THE MERCURY RISES

Read and become Climate Smart

A selection of climate change topics

"THE MERCURY RISES"

A RADIO SERIES ON CLIMATE CHANGE

Western Cape Government
Agriculture
BETTER TOGETHER.

RSG
DIS DIE EEN

RSG 100 - 104fm
DIE KWIKSTYG
Aangebied deur
Lizma van Zyl

PREFACE

A weekly radio programme on climate change and its consequences for humans, animals, the environment and the agricultural sector was launched in 2018 and ended in 2020 after 104 programmes.

The series, the first of its kind on climate change, was broadcast on RSG and discussed a range of interesting topics with a variety of experts.

According to Dr Ilse Trautmann Chief Director: Research and Technology Development, and coordinator of "The Mercury Rises" series, this initiative resulted from the Western Cape Department of Agriculture's SmartAgri plan and sought to raise awareness of the "new" climatic environment among listeners.

The series was produced and funded by the Department. In the series, presenter Lizma van Zyl spoke to people from across the spectrum and sought expert advice on appropriate measures to make South Africa, and specifically the agricultural sector, more climate resilient.

The series also placed great emphasis on the responsibility of every citizen. As Lizma remarked in her weekly greeting: "The earth is precious; let's preserve it. Fourteen of the programmes have been adapted and translated and are presented in this booklet. Broadcasts of the radio programmes are available on www.elsenburg.com - click on "drought portal" and then "droughtmedia".

Dr Ilse Trautmann
Chief Director: Research and Technology Development Services
Western Cape Department of Agriculture

For more information on the SmartAgri plan, case studies and regional information sheets, visit: www.greenagri.org.za or www.elsenburg.comwww.elsenburg.com

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"TWENTY-FIVE YEARS AGO PEOPLE COULD BE EXCUSED FOR NOT KNOWING MUCH, OR DOING MUCH, ABOUT CLIMATE CHANGE. TODAY WE HAVE NO EXCUSE."

DESMOND TUTU, FORMER ARCHBISHOP OF CAPE TOWN

CLICK ON THE FOLLOWING LINKS FOR PREVIOUS COPIES OF THE MERCURY RISES

Die Kwik Styg

Luister saam na ons klimaatsveranderingreeks

deur Dr. Ilse Trautmann

Lizma van Zyl
Photo © Milan Cronjé

'n Nuwe weeklikse program oor klimaatsverandering en die gevolge daarvan vir mens, dier, die omgewing en die landboubedryf het op 6 April 2018 afgeskop. Die program, *Die Kwik Styg*, word Vrydae om 12:45 op RSG uitgesaai en gaan vir 52 weke interessante onderwerpe bespreek met 'n verskeidenheid kenners as ateljeegaste.

Volgens dr. Ilse Trautmann, Hoofdirekteur: Navorsing en Tegnologie-ontwikkeling en koördineerder van *Die Kwik Styg*-reeks, is hierdie inisiatief 'n uitvloeisel van die Wes-Kaapse Departement van Landbou se SmartAgri-plan en gaan dit poog om 'n groter bewusmaking van ons "nuwe" klimaatsomgewing by luisteraars te bewerkstellig. Die reeks word deur die departement vervaardig en befonds.

"Die klimaatsveranderingsprentjie lyk donker, maar daar is altyd die spreekwoordelike lig aan die einde van die tonnel."

In die reeks gaan aanbieder Lizma van Zyl met mense van regoor die spektrum gesels en kennerswenke inwin oor toepaslike maatreëls om Suid-Afrika meer klimaatsveerkragtig te maak.

Lizma is 'n veteraan radiojoernalis en nuusredakteur met 'n meestersgraad in Joernalistiek. Sy is ook die stigter van Smile 90.4 FM en bied die kykNET-program *Hond se gedagtes aan*.

Agriprobe Vol 15 no 2 - The Mercury Rises: Series 1

"Die kuns lê beslis in die verskeidenheid sprekers en onderwerpe – enersyds om die luisteraar deurlopend te prikkel, maar ook die bewusmaking oor 'n wye reeks onderwerpe."

In die *Agriprobe* van Junie 2018 is die nuwe radioreeks *Die Kwik Styg* aangekondig en ses maande sedert die eerste program op 6 April 2018 op RSG uitgesaai is, lok die reeks ongekende belangstelling, nie alleen van die ateljeegaste nie, maar ook van die publiek en ons landboumense. Net minder as 300 000 luisteraars skakel weekliks in om na die program te luister!

Enige suksesvolle projek staan egter op twee bene – 'n duidelike doelwit en 'n toegewyde span wat week na week sorg vir

Agriprobe Vol 15 no 3 - The Mercury Rises: Series 1

It is time to say farewell, but stay tuned to Station Climate Change!

by Dr Ilse Trautmann, ilset@elsenburg.com

We truly hope that you tuned in to our second series of "Die Kwik Styg", which was broadcast on RSG at 12:45 on Friday afternoons. Our presenter Lizma van Zyl informed, educated, and empowered South Africans on climate change and relevant subject matters with world-renowned experts as her studio guests. We informed our *AgriProbe* readers on this most popular series in previous editions of *AgriProbe* (Vol 15, No 2, p 12–13; Vol 15, No 3, p 44–49).

The programme was funded by the Western Cape Department of Agriculture with Dr Ilse Trautmann, chief director of Research and Technology Development as project leader. This project was run as part of the SmartAgri plan (**greenagri.org.za** or **elsenburg.com**) with the objective of creating awareness on climate change for the agricultural sector and the general public. After the success of the first series, RSG invited the department to do a second series. Experts on climate change in South Africa (and one from the UK) took part in the two series.

The sad news is that the team, Lizma, Ilse and Lindsay, broadcast their last programme on Friday 3 April 2020 after 104 programmes. Please take time to listen to this programme – the grand finale of "Die Kwik Styg"!

Our sincere appreciation to our team of

The Mercury Rises article - Agriprobe Vol 17 No 2 2020

Department of agriculture scoops another **"hot" climate-change award**

by Dr Ilse Trautmann, ilset@elsenburg.com

In less than a year after being awarded the 2019 Eco-Logic gold award in the category "Climate Change" for its SmartAgri plan, the department once again took centre stage at the 2020 Eco-Logic Awards ceremony, which was presented in a virtual format during September. This time the gold award in the category "Climate Change" was awarded to the very popular radio series *Die Kwik Styg* (refer to *AgriProbe* Vol 15 (2) and (3) (2018) and Vol 17 (2) of 2020).

Western Cape Minister of Agriculture, Dr Ivan Meyer congratulated the Western Cape Department of Agriculture for winning the gold award and said, "Tackling climate change is one of my priorities. So I am extremely proud of Dr Trautmann and her team. Creating awareness among South Africans of the challenges and opportunities of climate change is critical in our campaign to develop innovative solutions to the challenge it presents. *Die Kwik Styg* provided the perfect platform for the Western Cape to contribute to the building of a climate-resilient South Africa."

In an attempt to encourage prevention and planning that may lead to a climate-resilient South Africa, the department embarked on this innovative project to produce a radio series on climate change called *Die Kwik Styg* in 2018. This initiative was also one of the communication tools of the SmartAgri plan, the first ever provincial sector plan for the agricultural sector in South Africa. *Die Kwik Styg* was the first radio series on climate change produced and broadcast in South Africa.

The judges commented by saying, "This

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The Mercury Rises article - Agriprobe Vol 17 No 4 2020

WHAT IS CLIMATE CHANGE AND HOW DOES IT AFFECT US?

DR PETER JOHNSTON

Climate change is something that affects us all in our daily lives.

In this series we interviewed people from all walks of life, to understand how it affects not only the ordinary citizen (Joe Public), but especially how it affects the agricultural sector, the heartbeat of our very existence.

- We walked the streets to hear what people had to say about climate change. "Climate change for me, is the seasons all starting later than they should. In the summer it gets very hot and in the winter we don't get as much rain as we used to get."
- "When the climate and weather patterns and nature's reactions on earth are all completely "out of whack" as a result of the negative actions of an overpopulated humanity."
- "Climate change, in my opinion, is the earth getting warmer and the direct effect this has on the seasons."
- "Various human activities release greenhouse gases like carbon dioxide into the atmosphere. Many of these gases make it difficult for infrared rays from the sun to escape from our atmosphere."
- "It is a change in weather patterns over a specified timeframe that results in the earth getting warmer. This is a result of overpopulation, destruction of the rainforests and agriculture."
- "Hopefully people are now beginning to see what is happening around us in terms of the drought and that climate change is a reality."

Our first guest speaker was climatologist and researcher Dr Peter Johnston, from the African Climate Development Initiative at the University of Cape Town.

Which are the most common questions that people ask you regarding climate change? The most common questions are:

- "Is it true?"
- "Do you believe in climate change?"
- "What is going to happen?"
- "Are we going to have food?"
- "What is going to happen with the water?"

What is climate change?

It is a change in the long-term climate. The difference between climate and the weather is important. The weather is what occurs and the climate is what you expect. Weather is the common occurrences in the atmosphere. Climate is the average over a long period of time.

W**e have heard what Joe Public thinks climate change is. Are they correct?** They are mostly spot on in their observations. We, as scientists, must look at the last 50 to 100 years of data to see if the climate (rainfall, temperature, etc.) has changed. We have seen that global temperatures have risen. And every year they rise a little bit more. Some years are extremely hot and others less so, but the temperature is rising.

Rainfall (patterns) change and it is not possible to say if the trend is the same everywhere on earth. However, we know that extreme (weather) events occur. We know that it is getting warmer and the number of hot days is increasing. We can definitely say that the climate is changing.

At what rate is the temperature rising and the rainfall patterns changing?

Data over the last 100 years shows that the temperature increases by approximately 0.2 degrees Celsius every decade.

It seems negligible. Will it have a marked effect on the Earth's climate?

A memorable hot summer is one degree hotter than a normal summer and if each day is one degree hotter, it means that the average is one degree hotter. We cannot say that throughout history it gets

one degree warmer in the space of a decade.

It took a long time to heat up. We are now sure that it is definitely warmer. It is possible to predict that by 2100 it is likely to be 4 degrees Celsius hotter, which poses a problem for normal living (life).

There is no turning back – it is the trend that we must face up to. We know that the temperature is rising, because of the greenhouse gases being released into the atmosphere.

Is that the main reason?

Definitely. The effect of the gases in the atmosphere makes the air warmer. And we are continuously sending more gases into the air (atmosphere).

There is currently no indication that this will be reduced. Temperatures will continue to rise over the next 50 years unless we reduce it. If the status quo remains, the temperature will have risen by 3 to 5 degrees Celsius by the end of this century.

You paint a very dismal picture. What is the solution? There are two solutions:

Prevent it from happening – a global summit needs to be convened to set up rules. I doubt that it will ever happen because people want energy. There is the possibility of renewable energy (wind and solar power), which is a long term solution.

We must adapt and prepare for the higher temperatures.

We need to look at our agricultural sector, water and our lifestyles. Everyone needs to see what is to be done to prevent or reduce the damage.

What can the public do to reduce the effect of greenhouse gases in the atmosphere?

The greenhouse gases are generated from three sources:

- Agriculture: where natural grasslands are replaced by crops that are only in the ground for six months of the year. Grasslands that previously absorbed carbon dioxide no longer exist. People need to consume less meat – cattle produce methane.
- Transport: the less we drive or fly, the less carbon dioxide gets released into the atmosphere.
- Coal fueled electricity generators: we need to put pressure on the government to replace coal (fossil fuel) burning power plants with renewable energy.

The Earth's climate has always changed. Why is this suddenly headline news?

The climate has changed over the centuries. The distance between the earth and the sun has changed and there are cycles. Historically, there were ice ages and periods of greater warmth.

These changes occurred over a long period of time. Now the changes are much faster. The Ice Age lasted 20 000 to 30 000 years before it got warmer.
What we are seeing now is the rise in temperatures over a much shorter time span – less than 100 years. This is of great concern because it has never happened so quickly before.

What is "worst case scenario"?

