KNOWLEDGE DISSEMINATION AND SHARING: REVIEWED AND UPDATED SOUTH AFRICAN IRRIGATION DESIGN MANUAL AND IRRIGATION USER MANUAL

Report to the
WATER RESEARCH COMMISSION

by

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EXECUTIVE SUMMARY

BACKGROUND

Technology transfer related to the irrigation sector should take place to communicate information on improved water-use efficiency to all stakeholders in the irrigation sector, including suppliers of irrigation equipment and management services as they play an important role in water management at the farm.

The newly updated (2020) Irrigation Design Manual and the Irrigation User Manual are the main sources of locally relevant information on the design and management of irrigation systems. Both manuals were originally developed and published by the Agricultural Research Council (ARC). The Design Manual was first published in 1996 and updated in 2003, while the User Manual was first published in 2002. The latest editions of these manuals are a result of a review and update process undertaken by various partners (ARC, Isowat and RIENG). The Water Research Commission (WRC) fully funded and supported the process.

The review and update of the manuals was an opportunity to influence irrigation water-use efficiency across a wide spectrum of stakeholders in South Africa. The two irrigation manuals are well-known and widely used in the South African irrigation sector, especially the Design Manual, which is used by most of the tertiary education institutions as textbook for irrigation courses as the industry standard. The irrigation industry consists of the manufacturers or suppliers of equipment, retail outlets, irrigation design professionals, and irrigation installation and/or maintenance contractors, serving the agricultural sector, comprising more than 30 000 farmers, irrigating approximately 1.5 million hectares of land in South Africa.

During the review and update process it was discovered that there existed a number of industry players who never knew that South Africa had such useful tools for the irrigation sector. It became clear that for years a huge number of farmers, farmer organisations and provincial farmer organisations in the country missed out on an opportunity to access these manuals, which are important for appropriate and effective irrigation system management.

It has consequently become apparent and clear that the farming community, and irrigation sector in particular, needs more awareness on the existence of these two manuals. Not only was better level of awareness proposed, but also sharing of the main contents of the manuals. Therefore, an information dissemination exercise was proposed to be carried out at national level to ensure that all relevant stakeholders are aware of the existence and contents of the manuals.

It is of utmost importance that the entire irrigation industry know about the manuals and their contents as crucial knowledge sharing is necessary for the effective use of water by all role-players involved in irrigation. According to the ARC, approximately 400 manuals were sold annually before the review and update of these manuals. The new edition (the revised and updated edition) allows users of the manuals to replace their outdated copies. This project will thus have a positive long-term effect, especially since it aims to meet some objectives of the National Water Resource Strategy while ensuring that all stakeholders in the sector are briefed on the key changes and overall contents of the two manuals.

This project aimed to address capacity building and skills development targets of the National Water Resource Strategy 2 (NWRS2) by enhancing nationwide knowledge of the existence and contents of the new manuals.

AIMS

The following were the aims of the project:

1. To create a nationwide awareness of the existence and contents of the irrigation design and user manuals.
2. To create accessibility of the manuals to the entire irrigation sector (both in print form and online)

METHODOLOGY

In order to comprehensively share the knowledge of the existence and contents of the new manuals the following processes were be followed, namely

1) Stakeholder identification, listing and grouping
2) Knowledge dissemination workshops
3) Exploration of various ways to make the manuals continuously available in print form other than just online

1) Stakeholder identification, listing and grouping

There are many ways to identify the stakeholders for a project; however, the project team carried out the identification process in a methodical and logical way to ensure that stakeholders were not easily omitted. This was done by looking at stakeholders individually, organizationally, geographically, or by involvement with various knowledge dissemination phases or outcomes.

Another way the project team identified the stakeholders was by identifying those who are directly impacted by the project and those who may be indirectly affected. This is important because directly affected stakeholders usually have greater influence and impact of a project than those indirectly affected.

A comprehensive listing and grouping required the project team to take a close look at each stakeholder to gather more in-depth information in order to understand their impact, involvement, communication requirements, and preferences of the manuals.

In order to accomplish the above process, a series of desktop information gathering accompanied by a questionnaire was undertaken whereby, amongst others, representatives and individuals from the following were identified and listed:

a) South African Irrigation Institute (SABI)
b) South African Institute of Agricultural Engineers (SAIAE)
c) Academics from local universities
d) Practicing consultants
e) Commercial and smallholder farmers
f) Farmer organizations such as AgriSA
g) Industry experts.

2) Knowledge Dissemination Workshops

Invitations to workshops were extended to identified stakeholders. These included:

a) South African Irrigation Institute (SABI)
b) South African Institute of Agricultural Engineers (SAIAE)
c) Academics from local universities
d) Practicing consultants
e) Commercial and smallholder farmers
f) Farmer organizations such as AgriSA
g) Industry experts

In order to involve as much role-players as possible, the workshops were not necessarily based on Provincial boundaries. The output of the above stakeholder identification was used as a guide towards the presentation of workshops.

A combination of desktop study and feedback from workshops helped to come up with alternative ways to ensure the manuals are readily available in various and preferred formats other than just online. The workshops discussed several potential forms of dissemination which included (but not limited to) distribution of hard copies through various accessible centres, pamphlets, radio talks, oral presentations, etc. The aim of exploring and identifying these dissemination alternatives (through a consultative process) was to ensure the entire stakeholder spectrum is covered and get interested in the manuals. The interest in the manuals will be a base for periodical or more frequent update of the manuals going forward.

RESULTS AND DISCUSSION

Based on responses from the stakeholders, there are different categories of stakeholders who have indicated a strong interest in the irrigation manuals. The identified categories are:

1. Advisory services which cover irrigation extension services
2. Irrigation user and farmers
3. Irrigation designers
4. Research and academic
5. Construction.

The respondents also indicated their expectations from this knowledge dissemination process. The indicated expectations were:

1. Information on efficient irrigation practices
2. A concise design manual with standards and parameters that can be used/referred to as the benchmark for modern and cost-effective irrigation and drainage design layouts
3. Distribution of the Design Manual; Keeping the manual up to date
4. Expanding the design manual to include sustainable available water before design starts
5. Easy accessibility and utility
6. Easy update as standards and procedures evolve with time
7. Awareness as planned
8. All SASRI Extension Specialists should be knowledgeable about the contents of the User Manual so that they can prepare/facilitate ongoing training/knowledge sharing and farmer education on the various irrigation topics in their respective home regions
9. All irrigation designers and contractors who provide a service to sugarcane farmers should be equipped with the latest version of the Irrigation Design Manual and, should meet the latest standards and design norms
10. Information on current laws and best practices
11. Possible accessibility to the manuals. Summary regarding how best to utilise each manual and their target audiences.
12. Irrigation user manual as guideline.

The research and academic sector was equally represented as the private sector at 45% each while the public sector had a 10% representation at the workshops. Note that the private sector included farmers.

Extension officers and researchers were represented at 31% each followed by irrigation specialists at 28% while only 10% was farmer representation.

The workshops further explored ways of ensuring that the existence of the manuals reach as many members of the irrigation sector as possible. It was suggested that the manuals be advertised through various media platforms such as social media, online and print media. This was accomplished through ARC LinkedIn account and Facebook account.

It was also suggested that the manuals be Modularised. This recommendation has started to be implemented with two modules ready for delivery. The modules are:

1. Water Saving Irrigation Technologies
2. Guidelines for the Maintenance of Irrigation Systems

The workshops sought to identify preferred access formats for the manuals. The majority at 52% and 45% prefer pdf format shared via email and downloading through a shared link, respectively. Hard copy format was the least preferred at 3%.

The manuals cannot be accessed through a link (though a preferred format) because neither ARC nor WRC have network capacity to host them. ARC has managed to share the manuals stored in CDs and USBs. Since the manuals are packaged by chapter, ARC is managing to share the manuals per chapter through emails.

The results of this engagement indicate that the irrigation sector, as focused as it may, has diverse areas of interest to meet the demands of irrigated agriculture. And, to meet the agricultural market demands, up to date irrigation technology and innovation has grown tremendously and the need to keep stakeholders updated with key developments (such as the new and updated irrigation manuals) is paramount. Going forward, this register and its contents will be used as a contact database in ensuring that all key stakeholders participate in developing methods and tools that will be effective in sharing the contents of the manuals. It can also be concluded that modules have started being developed and will continue to be developed in line with the needs of the sector.

GENERAL

The degree to which the aims could be achieved depended largely on attendance at workshops. The project managed to reach out to the irrigation designers wider than it did to the irrigation users. Irrigation designers were reached out at various SABI and SAIAE gatherings. There are over 70 SABI approved irrigation designers of which all of them have not only known, but used the manuals in their design works. About 20 new designers undergo training provided by SABI each year. Not so many irrigation users attend these gatherings. Almost all irrigation designers in the country are aware of the existence and contents of the manuals since the manuals are used as a teaching tool at university and also by SABI. The use of multi-media platforms extended the knowledge on the existence and contents of the manuals to wider stakeholder community. Popular articles were the major vehicle for knowledge dissemination after workshops and gatherings to irrigation users.

CONCLUSIONS

It came to the attention of the project team that the manuals cannot be accessed through a link (though a preferred format) because neither ARC nor WRC have network capacity to host them. ARC has managed to share the manuals stored in CDs and USBs. Since the manuals are packaged by chapter, ARC is managing to share the manuals per chapter through emails.

Engagement and partnership with South Africa Irrigation Institute (SABI) and Water Resources Observatory (WRO) project team has enabled the project to find homes for the manuals. The manuals can be accessed through this link under SABI: https://sabi.co.za/irrigation-manuals-for-review/ and these links under WRO:
https://protect-za.mimecast.com/s/zJ69CoYKmkTD0DkYCzaQNX?domain=data.waterresearchobservatory.org
https://protect-za.mimecast.com/s/t6VKCpgKnlt9B95ohYePyP?domain=data.waterresearchobservatory.org

The results of this engagement (knowledge dissemination exercise) indicate that the irrigation sector, as focused as it may be, has diverse areas of interest to meet the demands of irrigated agriculture. And, to meet the agricultural market demands, up to date irrigation technology and innovation has grown tremendously and the need to keep stakeholders updated with key developments (such as the new and updated irrigation manuals) is paramount.

RECOMMENDATIONS

Going forward, the stakeholder register developed through this project and its contents will be used as a contact database in ensuring that all key stakeholders participate in developing methods and tools that will be effective in sharing the contents of the manuals. One of the outcomes of the workshops was that the manuals be modularised so as to target specific interest groups. This will not only help impart skills contained in the manuals but to further create awareness on the existence of the manuals. It is recommended that the WRC funds the development and sharing of the modules.

