



The Gauteng Environmental Research Register

**FOURTH ANNUAL REPORT:  
THE ENVIRONMENTAL RESEARCH REGISTER (ERR) FOR THE 2021/22 FINANCIAL YEAR**

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## EXECUTIVE SUMMARY

The Gauteng Environmental Research Register (ERR) was developed in the 2017/18 financial year responding to the need to have a reporting tool on environmental research that is conducted in Gauteng Province. It was initiated by the Gauteng Department of Agriculture and Rural Development's Environmental Policy Planning and Coordination Directorate. So far it has achieved the following milestones amongst other: 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 20<sup>th</sup> of June 2020, and the third annual report was approved on the 15<sup>th</sup> of February 2021.

The ERR is updated and analysed and it is one of the activities in the Memorandum of Agreement (MOA) with the University of Johannesburg's Africa Centre of Evidence (ACE) where a technical committee has been established to help in ensuring that the database is user friendly and

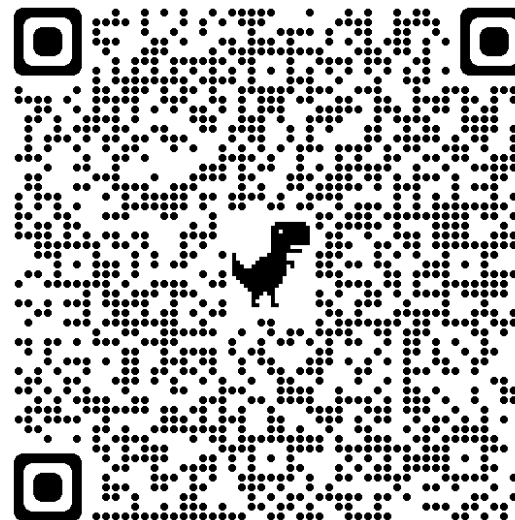
reaches more audience that can benefit from it being hosted in a public institution's domain.

The register and approved reports have been shared with stakeholders outside the departments using various Fora, like wise this report will follow suit. This doesn't only promote collaboration and partnership with research institutions and evidence-based communities, individuals who are pursuing studies in different institutions, amongst other. It assists in selection of research topics, providing pointers of the already existing information/ data and highlights the niche areas that researchers can focus on in order to have a greater impact as well as provided more effective implementation of research outcomes that would otherwise be shelved and unknown to the greater audience.

The ERR has also found its way to being an APP that can be downloaded and used from mobile gadgets and tablets, amongst other small screens. The link to access the data on the newly developed app is <https://www.appsheet.com/start/904382a8-48f4-4c4b-ba06-44fd015421a2> on the browser and for downloading of the APP <https://www.appsheet.com/newshortcut/904382a8-48f4-4c4b-ba06-44fd015421a2>

The legal aspects of putting the APP store on play store, i-tune stores etc. are still to be done through the department's Legal service directorate.

The QR code for accessing the ERR APP is pasted below and can be used on any device that has access to the QR code scanner:



For better understanding of the conceptualisation of the idea of the ERR the concept note is attached on the annexures below. The user manual is also attached to explain the rationale regarding the different columns used and to guide the user on the information that they can expect to find in the database. It is important to note that this is a generic report on the overall findings of the data collected hence it can be further analysed to generate customised reports that are relevant to different professional and academic fields.

In light of the above, it can be deduced that the ERR is a living document that presents environmental studies carried out in Gauteng Province from 2007- to date.

## 1. PURPOSE

The aim of this report is to serve as a fourth annual report of the Gauteng Environmental Research Register (ERR) and provide progress on the database since the approval of the third annual report on the 15<sup>th</sup> of February 2021.

This project is part of Gauteng Department of Agriculture and Rural Development (GDARD)'s Operational Plan for the 2021/22 financial year, under the Environmental Policy, Planning and Coordination (EPPC) Directorate.