Agriculture is "worst case scenario". It will be a problem if the temperatures rise 3 to 5 degrees Celsius by the end of the century, because many crops are not suited to such high temperatures.

The very hot days will stunt crop growth; production will drop and food security will become a problem.

The impact of rainfall is critical – temperature changes is one thing, but rainfall changes are much more significant. We have summer and winter rainfall regions and the changes in the two areas are different.

We need to look carefully at South Africa's climate and the crops we grow. Several studies predict that in the Western Cape the winter rainfall will become less. It is in the growing season and when water is most needed. In the summer rainfall regions it is different – there is also a growing season, but water doesn't need to be stored as it does in the winter rainfall regions.

What is your message for us Earthlings – how can we conserve our planet?

We must examine our own lifestyles and keep in mind that what is good for us, is good for the earth. This applies to water, pollution etc. We must care for the earth.

Conclusion

Scientists like Dr. Johnston believe that the earth's temperatures will continue to rise over the next 100 years and extreme weather patterns will increase. We hold the planet's continued survival squarely in our hands and water plays a huge role. A wise person once said: "For a thirsty person, a drop of water is more precious than a bag of gold."

"Data over the last 100 years shows that the temperature increases by approximately 0.2 degrees Celsius every decade."

ANDRÉ ROUX

South Africa is the thirtieth driest country in the world with an average rainfall that is 40% lower than the world average. What makes this information even more concerning, is the fact that South Africans use 61% more water than the world average.

We, as South Africans, have since the end of 2015 become much more aware of how valuable water is and the necessity of water conservation. We are in the grip of a drought crisis and, as in the case of other regions in the world, we are experiencing a reduction in rainfall as a result of global warming.

Water sustains life on earth and humans, plants and animals depend on this precious resource for survival. Water is naturally essential for food security and the agricultural sector is in the direct line of fire with crops and livestock under threat. South Africans these days increasingly want to know what is the state of our water system and whether it is sustainable for the future. To answer these and other important questions, we interviewed André Roux, a special water advisor for the Western Cape government.

Is South Africa's water going to dry up?

I don't think it will dry up. We will just have to manage and develop it in a more sustainable way. We have got used to accepting that there will always be water. The drought that we have now experienced in the last couple of years, in various parts of the country, was a wake-up call for us all to rethink and to decide how we want the future to be. We will have to be more economical in our water usage and also develop alternative sources that we haven't yet developed.

How do you see the future?

The forecast for climate change in the Western Cape is that the province will be the most affected by climate change. If you draw a line from East London up to the north – to the east of that line they are probably going to get more rain in the future and the west will get less.

The result will be that we will probably have more droughts and more floods – more intense weather patterns.

Only 16% of SA water sources are apparently protected. Will it help if the percentage is raised? Will our future look better?

Yes, it depends on where the 16% is. If it is in the catchment areas of the big dams and river systems that feed it, it will help a lot. The big challenge at the moment is to protect what we have.

Our biggest problem is the millions of litres of raw sewage dumped daily into our rivers and dams. We pollute the water to such an extent that it is no longer usable, except if we purify it at high cost to make it usable again.

What is the biggest priority now?

The biggest priority now is firstly the maintenance of our infrastructure on a national and municipal level so that we can ensure that our water is of acceptable quality.

Just as important is that water that is released back into the river, the purified sewage water, again meets the standards. This water returns to the river and the towns downstream re-uses it. It is said that by the time the water in the Vaal River reaches Douglas, it has already been used 7 times.

Can we conclude that the risk of disease is high?

It is increasing and the cost of purifying water is rising. There are many people who live next to rivers that are dependent on the water, but do not have the facilities to purify the water. They assume that the water is going to be of acceptable quality.

The Department of Water and Sanitation is considering reviewing the price of water, which means it is going to touch all water users' pockets.

Yes, at the moment water is actually free. We pay for the purification of water and to get it to our houses. The Department therefore places a levy on the management and the operation of their systems. The capital that is used to create the infrastructure must then be repaid, thus the levy that is placed on the water.

The problem is, if the Department uses the so called "user pay principle" it can make water prohibitively expensive. The State's constitutional responsibility remains to provide bulk water at a reasonable cost.

South Africa has an average rainfall of less than 500mm, whereas the world average is 850mm. Nevertheless, apparently between 37% and 42% of usable (potable) drinking water cannot be accounted for. How is this possible?

That is unfortunately so. Fortunately, this doesn't apply to all municipalities. This also means losses from water systems and water that is stolen from the system. Water is also used for sports grounds and parks where it isn't necess arily always measured. In many municipalities there are unbelievably high losses.

The losses are caused by poor maintenance of systems. We cannot afford that expensive purified water is lost. Just as we actually also cannot afford to use SA's expensive purified water to flush our sewerage. We need to move in the direction of using recycled water to flush sewerage.

Are chemical toilets the future?

I don't think so. Our houses are not designed for them. It works well in camp sites and remote areas, but you will need to rebuild your whole house or a section thereof if you want to install this type of toilet.

What will houses in future look like? What will the structure look like? What will the design look like? Is it going to change drastically as the future unfolds?

I think so. There are already many changes to improve energy efficiency. Getting more light into the house, but not necessarily higher temperatures. Houses that need less electrical light, less power for air conditioning and heating – more environmentally friendly.

SA's houses are not planned or designed for double water supply systems. We do not have the capacity to, for example, get purified sewerage water, that is not of the same standard as drinking water, into our houses to use for sewerage.
Will it be possible in the future?

It will definitely be done in the future. It must be given attention in the municipal ordinances to be revised and new building developments that are approved should be subject to this.

It is naturally not just changing rainfall patterns, but also rising evaporation and water usage of plants that makes the soil and rivers drier?

It is a big challenge for us. In certain areas where we now, for example, farm apples, it is possible that in 10 or 15 years' time we will not be able to grow apples. It is especially due to the changes in temperature.

Fruit needs a certain number of cold units in the winter. Unless they get sufficient cold units, they cannot produce fruit. The areas where these crops are successfully cultivated and fruit is farmed are likely to change dramatically over the next 20 – 30 years.

We will have to develop new cultivars that are suited for these circumstances or move to other areas.

There are numerous irrigation areas in the Western Cape and also in the Eastern Cape and other parts of SA that do not have enough or very little water for irrigation. It has a direct impact on farms and also on their workers – permanent and seasonal workers.

The socio–economic implications are going to be massive?

Enormous. It is probably the only source of income especially for seasonal workers for a period of 6 to 7 months of the year. We hope there are clever people like you that will find solutions

It is being worked on diligently, but I think it is very important at this stage that people do not play the "blame and shame" game. It won't help. Mistakes might have been made in the past, but we can look at that later to rectify it. We must focus on our current situation and what we need to do to get through this.

If the crisis gives us a bit of breathing space with at least an average rainfall season this year, then we can look at short, medium and long term planning to overcome this.

Conclusion

Water is a life giving source and a sustainable resource that we all need to protect at all cost – not just for ourselves, but for generations to come.

CLIMATE CHANGE AND THE ECONOMY

LOUW PIENAAR

The drought which has large parts of South Africa in a strangle hold is already leaving a scar on the economy. Rising food costs and job losses are just some of the results.

Although it isn't just the Western Cape that is affected, an ongoing drought in the province will eventually have a significant impact on the national economy.

Tourism related income in the Western Cape is responsible for approximately 9% of South Africa's gross national product and the province is also the second biggest contributor to the national agricultural economy.

We are interviewing agricultural economist, Louw Pienaar, from the Western Cape Department of Agriculture, about the impact of the drought on the economy and in particular on the agricultural sector – which, among other things, plays an enormous role in food production, job creation and generating foreign income from exports.

For the past three years, we have experienced drought in large parts of the country – what has been the impact on the national economy so far?

Currently we are experiencing weather conditions which have a particularly negative impact on the agricultural sector in the form of droughts. Already starting with the 2015/16 drought which affected South Africa's major summer grain regions, we can see that that particular season the average annual rainfall was one of the lowest ever recorded, according to our weather history records which go back to 1904.

If we think back to the past the most severe drought was in 1992. The average rainfall of 2015 was even lower than that of 1922. What we have seen from the drought of 2015/16, is that large parts of our summer grain producing areas did not get sufficient rainfall for the grains mainly grown under dry-land production systems. This has meant that in one season, our maize harvest decreased from around 14 million tonnes in 2014, to 7.7 million tonnes in the space of two years.

South Africa used to be a net exporter of maize, but now we have to import, because we don't have a surplus anymore. This had a big impact on maize prices and especially maize meal prices which rose by more than 37%.

Much later, meat prices also increased as the higher maize and soya bean content used in animal feed became much more expensive and is therefore a direct impact of the 2015/16 drought. This had a huge impact on millions of consumers who buy meat, maize meal and other related products.

Is there a (drought) product that is more affected than others price wise?

Since rainfall is heavily sporadic, even within small geographic areas and dam levels are dependent on receiving rain in key catchments, the drought impacts are often diverse. For instance, the Western Cape needs to store water that it receives from rainfall in the winter to be used in irrigation systems in the summer months when there is almost no rainfall.

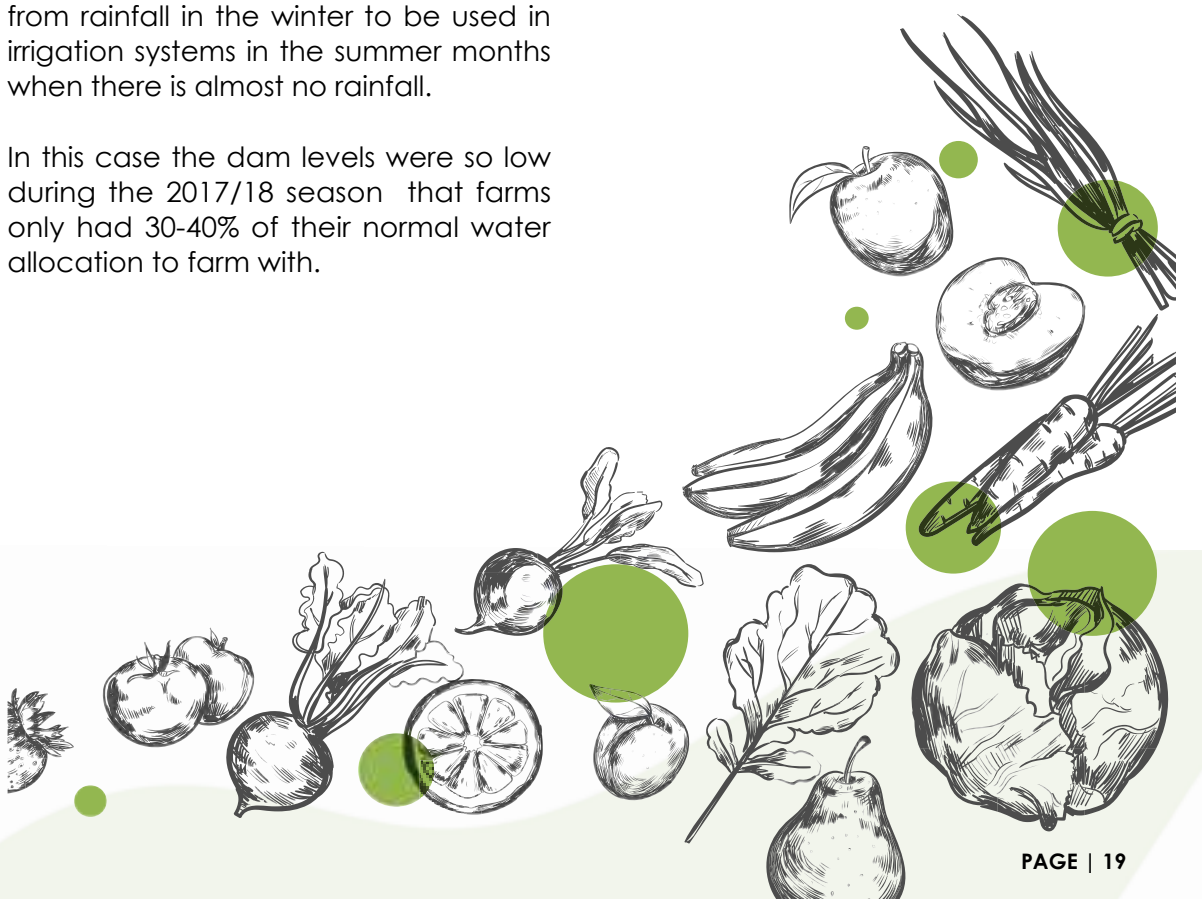
In this case the dam levels were so low during the 2017/18 season that farms only had 30-40% of their normal water allocation to farm with.