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Reference Group	Affiliation
Dr SN Hlophe-Ginindza	Water Research Commission (Chairperson)
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Dr L Nhamo	Water Research Commission
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Ms MJ Gabriel	Department of Land Reform and Rural Development
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Mr P Keuck	Department of Land Reform and Rural Development
Ms N Mjadu	Department of Land Reform and Rural Development
Mr A Jumman	South African Sugar Cane Institute
Mr W Kritzinger	AGRISA
Ms I van der Stoep	Cherry Irrigation

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ACRONYMS & ABBREVIATIONS

AFASA	African Farmers' Association of South Africa
AgriSA	Agriculture South Africa
ARC	Agricultural Research Council
NWRS2	National Water Resources Strategy 2
SABI	South African Irrigation Institute
SAIAE	South African Institute for Agricultural Engineers
WRC	Water Research Commission

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CHAPTER 1: BACKGROUND

1.1 INTRODUCTION

Technology transfer related to the irrigation sector should take place to communicate information on improved water-use efficiency to all stakeholders in the irrigation sector, including suppliers of irrigation equipment and management services as they play an important role in water management at the farm.

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It is with the above that it has become apparent and clear that the farming community, and irrigation sector in particular, needs more awareness on the existence of these two manuals. Not only was better level of awareness proposed, but also sharing of the main contents of the manuals. Therefore, an information dissemination exercise was proposed to be carried out at national level to ensure that all relevant stakeholders are aware of the existence and contents of the manuals.

1.2 PROJECT AIMS

It is of utmost importance that the manuals and their contents are known by the entire irrigation industry as effective knowledge sharing is necessary for the effective use of water by everybody involved in irrigation. According to the ARC, approximately 400 manuals were sold annually before the review and update of these manuals. The new edition (the revised and updated edition) is resulting users of the manuals replacing their outdated copies. Thus the this project will have a positive long-term effect especially since it aims to meet some objectives of the National Water Resource Strategy while ensuring that all stakeholders in the sector are briefed on the key changes and overall contents of the two manuals.

This proposed project aimed to address capacity building and skills development targets of the National Water Resource Strategy 2 (NWRS2), by enhancing nationwide knowledge of the existence and contents of the new manuals. The specific objectives of the project were:

1. To create a nationwide awareness of the existence and contents of the irrigation design and user manuals.
2. To create accessibility of the manuals to the entire irrigation sector (both in print form and online)

CHAPTER 2: LITERATURE REVIEW ON KNOWLEDGE DISSEMINATION TOOLS/TECHNIQUES

2.1 INTRODUCTION

Knowledge is information that is organized, synthesized, or summarized to enhance comprehension, awareness, or understanding (Bergeron, 2003). To differentiate knowledge from information, knowledge is also known as actionable information (Tiwana, 2003). Therefore, information needs to be disseminated in order to make them actionable. There are three types of knowledge. They are tacit (know how), implicit and explicit (know what) knowledge. Below are the definitions from different authors.

2.2 KNOWLEDGE DISSEMINATION

To disseminate information or knowledge means to distribute it so that it reaches the masses or organizations (2003). Dissemination is generally seen as a measure through which the results are brought into the awareness of certain target groups (Suurla, Markkula et al., 1999). According to both of these definitions, it is obvious that dissemination is to distribute or diffuse any information or knowledge to other party for their usage. In knowledge management, knowledge dissemination process supports the knowledge sharing process. Knowledge in the form of topics can be discussed in knowledge sharing platforms and disseminated using dissemination tools. These tools will create awareness of knowledge to the target users. This process will enhance the knowledge sharing processes. Users who are interested in the topics will be attracted to share their knowledge and visit the knowledge sharing platform. After sharing the knowledge, new knowledge will be produced. This knowledge then once again will go back to the knowledge dissemination tools in order to distribute updates to the target users. And this cycle will be repeated many times. This action shows that knowledge dissemination and knowledge sharing processes need and support each other.

Knowledge dissemination is a process where knowledge or actionable information is distributed to others for some attentions. There are several reasons that explain the benefit of knowledge dissemination whether in the society or in the organization surrounding. For example:

- Product advertisements (Shelly and Vermaat, 2008).
- To enlighten the society due to some issues
- To acknowledge community in new ideas
- To inform updates of news or websites
- Event announcements (Shelly and Vermaat, 2008).
- Job vacancies (Shelly and Vermaat, 2008).

Knowledge need to be disseminated in order to build knowledge society. Knowledge society is about creating, sharing, and using knowledge to bring prosperity and sense of well-being to its people (Al-Hawamdeh and Hart, 2002). Government who need to acknowledge the citizen about new economic strategy needs to find the way to disseminate the knowledge to them effectively. Knowledge dissemination encourages knowledge sharing processes while knowledge sharing processes occurred in knowledge society. Therefore, knowledge dissemination 22processes are needed in building knowledge society.

2.3 ICT TOOLS

The success of knowledge dissemination depends on the level of previous knowledge held by the audience and the effectiveness of the channels available to share the knowledge (Debowski, 2006). Information and communication technologies (ICT) are one set of major forces that has moved knowledge management front and centre. These technologies have made it possible for people to share enormous amounts of information unconstrained by the boundaries of geography and time (Bukowitz and Williams, 1999). Internet is one of the medium for communication. It is a tool that may be used as knowledge disseminator. People use the internet as knowledge disseminator because internet is:

- Fast and efficient
- Readily available
- Easy to update
- Cater for wide audience groups
- Easily accessible for users anytime anywhere
- Lower cost compared to conventional dissemination process.

This review will discuss some of the relevant dissemination ICT tools (phone texts, RSS feeds).

2.4 RSS FEEDS

Rather than conventional mails, electronic mails (e-mails) are now more popular among the internet users. It is not just because they are fast but they also free. This is one of the suitable ways to disseminate knowledge through the internet. E-mail is the transmission of messages and files via a computer network (Shelly and Vermaat, 2008). Several knowledge dissemination tools using e-mails as their medium to pass the knowledge to the end users such as RSS feeds. RSS feeds stands for real1y simple syndication. RSS is a specification that content aggregators use to distribute content to subscribers (Shelly and Vermaat, 2008). A content aggregator is a business that gathers and organizes web content and then distributes, or feeds, the content including news, music videos and pictures to subscribers for free or fee (Shelly and Vermaat, 2008).

An RSS feed is, therefore, suitable for knowledge content dissemination in any website, blogs or portals.

2.5 PHONE TEXT MESSAGING

Other than the internet, mobile application such as phone text messaging or short message services (SMS) have also seen a trend in disseminating information and knowledge. Information or knowledge passed within this medium may be formal or informal. In South Africa itself, total subscriptions for cellular phones draws a very large numbers within the last few years. The reasons why SMS is one of the suitable tools for knowledge dissemination are (Guthery; and Cronin, 1999):

- The world wide availability and popularity of an inexpensive SMS
- The evolution of Subscriber Identity Module (SIM) in phone into a standardized and secure application platform for the next-generation networks.
- The demand for applications that let people uses their mobile phones for more than just talking.

2.6 EXAMPLES OF KNOWLEDGE DISSEMNIATION TECHNIQUES/APPROACHES

This section describes some of the prominent knowledge dissemination approaches that were chosen because they were perceived to be commonly used in commerce, industry and government.

2.6.1 COMMUNITY OF PRACTICE

Community of Practice (COP) is defined as a group of individuals who share a common interest, a set of problems or a passion and who increase their knowledge and the understanding of these aspects through interpersonal relationships. South Africa Institute of Irrigation is an example of COP.

The key to using COPs as a knowledge dissemination technique is to encourage regular contact between COP members about knowledge need, available knowledge, and ideas. Contact can be either through face-to-face contact (in meetings and workshops, rather than one-to-one chats; the goal is for shared knowledge to be available to the whole community) or through internet-based discussion fora and/or other collaboration spaces. South African institute of Irrigation, for example, holds bi-annual congresses in this regards.

Communities of practice connect those who need knowledge with those who have knowledge, and the knowledge that is expressed is usually in the form of conversations.

Community of Practice are successful because:

- It allows a widely dispersed group of differing technical specialists to communicate with each other across organisational boundaries;
- Community members can seek out knowledge and experience on a technical issue from a topic expert, who may otherwise remain unidentified within the organisation;
- The community can seek an independent opinion about a technical issue without formality and support an approach to take on challenging issues;
- Information is uploaded, downloaded, stored and communicated for the interest and benefit of all;
- The community's web site can be searched using technical search terms, which quickly generates a view about what is known within the community about a particular issue;
- The community promotes networking and problem solving;

2.6.2 KNOWLEDGE PORTALS

Knowledge Portals (KP) are ICT systems, often with a web page as a user interface, that provide a single point of access to key information and knowledge resources. The information supplied can be customised according to user requirements. They can bring together information from internal and external sources that is relevant to an individual or a group. Commonly-used sources include corporate message boards, document search results, internal databases, specialised websites, or news channels.

2.7 FINDINGS FROM LITERATURE REVIEW

There is a large and growing body of literature on the dissemination of knowledge, with different tools and methods. The following is a selection of the most relevant and recent papers on the topic.

2.7.1 Knowledge dissemination tools and methods: a systematic review.

This systematic review examines the literature on knowledge dissemination tools and methods, and evaluates their effectiveness in terms of knowledge uptake and use. The review identified 33 studies that met the inclusion criteria. The results showed that the most effective tools and methods for knowledge dissemination were personal communication, face-to-face meetings, and electronic communication. The least effective tools and methods were print media and posters.

2.7.2 A systematic review of the literature on the effectiveness of knowledge dissemination tools and methods

This systematic review examines the literature on the effectiveness of knowledge dissemination tools and methods, and identifies the most effective tools and methods for knowledge uptake and use. The review identified 44 studies that met the inclusion criteria. The results showed that the most effective tools and methods for knowledge dissemination were personal communication, face-to-face meetings, and electronic communication. The least effective tools and methods were print media and posters.

2.7.3 The use of social media in knowledge dissemination: a systematic review This systematic review examines the use of social media in knowledge dissemination and identifies the most effective tools and methods for knowledge uptake and use. The review identified 31 studies that met the inclusion criteria. The results showed that the most effective tools and methods for knowledge dissemination were personal communication, face-to-face meetings, and electronic communication. The least effective tools and methods were print media and posters.

2.7.4 A systematic review of the literature on the use of knowledge management tools and methods for knowledge dissemination

This systematic review examines the use of knowledge management tools and methods for knowledge dissemination and identifies the most effective tools and methods for knowledge uptake and use. The review identified 43 studies that met the inclusion criteria. The results showed that the most effective tools and methods for knowledge dissemination were personal communication, face-to-face meetings, and electronic communication. The least effective tools and methods were print media and posters.