## 2. BACKGROUND

The primary objectives of the ERR can be noted on the attached concept note, however they have been modified to ensure relevance and can be summarised to be as follows:

- To continually update 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;

- To facilitate research collaboration between various research institutions and provincial government; and
- To ensure that the data and reports are hosted in a public domain to ensure easy access by the public and potential users.

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 sources used for disseminating research outcomes; and
- 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.

It has also improved in a sense that it is transitioning from just being a desktop database to being an APP that can be

easily accessed through devices such as cell phones and tablets. The links to access the APP are as follows:

Browser: <https://www.appsheet.com/start/904382a8-48f4-4c4b-ba06-44fd015421a2>

Installer:

<https://www.appsheet.com/newshortcut/904382a8-48f4-4c4b-ba06-44fd015421a2>

The improvement of the columns and the data contained 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: Emory University, Atlanta, GA 30322, USA Pachaiyappa's College (Affiliated to University of Madras), Chennai 600030 in Tamil Nadu based in India; Sefako Makgatho Health Sciences University; Wasit University in Iraq; and South African National Space Agency, as well as the University of Birmingham in UK.

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 entries on sustainable development that were added in previous financial year to ensure that the studies that look at smart cities, alternative technologies, methods and techniques are properly recognised; have now been further broken down to fit in the specific component of sustainable development that they focus on hence this option has been dissolved.

#### 4. DISCUSSION

The Gauteng Environmental Research Register (ERR) was developed in the 2017/18 financial year to respond to the need to have a reporting tool on environmental research that is conducted in Gauteng Province, hence becoming a benchmarking tool for studies carried out in the province.

Not only does it present the studies to Gauteng Provincial Government officials (GPG) but it has a proven record of being requested and used for academic purposes. The ERR not only allows the GDARD officials with easy access and but also assists external stakeholders. It will in future



have columns where potential benefactor of the information are identified and notified of studies that are relevant to their institutions.

According to Project Management Institute (2014) the advantage of having a centralised database includes allowing for minimized data redundancy; creating consistency; file-based systems create data redundancy, etc. Kerzner (2005) supports this notion by stating 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.

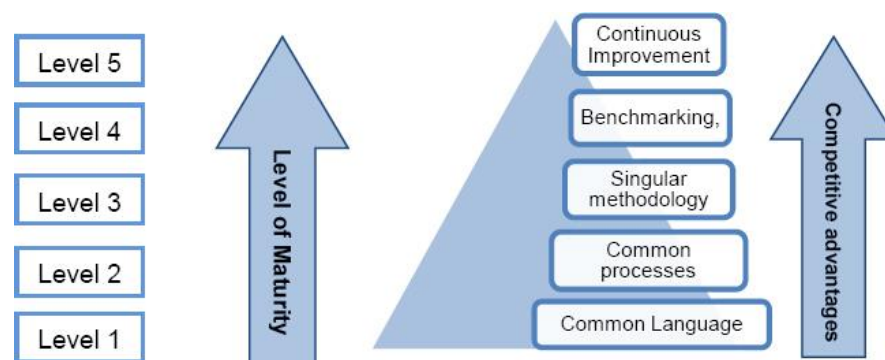


Figure 1: Kerzner's Maturity Level (2005)

From the figure above it can be deduced that having a centralised database ensures that there's a common language in this case the ERR classifies like for like and merges the studies to an easy to understand language. The process followed in the compilation, updating and maintenance of the database is transparent and easy to follow; the fact that the register dates back to 2007 makes it fit into the benchmarking categories and can be used to showcase the shift in focus areas that research has taken and lastly for the continuous improvement field this is obtained from the annual updates and updating.

From the above, it can be noted that 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 -19 regulations in place.

#### 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 2<sup>nd</sup> Annual Gauteng Environmental Research Symposium which was held on 16<sup>th</sup> 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 for Evidence (ACE) website to get a wide cover of

stakeholders and promote usage by students and other researchers.