Some regions were, however, more adversely affected, such as the Lower Olifants River where farmers had their water curtailed by 85%.

The Western Cape has large areas of rain-fed winter grains (wheat, canola and barley), as well as large areas cultivated under irrigated horticultural crops, such as grapes, vegetables, pome and stone fruit. The losses in these industries because of the drought are significant, with production volumes and quality of fruit affected.

Does that mean wine will get more expensive?

It is difficult to say at the moment, because it also depends on the world market.



There is already a considerable increase in wine prices compared to 2017, but it is driven by a specific shortage of bulk wine in international markets. The shortage will cause a substantial rise in the price of grapes and wine. The positive result of the drought is that the quality of wine will be very good, which is beneficial for the wine industry.

The agricultural sector uses two thirds of the nationally allotted water. This makes it the single largest water user. How can the sector survive if we remain in the grip of a drought?

There is huge competition in the Western Cape between water used for agriculture and domestic use. There is actually a big difference in the quality and value of each of these and it is important to make this distinction. The infrastructure and related costs incurred to supply drinking water to people's homes make the price of this water much higher.

The water for agriculture is "different" in the sense that it is often bulk supply of untreated water from dams and rivers and therefore the price is also different. The water that agriculture uses has great social and economic implications.

Large fruit exports mean we get paid in foreign currency. We export high value products to countries such as the USA, Europe and England and by doing so we create sustainable economic opportunities.

We speak of the Western Cape and what the impact of an ongoing crisis, not only in the province, but also in the rest of the country will have – do you believe it is going to be considerable?

The Western Cape is unique because it is a winter rainfall region. Many of the products that we produce here are as a result of our climate. We did a study on the impact of the drought on the Western Cape economy and found that the estimated impact on farm income in the province decreased by R5.9 million.

Naturally, it also has a big impact on the rest of the country's economy, because the total income from agriculture in the Western Cape generates about 20% of South Africa's agricultural income, because we export high value goods. The effect of the drought on agriculture in the Western Cape is going to impact negatively on the rest of South Africa as well.

Climatologists say "Day Zero" is arriving in 2019 for the Western Cape, given that the April rains are usually a good indication. Do you agree?

We have been speaking for a while about "Day Zero," because we are looking at the Cape Metropolitan area's water usage. Agriculture already reached Day Zero in February 2018, because farmers were not allowed to use water from main sources for irrigation.

We are naturally concerned. The water allocation and availability is going to depend on the rainfall in the next 2 to 3 years. The current water allocation for agriculture can take up to 4 years before it returns to levels where we can expect the water restrictions to be lifted. In the future we will definitely increase our effective use of water.

Agriculture will survive and farmers will adapt. Do you agree with this view?

I agree 100%. Farmers' reaction to the drought was a sign that they are innovative. The impact of such a high percentage water restriction had a significant impact on production, but less than expected. It is a sign that the sector is busy innovating, using technology to increase water use efficiency and that farmers are incredibly resilient when faced with difficulties. Generally speaking, there is room for improvement in using our water resource more efficiently and for many industries, large amounts of water can still be saved.

Conclusion

A crisis, like the drought, forces innovation, but we have seen that there has been a paradigm shift in the agricultural sector. Water is now an essential resource and the availability thereof can no longer be taken for granted.

TECHNOLOGY AND THE AGRICULTURAL SECTOR IN THE CONTEXT OF CLIMATE CHANGE

DR MIKE WALLACE
FC BASSON

It is said that there is a technological revolution happening in the agricultural sector. Farmers these days, especially because of climate change, are increasingly dependent on technology for survival and giant leaps have been taken in this regard.

We interviewed Dr Mike Wallace, Specialist Scientist, and FC Basson, Geographical Information Systems technologist, both from the Department of Agriculture Western Cape, about the huge role technology plays in the agricultural sector.

You are experts in spatial information interpretation. What is it and why is it so important in the context of agriculture?

The environmental factors that influence agriculture differ from region to region e.g. climate, soil, gradients, plant growth, topography, etc. Geographic Information Systems (GIS) and spatial analysis allow us to take all this spatial information, plus other data types, such as satellite images and crop modelling, and integrate it into one framework.

GIS – which among others includes GPS (Global Positioning System), Google Earth and Google Maps – have been available for a long time now and are even included in the government's National Development Plan. Do all farmers have access to this and are they using it successfully?

To a certain extent, yes. Any farmer with good internet access can make use of this technology. A lot of farmers are becoming familiar with Google Earth, which they use to look at their farms and their farm boundaries.

What about farmers that live in outlying regions and do not have access to this technology?

In such cases, farmers can visit their local departmental agricultural advisors to get support and access to this technology.

Is it a necessity these days in the agricultural sector (and why…)?

There is no "one size fits all", but they all contribute in their way to better, more informed decision making. There are many service providers that want to sell this technology, so it is important for the farmer to know what is going on so he can make the right decision regarding which service or product he wants to buy.

Has technology, for example, over the last decade already changed agriculture considerably and if so, how?

It has changed considerably in terms of access. It is referred to as the "information explosion." Farmers have information on the web, cell phones and cell phone apps and satellite information, which they can procure or access – some free from the internet. There are options to use new real-time crop monitoring.

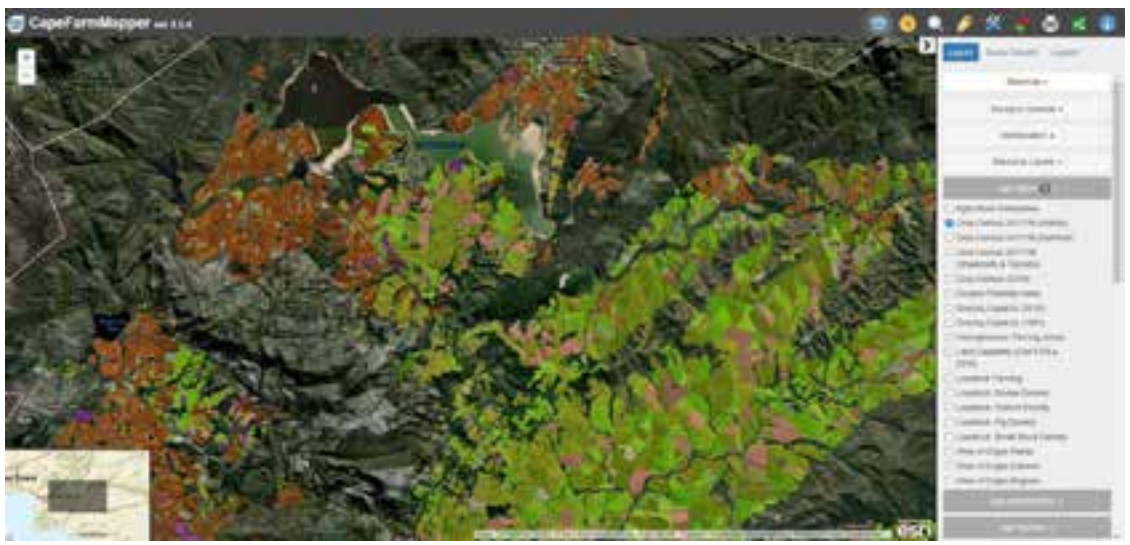
We hear about smart farms, where everything on the farm is connected wirelessly to something else.

It is becoming part of this "internet of things" where everything is connected and that is supposed to help the farmer to manage this huge explosion of data.

We do not see many farmers adopting that intensive kind of application – it is more piecemeal. So farmers will adopt a little bit at a time and gradually grow their technological applications.

Are the days gone when farmers could farm without technology?

In today's times I do not think one can ignore technology. Technology must be the farmer's friend. There is a substantial amount of relevant information, equipment and applications. Especially in the present time where people need to make informed management decisions in terms of things such as climate change etc.



What if technology falls to pieces – systems that crash?

It won't come to a halt. There are various forms of technology at the farmer's disposal e.g. drones and satellite sensors to do the work on different platforms.

When it comes to artificial intelligence and its applications, one must talk about robots, even if you aren't a "sci-fi" fundi or a "techie." Are robots already in use here in South Africa? (How is it eventually going to influence job creation?)

There are a small amount of robots in the agricultural sector. Think of a dairy and how milking machines have entered the industry in the last 50 years. It is an integral part of the industry and helps them to move forward. The milk industry supports more people now and uses/needs more labour than ever before.

Does this necessarily mean that technology is going to take away jobs?

It is a case of reskilling and redeploying workers and that will happen over time. It is not something to fear. If an industry prospers, it will open opportunities.

Do you see a mechanised future for agriculture?

Jobs will change from manual labour to more technical aspects. The farmer will basically be able to manage his farm from his office.

We all know what a huge role weather conditions play in the agricultural sector – to what degree does technology help farmers to get accurate weather forecasts?

I think weather forecasts as we know it are vital. These vary from daily operations so that a farmer can plan what he is going to do on a particular day to strategic decisions, which may take over a week and could include decisions such as whether he will plant that week or leave it till there's more rain.

There are also longer term planning and decisions, seasonal planning, such as the kind of crop that he is going to plant that season and whether it is going to be viable to plant the entire farm or leave one side open.

Many strategic decisions are completely dependent on good weather information.

Cape Farm Mapper is a handy, I almost want to say revolutionary, information system, which provides valuable information to farmers, especially to those in the Western Cape. What is it? Are there plans to roll it out to the rest of the country?

It is an online application that we developed ourselves in the Department. All the spatial data sets we have are available on this interactive mapping platform. It is free – anyone has access to it.

There is a great selection of data sets that range from soil and plant growth types to long term rainfall figures – one can then get timely weather data, compare and see which anomalies appear in the weather pattern. There are also tools for farm planning and for developing as many maps as you want. For more on Cape Farm Mapper, click here: https://gis.elsenburg.com/apps/cfm/

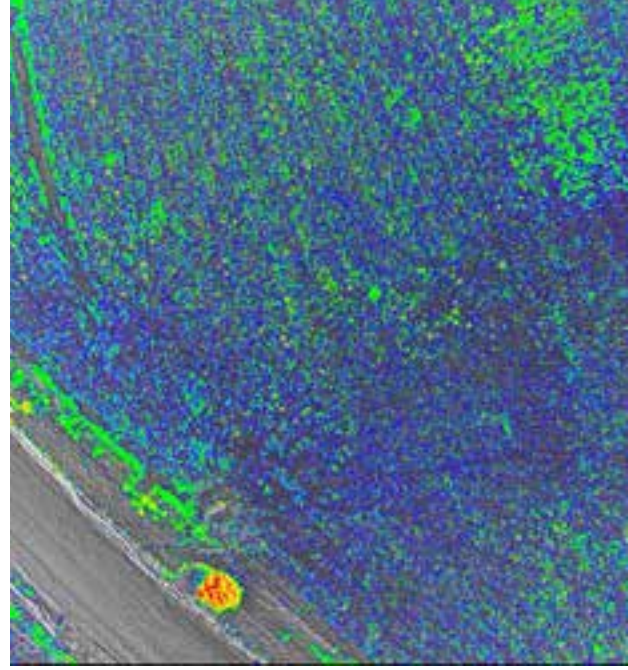
Can we look forward to any technological developments that will take our breath away?