CHAPTER 3: STAKEHOLDER REGISTRATION AND GROUPING

3.1 INTRODUCTION

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3.2 METHODOLOGY

Stakeholder identification, listing and grouping is the first action towards knowledge dissemination of the irrigation manuals.

There are many ways to identify the stakeholders for a project; however, the project team will carry out the identification process in a methodical and logical way to ensure that stakeholders are not easily omitted. This was be done by looking at stakeholders individually, organizationally, geographically, or by involvement with various knowledge dissemination phases or outcomes.

Another way the project team identified the stakeholders was by identifying those who are directly impacted by the project and those who may be indirectly affected. This was important because directly affected stakeholders will usually have greater influence and impact of a project than those indirectly affected.

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a. South African Irrigation Institute (SABI)
b. Academics and researchers from local universities
c. South African Institute of Agricultural Engineers (SAIAE)
d. Practicing Consultants
e. Commercial and smallholder farmers
f. Farmer organisations such as AgriSA, TLA, AFASA, etc.
g. Industry experts

3.3 RESULTS

The engagement process involved circulating (as wide as we could) a table (ANNEXURE A) for respondents to complete. We received responses from 38 stakeholders (11 through email correspondences and 27 at SABI Congress). The stakeholders comprised of individuals and various organisations that are actively involved in the irrigation sector. Even though the number was small, the stakeholders that responded provided an insight into the work needed to maximise knowledge dissemination of the manuals.

Based on responses from the stakeholders, there are different categories of stakeholders who have indicated a strong interest in the irrigation manuals. The identified categories are:

1. Advisory services which cover irrigation extension services
2. Irrigation user and farmers
3. Irrigation designers
4. Research and academic
5. Construction

Figure 1 below represents proportional representation of respondents under each stakeholder category. The figure shows that the majority of the respondents were irrigation designers, at 50%. In reality, designers are fewer than users. This representation could be because farmers (who are the majority users) do not have time to complete forms and also attend events such as SABI Congress. The study shows that irrigation users are second highest respondents, at 29%, while research and academic is next at 11%.

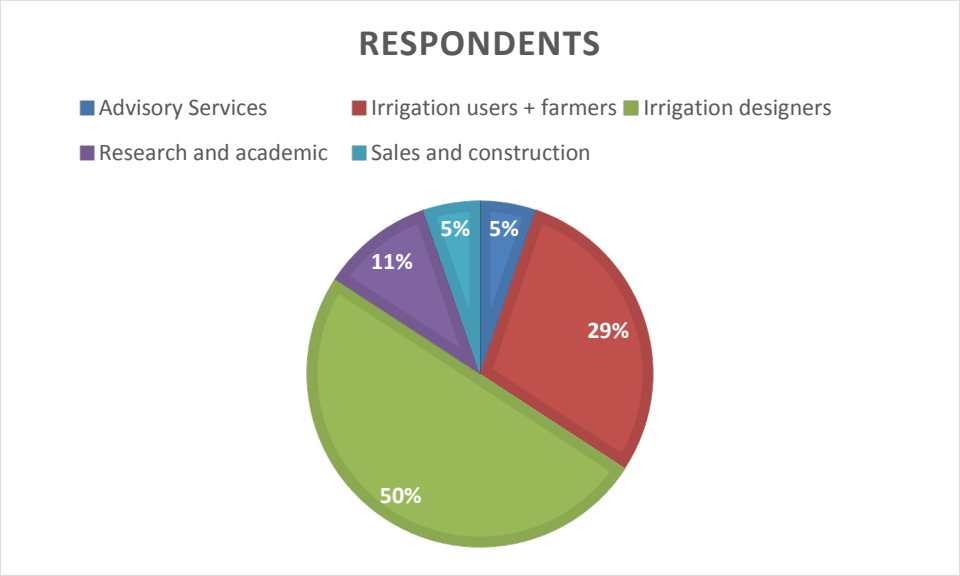

Figure 1: Representation of respondents from different stakeholder categories

The respondents also indicated their expectations from this knowledge dissemination process. The indicated expectations are:

1. Information on efficient irrigation practices
2. A concise design manual with standards and parameters that can be used/referred to as the benchmark for modern and cost-effective irrigation and drainage design layouts
3. Distribution of the Design Manual; Keeping the manual up to date
4. Expanding the design manual to include sustainable available water before design starts
5. Easy accessibility and utility
6. Easy update as standards and procedures evolve with time
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8. All SASRI Extension Specialists should be knowledgeable about the contents of the User Manual so that they can prepare/facilitate ongoing training/knowledge sharing and farmer education on the various irrigation topics in their respective home regions
9. All irrigation designers and contractors who provide a service to sugarcane farmers should be equipped with the latest version of the Irrigation Design Manual and, should meet the latest standards and design norms
10. Information on current laws and best practices
11. Possible accessibility to the manuals. Summary regarding how best to utilize each manual and their target audiences.
12. Irrigation user manual as guideline.

3.4 CONCLUDING REMARKS

The results of this engagement indicate that the irrigation sector, as focused as it may, has diverse areas of interest to meet the demands of irrigated agriculture. And, to meet the agricultural market demands, up to date irrigation technology and innovation has grown tremendously and the need to keep stakeholders updated with key developments (such as the new and updated irrigation manuals) is paramount. Going forward, this register and its contents will be used as a contact database in ensuring that all key stakeholders participate in developing methods and tools that will be effective in sharing the contents of the manuals. Workshops, multimedia and social media were, after this process, used to disseminate appropriate content of the manuals as well. These platforms exploited the existence of COPs such South Africa Institute of Irrigation, South Africa Institute for Agriculture Engineers, farmer groups, academics, agriculture advisors, etc.

CHAPTER 4: KNOWLEDGE DISSEMINATION AND DISTRIBUTIONAL ALTERNATIVES

4.1 INTRODUCTION

The newly updated (2020) Irrigation Design Manual and the Irrigation User Manual are the main sources of locally relevant information on the design and management of irrigation systems. Both manuals were originally developed and published by the Agricultural Research Council (ARC). The Design Manual was first published in 1996 and updated in 2003, while the User Manual was first published in 2002. The latest editions of these manuals are a result of a review and update process undertaken by various partners (ARC, Isowat and RIENG). The Water Research Commission (WRC) fully funded and supported the process.

The review and update of the manuals was an opportunity to influence irrigation water-use efficiency across a wide spectrum of stakeholders in South Africa. The two irrigation manuals are well-known and widely used in the South African irrigation sector, especially the Design Manual, which is used by most of the tertiary education institutions as textbook for irrigation courses as the industry standard. The irrigation industry consists of the manufacturers or suppliers of equipment, retail outlets, irrigation design professionals, and irrigation installation and/or maintenance contractors, serving the agricultural sector, which consists of more than 30 000 farmers irrigating around 1.5 million hectares of land in South Africa.

It was discovered during the review and update process that there existed a number of industry players who never knew that South Africa had such useful tools for the irrigation sector. It became clear that for years a huge number of farmers, farmer organizations and provincial farmer organizations in the country missed out on an opportunity to access these manuals, which are important for appropriate and effective irrigation system management.

It is with the above that it has become apparent and clear that the farming community, and irrigation sector in particular, needs more awareness on the existence of these two manuals. Not only is better level of awareness proposed, but also to share the main contents of the manuals. Therefore, an information dissemination exercise was proposed to be carried out at national level to ensure that all relevant stakeholders are aware of the existence and contents of the manuals.

4.2 METHODOLOGY

Workshops were conducted as per the groups of the identified stakeholders that were identified under Deliverable 1 (**Stakeholder identification, listing and grouping)**. The workshops were, therefore, not necessarily based on Provincial boundaries. The output of the **Stakeholder identification, listing and grouping** exercise was used as a guide towards holding of appropriate workshops.

A combination of desktop study and feedback from workshops helped in coming up with alternative ways to making sure the manuals are readily available in various and preferred formats other than just online. The workshops presented the contents of the user manual and discussed several potential forms of dissemination which included (but not limited to) distribution of hard copies through various accessible centres, pamphlets, radio talks, oral presentations, etc. Priorities of ways of dissemination were linked to different stakeholder groups and corresponding platforms will be utilized per group. The aim of exploring and identifying these dissemination alternatives (through a consultative process) was to ensure the entire stakeholder spectrum is

covered and get interest in the manuals. The interest will be a base for periodical or more frequent update of the manuals going forward.

4.3 RESULTS

The workshops were represented by sector as per Figure 2 below. The research and academic sector was equally represented as the private sector at 45% each while the public sector had a 10% representation at the workshops. Please note that the private sector included farmers.

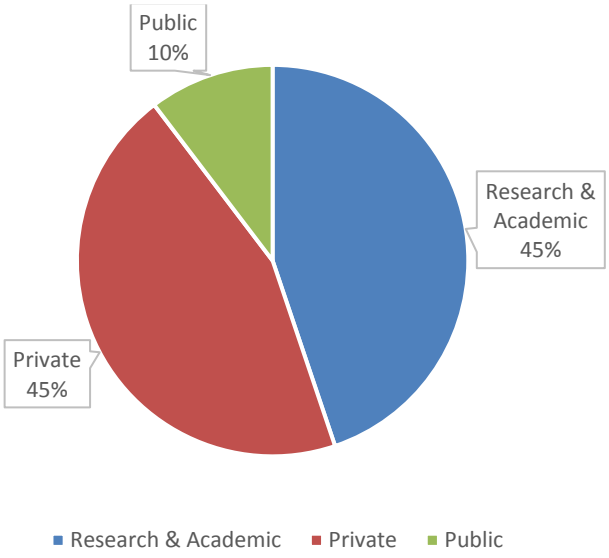

Figure 2: Representation by sector

The representation was further divided to identify roles of the individual participants in the irrigation sector as shown in Figure 3 below. Extension officers and researchers were represented at 31% each followed by irrigation specialists at 28% while only 10% was farmer representation.