#### 4.2 THE APP

After a series of coding and vigorous process of working on the back end of various Deploying techniques the most user friendly APP had to be used. Issues of data accuracy and security had to also be considered in ensuring that the intellectual property rights of the department were not compromised. As such the APP was generated and deployed for the purposes of viewing and accessing the data. The editing right of the APP still lies with the generator of the APP who in this case is the same person who is responsible for updating the ERR and is an employee of the directorate.

The development of the APP included development of prototypes to test the relationship between the back end language of input with the visual and interactiveness of the output.

Just like any other APP the paid options have added benefits that otherwise the free versions would have limited to. As such it is recommended that the not only is the data display option improved but also paid services that the subscription offers be considered for better customisation and to create a wider audience reach.

### 4.3. FINDINGS

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

#### 4.2.1 Economic contributors

According to STATS SA (2021) South Africa's gross domestic product (GDP) decreased by 1,5% in the third quarter of 2021. The trade, catering and accommodation industry decreased by 5,5%, contributing -0,7 of a percentage point to GDP growth. Decreased economic activities were reported for wholesale, retail and motor trade; and catering and accommodation services.

The manufacturing industry decreased by 4,2% in the third quarter, contributing -0,5 of a percentage point to GDP growth. Eight of the ten manufacturing divisions reported negative growth rates in the third quarter. The motor vehicles, parts and accessories and other transport equipment division made the largest contribution to the decrease in the third quarter. The food and beverages division and basic iron and steel, non-ferrous metal products, metal products and machinery division also made noteworthy contributions to the contraction. The agriculture, forestry and fishing industry decreased by 13,6% and contributed -0,4 of a percentage point to GDP growth. The decrease was mainly due to decreased production of field crops and animal products. The transport, storage and communication industry decreased by 2,2%, contributing -0,2 of a percentage point. Decreased economic activity was reported for land transport and air transport.

Unadjusted real GDP at market prices for the first nine months of 2021 increased by 5,8% compared with the first nine months of 2020.

#### 4.2.2 Database analysis

The results presented below are from 354 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

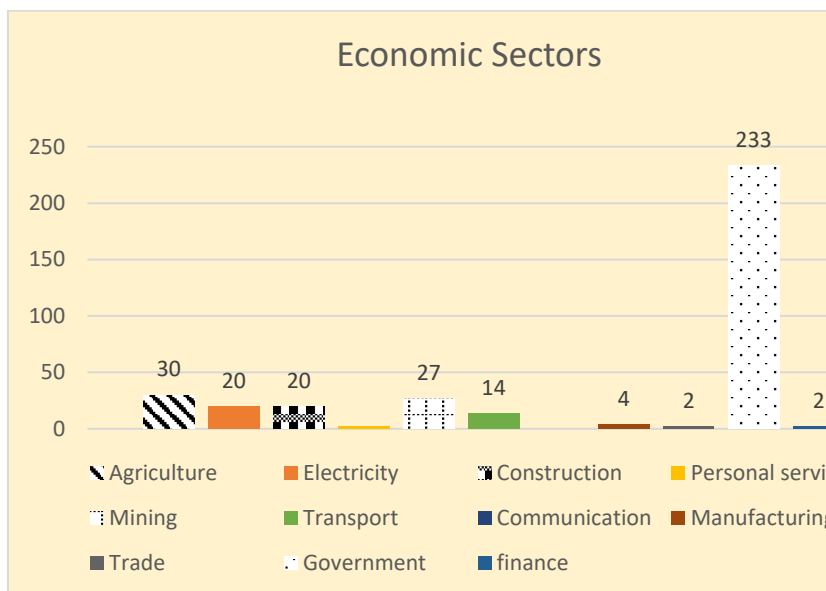
The graph below represents the number of studies captured in the database. The findings are similar to those of the previous financial year; however, the figures have changed due to more studies being added to the database.

It is still found that the government has the highest number of studies captured in the ERR (233 of the 354 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.

