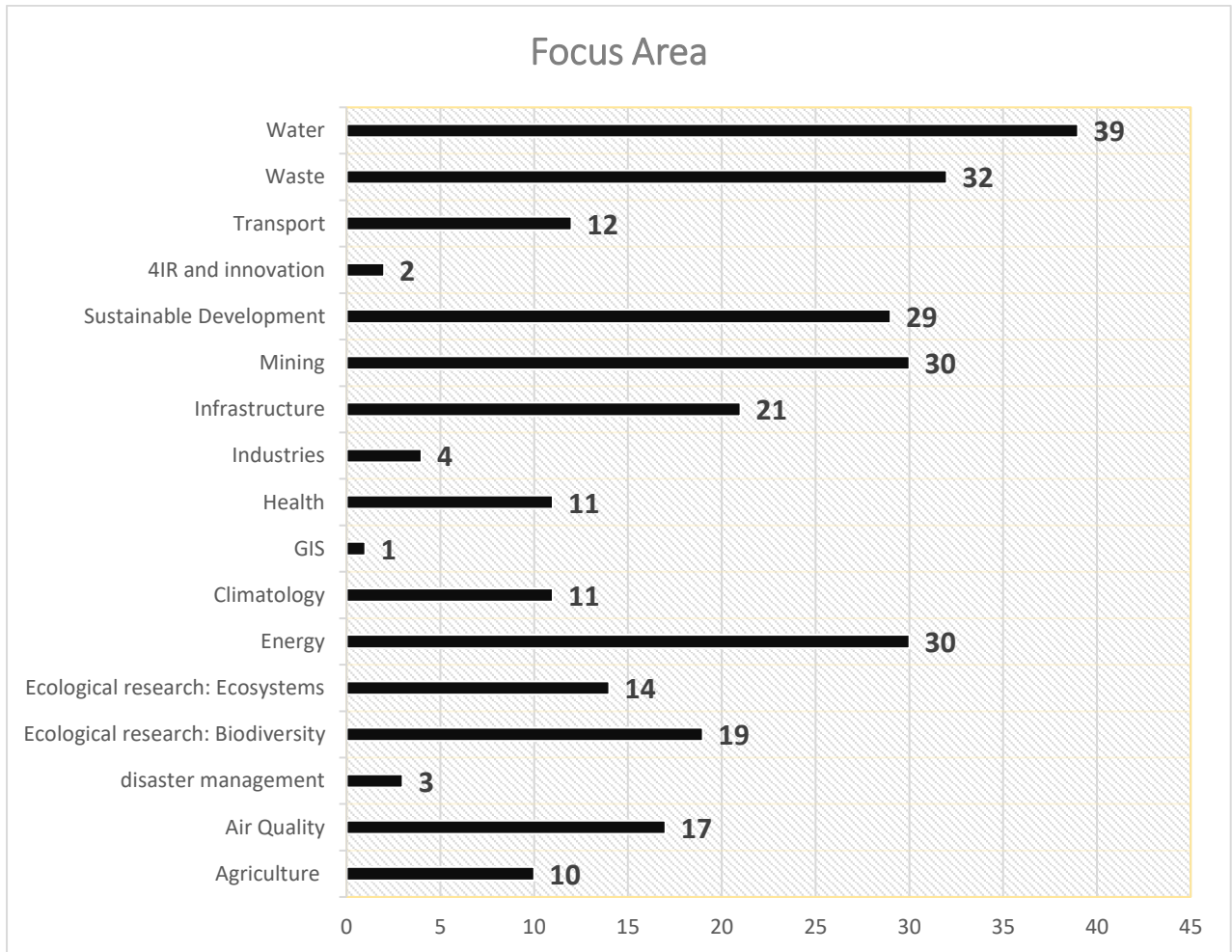
- Granny shows the way: Results from implementing an alternative fire-lighting method in Orange Farm,
- Setting up for the 2020s: Addressing South Africa's electricity crises and getting ready for the next decade. ,
- The impact of energy fuel choice determinants on sustainable energy consumption of selected South African households,
- The potential and reality of the solar water heater programme in South African townships: Lessons from the City of Tshwane,
- Energy efficiency practices in facilities management in Johannesburg,
- Municipal solid waste management in South Africa: from waste to energy recovery through waste-to-energy technologies in Johannesburg.