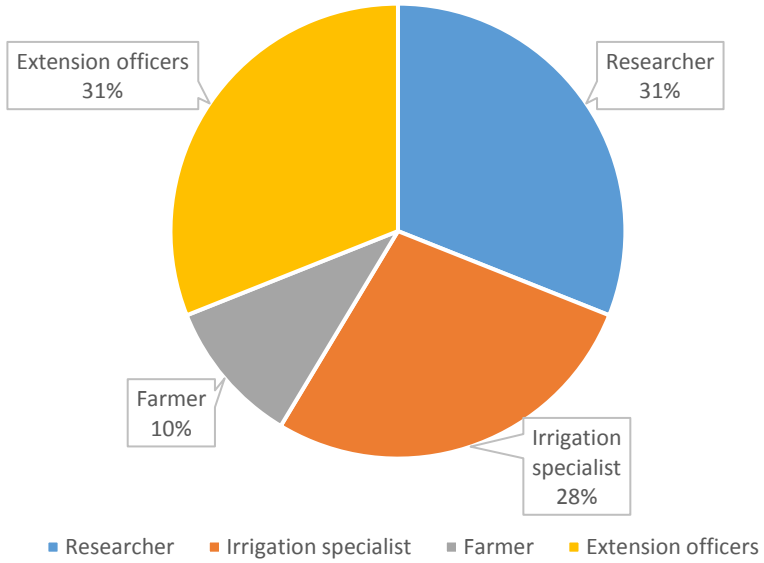

Figure 3: Representation by role in irrigation sector

The workshops further explored ways of ensuring that the existence of the manuals reach as many members of the irrigation sector as possible. It was suggested that the manuals be advertised through various media platforms such as social media, online and print media. This was accomplished through ARC LinkedIn account, Tweeter and Facebook account. An advert on the two manuals was placed on these platforms. The following indicate reactions on social media:

1. Tweeter analytics had 585 impressions, 29 engagements, 3 detailed expands and 2 profile visits
2. Facebook had 45 likes, 6 comments and 12 shares

One of the project members, Mr Fanie Vorster, had an 8-minute radio talk hosted by AgriOrbit.

Articles were also sent out for publication at various popular magazines (**See Appendix C**):

1. Agri-Orbit
2. SABI Magazine
3. StockFarm
4. CHIPS
5. AgriSA Magazine

Table 1: Readership of various platforms used to dissemination the manuals'

Platform where advertisement/article was placed	Daily average	Readers/reach
PLAASMEDIA		
Stockfarm (Half-page) & free cover line October 2022		Postage – 4218 Retail – 3084 Email PDF – 119 **Total – 7421**
Oilseeds Focus – Half-page September 2022		Postage – 702 Email PDF – 397 Protein Research – 498 **Total – 1597**
Chips – Half-page November 2022		Postage – 1582 Email PDF – 401 Potato SA – 300 **Total – 2283**
Agriorbit (Advertorial post premium) Views on agriorbit.com Facebook reach Facebook reactions comments and shares Facebook clicks Twitter impressions Twitter engagement		124 602 6 11 121 23 **Total – 887**
RSG Landbou – Radio interview		**Total – 60 000**
Social media: Facebook & Twitter (ARC Irrigation Manual) Facebook reach Facebook engagement, comments and shares Twitter reach Twitter engagement		5926 20 2241 93 356 **Total – 8280**

SABI MAGAZINE		
SABI magazine		Amount of readers is on average **33 000** per edition. SABI magazine distribution and readership 2022 Glossy Print: 1000 copies at 3 readers per magazine – 3 000 readers Digital: 30 000 online readers SABI magazine is accessed from SABINET by institutions – the subscribers include groups, universities and businesses from South Africa, Africa, USA, UK, etc.

Table 1 above indicates that the knowledge on the existence and contents of the manuals could have reached at least 60 000 stakeholders through both print, online and radio through the various platforms utilised by the project team.

One of the outcomes of the outreach or knowledge dissemination exercises or approaches, the workshops, suggested that the manuals be modularised. This recommendation requires funding to implement.

The workshops also sort to identify preferred access formats for the manuals. Figure 4 below is a representation of the outcome of the exercise. The majority, at 52% and 45%, prefer pdf format shared via email and downloading through a shared link, respectively. Hard copy format was the least preferred at 3%.

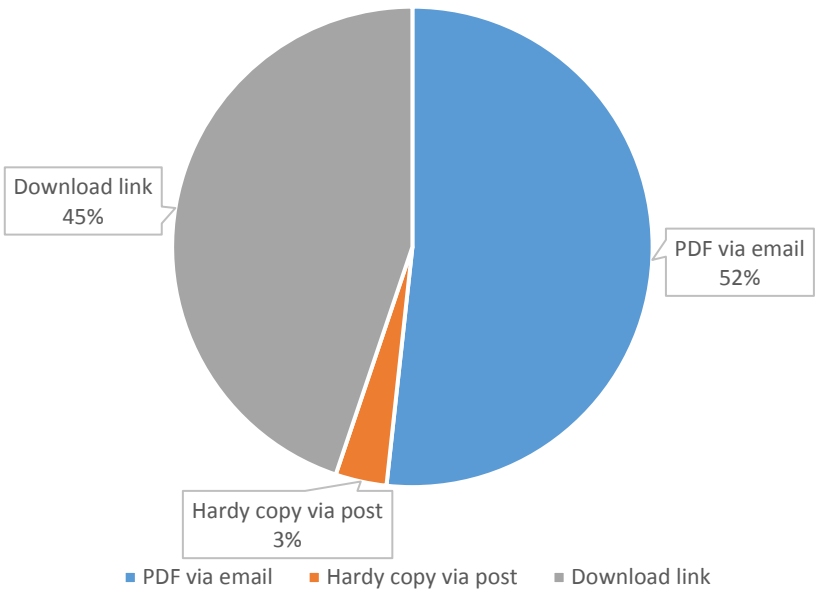

Figure 4: Proportion of preferred formats

It has come to the attention of the project team that the manuals cannot be accessed through a link (though a preferred format) because neither ARC nor WRC have network capacity to host them. South African Institute for Irrigation (SABI) and Water Resources Observatory (WRO) have been approached to ask them if they can host the manuals on their network. They have responded positively. The manuals can be accessed on SABI website https://sabi.co.za/irrigation-manuals-for-review/ and on WRO website:
https://protect-za.mimecast.com/s/zJ69CoYKmkTD0DkYCzaQNX?domain=data.waterresearchobservatory.org
https://protect-za.mimecast.com/s/t6VKCpgKnlt9B95ohYePyP?domain=data.waterresearchobservatory.org

Table 2: Distribution of manuals through ARC publications office since 2021

January 2021		
1 x Irrigation Design Manual	20 chapters	Shared PDF format via e-mail
March 2021		
1 x Irrigation Design Manual	20 chapters	Shared PDF format via e-mail
1 x Irrigation User Manual	16 chapters	Shared PDF format via e-mail
April 2021		
1 x Irrigation Design Manual	20 chapters	Shared PDF format via e-mail
January 2022		
1 x Irrigation Design Manual	20 chapters	Shared PDF format via E-mail
February 2022		
1 x Irrigation Design Manual	20 chapters	Shared PDF format via E-mail
1 x Irrigation Design Manual	20 chapters	Shared PDF format via E-mail
1 x Irrigation User Manual	16 chapters	Shared PDF format via E-mail
1 x Irrigation Design Manual	20 chapters	Shared PDF format via E-mail
1 x Irrigation User Manual	16 chapters	Shared PDF format via E-mail
March 2022		
1 x Irrigation Design Manual	20 chapters	Shared PDF format via E-mail

May 2022 at Nampo expo		
1 x Irrigation Design Manual	20 chapters	Sold on CD PDF format
1 x Irrigation User Manual	16 chapters	Sold on CD PDF format
1 x Irrigation Design Manual	20 chapters	Sold on CD PDF format
1 x Irrigation User Manual	16 chapters	Sold on CD PDF format
1 x Irrigation Design Manual	20 chapters	Sold on CD PDF format
1 x Irrigation User Manual	16 chapters	Sold on CD PDF format
August 2022		
1 x Irrigation Design Manual	20 chapters	Shared PDF format via E-mail
1 x Irrigation Design Manual	20 chapters	Shared PDF format via E-mail
1 x Irrigation User Manual	16 chapters	Shared PDF format via E-mail
1 x Irrigation User Manual	16 chapters	Shared PDF format via E-mail
1 x Irrigation Design Manual	20 chapters	Shared PDF format via E-mail
September 2022		
1 x Irrigation Design Manual	20 chapters	Shared PDF format via E-mail
1 x Irrigation Design Manual	20 chapters	Shared PDF format via E-mail
1 x Irrigation User Manual	16 chapters	Shared PDF format via E-mail
October 2022		
1 x Irrigation User Manual	16 chapters	Shared PDF format via E-mail
1 x Irrigation Design Manual	20 chapters	Shared PDF format via E-mail
November 2022		
1 x Irrigation Design Manual	20 chapters	Shared PDF format via E-mail
1 x Irrigation User Manual	16 chapters	Shared PDF format via E-mail
February 2023		
1 x Irrigation Design Manual	20 chapters	Shared PDF format via E-mail
1 x Irrigation User Manual	16 chapters	Shared PDF format via E-mail
May 2023 Nampo Expo		
1 x Irrigation Design Manual	20 chapters	Sold on CD PDF format
1 x Irrigation User Manual	16 chapters	Sold on CD PDF format
1 x Irrigation Design Manual	20 chapters	Sold on CD PDF format
1 x Irrigation User Manual	16 chapters	Sold on CD PDF format

ARC has managed to share 25 manuals in pdf format through emails and 10 manuals in pdf format stored on CDs to date. as seen in Table 2 above.

4.4 CONCLUDING REMARKS

The project succeeded in reaching out to at least 30 000 stakeholders through the use of various knowledge dissemination approaches available though difficult to conclude how many and who exactly had access. Today's knowledge dissemination techniques have allowed the exercise to reach out as wide as possible within a short space of time. The conventional methods of knowledge dissemination (such as workshop, TV, and radio) could have required more time and huge funding to reach out to stakeholders. Modularisation of the modules could be explored as a vehicle to ensuring that stakeholders, especially farmers, not only get to know about the existence of the modules but also detailed content.

CHAPTER 5: CONCLUSIONS & RECOMMENDATIONS

5.1 CONCLUSIONS

The results of this engagement indicate that the irrigation sector, as focused as it may, has diverse areas of interest to meet the demands of irrigated agriculture. And, to meet the agricultural market demands, up to date irrigation technology and innovation has grown tremendously and the need to keep stakeholders updated with key developments (such as the new and updated irrigation manuals) is paramount.