Agriculture is second (30 of the 354 studies) due to importance of food security in Gauteng which is the most populous province in South Africa. The mining sector is second (27 of the 354 studies) due to mining being one of the drivers to economic development in Gauteng province. Communication is still the least (no studies) together with 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 being done in 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 that South Africa is a water scarce country it is not surprising that most of the studies (46 out of the 354 studies) focused on water.

Examples of studies that justify the water scarcity include the following:

- Drought response strategy in Gauteng.
- The application of water poverty mapping in water management.
- Towards a water sensitive city. The case of Johannesburg.
- Exploring the potential greywater use in a typical microcosmic commercial area of South Africa.

The sector that ranked the second highest in the ERR is waste, with 44 of the 354 studies, this could 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. Gauteng also generally generate more waste than other provinces due to

population size and industrial nature. The economic position of the country also resulted in adaptive measure to economic crisis hence , it is not surprising that the third highest studies conducted focuses on energy as most researchers are looking at ways to help “energy poor” population to find alternative or more affordable sources of energy.

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,

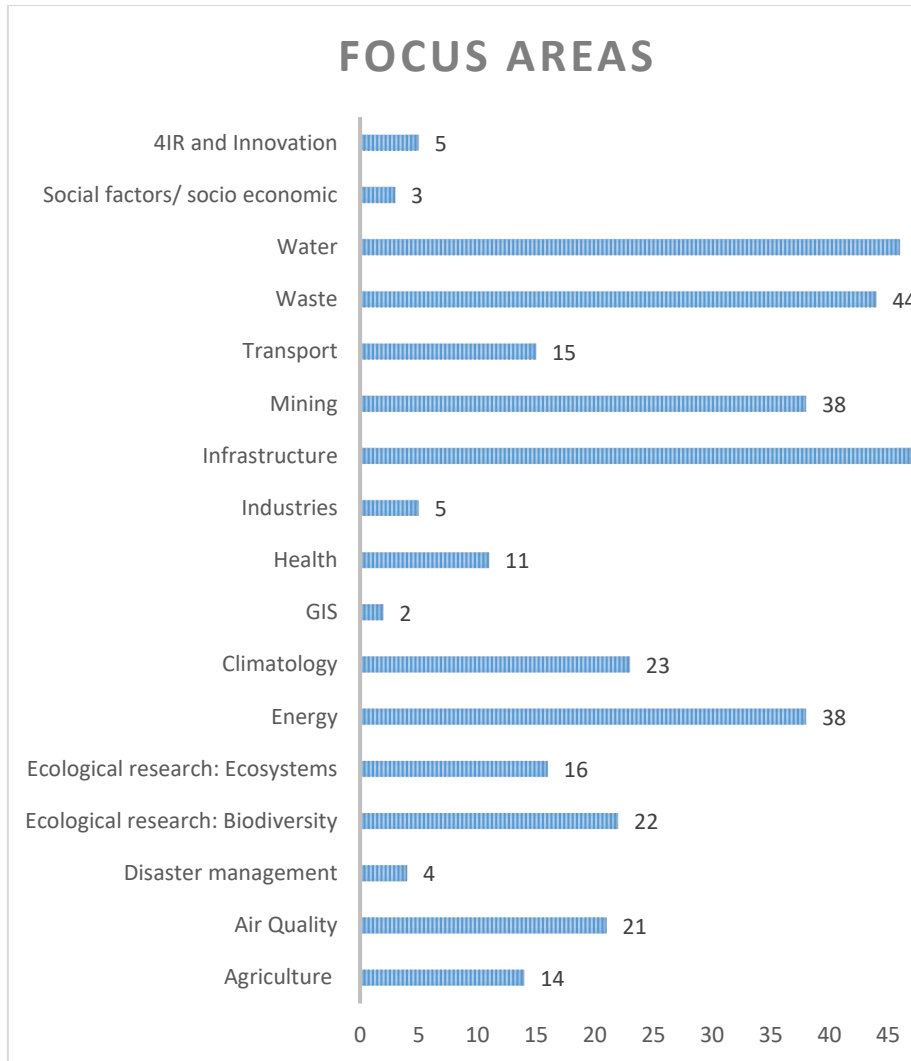
- Municipal solid waste management in South Africa: from waste to energy recovery through waste-to-energy technologies in Johannesburg.