Waste and energy studies have surpass mining (30 of the 285 studies) which has been the focus area of interest in Gauteng province for the past decades.

Unlike the two previous reports, the water sector has the highest number of studies (39 of the 285 studies) present in the ERR. This could be justified by the fact that water is still the major issue for Gauteng.

For now, Geographic Information System (GIS) has only one study because it was added at the later stage of data collection. Fourth Industrial Revolution (4IR) and Innovation have been combined together as they produce similar outcomes. It is also important to note that the industrial research looks also very limited, but it is

possible that this type of research is proprietary and could not be accessed through internet searches.



Graph 3: Focus areas

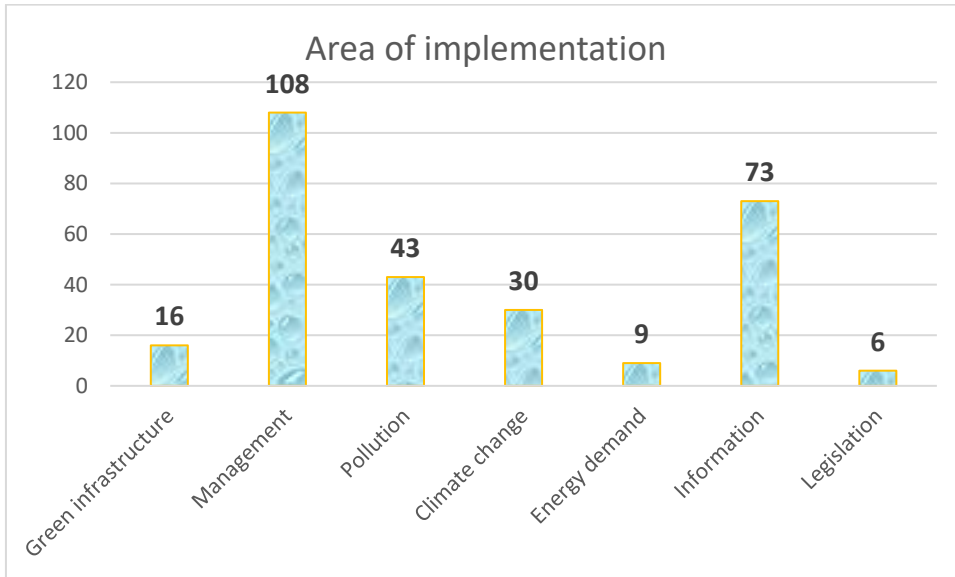
c) Area of implementation

The studies captured were individually categorised to areas of implementation that they fall under. This is also related to the purpose of the study. For instance, some studies were providing information, while others suggested ways of managing the resources, addressing issues of pollution, had suggestions on how to deal with climate change issues, proposed green infrastructure initiatives, etc. It is important to note that some studies fell under more than one category, however they had one dominant area, so the dominant one was used.

The graph 4 below shows that 73 of the 285 studies captured had main purpose of providing information to the reader pertaining the subject that is being studied,

where else 108 of the 285 studies were suggesting ways to better manage resources. 43 of the 285 studies focused on ways of handling pollution issues.

It must be noted that this classification is still quite vague and will be improved based on inputs from users of the ERR.