5.2 RECOMMENDATIONS

Going forward, the stakeholder register developed through this project and its contents will be used as a contact database in ensuring that all key stakeholders participate in developing methods and tools that will be effective in sharing the contents of the manuals. One of the outcomes of the workshops was that the manuals be modularised so as to target specific interest groups. This will not only help impart skills contained in the manuals but to further create awareness on the existence of the manuals. It is recommended that WRC funds the development and sharing of the modules

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APPENDIX A: STAKEHOLDER REGISTER

#	Stakeholder name (Individual or Organization)	Title	Role (Irrigation User/Irrigation Designer)	Location	Requirements (Irrigation User/Irrigation Design Manual)	Expectations	Contact Person
1	AgriSA		Irrigation user	Centurion	Irrigation user	Information on efficient irrigation practices	Janse Rabie
2	William McKersie	Director & Shareholder Agricane	Designer & User	Harare Zimbabwe	Design Standards	I expect a concise design manual with standards and parameters that can be used/referred to as the benchmark for modern and cost-effective irrigation and drainage design layouts	William McKersie
3	Kobus Janse van Rensburg	Pr Eng	Irrigation planner and Project manager	Stellenbosch Western Cape	Irrigation Design manager (manual??)	Distribution of the Design Manual; Keeping the maual UP to date; Expanding the design manual to include sustainable available water available before design starts.	Kobus Janse van Rensburg
4	Dr A. Senzanje	Senior Lecturer	Lecturing & Research	University of KwaZulu-Natal, Pietermaritzburg	1) Different irrigation systems design procedures 2) Design norms and standards 3) Irrigation systems evaluation	1) Easy accessibility and utility 2) Easy update as standards and procedures evolve with time	Dr A. Senzanje
5	Mark Zartmann MBB Consulting Services (PMB) (Pty) Ltd	Mr	Irrigation Designer	Offices in Pietermaritzburg, Nelspruit, Grahamstown and Stellenbosch. Area of operation – Africa.	A standard that meets international best practice but is appropriate to southern Africa to serve as a guideline, teaching resource and reference document.	Awareness as planned.	Mark Zartman
6	A Jumman (South African Sugarcane Research Institute – SASRI)	Dr.	My role: Researcher: Agricultural Engineering Plus, advisory and support roles to SASRI Extension Specialists and sugarcane farmers Extension Specialists role: Provide technical support and advice to sugarcane growers, facilitate knowledge sharing and training campaigns, stimulate farmer adoption of Best Management Practices and new technologies/innovations.	I am based in Mount Edgecombe, KwaZulu-Natal The Extension Specialist are located in Mpumalanga (Komatipoort and Malelane), as well as in KwaZulu-Natal (Pongola, Umfolosi, Empangeni and Mount Edgecombe). The main irrigated mill supply areas are Komatipoort, Malelane, Pongola, Makhatini.	All SASRI Extension Specialists (for large and small-scale growers) should each have a copy of the irrigation user manual in their respective home regions (± 10 copies). There is also opportunity to make copies of the Design and User's Manual available to Sugar Milling companies (RCL in Mpumulanga and Pongola, UCOSP in Umfolosi and Illovo and Tongaat Hullets who both have their head offices in Durban). The Milling companies often also farm on large estates (as Miller Cum Planters) and often employee irrigation engineers/agronomists.	1. All SASRI Extension Specialists should be knowledgeable about the contents of the User Manual so that they can prepare/facilitate ongoing training/knowledge sharing and farmer education on the various irrigation topics in their respective home regions. 2. All irrigation designers and contractors who provide a service to sugarcane farmers should be equipped with the latest version of the Irrigation Design Manual, and should meet the latest standards and design norms.	Ashiel Jumman (South African Sugarcane Research Institute – SASRI)
7	Luke Fowler (Irritech Agencies International (Pty) Ltd)		Irrigation Design + Install company	Pietermaritzburg KZN	Design manual and User manual	Information on current laws and best practices	Luke Fowler
8	Trevor Baier	Engineer	Irrigation Designer	Hilton/ Pietermaritzburg, KwaZulu Natal	Irrigation Design Manual & Irrigation User Manual	Possible accessibility to the manuals. Summary regarding how best to utilize each manual and their target audiences.	Trevor Baier
9	Westfalia Fruit		Irrigation user	Tzaneen – Limpopo Howick–Natal	Irrigation User Manual	Use Irrigation user manual as guideline	Westfalia Fruit
10	Johannes Grobler	Mr.	Irrigation Designer	Tzaneen – Limpopo	No requirement, already have new design manual	Already using new manual	Johannes Grobler
11	Khayelihle Zungu	Mr.	Irrigation Designer	Tzaneen – Limpopo	No requirement, already have new design manual	Already using new manual	Khayelihle Zungu

12	Uli Peters (CBA Water)	Mr	Irrigation Designer	SADC	Design Manual for designing	1. Mistakes to be corrected 2. Accurate, current, appropriate, industry/technology driven manual	Uli Peters
13	Uli Peters (SABI)	Mr	Training Oficer	SA, Countrywide	Design Manual for training	1. Mechanism to channel required changes, improvements, mistakes for implementation 2. Liaising with industry, tertiary instititions and relevant organisations to keep the manuals at the forefront of developments	Uli Peters
14	Koketso Masito	Ms	Irrigation user	Taung Agriculture College	Irrigation User Manual for teachning	Be able to inform/provide students with irrigation knowledge	Koketso
15	David Pitt	Mr	Designer	Southern Cape	Design manual	Design reference material	
16	The Co-op (Bevan Delmar)	Mr	Designer and Surveyor	Hermitage Addo	Design Manual	pdf version of manual	
17	Tian Lourens	Mr	Designer	Caledon, Western Cape	Design Manual		
18	Isaac Makandwa	Mr	Irrigation User	Taung, North West	Design Manual		
19	Nyasha Dube	Mr	Lecturer	Taung, North West	Design Manual		
20	Neo Makhobela	Ms	Lecturer	Taung, North West	User Manual	Detailed information that can be interpretted with ease and with science knowledge that can be interpreted	
21	James Monsse (NuWater)	B.D.	Water plant designer	Cape Town	Design and User Manuals	Requires manuals to better assist clients design systems	
22	Alasdair Harris (Illovo Sugar Limited)	Mr	User and Designer of irrigation	KZN	Design and User Manuals		
23	Neil Lecler (Illovo Sugar Africa)	Dr.	User and Designer of irrigation	KZN & Africa	Design and User Manuals		
24	Oliver Scarac (Illovo Sugar Africa)	Mr	User and Designer of irrigation	Africa	Design and User Manuals		
25	Stephan C. (AgriDrainage)	Mr	Irrigation and Drainage design	North West	Design and User Manuals		
26	A Cornelissen	Mr	Designer	Western Cape	Design manual	Corrections	
27	Pieter Wiedeman (The Co-op)	Mr	Irrigation user	Eastern Cape	Design manual	Design reference material	
28	Kalven JAMBO	Mr	Irrigation user	Eastern Cape	Design and User Manuals	Sales support refernce material	
29	TTI	Mr	Designer	Polokwane	Design Manual		
30	Groen Karoo AGR	Mr	Designer	Ashton	Design Manual		
31	Mosimese Thebe	Mr	Designer	Taung, North West	Design Manual		
32	Albertus Burger (Grundfos)	Mr	Sales	Pretoria	Design Manual		

APPENDIX B: WORKSHOPS REGISTER

WORKSHOP 1: AGRISA AND AGRICULTURAL RESEARCH COUNCIL

Meeting title			
Attended participants	24		
Start time	22/07/19, 13:44:58		
End time	22/07/20, 19:49:07		
Meeting duration	6h 4m 10s		
Average attendance time	3h 53s		
Participants			
Name	First join	Last leave	In-meeting duration
Manoshi Mothapo	22/07/19, 13:45:03	22/07/19, 16:16:35	2h 31m 31s
Cleopadia Molepo	22/07/19, 13:45:14	22/07/19, 16:34:05	2h 48m 50s
Isaac Mokowe	22/07/19, 13:45:23	22/07/19, 16:05:20	2h 10m 43s
Siyabonga Mathebula	22/07/19, 13:46:05	22/07/19, 15:49:18	2h 3m 13s
Leoka Mphuthi	22/07/19, 13:47:17	22/07/19, 14:47:21	51m 2s
Moshaatlhama MKF. Seerane	22/07/19, 13:48:29	22/07/20, 19:49:07	6h 38s
Piet Nell	22/07/19, 13:48:44	22/07/19, 16:15:49	2h 27m 5s
Stephanus Vorster	22/07/19, 13:50:01	22/07/19, 16:16:08	2h 26m 7s
Lerato Maboa	22/07/19, 13:50:03	22/07/19, 16:15:58	2h 23m 7s
Sarah Roffe	22/07/19, 13:51:51	22/07/19, 16:02:16	2h 8m 29s
Khumbulani Dhavu	22/07/19, 13:52:57	22/07/19, 16:15:57	2h 23m
Malebo Mokoena	22/07/19, 14:01:00	22/07/19, 14:10:13	9m 13s
Ntuthuko Mkhize (ARC-AP Cedara) (Guest)	22/07/19, 14:01:24	22/07/19, 15:40:34	1h 39m 9s
Milton Petersen	22/07/19, 14:01:24	22/07/19, 16:16:01	2h 8m 43s
Macdex M. Mutema	22/07/19, 14:01:55	22/07/19, 16:15:58	2h 14m 3s
Kwena Mokgohloa	22/07/19, 14:02:01	22/07/19, 15:02:10	1h 9s
Lebohang (Guest)	22/07/19, 14:05:21	22/07/19, 16:56:14	2h 50m 53s
Elize Lundall-Magnuson	22/07/19, 14:05:44	22/07/19, 16:18:20	2h 12m 35s
Romeo Murovhi	22/07/19, 14:08:17	22/07/19, 16:16:02	2h 7m 44s
Lindumusa Myeni	22/07/19, 14:10:39	22/07/19, 14:52:51	42m 11s
Mbulelo	22/07/19, 14:11:06	22/07/19, 16:00:05	1h 48m 59s
SIBONISO SN. Nkambule	22/07/19, 14:25:41	22/07/19, 15:43:36	1h 17m 55s
Rorisang Patose	22/07/19, 14:30:10	22/07/19, 16:12:44	1h 42m 34s
Mbulelo	22/07/19, 16:02:42	22/07/19, 16:16:00	13m 18s

WORKSHOP 2: SAIAE GAUTENG BRANCH MEETING

1. Summary			
Meeting title	Irrigation User Manual Information Dissemination Workshop		
Attended participants	7		
Start time	22/08/11, 09:45:15		
End time	22/08/11, 11:21:15		
Meeting duration	1h 35m 59s		
Average attendance time	1h 15m 46s		
2. Participants			
Name	First join	Last leave	In-meeting duration
Manoshi Mothapo	22/08/11, 09:45:20	22/08/11, 11:21:08	1h 35m 48s
Kurt Stock (Guest)	22/08/11, 09:53:53	22/08/11, 11:21:01	1h 27m 8s
Macdex M. Mutema	22/08/11, 09:55:22	22/08/11, 11:21:04	1h 25m 42s
André Meyer (Guest)	22/08/11, 09:55:52	22/08/11, 11:21:15	1h 25m 22s
Stephanus Vorster	22/08/11, 09:56:42	22/08/11, 11:21:08	1h 24m 25s
Chirende Benard	22/08/11, 10:00:47	22/08/11, 11:21:04	1h 20m 16s
Langa Portia Nandi (PCM)	22/08/11, 11:08:40	22/08/11, 11:20:20	11m 39s
3. In-Meeting activities			
Name	Join time	Leave time	Duration
Manoshi Mothapo	22/08/11, 09:45:20	22/08/11, 11:21:08	1h 35m 48s
Kurt Stock (Guest)	22/08/11, 09:53:53	22/08/11, 11:21:01	1h 27m 8s
Macdex M. Mutema	22/08/11, 09:55:22	22/08/11, 11:21:04	1h 25m 42s
André Meyer (Guest)	22/08/11, 09:55:52	22/08/11, 11:21:15	1h 25m 22s
Stephanus Vorster	22/08/11, 09:56:42	22/08/11, 11:21:08	1h 24m 25s
Chirende Benard	22/08/11, 10:00:47	22/08/11, 11:21:04	1h 20m 16s
Langa Portia Nandi (PCM)	22/08/11, 11:08:40	22/08/11, 11:20:20	11m 39s

