# The Impact of Air Pollution on Public Health through the Lens of the South African Weather Service Air Quality Monitoring Programme

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# Outline

- Introduction
- SAWS Observation Network
- SAAQIS Network
- Air Pollutants and Quality Management
- Air Quality and Human Health Impacts
- Concluding Remarks

# Introduction

- The South African Weather Service (SAWS) is an entity of the Department of Forestry, Fisheries and the Environment (DFFE)
- SAWS is the authoritative voice for weather and climate in South Africa

**South African Weather Service Act (No. 8 of 2001)**

- Mandate:
  - Provide weather and climate services to all South African citizens
  - E.g., public good (weather, climate and air quality monitoring services
  - Sector-specific (and tailor-made) solutions and services

**South African Weather Service Amendment Act, 2013 (Act No. 48 of 2013)**

- Mandate:
  - Maintain, extend and improve the quality of meteorological services for the benefit of all South Africans; include, among others, provisions relating to the
  - South African Air Quality Information System (SAAQIS) and the National Ambient Air Quality Monitoring Network (NAAQMN)

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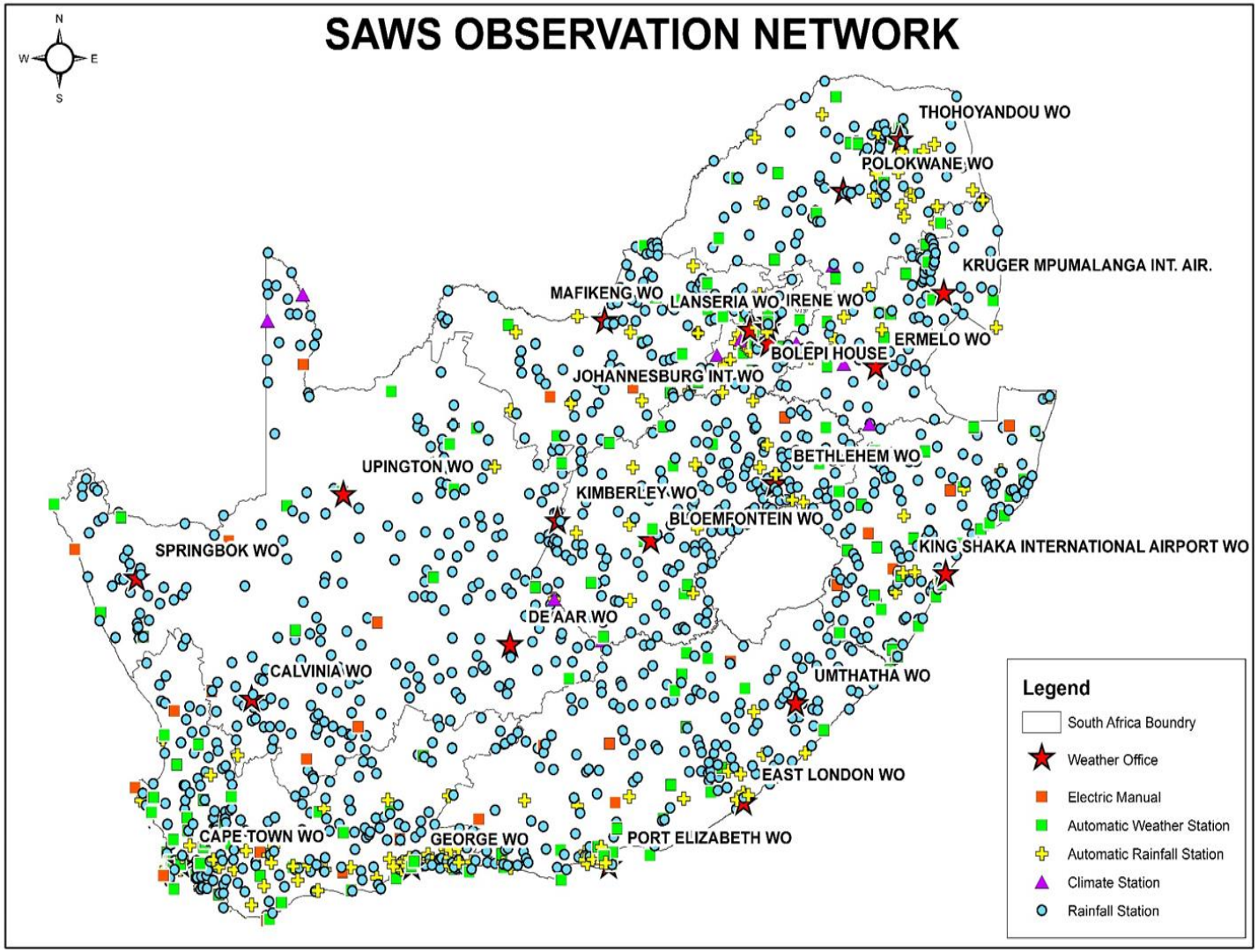
# SAWS Observation Network