Graph 4: Areas of implementation

d) Host institution

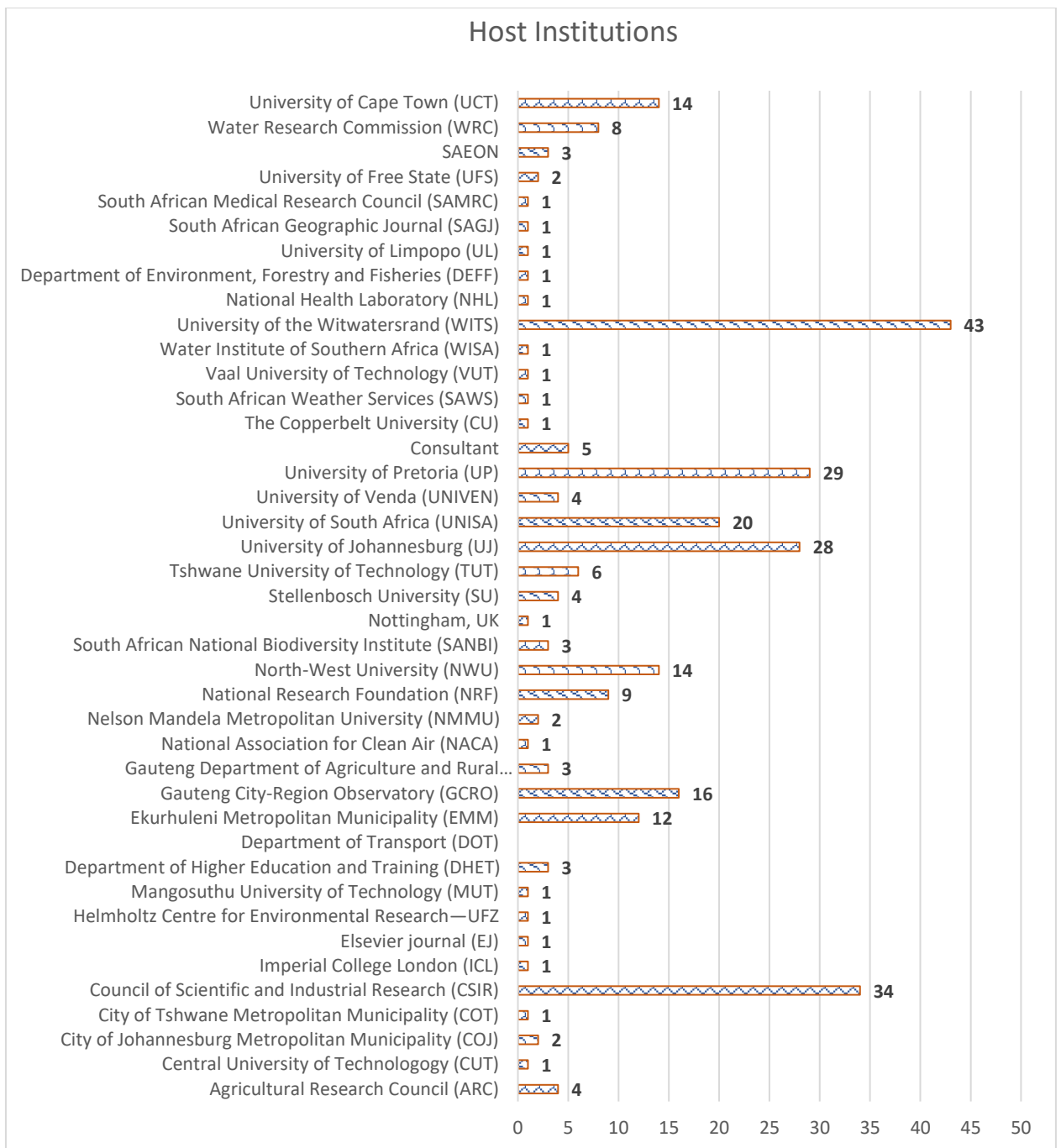
The below graph shows the number of studies captured in the ERR per institution or source. The number of studies captured depends on the ease of access to the research documents at the given time. It may not necessarily reflect on the number of studies produced by that particular institution during or prior the capturing. The main aim of the below graph is to show the diversity of the sources of information. It also gives an indication of the possible stakeholders to be contacted for data.

From the graph below the University of the Witwatersrand (WITS) as an academic institution has the highest number of studies captured (43 of the 285 studies), followed by the Council of Scientific and Industrial Research (CSIR) with 34 studies. It is not a surprise that higher institution of learning got the highest numbers as one of their main aims is to produce thesis and dissertations. It is necessary to note that some funding institutions such as the National Research Foundation (NRF) and

South African Environment Observation Network (SAEON) may not necessarily be the producers of the research, but they are the ones who commission the studies. In most cases the institutions that host the researchers have their names appearing in the register.