Water and waste studies have surpass mining 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

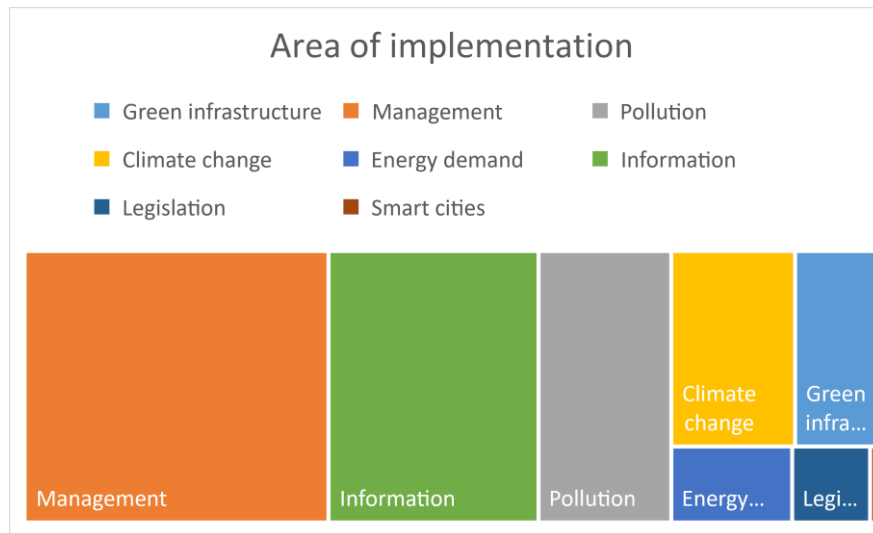
### c) Area of implementation

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 there's a shift to management of resources from just provision and demands.

This graph differs from the others in a sense that the size of the block depicts the contribution.