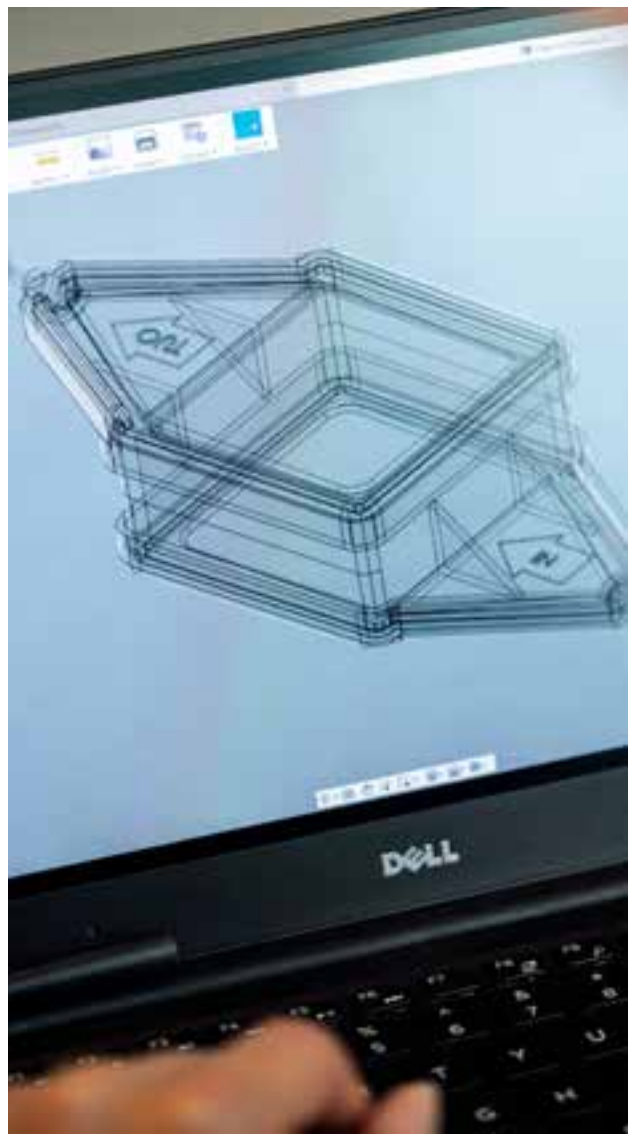
There will be an increasing availability of satellite sensor data. All this information is available to the man on the street. For me, 3D printers will be the advancement that will take my breath away.

It is said that in the future we will be able to print food and things such as tooth implants and medicine. It will definitely make these things more affordable.

Conclusion

We see how essential technology is for farmers and that what is available is but the beginning, especially with climate change increasingly making its mark. Is technology going to become an integral part of every farmer's blueprint? Technology should not just be about survival and success; it should also bring people together.





CLIMATE CHANGE AND THE DECIDUOUS FRUIT INDUSTRY

ANTON RABE

Experts agree: for farmers to survive the changing climate they will have to harness their knowledge and the information available to them. Global warming due to climate change is here to stay and it is expected that by 2080 temperatures along the coast will be about 4.5 degrees Celsius higher and inland, up to 6 degrees Celsius higher.

We are talking to the Executive Director of Hortgro, Anton Rabe, about the effect of climate change on the deciduous fruit industry. Hortgro is striving to create an environment where equality, sustainability, profitability and cooperation within the deciduous fruit industry is advanced.

Is it mainly the Western Cape's fruit industry that is suffering because of the drought?

No, in the last 2 to 3 years there have been occasional water shortages in the northern provinces i.e. the Free State, Limpopo and Mpumalanga. Because the deciduous fruit industry is concentrated in the Western Cape, it has the biggest problem. In the Western Cape we are dependent on winter water that is stored in dams and groundwater from boreholes. The biggest problems lie with the irrigation schemes, specifically around Theewaterskloof, Berg River Valley and Olifants River Valley. It differs from region to region – from very big problems to few or no problems.

Is the situation mainly the result of climate change?

Climate change definitely plays a big role in this drought. Previously there were drought cycles, but this one is apparently one in a hundred years and we hope the coming winter will break the drought.

We see these types of phenomenon from time to time, but I think, in the future, we can expect longer periods of drought cycles which will again be broken by floods.

We will have to be ready when the water is there to store it. We need to work better and smarter with the water we have and develop other sources. Specifically also in the Cape metropole other water sources such as desalination, recycling of water and groundwater will have to be investigated.

Are you already busy with long-term planning?

As an industry we began research on plant material, rootstocks and cultivars, which can survive on less water, fifteen to twenty years ago. We are looking at production techniques, the use of nets, the use of mulches (groundcover) to conserve soil moisture, new irrigation systems, and even satellite systems to schedule the most effective irrigation times. The crux of the matter is we can get by on less water, but we cannot do without (any) water.

It is said that deciduous fruit farmers will only survive if they begin to plant suitable, new cultivars – is this true/is it already happening?

Yes and no. No, in the sense that we are continuously in the process of replacement.

We are a long-term industry and we replace 2 to 4% of the orchards per year. The replacement is always with more popular cultivars. We also look at mutations and clones of existing cultivars that have better productivity, yields, colour and fruit size.

It is in any case a continuous process to renew and replant orchards. We must do it over time and it actually happens organically as a result of the long-term nature of the industry.

Does that mean we are going to see "new" fruit?

An apple will stay an apple. It might be from a better cultivar or produced in a different way with new technology. The traditional crops will still be produced for the next 20 to 30 years.

Alternative crops have come to the forefront in the last 10 to 15 years and are rapidly expanding, e.g. berries, cherries, pomegranates and figs. Some of the indigenous crops e.g. the fynbos, rooibos and honeybush are also growing stronger. Producers are continually busy diversifying to adapt to survive the changing weather patterns.

Already in 2016, you predicted losses in the deciduous fruit industry due to the drought would run into the region of R720 million. What is the loss to date?

We are now in the third year of considerably less water in many cases. We estimate this last season's loss at about R1.5 billion. The loss registered for the previous two years was between R700 million and R800 million. The numbers are now increasing substantially. The industry's turnover is between R10 billion and R11 billion a year.

The loss in income was thus an average of 15% of that figure as a result of the lower crop. It could have been much worse. Available water was also prioritised for long-term crops, specifically deciduous fruit, at the cost of cash crops such as potatoes, onions and tomatoes of which much less were planted than usual.

Is it because deciduous fruits have a higher export value? Why the prioritisation?

It is one of the reasons, but also because it is a long-term crop – the tree must be kept alive. Many producers discarded the lower value cultivars just to save the tree or more rapidly started replacing older orchards with higher value cultivars. If we get normal weather patterns now, the industry is reasonably well geared to quickly bounce back and again reach its potential with regards to yields.

Are there going to be normal weather patterns again?

I believe we are going to get periods of higher rainfall again. If one looks at long-term rainfall figures and climate data, there is a natural cycle of drier periods followed by wetter periods with higher rainfall and floods. We are now just in an extended drought cycle. We will get rain again and then we must be ready with bigger dams to ensure that we can store water for longer periods.

Is there less fruit on the shelf and has the quality dropped?

The quality of the produce isn't necessarily affected, but we have had smaller fruit. The distribution of the produce to various markets is definitely affected. In previous years there was a reasonable balance between the export and the local market. There is apparently less produce, which increases the price, but there will definitely be produce on the market.

On a lighter note: you have exciting news about the return of the "offspring" of that first apple that was picked in the Cape of Good Hope.

One of our members, from the Tru-Cape group, did research on the original apple that was planted in the Cape, just after Jan van Riebeeck's arrival, and tracked down its plant material. It is currently in quarantine, the so-called "Wittewijn Appel".

We are looking forward to making trees from the material as soon as it is released. We will plant them in a few places, amongst others also in the Botanical Gardens where it originally stood. It is going to be interesting to see how it develops in the next 2 to 3 years.

Conclusion

Albert Einstein once said, "A table, a chair, a bowl of fruit and a violin – what more does one need to be happy." May our deciduous fruit industry not just survive, but go from strength to strength.

CONSERVATION AGRICULTURE

DR JOHANN STRAUSS

Conservation agriculture is a relatively new concept in South African agriculture in which an increasing number of farmers see the benefit – especially in the light of climate change.

As farmers will also agree, soil of a high quality is the key to sustainability in the agricultural sector and this is the actual focus of conservation agriculture. We are interviewing Dr Johann Strauss, a senior agronomist from the Western Cape Department of Agriculture.

What is Conservation agriculture?

It is an adaptation that was made a few years ago – from the 1970's, where farmers began an alternative way of cultivation when they realised they were losing too much soil as a result of erosion. Conservation agriculture limited the problem. It originally found favour largely in South America and grew worldwide from there.

It moves away from the idea of ploughing the soil to plant, because it increases the chances of erosion and organic material being lost. No ploughing ("no-till") increases the quality of the soil with corresponding (expected) higher production. Over time, it increases sustainability. It is based on three principles:

- Minimum soil disturbance – no ploughing, just planting action.
- Diversity through crop rotation – do not cultivate just one sort of crop on the same soil year-on-year.
- Permanent soil cover with either harvest residue or living plants on top of or in the soil – just as people have skins to protect them from the sun and the elements – in a similar way the earth is protected by a "skin".

It sounds like a return to the conventional farming of the old days?

It is before the plough shear was invented. It did bring about good things for the agricultural sector, but it also worked the life in the soil to death. The last figure in South Africa for erosion is 3 tonnes of topsoil for every ton of maize we cultivate and that is only water erosion.

What type of farmer can make use of this?

Grain farmers specifically can benefit from this. The principle reaches further than just pure single year crops such as wheat. Any type of agriculture can apply these principles.

What sort of equipment do farmers need?

It is reasonably specific equipment, especially for the planting. There is a specific (special) planter needed to get the seed and fertiliser into the ground and there is no need for workers to sow and cover the seed. Fortunately, this equipment is available worldwide and in the Western Cape specifically there are four distributors of these planters, which also makes it cheaper than importing. Initially it costs money to make the change, but over time it pays.

How many grain farmers, percentage wise, in South Africa apply conservation agriculture?

In the Western Cape there is a very high percentage of farmers applying conservation agriculture. Not all the principles are applied 100%, but if we can just look at soil disturbances, we have approximately 80% of farmers that don't use any tilling implements.

In the rest of the country there are strong groups that have arisen, especially in KwaZulu-Natal (also some of the first adopters before the Western Cape) and they are supported by Grain SA.

If a farmer wants to change to conservation agriculture, where does he begin and who can he approach for support?

Anyone is welcome to approach the Western Cape Department of Agriculture, Grain SA or the KwaZulu-Natal No-till Club. It is important to begin small. Take one camp at a time and get used to it. It is not necessary to apply it immediately to your entire farm. It is something that takes time and farmers must not give up after only one year. Be patient and you will see the results.

Does it take longer to pick the fruit, so to speak?

It is a decision you must make, and once made you must stick to it. We see it particularly with the research we do. The oldest experiment is 26 years old and it is not an overnight thing. It takes at least 5 years for the system to establish and 20 years where the system flows. We see the benefits of the system in our experiments after 20 years. There are other parts of the world where it happens faster. In the Western Cape we do not have summer rains, which makes it difficult for faster cultivation. The research shows that carbon is busy returning and yields are becoming more stable over time.

Can conservation agriculture mitigate climate change?

It can be effective if you keep as much material as possible above the ground to protect and cool it – thus minimising evaporation. You can get further with water if the ground is covered as opposed to bare ground. Ground that is not ploughed has small and large pores under the ground that can hold the water. The system serves as a carbon sink over time and add to that less energy need and lower inputs reducing the carbon footprint and thus the effect on the climate even more.

Capetonians are positive about the 2018 rains. Does this mean we are out of trouble?

I think we must still wait for 2 to 3 years to get the dams filled and then make sure that we keep them full. Everyone must decide to use less water over time. More and more people are moving to the Western Cape, so we must do everything in our power to save water.

Conclusion

According to Dr Strauss conservation agriculture is likely the future of the agricultural sector, especially in the light of climate change. It will not become the new conventional way of farming overnight, but patience will definitely yield future rewards.

CLIMATE CHANGE AND THE FOURTH INDUSTRIAL REVOLUTION

DR DIRK TROSKIE
DR ALBERT STREVER

There has never been a time of greater promise or greater danger." So says the founder and executive chairman of the World Economic Forum, Klaus Schwab, with reference to the Fourth Industrial Revolution, or 4IR.