From the graph below it can also be deduced that even though a number of environmental research projects produced by the government could be higher than appears in the ERR, only a few of them get to be published online and accessible to the public. Hence Batho Pele Principles such as access to information and transparency may be compromised. It could also be explained by the fact that the Gauteng Provincial Government website has been undergoing significant changes in the last two years and this process have not yet been finalised.

Although local government does not have dedicated mandate for research, City of Ekurhuleni (previously Ekurhuleni Metropolitan Municipality) have done a lot of projects that can support environmental research and allowed ERR researcher to access and download them from the metro's intranet. Therefore, this city has relatively high number of studies (12) compared to other metros in Gauteng. This also can be explained by the fact that this is the only metro which so far provided access to their intranet for the ERR data collection.



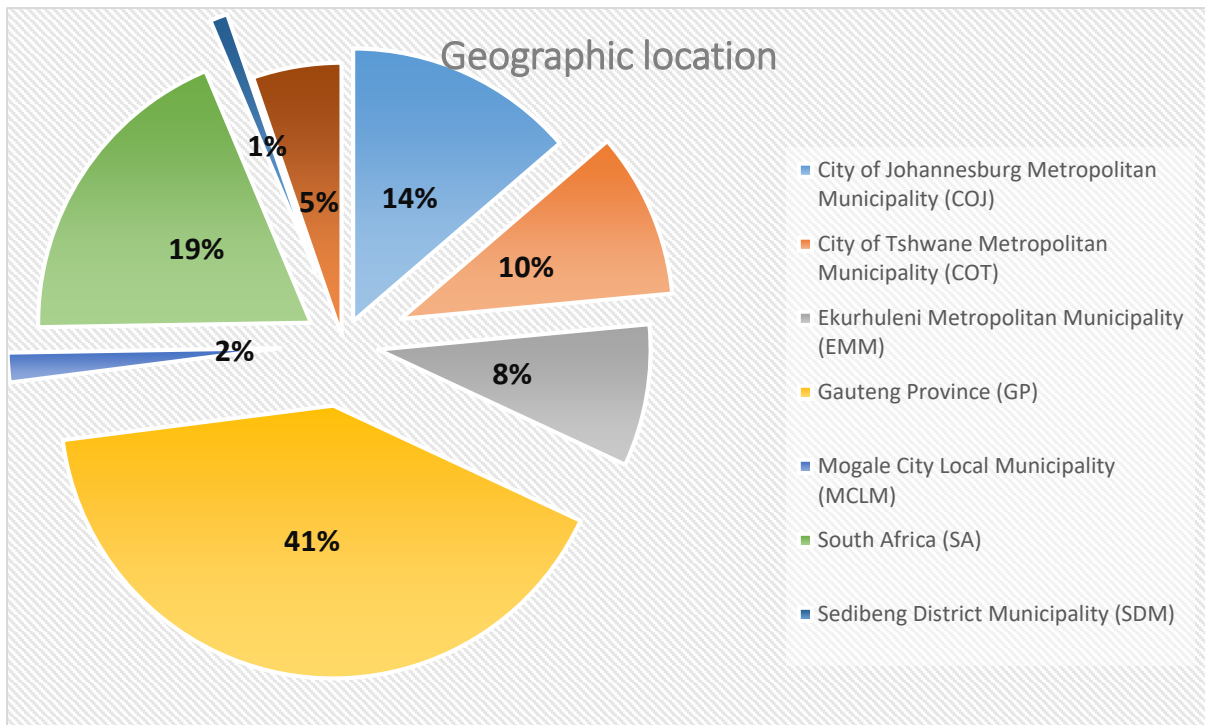
Graph 5: Host institutions

e) Geographic location

The below graph shows the distribution of studies per municipality. The province was used as a study area in cases where the study included more than one municipality. South Africa was also used as a geographic area for studies that researched a number of provinces, while Gauteng was one of the case studies.