WORKSHOP 3: SOUTH AFRICAN SUGAR RESEARCH INSTITUTE (SASRI)

1. Summary			
Meeting title	Irrigation Design and User Manual Information Dissemination Workshop		
Attended participants	22		
Start time	22/08/01, 08:47:32		
End time	22/08/01, 10:53:32		
Meeting duration	2h 6m		
Average attendance time	1h 42m 54s		
2. Participants			
Name	First join	Last leave	In-meeting duration
Manoshi Mothapo	22/08/01, 08:47:37	22/08/01, 10:45:55	1h 58m 18s
Bongiwe Chonco	22/08/01, 08:48:04	22/08/01, 10:45:33	1h 57m 29s
Macdex M. Mutema	22/08/01, 08:54:19	22/08/01, 10:45:30	44m 46s
David Wilkinson	22/08/01, 08:55:28	22/08/01, 10:45:29	1h 50m 1s
Stephanus Vorster	22/08/01, 08:56:01	22/08/01, 10:45:29	1h 49m 28s
Ashiel Jumman	22/08/01, 08:56:17	22/08/01, 10:45:31	1h 49m 13s
Winile Shelembe	22/08/01, 08:56:55	22/08/01, 10:45:34	1h 47m 23s
William Gillespie	22/08/01, 08:57:04	22/08/01, 10:45:26	1h 46m 53s
Khumbulani Dhavu	22/08/01, 08:57:13	22/08/01, 10:45:26	1h 48m 13s
Paul Botha (Guest)	22/08/01, 08:57:40	22/08/01, 10:48:25	1h 48m 13s
Etienne de Beer (Guest)	22/08/01, 08:57:47	22/08/01, 10:46:40	1h 48m 53s
Thandile Mdlambuzi	22/08/01, 08:58:05	22/08/01, 10:45:35	1h 47m 30s
Jeffrey Foxon	22/08/01, 09:01:01	22/08/01, 10:53:32	1h 52m 30s
Rianto Van Antwerpen	22/08/01, 09:01:17	22/08/01, 10:45:25	1h 44m 7s
Thulani Masondo	22/08/01, 09:01:35	22/08/01, 10:45:32	1h 43m 57s
Mboniseni Buthelezi	22/08/01, 09:02:39	22/08/01, 10:45:28	1h 42m 49s
Marius Adendorff	22/08/01, 09:03:08	22/08/01, 10:45:30	1h 42m 22s
Jan Erasmus	22/08/01, 09:03:28	22/08/01, 10:45:32	1h 42m 4s
Adrean (Guest)	22/08/01, 09:05:03	22/08/01, 10:45:24	1h 40m 20s
Zulu (Guest)	22/08/01, 09:08:57	22/08/01, 10:45:20	1h 36m 22s
Norman Mkhabela	22/08/01, 09:10:16	22/08/01, 10:46:28	1h 36m 11s
Tshifhiwa Radzilani	22/08/01, 09:18:51	22/08/01, 10:45:34	1h 26m 42s
3. In-Meeting activities			
Name	Join time	Leave time	Duration
Manoshi Mothapo	22/08/01, 08:47:37	22/08/01, 10:45:55	1h 58m 18s
Bongiwe Chonco	22/08/01, 08:48:04	22/08/01, 10:45:33	1h 57m 29s
Macdex M. Mutema	22/08/01, 08:54:19	22/08/01, 09:27:36	33m 17s
Macdex M. Mutema	22/08/01, 10:34:00	22/08/01, 10:45:30	11m 29s
David Wilkinson	22/08/01, 08:55:28	22/08/01, 10:45:29	1h 50m 1s
Stephanus Vorster	22/08/01, 08:56:01	22/08/01, 10:45:29	1h 49m 28s
Ashiel Jumman	22/08/01, 08:56:17	22/08/01, 10:45:31	1h 49m 13s
Winile Shelembe	22/08/01, 08:56:55	22/08/01, 09:34:16	37m 20s
Winile Shelembe	22/08/01, 09:35:30	22/08/01, 10:45:34	1h 10m 3s
William Gillespie	22/08/01, 08:57:04	22/08/01, 08:58:22	1m 18s

William Gillespie	22/08/01, 08:59:50	22/08/01, 10:45:26	1h 45m 35s
Khumbulani Dhavu	22/08/01, 08:57:13	22/08/01, 10:45:26	1h 48m 13s
Paul Botha (Guest)	22/08/01, 08:57:40	22/08/01, 09:34:16	36m 36s
Paul Botha (Guest)	22/08/01, 09:36:47	22/08/01, 10:48:25	1h 11m 37s
Etienne de Beer (Guest)	22/08/01, 08:57:47	22/08/01, 10:46:40	1h 48m 53s
Thandile Mdlambuzi	22/08/01, 08:58:05	22/08/01, 10:45:35	1h 47m 30s
Jeffrey Foxon	22/08/01, 09:01:01	22/08/01, 10:53:32	1h 52m 30s
Rianto Van Antwerpen	22/08/01, 09:01:17	22/08/01, 10:45:25	1h 44m 7s
Thulani Masondo	22/08/01, 09:01:35	22/08/01, 10:45:32	1h 43m 57s
Mboniseni Buthelezi	22/08/01, 09:02:39	22/08/01, 10:45:28	1h 42m 49s
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Norman Mkhabela	22/08/01, 09:10:16	22/08/01, 10:46:28	1h 36m 11s
Tshifhiwa Radzilani	22/08/01, 09:18:51	22/08/01, 10:45:34	1h 26m 42s

APPENDIX C: WORKSHOPS REGISTER

The Reviewed and Updated South African Irrigation Design and User Manual

By Mr Fanie Vorster, Dr Macdex Mutema & Dr Khumbulani Dhavu
ARC-Natural Resources and Engineering (Agricultural Engineering Campus)

South Africa is located in a water-constrained region. Therefore, it is very important that efforts are made to utilize water more efficiently. In an initiative from the Water Research Commission (WRC) a report was issued in 2010 on: "Standards and Guidelines for Improved Efficiency of Irrigation Water Use from Dam Wall Release to Root Zone Application".

The report recommends, among other aspects, that information on improved water use efficiency should be shared with everyone involved in the irrigation industry. This includes irrigation equipment suppliers as well as irrigation management services, as well as farmers because they perform an important role in water management at the farm level.

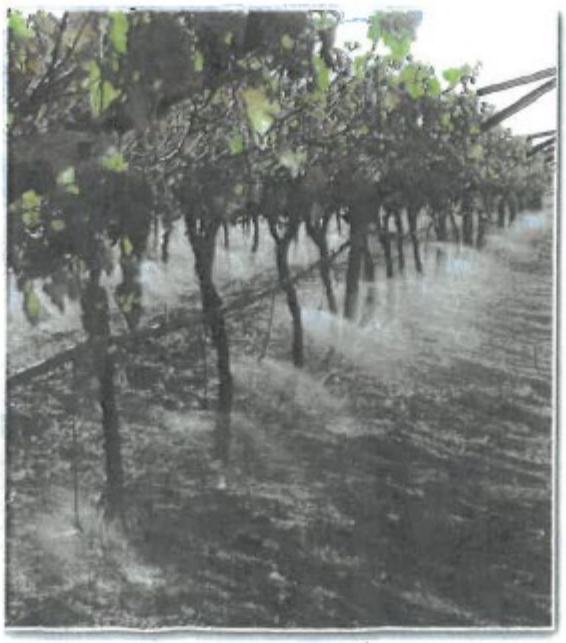
Until recently the main sources of locally relevant information on the design and management of irrigation systems were the Irrigation Design Manual and the Irrigation Users' Manual which were originally published by the Agricultural Research Council (ARC) in 1996 and 2002. The Design Manual was updated in 2003. These manuals are widely used in the South African irrigation industry.

The updated "Irrigation Design Manual" (IDM) consists of twenty chapters of highly technical information, while the "Irrigation Users' Manual" (IUM) has sixteen chapters, consisting of information that is relevant to irrigation system users.

New chapters added to the IDM include: Greenhouse irrigation systems (Chapter 14) Documentation and drawings (Chapter 18), Feasibility studies (Chapter 19) and Terminology, conversion tables, design norms, and an overview of design software (Chapter 20).

The new chapters added to the IUM are Greenhouse irrigation systems (Chapter 13) and Terminology, conversion tables, design norms, and overview of scheduling software (Chapter 16).

In both manuals, all the other chapters were reviewed, restructured, and updated where deemed necessary.



Greenhouse irrigation systems added

The chapter on greenhouse irrigation systems is a valuable addition to the manuals. A greenhouse irrigation system design is done on the same principles as micro and drip irrigation, but with a few adaptations to facilitate more frequent and intensive irrigation strategies. However, the management requirements for these systems are more comprehensive and require more sophisticated equipment and application techniques.

A significant addition to the chapter on system planning

SUGGESTED FORMATTING IN THE REPORT

(Chapter 6) is the elaboration on irrigation system efficiency under the section on Irrigation Requirements. The water balance approach is used. The assumption is that the maximum theoretical efficiency of any irrigation system should be 100%. Assumptions are then made for acceptable losses that can occur in any system, and the total losses are deducted from 100%, to obtain the maximum recommended efficiency. The minimum acceptable value is based on the previous norms.