The first industrial revolution was in the 1800's when fewer things were made by hand and more things were made by machinery.

The 4IR in which we now begin to find ourselves is worlds apart from the first one, which was called the Industrial Revolution.

In a study commissioned by the Western Cape Department of Agriculture (WCDoA) and conducted by Stellenbosch University's Business School regarding the future of the agricultural sector in the context of the 4IR, it is frankly stated that the extent is far greater and wider than mere intelligent and connective devices, machines and systems. The 4IR aims to be a fusion of physical, digital and biological spheres.

But what does it all mean for the agricultural sector especially in light of climate change?

We are discussing this with Dr. Dirk Troskie, Director: Business Planning and Strategy from the WCDoA, and Dr. Albert Strever from the Department of Viticulture and Oenology and the Institute for Wine Biotechnology at Stellenbosch University who was part of the team of the Business School undertaking the study.

Dirk, what necessitated the study of the agricultural sector and the 4IR?

The 4IR isn't just about technology. It also has a human aspect. These days there is a lot of talk about the "millennials" and their specific needs. You have new technological developments and then there is social development of people. The way in which these two meet creates opportunities and a synergy that up until now we haven't had.

Albert, what effect will the 4IR have on agriculture?

The biggest effect is the fusion of technologies and cyber-physic systems and the integration of artificial intelligence with technology and integrated technologies. All these technologies are in some way applicable to agriculture. Previously we spoke about precision agriculture, which mostly included positioning and automation.

Now we are looking at the integration of artificial intelligence and also the integration of systems within an agricultural management system. It isn't just about separate technologies – it also crosses the boundaries of and includes biological technologies.

Dirk, will all farmers be able to benefit from this or only those with internet access?

A number of these technologies are not only linked to the internet. There are also genetic developments which can be utilised by all farmers. There is the potential that a fundamental change is going to happen in the economy of scale of farming. At present we are sitting with the indivisibility of agricultural technology – a tractor or a combine harvester is of a specific size. At the core of the tractor's size is the person who needs to drive it.

If you remove the person, then you can move in the direction of smaller and lighter technology. You can use the principle of smaller pieces of equipment that can move over a piece of land or through an orchard.

Is the "removal of the person" not going to have far-reaching effects on the sector in terms of jobs?

We have to accept that there are certain types of jobs that will be redundant. The arrival of the motor car changed work opportunities. There were no longer people who picked up horse manure in the streets or who were coachmen, but new opportunities such as motor mechanics and people who build roads were created. The question is not if job opportunities are going to be lost, but rather what new job opportunities are being created.

Albert, how is the 4IR going to be of practical help to wine farmers and producers (an industry struggling because of climate change)?

Wine farmers in the Western Cape has just gone through a long drought and it is important that irrigation technology is improved. Also the information around climate data and data regarding climate change has per se improved, which allows us to make better decisions. We now have low cost weather stations and a larger network of weather stations that we can bring in to improve our source of information.

Also, there are advancements in technology regarding the genetic potential of cultivars and root stocks which we can use.

Dirk, what is the role of the government in the 4IR?

The moment people hear the word "government", they think money. It is definitely not the role of the government to subsidise new 4IR technology. The role of the government is rather to create a climate where business can work and flourish; to create an opportunity for young people to get creative and to create an atmosphere of excitement for the use of this new technology for the benefit of society.

Are we going to lose the human connection?

The human element is something that will always form part of specific areas and cannot be automated. It is the whole idea of passion, interaction and of being human. It is one of the aspects where there will always be a role for humans.

One of the qualities of agriculture as a business is that the farmer can spend less time on tasks that can be automated. Decisions can be made on a computer so that they can spend more management time with their employees who still form part of the value chain. Again, a shift of focus means time becomes available for other tasks and for human connections.

What excites you about technology? Is there something that stands out for you?

Several issues in agriculture, such as land reform, water and sustainability can be addressed by technology. Online models of funding, such as "crowdfunding" for smallholder farmers are really exciting.

For me the fact that land doesn't need to be owned, but can be worked on and be a model for investment in land by making use of digital platforms is something that stands out.

There is an opportunity for an assortment of new developments, but what is exciting, is that the developments can be used to bring us closer to one another. The individual farmer can use his unique message, his story, to promote his produce. It can connect the consumer and the farmer on a personal level.

Conclusion

The "agri-renaissance" as researchers call it, is busy gaining momentum – there is no turning back. It is essential that the latest technology gets integrated as seamlessly as possible into the agricultural sector to ensure productivity and sustainability. There is no doubt – technology provides wings. We must just make sure that the wings, as in Icarus's case, are not made of wax and feathers.

CLIMATE CHANGE AND ALIEN VEGETATION

RUDOLPH RÖSCHER
BRAHAM VAN ZYL

We often hear the term "alien vegetation" and speak about its negative impact on man and nature and how this type of vegetation has to be eradicated. Examples are the Port Jackson and Black Wattle, to name a few. A plant is classified as an alien if it has been introduced by man into an area or region where it never previously occurred naturally.

Alien vegetation poses a huge challenge to the agricultural sector. To explain why and what is being done about it, we interviewed two experts, Cape Winelands district LandCare Manager, Rudolph Röscher, and Braham van Zyl, a landowner from Swellendam and a doctoral student.

Why is the removal of alien vegetation so important? What is the biggest threat?

Alien vegetation creates an enormous number of problems for landowners:

- Excessive water usage;
- Higher risk of fire danger, and
- Overgrowth of river systems that can change the whole hydrodynamics of a river and lead to:
  - erosion;
  - sedimentation and the formation of unnatural islands;
  - bridges being washed away, and
  - agricultural structures suffering damage.

Tell us more about LandCare's 5-step process. What does it entail?

LandCare is based on certain principles. Whenever work is done in a community of farmers, the complete buy-in of landowners is required through the implementation of an area wide planning approach.

It is broader than just an individual farm. We look at the greater community and ask them about the natural resource challenges in the area. It covers a wide field, but it can be anything from erosion, fire hazards and drought to flood risks.

After the overall planning is done, we move to farm level, draw up farm plans, identifying priorities with the owner and then project implementation starts.

What is the link between climate change and alien vegetation?

The alien vegetation's growth rate increases when the temperature rises and that increases its water usage. A lot of our natural biodiversity is lost as a result of alien vegetation, which totally overwhelms certain catchment areas.

It has a direct connection with the growth patterns that we experience with climate change and changing weather patterns. In the Cape Winelands the rain falls later in the season and it is usually higher in intensity over a shorter time period.

These rainfall patterns, together with the alien vegetation that blocks our river systems, then cause flood damage.

Braham, you have first-hand knowledge of the damage that alien vegetation can cause. How is your land affected?

Two floods in 2004 and again one in 2006. A large piece of my land in Swellendam was washed away as a result of the river being covered with Black Wattle. I had to make a plan. I worked with the Western Cape Department of Agriculture's LandCare programme. We established a non-profit company and everyone cooperated to clear the valley of Black Wattle.

You speak of the "joy of rehabilitated land". What does "rehabilitated" land look like?

In the Swellendam area there is a farmer named Henry Barry. He encouraged me to clear my land of alien vegetation as he spoke with such enthusiasm about how beautiful his mountain slopes are after it

had been cleared (of alien vegetation). I began cleaning and experienced the same joy of rehabilitation. Where there is alien vegetation, there is a monoculture of plants – one species that dominates. The natural plant environment has a variety of plants – big, small and various colours. I now get pleasure walking on my land and seeing how various plants grow, almost in gratitude.

To eradicate alien vegetation is hard work, especially once they are established. Shouldn't people remove them while they are still small?

I believe landowners that do not keep their property clean, are lazy and don't care. In order to win, you have to pull them out as soon as you notice them. It is hard work, but also very rewarding.

Rudolph, how important is it that the community gets involved and takes responsibility?

It is absolutely critical. Landowners must be involved from day one at the start of a LandCare area wide planning. The goal is to ask owners to identify risks in relation to climate change and the natural resources that farmers need and to list anything else they need to perform their farming activities. This plan doesn't only happen in isolation with the landowners.

We work together with various other departments within the Western Cape Government and as a united front we offer our services, technical expertise and financial resources to communities. We established a network platform of 19 different departments and non-profit organisations where we meet at least twice a year.

Here we share our knowledge, our budgets and expertise with each other and ensure that our projects dove-tail. The end product is a Memorandum of Agreement between landowners, irrigation boards or farming organisations. From this agreement funds are made available and landowners, are also always expected to make a financial contribution.

One of the success stories is the Breede River of which 75 km, ranging from Ceres through Mitchell's pass, Wolseley and down to Worcester, is 95% clear of any alien vegetation.

This includes one of the largest, remaining natural wetlands in the Breede River system of 600 hectares, the Papenkuils wetland. Every landowner along this route participated and contributed financially.

After five years they have developed a culture of budgeting for alien vegetation control and they see the value. Four to five years later the indigenous plants are returning to river systems and the wetlands are being repaired to fulfil their ecological function.

You have now also begun to stimulate small business enterprises?

Precisely. We can't just control the alien vegetation and leave the biomass in the rivers. Rather than burning this asset of woody biomass, we opted to support SMME development through various initiatives. These initiatives varied from fire wood production to the production of chipped material to be used as mulch by farmers in their orchards.

Braham, you are passionate about community projects and want to spread the message that it is not so difficult to eradicate alien vegetation. How are you going to do it?

My primary target that I want to reach is the landowners. If I can spread my enthusiasm and show what I have already achieved, I believe I will get supporters.

Conclusion

We now know that alien vegetation can cause enormous damage, but we also have experienced what can be achieved if people decide to cooperate and work together to do something about the situation. Planning, interaction and cooperation are the key components to success, in conjunction with those exceptionally committed and dedicated people.

THE EFFECT OF CLIMATE CHANGE ON PESTS, PLAGUES AND ALSO ON BEES

DR GERHARD VERDOORN

Experts say when it comes to climate change there is apparently only going to be one winner in the war and that is insects – with the exception of bees. As temperatures rise, insects will become more active and breed faster, which will make them ravenously hungry. The consequences stretch far and wide. For the agricultural sector it means that new pests and plagues are going to make an appearance.

We are interviewing the Director of the Griffon Poison Information Centre and Operations and Stewardship Manager of CropLife SA, Dr. Gerhard Verdoorn, who is of the opinion that when it comes to agriculture, especially wheat, maize and rice will be the losers in the titanic struggle against pests and plagues.

Do you agree that as climate change increases, insects pose a huge threat – for man and nature?

We must view this from two perspectives: 1) the influence on man and 2) the influence on nature.

We can see globally that climate change and global warming have caused insect populations to explode, translocate or to grow negatively. Honeybees are one example of a species where one can see the impact of climate change. It is not only a case of insects increasing and spreading, it is also a case of some insect populations declining as a result of global warming.

What are the reasons for the cases where populations are going to grow?

When there isn't extreme cold, snow and frost, then insect populations survive better. South Africa, for example, has long extended summers and warm winters. We haven't really had decent cold winters, except for the past year.

A typical example is the fall army worm that invaded South Africa in 2017. In the warmer regions where it never gets cold, the worm flourished and its population is getting out of control in places like Limpopo.

If it was a normal winter, it would have been under control, but now we no longer have the controlling effect of nature to thin out insect populations. It is the same with ticks, where in the past the cold controlled their numbers, but now it isn't cold enough in the winter to control them.

What is the reason for the decrease in honey bee populations?

The high temperatures mean that certain plant species are taking strain. It is not really about declining of the bees, but rather their food sources that are directly affected. With little to no food supply the bee population cannot reproduce.

What can generally be classified as pests and plagues?

It is basically any organism, whether plant or animal or insect or even fungus that has an unacceptable impact on the human environment. If one talks of "human environment," there are two categories namely: the agricultural sector (animals or plants) or public health.

We already know that there is a movement of Malaria mosquitoes from the eastern Lowveld to the Highveld's side. A sign of climate change is a pest that moves out of its natural habitat to an area where it hasn't occurred before.