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

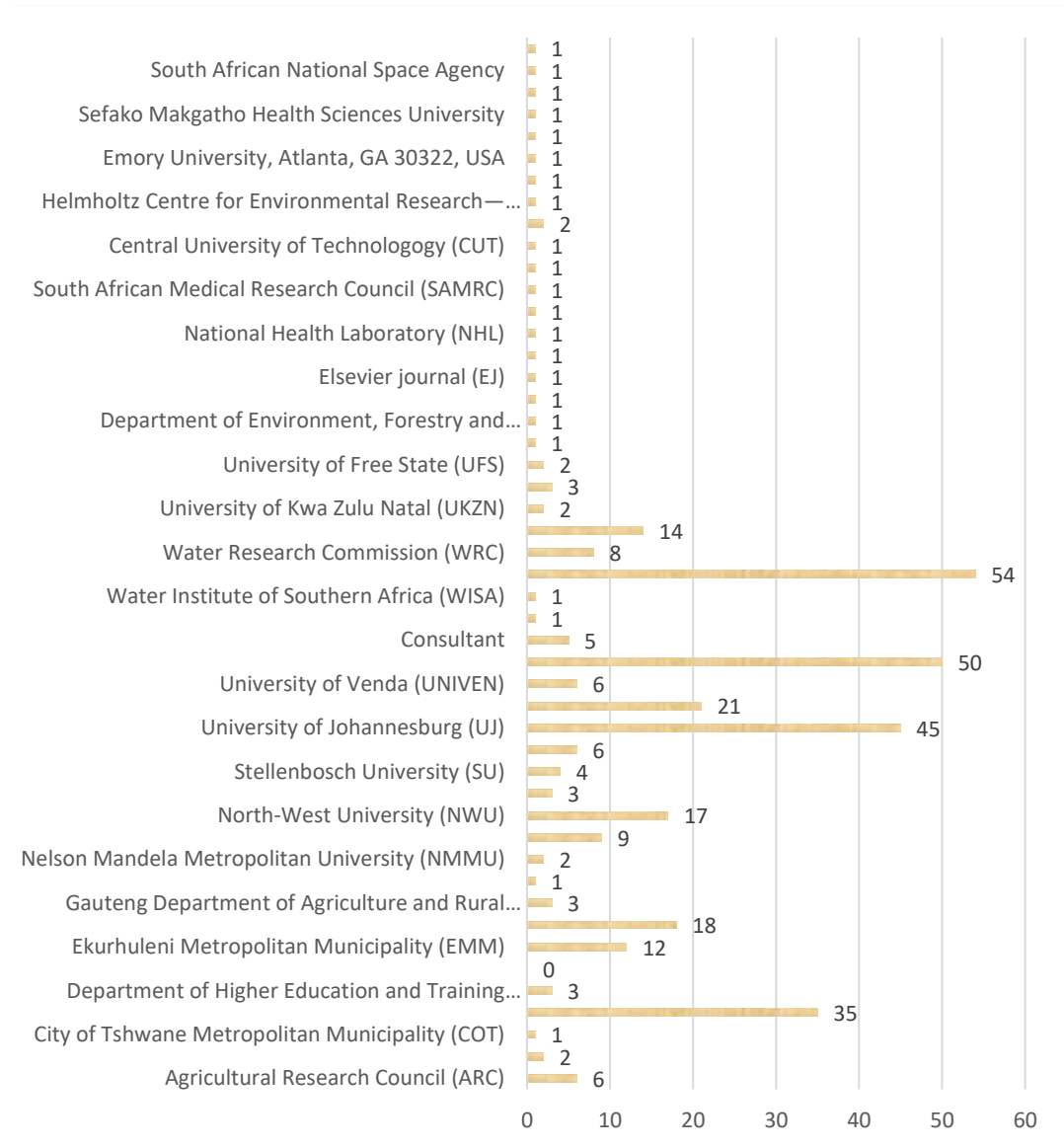
information. It also gives an indication of the possible stakeholders to be contacted for data.

From the graph below the University of the Witwatersrand (WITS) as an academic institution has the highest number of studies captured (54 of the 354 studies), followed by the University of Pretoria (UP) with 50 studies and the University of Johannesburg with 45 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 and fund 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 has 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.