Since the ERR objective was to reflect provincial status, the results showed that Gauteng province has the highest number of studies captured (41%), followed by Ekurhuleni Metropolitan Municipality with (24%). Smaller municipalities such as Mogale City account for only 1%.

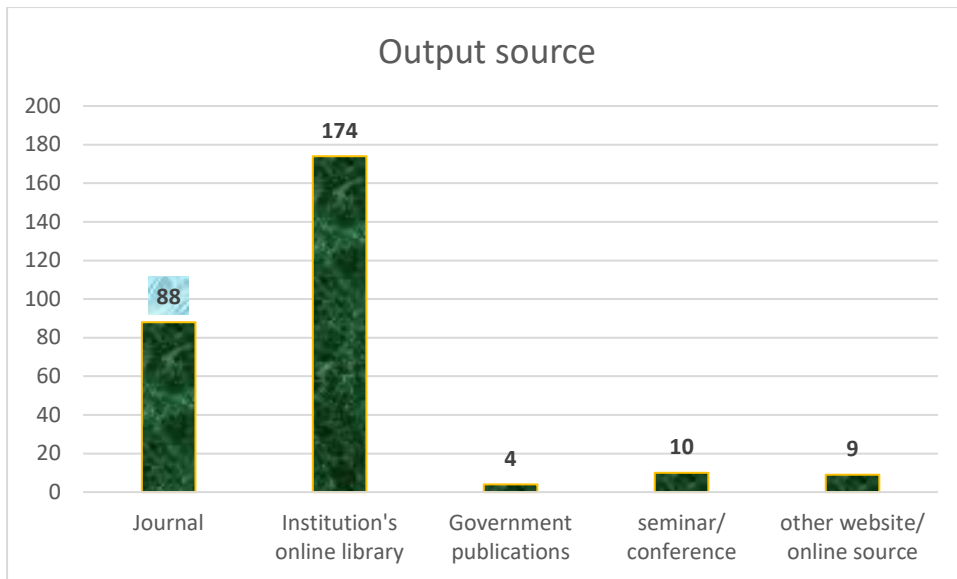
Important to note in this aspect is that some institutions outside of Gauteng Province had their case studies in Gauteng (see graph below).



Graph 6: Geographic locations of case studies

f) The output sources

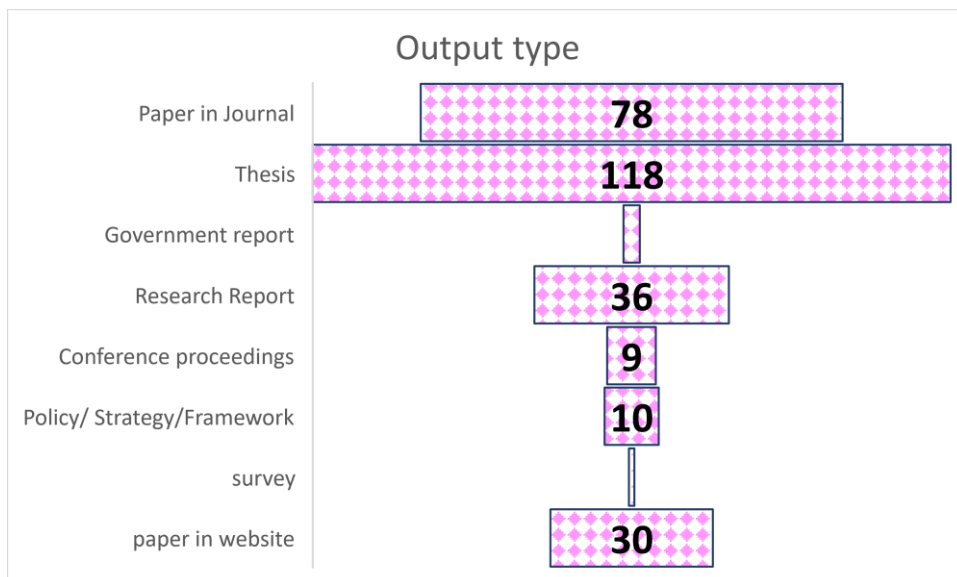
The graph below shows the sources of dissemination of research output or studies. As indicated above, most institutions use their online library. Some researchers disseminate their information through more conventional sources such as journals or presentation at conferences.