There is already an increase in insect related diseases such as Zika and Lyme Disease which are respectively caused by mosquitoes and ticks.

Yes, we have seen that Malaria is on the rise in the eastern parts of the country such as KwaZulu-Natal and the Lowveld. It has also spread to the western Bushveld around Vaalwater. This is frightening, because the latter is a region that was always known as being disease-free. There are also more animal diseases that develop as a result of insect plagues, like ticks which are rampantly increasing.

Will animals such as birds that live off insects naturally also flourish?

Not necessarily. As the insect population changes as a result of climate change, the birds will be forced to adapt to it. Birds can adapt and if we look at the Bird Atlas we observe that the birds are also moving around to accommodate climate change.

Birds are not necessarily going to be that much affected, but the concern lies in the smaller animals that cannot fly and move far away. Problems will arise with ground dwelling insects and the animals that are dependent on them. It is not all positive. In the broader sense climate change and global warming are horrible for everything that lives and breathes.

It is estimated that grain crops in America and Europe can expect 10 to 25% insect related damage for every degree the temperature rises. Is this also South Africa's fate?

There is no doubt about that. The previous years' catastrophic droughts and the floods have put grain farmers under tremendous pressure. Climate change is going to cause damage worldwide. News reports claim that the temperature is going to rise 3 degrees Celsius per century, instead of the estimated 1.5 degrees Celsius.

When it comes to grain crops – which insects cause the greatest damage?

All the moth-types that make worms in the grain crops e.g. the fall army worm and the bollworm types. Underground it is the false wireworms and the weevils which cause the greatest damage.

There are solutions such as crop rotation and insecticides. Isn't it a "Catch 22" situation, seeing as many of these agro-chemicals are detrimental to the climate, and also to humans and animals?

If people use pesticides according to the label (instructions), the chances of something going wrong is slim, but unfortunately many people don't read labels.

We can't just address the symptoms of climate change; we must also address the root of the problem. People must stop burning fossil fuels (coal). South Africa must stop considering new power stations that are based on coal.

What about domestic insect control – how can it be humanely and responsibly applied?

When I see how ants, cockroaches, bedbugs and termites are increasing, I see a tremendous amount of problems for households. Monitoring is very important.

Immediately make a plan to control the pests and plagues as soon as you see them. When they reach epidemic proportions, you can barely control them. Read labels and use pesticides correctly.

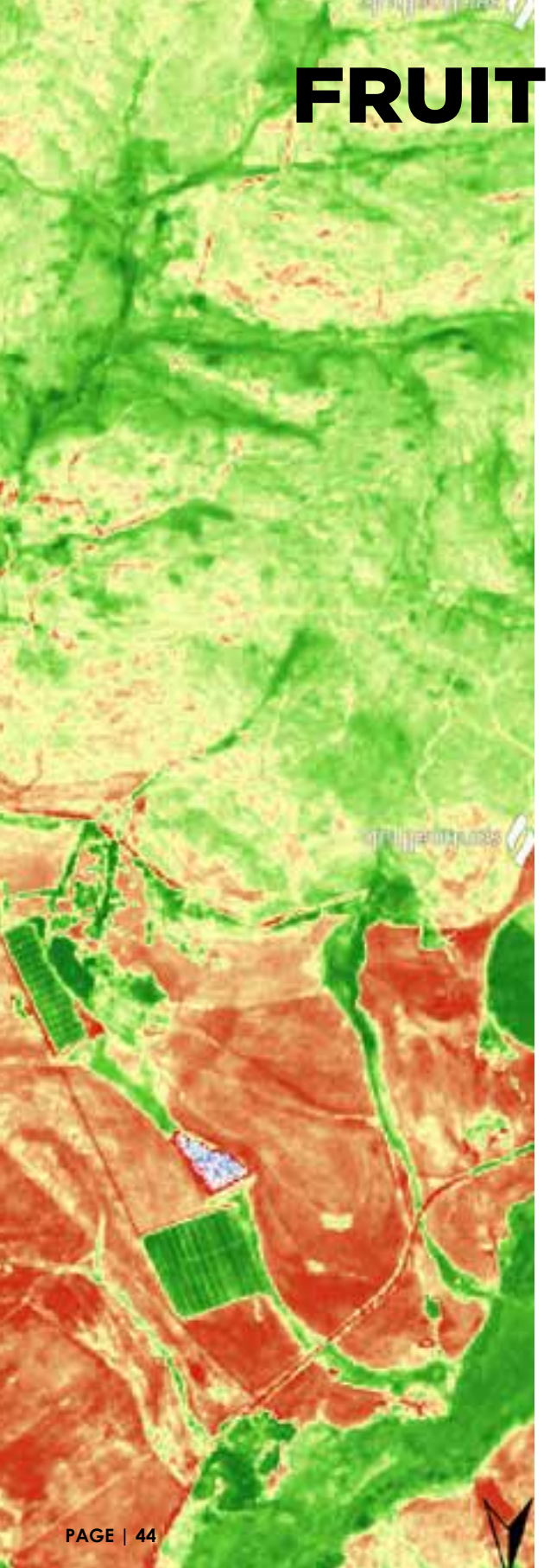
Do you believe it is our duty and that we have the right to interfere in the perfect order of nature – that natural balance – can human interference repair it?

It is our responsibility. If we want the human population to exist for the next thousand years, we have to get involved now and see where we can help nature to recover (again). We have to remove a number of the "human footprints" – fossil fuel that is being burnt; deforestation and incorrect farming techniques.

Conclusion

Insects are an example of amazing organic evolution over millennia. They are the biggest group in the animal kingdom, with scientists estimating that there are more than a million species in existence. They help with pollination of our food crops. They break down organic material, provide clues to cure cancer and even help to solve crimes.

However, insects out of control can also cause enormous damage. Climate change is busy warping the natural order of the world we live in. Eventually everybody is going to suffer because of this – humans, animals and plants. We must address the source of the problem and responsibly intervene.



FRUITLOOK

DR CAREN JARMAIN

A team of highly knowledgeable people provide the Western Cape fruit farmers with satellite-based information that contributes to more effective water usage. FruitLook is a public web portal (www.fruitlook.co.za) that enables farmers to monitor their crop growth.

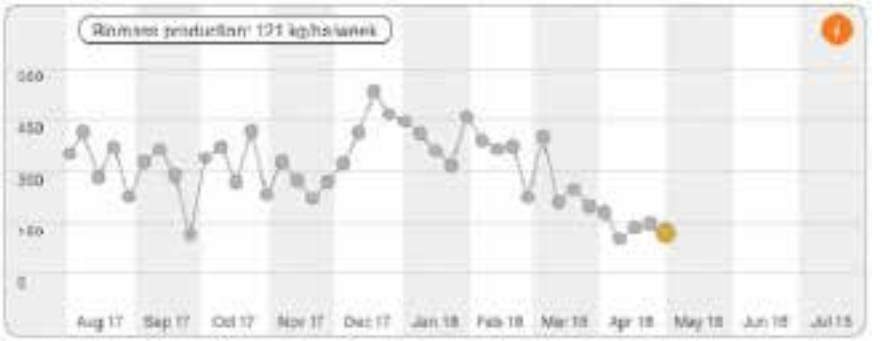
We are interviewing the South African project manager, Dr. Caren Jarmain, to learn more about FruitLook.

What is the important information and the services that FruitLook provides?

FruitLook is a free service and is basically a massive information data system. It gives farmers and consultants basic information on a weekly basis about how much water they use and how much growth occurred in the corresponding time period. We also provide training so that farmers and consultants know what FruitLook is about and also how to use the information effectively.

FruitLook is a Dutch initiative that is implemented by the Western Cape Department of Agriculture (WCDoA). Why was there a need for such a service?

The Dutch, through a company called e-Leaf, is still involved and they are the providers of the data systems. They are also the international leaders in this field. Originally the WCDoA wanted to introduce



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the data so that producers could use their water more efficiently. It is more complex than just placing a soil moisture sensor or a water meter in every block.

Thus, a method was investigated that could measure water usage over a season, as well as the correlation that it has with growth.

Effective water usage is now getting more important in the light of droughts and water shortages.

Farmers have realised that they will have to increasingly monitor and be aware of what they know and what they do not know. FruitLook is an incredible way to help them better understand what is happening on the farms in terms of water usage. It also assists in planning more efficiently for upcoming seasons.

What is the range of your satellite system?

FruitLook is a system on a website and it uses satellite data. In the current season we will provide information on 9.5 million hectares of the Western Cape. This means that for every 20 x 20m pixel (block) on the satellite image, there will be information available. It is a massive area that covers the biggest fruit and important agricultural areas. It includes all the fynbos areas and

all the important catchment areas that generate water for us. There is currently a 9-year database available on the website.

Farmers can therefore monitor the current season's information week by week, but they can also refer back to the history of their block over the past 9 years.

One of the benefits of any information system is that one can look at the data from a previous year and it can give you an indication of what your production will be in the current year. Internationally, there is no other system available that is so wide-ranging in terms of the spatial coverage of the data.

Can small scale farmers also benefit from this?

Definitely. There are commercial and small holder farmers that use the system. Consultants, who provide a service to farmers in terms of advice, can also use the system.

Except for the Western Cape, is FruitLook available elsewhere in South Africa?

Since the WCDoA provides the funding for the project, the information is unfortunately not available for areas outside of the province.

We receive several enquiries, especially from the Eastern Cape and the Northern Cape, which possibly ties in with the fact that they also have a substantial fruit industry and/or crops under irrigation.

How many farmers in the Western Cape make use of the system?

In the 2018/2019 season there were approximately 750 producers and consultants. We can also monitor how often they use it. All irrigation blocks bigger that 1 hectare can be monitored and all the big farms are monitored.

In 2010 we selected 40 farmers to pilot the system and today we have close to 750 users. There are still many more producers in the Western Cape that we must and want to reach, so that they can also benefit from the system.

What is the feedback that you have received from farmers so far? Are they positive? Does it help you to avoid pitfalls?

If one invests the time to use the information system and you recognise the value thereof, then you will continue using FruitLook. We receive a lot of positive feedback. At the end of the last season we had an online survey for users to complete. More than 70% of the users indicated that FruitLook helped them with water management and about 30% indicated that it helped with production and problem solving. As producers increasingly understand what FruitLook is about and attend a training session or two, they will get more value from it.

Do you provide information that farmers cannot obtain on their own?

Satellites take photos of things that we cannot see with the naked eye. The equivalent is a farmer that flies over his farm every week. Although farmers know what is happening on their farms, FruitLook offers a different spatial perspective and shows things that a person will not necessarily notice with the naked eye.
This information naturally becomes so much more important with our unpredictable rainfall.

The main point behind FruitLook is that one can monitor and can see what the reaction of your crop is to weather conditions. For example, if there is a heatwave you can see what the reaction of your plant was in terms of less growth and more stress. It is an incredible monitoring system and the historical data is of immeasurable value.

Unless, for example, you experience unforeseen weather conditions, you can look what happened in the previous year, and unless conditions are worse, you have an idea what to expect and you can prioritise. If you have a limited amount of water, you can see where it is most needed and where you can defer irrigation a little bit.

Can you please give the website's details which farmers can visit?

The address is www.fruitlook.co.za and the contact email address is info@fruitlook.co.za. We will, on request, also arrange to do regional training sessions in specific areas.

Conclusion

Someone recently had this insightful quip to say about FruitLook: "Western Cape fruit and grape farmers receive help from above. That satellite misses nothing and has no ulterior motives."

Like the American archeologist, Sarah Parcak, said: "A picture is worth a thousand words and a satellite image is worth a million dollars."

For more information on FRUITLOOK, click here: https://www.elsenburg.com/drought/

LATEST PREDICTIONS REGARDING CLIMATE CHANGE (IPCC-report)

PROF FRANCOIS ENGELBRECHT

Prof Engelbrecht is currently affiliated with the Global Change Institute, University of Witwatersrand.

"To limit global warming to 1.5 degrees Celsius, will need fast, far reaching and unequivocal changes in all aspects of our society."