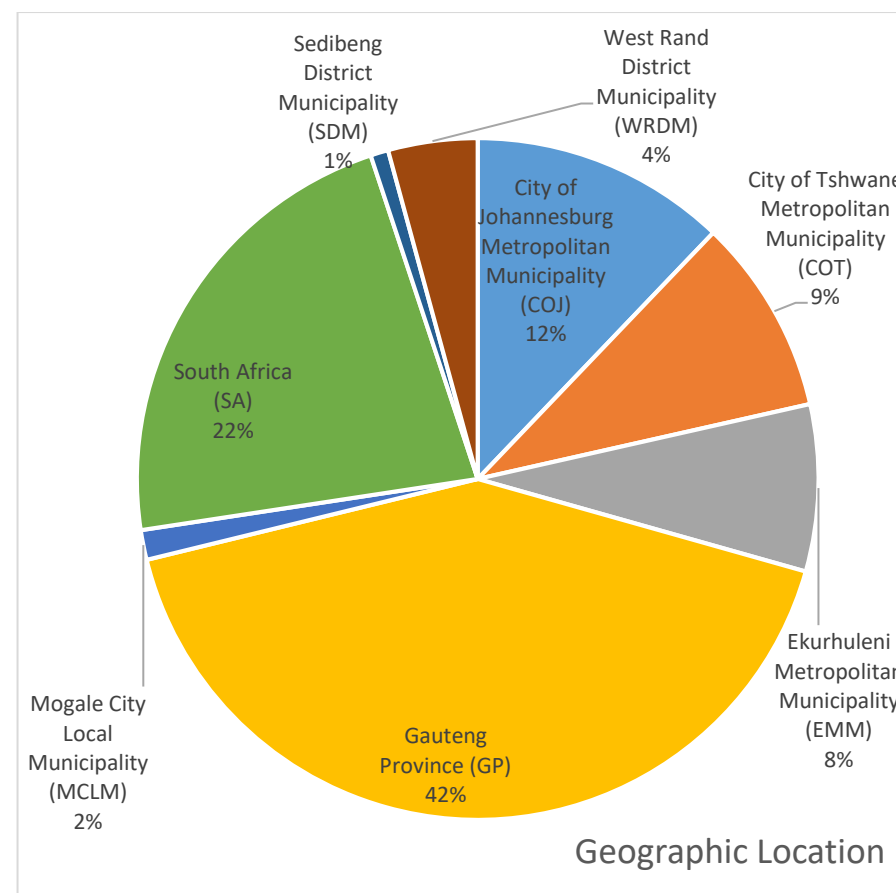
## Graph 5: Host institutions

### 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 (42%), followed by South African studies that had Gauteng Province as one of the key study areas (22%). Smaller municipalities such as Mogale City account for only 2%.

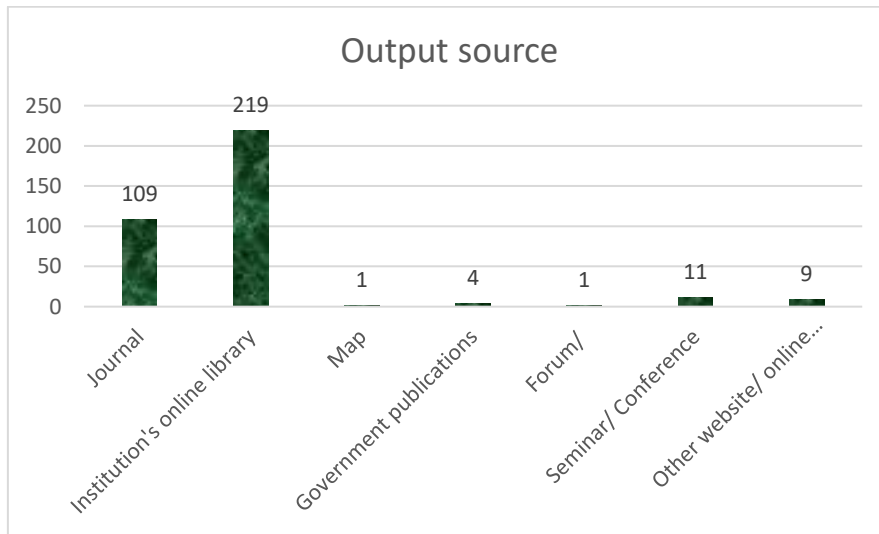
Important to note in this aspect is that some institutions outside of Gauteng Province had their case studies in Gauteng (see graph below).