Pipe hydraulics & components

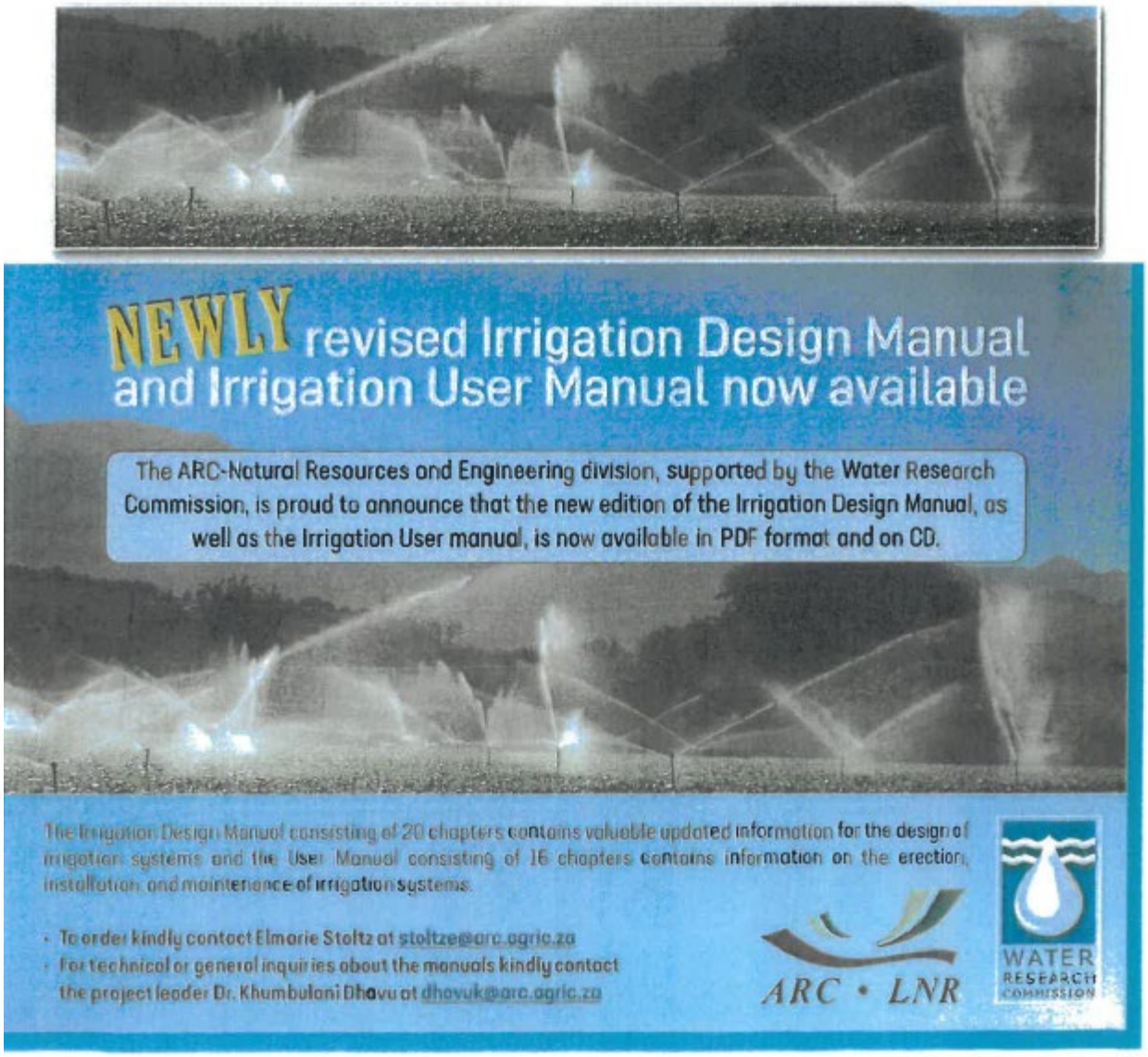
In the chapter about Pipe hydraulics (Chapter 8), a section on the components of an irrigation system was added. This is important in the design of the irrigation system after the planning phase. In addition, two sections were added to this chapter where the on-farm and in-field parts of an irrigation system are discussed. The purpose of the on-farm water supply system is to convey the water from the source to the in-field part in the most economic and energy-efficient way. This includes rising main pipelines, gravity pipelines, and economic pipe sizing. The purpose of the in-field part is to distribute water uniformly across the field to satisfy the demand of the crop. The focus of this section is on the selection of emitters and their pressure-discharge relationships, the design of steady-uneven systems and the hydraulic gradient thereof, pressure variation in systems as well as pipe sizing using the Jensen Fratini factor. A table with the allowable pressure variation in different irrigation systems is also included.

One of the key improvements to the manuals includes a complete section on variable speed drives (VSDs). A VSD is a device that facilitates variation of the speed of a normal fixed-speed motor. It is a type of adjustable-speed drive used in electro-mechanical drive systems to control the motor speed and torque by varying input alternating current frequency and voltage. This enables accurate control of the motor speed over a broad range.

The two manuals are valuable and comprehensive effective reference tools for the irrigation system designer as well as the irrigation system user.

The manuals were reviewed and updated by a team of irrigation experts from the ARC and private companies with inputs received from the industry under guidance from the WRC.

Technical Inquiries: Mr Fanie Vorster at *vorsters@arc.agric*.**za**
Inquiries to purchase the manual: Ms Elmarie Stoltz at *stoltze@arc.agric*.**za**

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As South Africa is located in a water-constrained region, it is crucial that efforts are made to utilise water more efficiently. Through an initiative by the Water Research Commission (WRC), a report was issued in 2010 titled *Standards and Guidelines for Improved Efficiency of Irrigation Water Use from Dam Wall Release to Root Zone Application.*

The report recommends, among others, that information on improved water-use efficiency (WUE) be shared with everyone involved in the irrigation industry. This includes irrigation equipment suppliers and management services, as well as producers since they play a pivotal role in water management at farm level.

Until recently, the main sources of locally relevant information on the design and management of irrigation systems were the *Irrigation Design Manual* (*IDM*) and the *Irrigation Users' Manual* (*IUM*) originally published by the Agricultural Research Council (ARC) in 1996 and 2002, respectively. The design manual was updated in 2003.

New chapters added

The updated *IDM* comprises 20 chapters of highly technical information, while the *IUM* contains 16 chapters of information relevant to irrigation system users.

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The chapter/s on greenhouse irrigation systems is a valuable addition to the manuals. A greenhouse irrigation system design is based on the same principles as micro- and drip irrigation, with a few adaptations to facilitate more frequent and intensive irrigation strategies. However, the management requirements for these systems require more sophisticated equipment and application techniques.

Homing in on system efficiency

A significant addition to the chapter/s on system planning (Chapter 6) is the elaboration on irrigation system efficiency under the section on irrigation requirements. The assumption is that the maximum theoretical efficiency of any irrigation system should be 100%. Assumptions are then made for acceptable losses that can occur in any system, and the total losses are deducted from 100% to obtain the maximum recommended efficiency. The minimum acceptable value is based on the previous norms.

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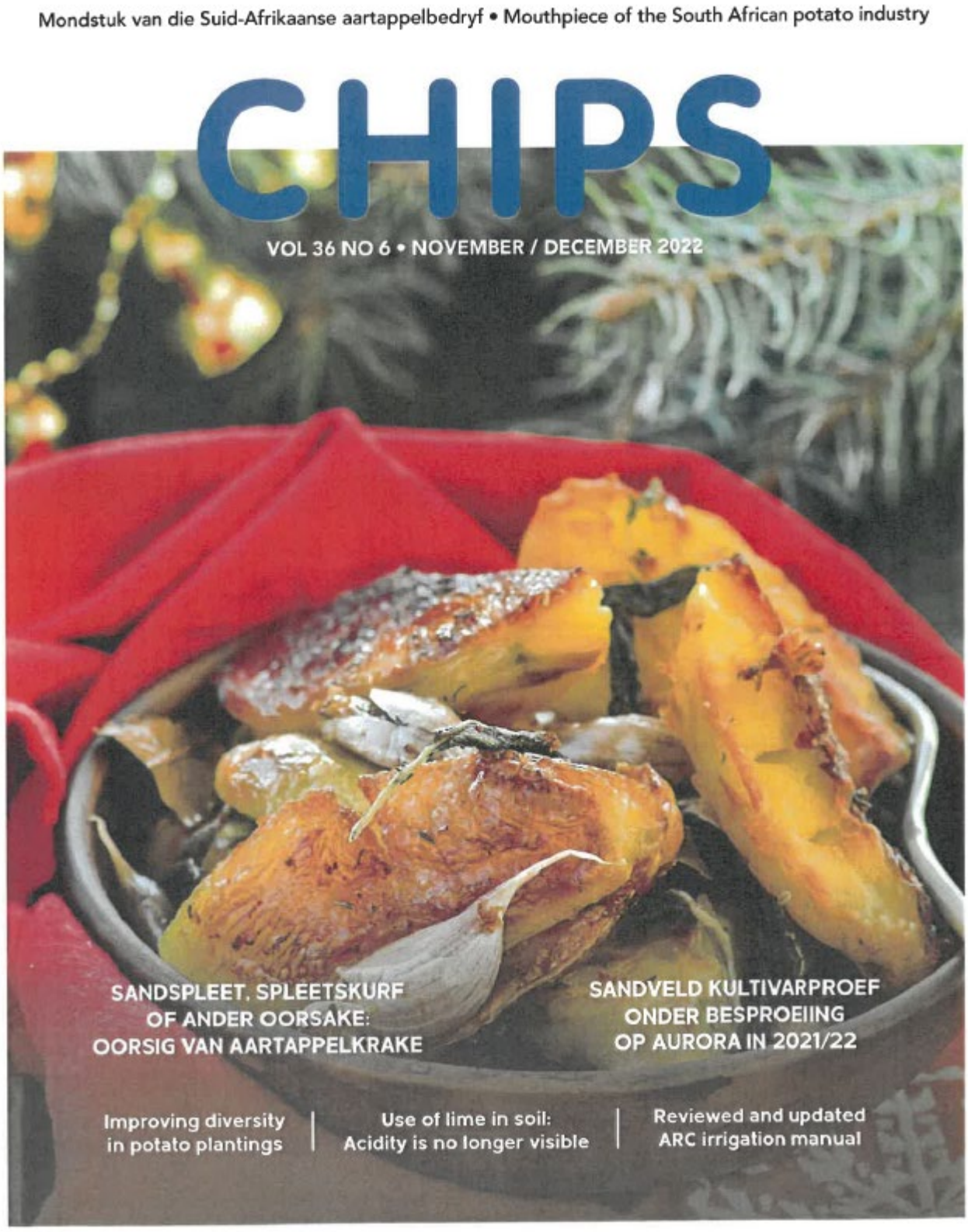
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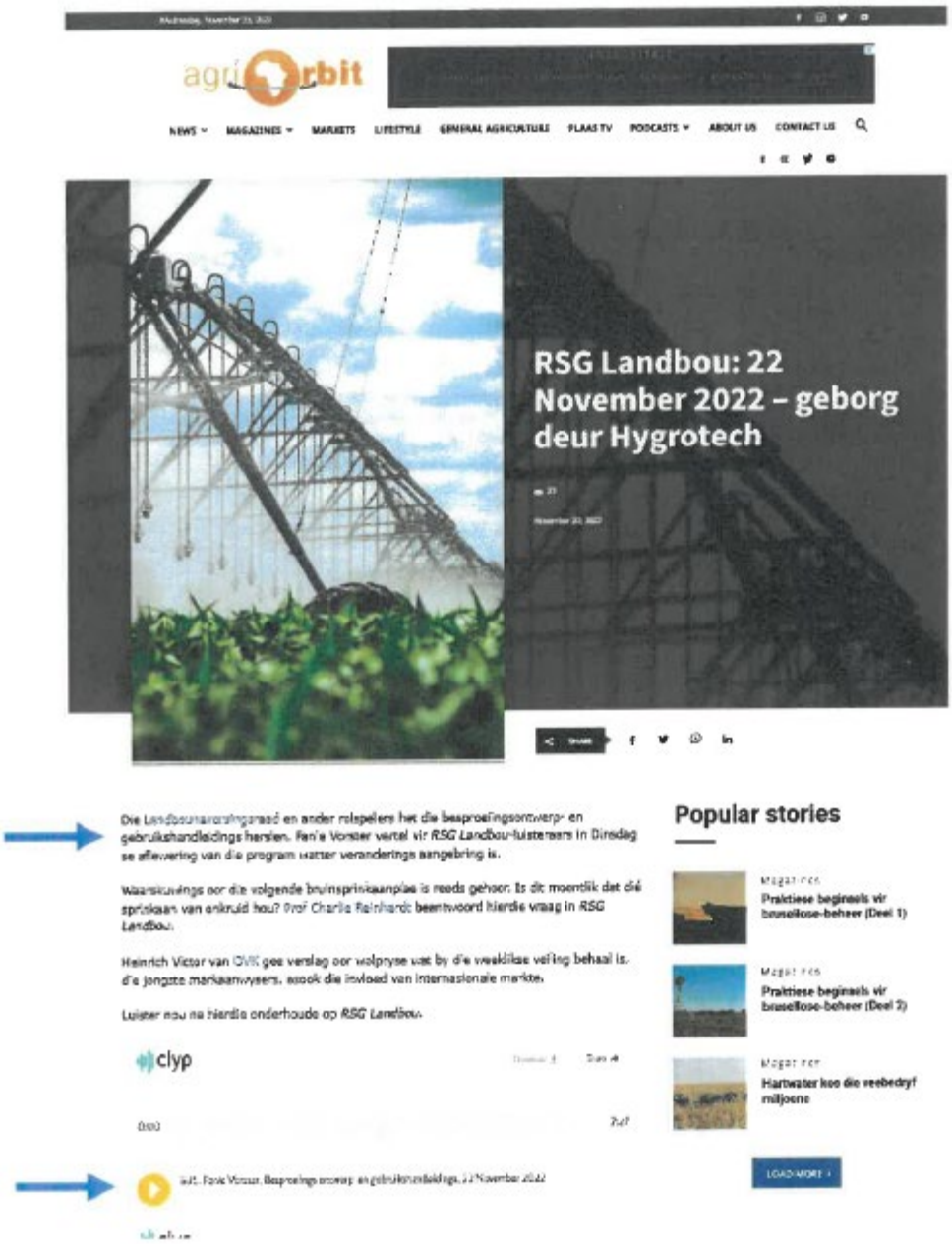