Those are the opening words of the summary of the document of the Intergovernmental Panel on Climate Change (or IPCC) that convened in October 2018 in Korea. The panel goes on to say that by the end of the century South Africa can expect a temperature increase of up to 8 degrees Celsius, which will have huge implications for humans and nature.

We are interviewing Prof. Francois Engelbrecht, the Council for Scientific and Industrial Research (CSIR)'s Research Group Leader for Climate Change and also one of the leading authors of this crucial report.

At the recent climate change conference in Poland, Sir David Attenborough said that the end of the natural world as we know it, is on the horizon. Do you agree?

Unfortunately a lot of truth is hidden in those words, applicable to us in Africa, but especially in Southern Africa. As a result of climate change we are on the path to a Southern African region somewhere in the second half of the century that is going to be a completely different world to the one that we are used to today.

Regional increases in temperature from as much as 6 degrees Celsius and more is forecasted for this area due to increasing global warming. This means that many of the typical things we farm in Africa, such as maize or beef cattle will no longer be possible.

In a country like Botswana where 70% of the population is dependent on cattle, cattle farming will probably no longer be viable. There will also be large scale and widespread problems regarding water security. Southern Africa is becoming considerably hotter and drier. It is fair to say that if people continue to pump greenhouse gasses into the atmosphere at the current rate, we are on route to a regional world here in Africa that is completely different to the world that we are used to.

What were the major findings of the report from the Intergovernmental Panel on Climate Change (or IPCC)?

The report's findings can be summarised into two main conclusions:

1. Drastic impact as a result of climate change worldwide, but particularly in Africa. Southern Africa is identified as one of the regions that is most vulnerable, because it is already very warm and dry. The average temperature increase in these parts is double that of other parts of the world.
2. It is still possible for humankind to limit the global temperature increase to 1.5 degrees Celsius. The first important requirement is to reduce the carbon dioxide emissions by 45% relative to the carbon dioxide emission levels of 2010, by 2030. This means a huge change in the way we generate energy on this planet. We must move drastically away from using coal and oil as our prime energy sources. By 2050 carbon dioxide emissions must have been completely eliminated. That is how big the challenge is.

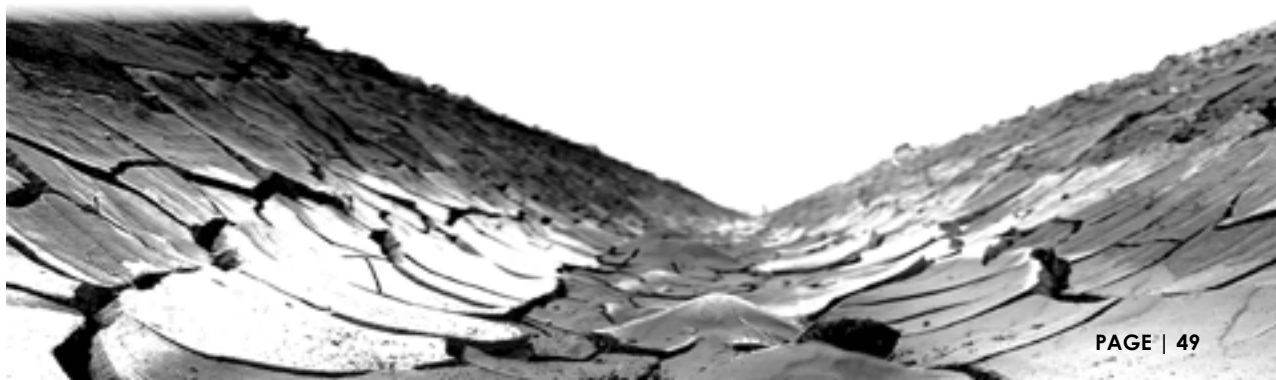
What would have to change/be done?

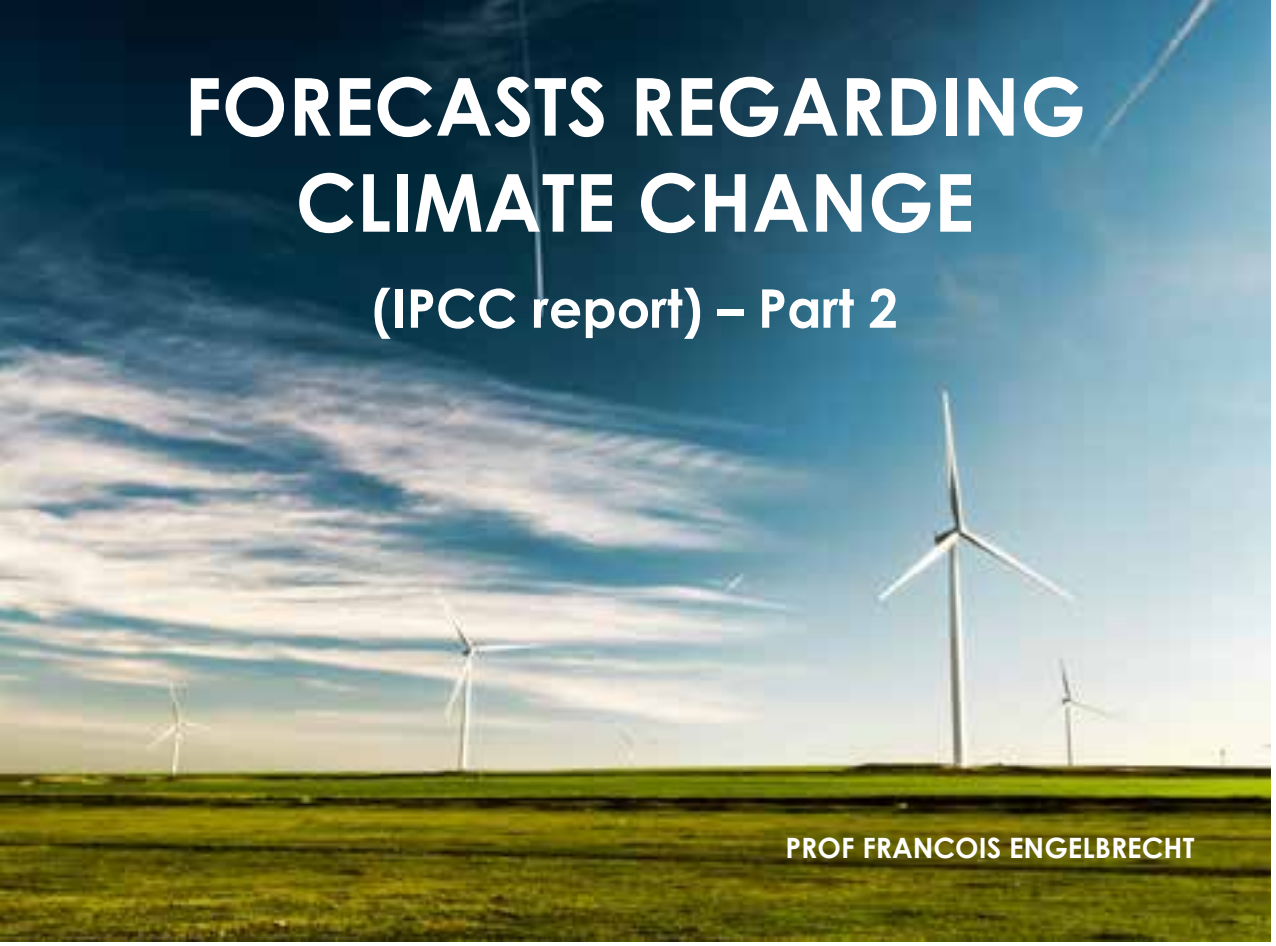
There are two main sources of renewable energy that we will have to use increasingly: wind and solar energy. There is currently not sufficient renewable energy to implement this changeover. We also need an increase in the quantity of nuclear power generated right across the world.

Lastly we must develop technology to remove the carbon dioxide already present in the atmosphere. Such technology that needs to be used on a large scale doesn't presently exist. We have many challenges in terms of further scientific development, but more importantly and urgently, we need strong policies around the world to reduce the short term use of coal and oil.

Conclusion

The effect of climate change is concerning, but according to Prof. Engelbrecht at the same time we can also say that a disaster can be avoided by human intervention and willpower.





FORECASTS REGARDING CLIMATE CHANGE

(IPCC report) – Part 2

PROF FRANCOIS ENGELBRECHT

We are continuing our discussion with Prof. Francois Engelbrecht, CSIR's Research Leader on Climate Change and one of the main authors of the Intergovernmental Panel on Climate Change (IPCC) report.

We focus on the expectations of the agricultural sector and the government's role in terms of climate change. The above-mentioned report painted a dim picture in terms of rising temperatures, specifically in Southern Africa.

Does the Paris Climate Accord make provision for what is waiting for Southern Africa in terms of climate change?

At this stage we definitely still have the power to prevent the anticipated temperature increases from happening. If we are going to successfully implement the Paris Climate Accord, then we are looking at increases of 1.5 to 2 degrees Celsius and for Southern Africa that means it will be 3 degrees Celsius or slightly higher. In all probability that means a drier Southern Africa.

South African farmers have experience in keeping their farms operational during periods of great climate variation. They are used to the comings and goings of droughts. The big challenges that we are going to have to deal with are much stronger heat waves than we are used to and also so-called multi-year droughts. It is still possible to farm through one or two years of drought, but if it lasts for three to five years, then it becomes increasingly difficult to keep farming in a sustainable manner.

Every industry within the agricultural sector must look closely and conscientiously at the projected climate changes for those parts of the country that are important to agriculture. We have to try as far as possible to make adaptations and to make our farming as resistant as possible against the impact of climate change.

When it comes to agriculture and food security, there are still many things that we can do to be more innovative in terms of where we farm and how we market food in South Africa.

It is predicted that Southern Africa is going to get drier, as it has been predicted that Eastern Africa is going to get wetter. In the light thereof, we will have to rethink where in the African region we should centralise our agricultural activities. In the future we are going to have to increasingly innovate how we are going to do business with food, electricity and water. There is a possibility that we are going to import electricity on a larger scale from Mozambique in the future. We can even import water from the Zambezi river. This implies a huge investment in infrastructure, but we will have to think on this scale if we really want to maintain a sustainable lifestyle despite the increasing climate change.

Does this also mean drastic lifestyle changes for the man in the street?

We must live as environmentally friendly as we can afford. Those of us that can, must move away from coal energy to solar energy – move off the grid as they say. We must save as much energy as we can. Everyone must do their fair share to

combat climate change. We also have to realise that South Africa alone cannot prevent or fight against climate change. The struggle against climate change and the reduction of greenhouse gases in the atmosphere is a global problem. In particular, we need the USA and China to take great responsibility in this process.

Practically speaking, what steps can we, in South Africa, take?

If we want to make a meaningful contribution, we need to implement an actual national attempt to move away from coal as an energy source and move towards solar power and wind power. Without these changes, no other attempts are going to make much difference.

Is anything happening on government level to make a difference?

In South Africa there have been two very positive developments over the last few years that many people don't know about:

The National Department of Environmental Affairs is a world leader when it comes to combating climate change in Africa. In reality, in the last few years this department has played a leading role in the United Nations' climate change negotiations. So much so, that South Africa had a direct impact on the Paris climate change agreement. Africa and South Africa played an important role in getting the target lowered from an original 2 degrees Celsius to 1.5 degrees Celsius. South Africa's official Whitepaper on climate change aims to drastically reduce greenhouses gas emissions within the next 10 years. The goal is that by 2025 we must reach a plateau with regard to greenhouse gas emissions.

From that point on the emissions should start to drop. The policy is in place and it is now merely a question of implementation.

Conclusion

In a nutshell, sustainability can only be reached through investment in infrastructure to combat climate change. The fight is a global challenge, but everyone can contribute by using renewable energy. In the words of the former, and now deceased, Secretary General of the United Nations, Ban Ki-moon: "We are the first generation that is in a position to end poverty and the last generation that can take the necessary steps to sidestep the worst effects of climate change. Future generations are going to judge us harshly if we don't fulfill our moral and historical responsibilities."