Graph 6: Geographic locations of case studies

#### f) The output sources

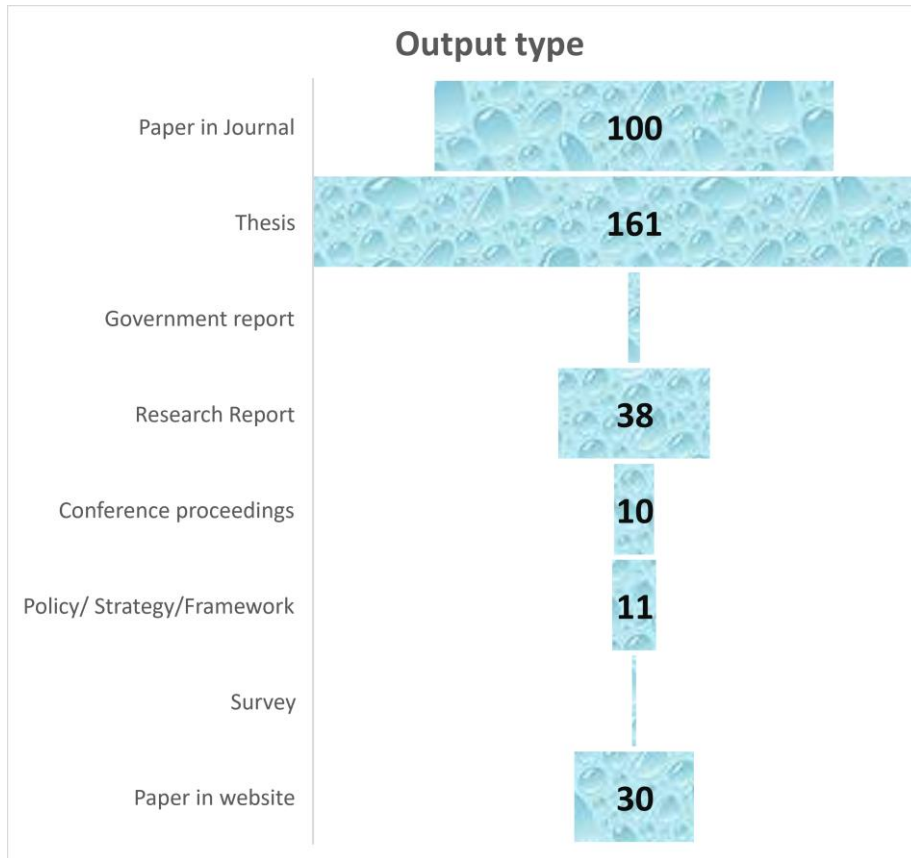
The graph below shows the sources of dissemination of research output or studies. As indicated above, most institutions use their online library. Some researchers disseminate their information through more conventional sources such as journals or presentation at conferences.



Graph 7: Output sources

#### g) Output type

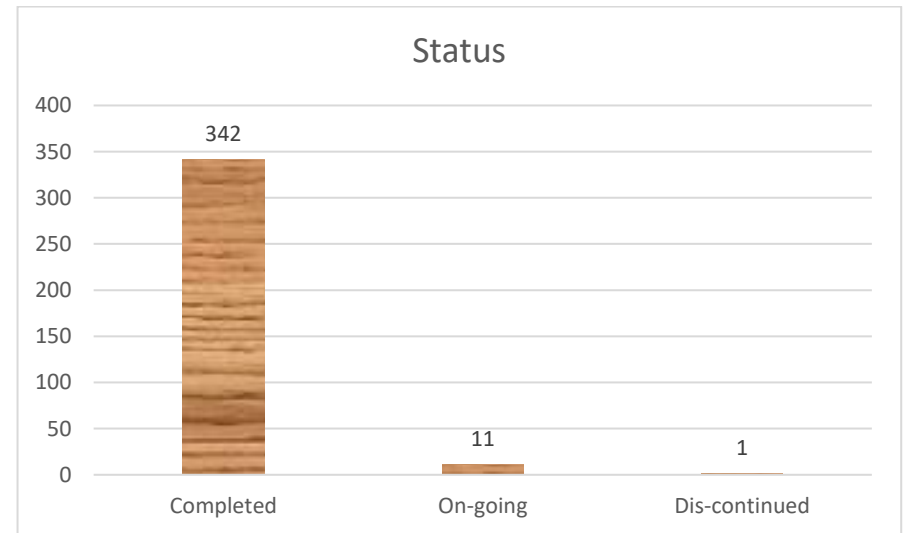
From the graph below, it can be deduced that most of the studies captured on the ERR are produced by universities in form of thesis (161 of 354 studies). The least number of studies captured is government report and surveys (see more detailed discussion in the section on Host institutions).



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 11 of them still on-going where else 342 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 (2021) 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:

- Further exploration of the transitioning of the ERR from desktop to the APP.
- Hosting of the ERR on the UJ ACE's website.
- 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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