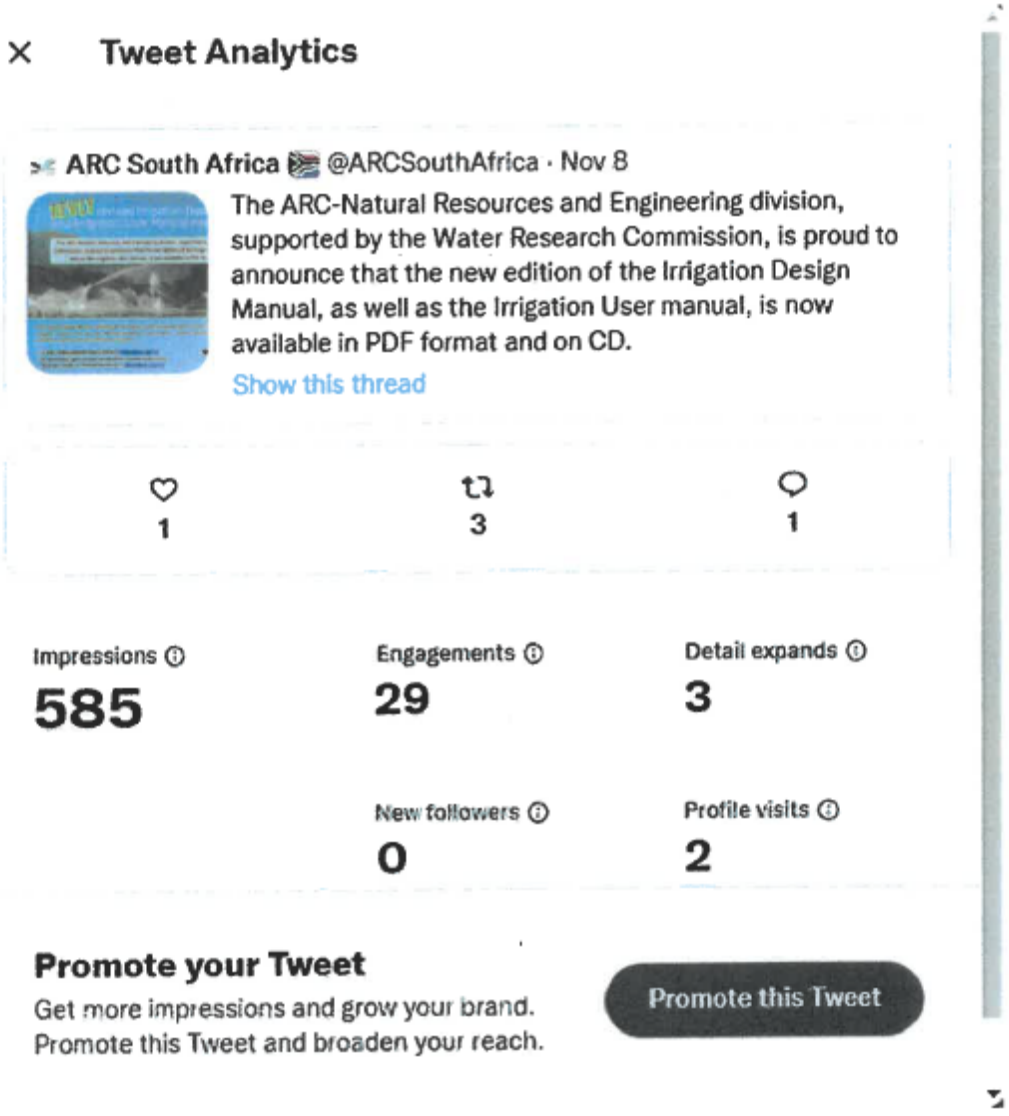
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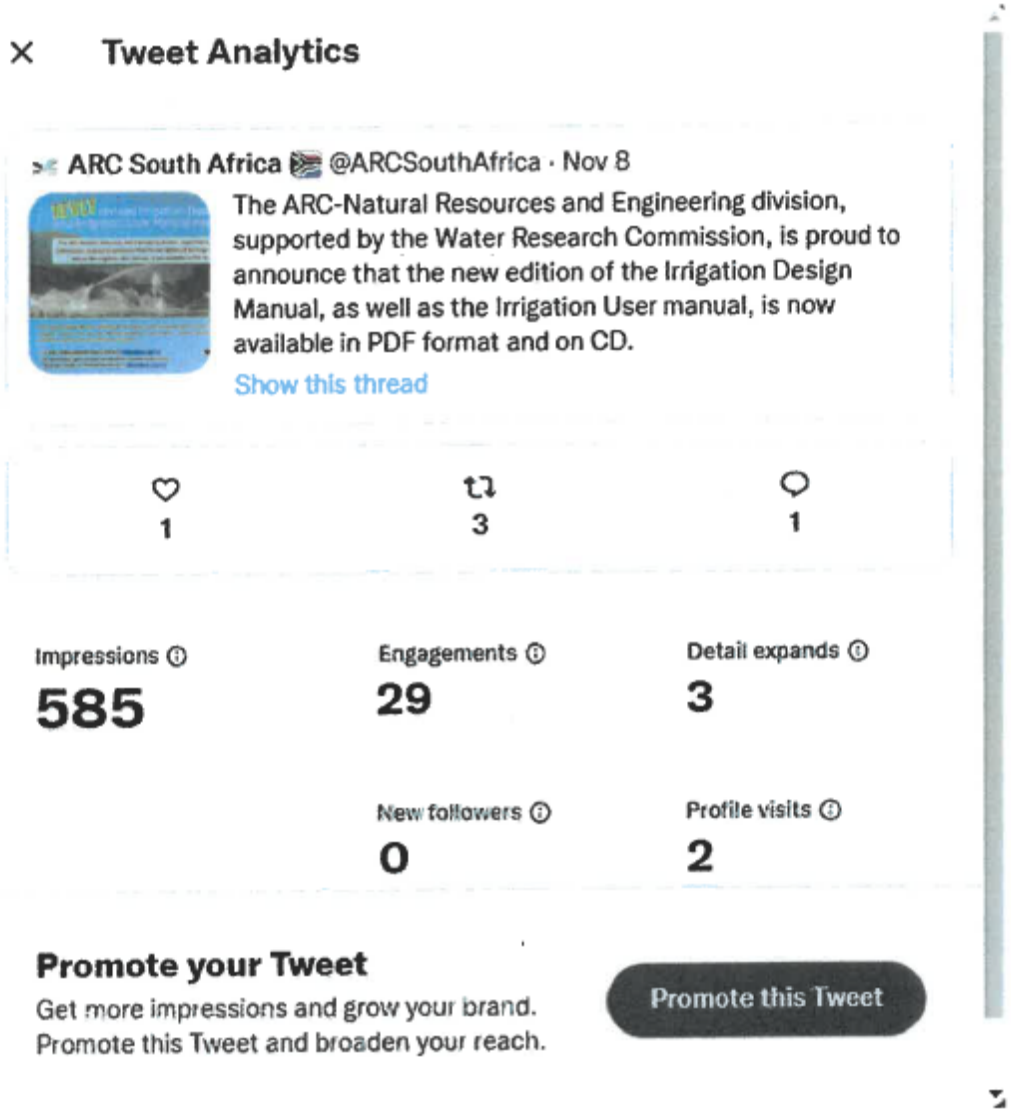
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