Graph 7: Output sources

g) Output type

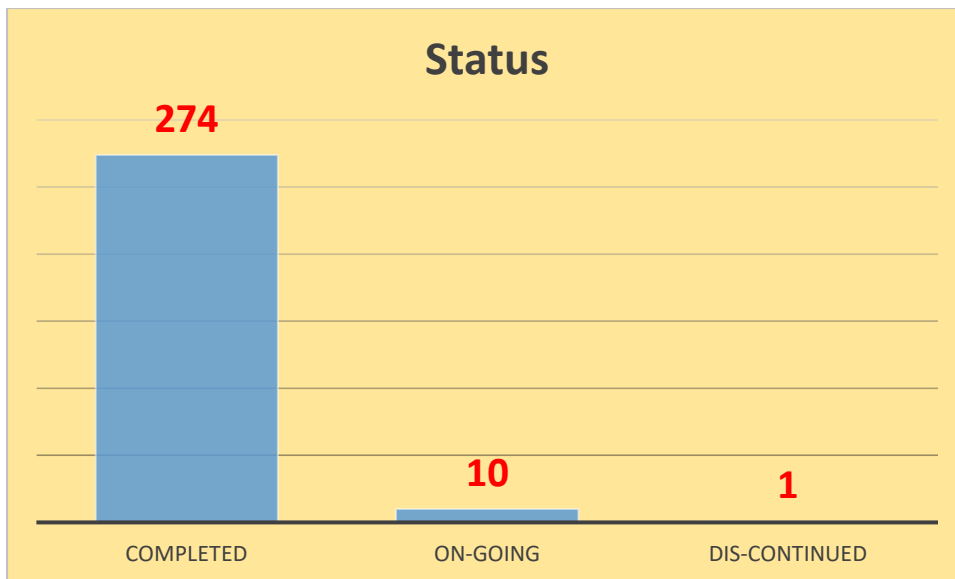
From the graph below, it can be deduced that most of the studies captured on the ERR are produced by universities in form of thesis (118 of 285 studies). The least number of studies captured is government report (see more detailed discussion in the section on Host institutions).



Graph 8: Output type

h) Status

The below graph indicates that of the studies presented in the ERR only 1 study has been discontinued due to data collection challenges, with at least 10 of them still on-going where else 274 have been completed.



Graph 9: Status

5. LINKAGES TO THE ANNUAL GAUTENG RESEARCH SYMPOSIUM

The ERR can be further mined for data in future to check for research gaps as well as focus areas of the studies that are carried out to channel the drafting of the concept note for next research symposium, choosing of themes as well other supporting documents. The ERR is already having enough studies to show areas in which researchers are interested in discussing as well as addressing the emerging areas where more research can be added. The ERR enables the user to see in a glimpse the saturated areas as well as areas in which research is still not sufficient.

The above analysis of the ERR supports identified research gaps from the last (2020) Research symposium, such as the need to ensure governance of environmental activities, management of waste, as well as ecosystem services amongst others.

6. WAY FORWARD/ RECOMMENDATION

The following are few items that can improve the quality of the report in future:

- Bilateral meetings will continue being organised with institutions that could open up their access to intranet to allow for easy access to work done and avoid duplication of work and create a conducive environment for forging partnerships and collaborations.
- Consultative workshops should be held with producers of the reports to explain the uses and benefits of sharing their work, hence improve the bringing forward of work to be captured and shared with a wider audience.
- The gaps identified will be presented to academia and research institutions that have potential to conduct research in such areas.
- The trade and financial websites will be examined using different range of keywords to find out if there is more research done on financial aspects of environmental challenges.
- More information on projects conducted within the EPPC directorate will be added in future, such include the research to be conducted as part of the Sustainable Public Procurement Guidelines (SPPG) project.

The register and approved reports will be shared with stakeholders outside the departments using various fora. This will promote collaboration and partnership with research institutions, evidence-based selection of new research and more effective implementation of research outcomes.

7. REFERENCES:

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