CLIMATE CHANGE AND WEEDS

PROF CHARLIE REINHARDT

They say "onkruid vergaan nie" (weeds are persistent) and it appears as if there is very good reason for this adage. Especially when it comes to agriculture.

A plant that is described as "the wrong plant in the wrong place" can cause great damage and climate change doesn't help. In fact, weeds are likely to become even more 'wicked' than they already are.

We are talking to Extraordinary Professor in Weed Science at Stellenbosch University (formerly Dean of the Villa Academy) and Professor in Agronomy at North-West University, Prof. Charlie Reinhardt, about the agricultural sector's struggle against these stubborn plants.

You have already mentioned that weeds are notorious for causing damage where they occur in the wrong place. Are plants that are classified as so-called "weeds" in truth just normal plants that find themselves in the wrong place?

Indeed. It is especially plants that have adapted very well to the environment where they are found. That means that they are doing very well in relation to the plants we see as desirable, such as crops or the flowers in your garden. When these other plants compete, they are seen as a problem.

How do we differentiate between "good" and "bad" weeds?

Weeds can be both. Even *Cannabis sativa* (dagga) is a good plant for people who use it for medicinal reasons, but it could also land you in jail.

There are some researchers who believe that no plants have more damaging effects on crop cultivation than weeds. Do you agree and if so, why?

It is purely because weeds adapt so well to the local conditions and also to a wide range of environments.

Crop plants are almost like racehorses – they only do well on a racecourse. Take them away from the racecourse and they don't do well, whereas weeds are adapted to a wide range of conditions.

Weeds cause direct and indirect problems – can you give a brief explanation?

The direct result is when weeds grow together with a crop and they actually steal the crops' water and nutrients, as well as sunlight which the crop would have used. When there is a shortage in any one or more of these growth factors the crop usually suffers.

Which is the biggest scapegoat when it comes to the agricultural sector?

In the agricultural sector today, we have specific weed problems in minimum or no-till crop systems. Reduced tillage practice has very good objectives, such as soil and moisture conservation, but it is also an ideal environment for perennial weeds to take root. Under conventional soil tillage you would mainly find annual weeds. Weed control becomes problematic without ploughing as a control method. It is a Catch 22 situation – we need to remember that any action in nature creates a reaction (and often more than one) and one of the reactions is the weeds which we struggle with.

Is it true that there is now also a new threat – an American invader?

Indeed. America's number one weed in cotton, soya beans, maize and other grain crops has literally driven some American farmers to bankruptcy. It is the so-called Palmer amaranth (*Amaranthus palmeri*) which was discovered in February 2018 in South Africa.

One of the theories of how it got here, is that seed was (unwittingly) imported in secondhand farming implements – this theory probably stems from the fact that this was the main way in which the weed spread across the USA.

In southwestern America it is an indigenous plant that was used as a food source for thousands of years by the Incas and the Mayans. It has adapted to dry, hot conditions and that is where the first alarm bells rang with regard to climate change and its invasiveness in South Africa. In America it flourished and spread within ten to fifteen years.

In South Africa we are still doing too little to combat this new threat. In Brazil they literally applied quarantine measures with eradication as the goal, with good results. We cannot apply quarantine, because we do not have the legislation to do it and it will also be very unfair to the farmer

who has this weed. But the government and the industry must do everything in their power to literally smother this weed in the seed (stage).

What is the general effect of climate change on weeds? Does it allow weeds to flourish?

As temperatures rise and less dependable rain falls, certain weeds that are adapted to those conditions, such as Palmer Amaranth, will flourish. Crops that have not been bred for hot, dry conditions are going to suffer. "Genetically modified" (GM crops) has become a curse word in some places, but it is the quickest way for us to adapt our crops to the changing weather conditions and to give them a fighting chance against weeds.

Are you implying that weeds have an unbelievable survival mechanism?

Yes, they have diverse genetics. It is the racehorse and the mule story. It allows them to adapt quickly to a wide variety of conditions, whilst the crops (and people are also in this category) do not adapt quickly enough.

Do weeds also have advantages?

Yes, as mentioned before, the Palmer amaranth was a food source for thousands of years for the Incas and the Mayans. Today we still cultivate Amaranthus species for possible food crops. Then there are also the aspects of medicinal value and fodder for livestock. One of our most important weeds that is found from the Cape to Cairo, is hairy fleabane *(Conyza bonariensis)* and it is an even better feed source than lucerne.

How do we, not being experts, know what to eradicate and what not to?

That is a difficult one. In your garden it is easy. You can remove anything that is not a flower. On the other hand, this very plant that you pull out, may release chemical compounds that keep fungi and insects away from your roses. Pull out plants which are not flowers, if you want to discriminate between plants in your garden. Many consider it unsustainable to just cultivate maize in a land. You have to grow something else with the maize, or there is an ecological imbalance. The secret is how to balance it so that you produce enough food, but at the same time regain biodiversity.

What is the safest way to get rid of weeds?

In your garden, just pull them out by hand. Get the opinion of experts if you use chemical products (herbicides) in order to know what product is appropriate and safe. Incorrect application and over-application of herbicide products are usually problematic. Read the instructions, use the product for what it is intended and follow the instructions.

Conclusion

Today we heard from Prof. Reinhardt that weeds' "roots" are in reality "the root of all evil", because they compete with desirable plants for light, water and nutrients. Weeds are not always bad; at least not where or when they do not interfere with human aspirations. Above ground they compete with desirable plants for sunlight and below ground for water and nutrients, and in most cases the weeds emerge as the winner in the struggle.

An American journalist once said: "Weeds have learnt every possible survival strategy, except to grow in a row."

DONKEYS AND CLIMATE CHANGE

ANNEMARIE VAN ZIJL

Patient, obliging, meek… That is the image that comes up in my and probably other people's minds when they think about donkeys…

It is estimated that donkeys have been "in service" to humanity for at least 5 000 years and for millions of people in Africa (and also elsewhere) "Big Ears" are essential for their survival.

We are interviewing Annemarie van Zijl from the Eseltjiesrus Donkey Sanctuary, outside McGregor in the Western Cape, about this hardworking, but also hugely underestimated and abused animal, and also to find out how climate change affects the continent's donkeys.

At the moment donkeys are on the brink of their biggest survival crisis – not only are they being slaughtered for their skins, but the extreme weather and especially the rising temperatures are busy putting tremendous survival pressure on these unique "workhorses".

When people hear the word "donkey" many immediately think: a stupid animal… but you can tell a different story?

Donkeys are extremely clever, more so than horses. They analyse situations and then handle them according to the most favorable survival choice. In the days when rainfall was still high at Eseltjiesrus, there was a stream between two camps and the donkeys were reluctant to walk through it – it was an unknown, and who knows what lurks beneath the water. Then you had to choose one that was a little braver than the others, walk through with him and then the others will follow.

If you want to make a comparison with horses – you can teach a horse to jump over huge obstacles, but a donkey will look at it and say no, it is not safe. They have much more reasoning ability than horses.

When we receive visitors at Eseltjiesrus, we have found the donkeys to be very intuitive. They quickly notice if a person has problems, or if they are heart sore or need help. A donkey will walk towards such a person and "ask" for a hug. We have already had a few people that burst into tears when they meet such donkeys. Donkeys understand suffering and they recognise it in humans.

There are an estimated 40 million donkeys in the world – are most used as pack and draught animals?

It is estimated that 80% of donkeys (do) work for people. They work to carry water (which is very heavy work), to plough, to transport seed, to transport harvests, to go to the market and to transport people. We all know donkey carts. They take granny to the clinic and the children to school. They are the "bakkie", the truck and the tractor for their owners.

Africa is very vulnerable to climate change and donkeys are commonly used as pack and draught animals. How is global warming going to affect donkeys and is it not already happening?

It is already happening. Donkeys are semi-desert animals and originate from the drier areas of northeast Africa. They are adapted to survive on plants that most other animals could not live on, but across Africa they work to make their owner's survival possible in the most basic and challenging conditions. All the factors that affect subsistence farming, will affect the donkeys.

You have a giant network – have you already received reports of donkeys that are suffering in rising temperatures?

It is a domino effect. Samochima Village in Botswana is a striking example. The fish population in the Okavango river has decreased noticeably. As a result, the crocodiles migrated to places where animals such as buck, donkeys and cattle must drink.

The animals must now walk in further and deeper to drink and are easily caught by the crocodiles. The loss of a donkey is a harsh setback for the owner.

In Nigeria donkeys suffer in many ways because of climate change. They struggle with access to sufficient food and water.

They must walk further to the water sources, which are often wells, for their owners. The water level of the wells drops, so they must work harder to get the water to the top and then transport it. This, without accompanying improvement in their own welfare. They get very little rest and they become exhausted and weak due to malnutrition. They also become easy prey for predators such as lions, wild dogs, hyenas and so forth.

You have a lot of partnerships, among others in Britain: is climate change high on your agenda?

Our group project aims to train (land) owners to use alternative farming practices. We place emphasis on conservation agriculture e.g. in the Eastern Cape there was a project using oxen to plough. Donkeys replaced them. First they harnessed six to eight donkeys with yokes to pull the heavy plough. It was completely uneconomical on all levels. Lighter equipment was developed; the yokes were adapted and a harness designed for one donkey to work easily with the lighter, adapted equipment. The owners are also encouraged not to plough too deeply, but to apply conservation practices – minimum turning of the soil and use surface layers of manure and plant growth.

How strong are your local partnerships?

We are working closely with a whole number of organisations that promote donkey welfare. We share our knowledge and refer queries to each other so that the person who is closest, can help.

What can be done, if anything, to help donkeys?

Become aware of the vital role donkeys play, especially in remote places. They are the invisible species, with low status and they deserve much more respect. Support organisations that care for the welfare of donkeys. Report incidents that make you feel uncomfortable to the nearest SPCA (Society for the Prevention of Cruelty to Animals) or to us, and we will follow it up.

Is there, specifically in South Africa and southern Africa already initiatives underway to limit the results of climate change on working donkeys?

Definitely. Particularly about the work they do. Owners get trained to care better for their donkeys with suitable shelter, enough water, time to graze and time to rest. Working donkeys' life expectancy is usually 10 to 12 years, but if they are well cared for, they can work until 20 years of age or older. Both owner and donkey benefit if the animal is in a good condition.

Is anything being done to make rural communities that commonly use donkeys as pack animals more aware?

There are several projects across Africa aimed at the education of owners. It is important to train local inhabitants so that the project continues and is independently implemented so that it will not fall to pieces when the presenters move on.

You regularly send a newsletter out to a wide network – tell us what is the aim of this?

"Donkeys for Africa" facilitates communication between organisations that address donkey welfare in Africa. Our network stretches over 18 African countries and is spreading. By sharing information, successes and frustrations we all become more effective. It is also an important medium to recognise and to give encouragement to people who are often isolated and feeling forgotten, to remind them that many of us struggle with the same challenges.

What can the public do to help protect donkeys?

Be aware of the role donkeys still play. Look critically at tourist attractions with donkeys. Cart rides are an example – the donkeys must have time to rest, they must not have sores from the harness and the cart must not be too heavy.

Look especially at so-called "petting zoos" – they must be neat and clean with suitable resting areas, clean water, grazing and feed and they must not breed just to have foals on display. Donkeys are social animals. A single donkey pines for the company of his own kind. If you feel unhappy about something, report cases to us or the SPCA.

How can we contribute to change the image of the donkey and do away with the stigma of a mere "dumb beast" and "work donkey"?

Understand that they are humble, patient animals that think. Act as a donkey ambassador. Visit our website or others and learn more about these animals that are still so important. Emphasise the value of the donkey as a working animal. A donkey is a lifelong team member that contributes to the security of his human family and who works harder than any other animal. Donkeys are not animals of the past, but a species of the future and must thus be cherished.

Conclusion

Annemarie van Zijl and her husband from the Eseltjiesrus Donkey Sanctuary are special people that manage a special place – a safe refuge for ill-treated, neglected and "thrown-away" donkeys. Eseltjiesrus' task is actually far greater and the challenges are increasing as the temperature rises. I hope that today we are all going to look at donkeys with greater appreciation – because yes, a donkey is a wonderful thing!