- Vast observation network of stations managed by SAWS-including SAAQIS network

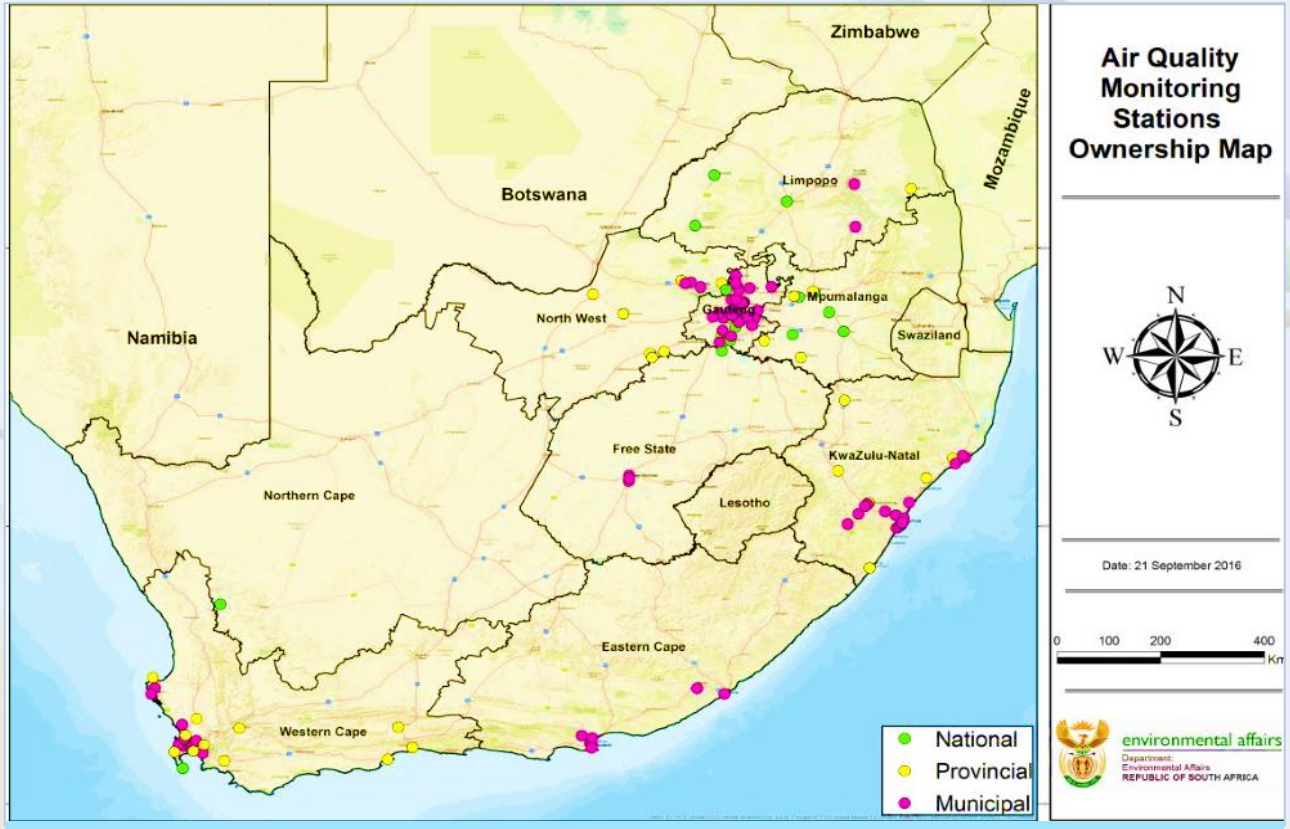



**1277**
Rainfall stations
**214**
Automatic weather stations
**141**
Automatic rainfall stations
**25**
Climate stations
**24**
Lightning sensors
**14**
Radars
**10**
Upper air stations
**13**
Solar radiation stations
**17**
UVA & UVB radiation stations
**1**
Global Atmosphere Watch station

**20**
Weather Offices

# SAAQIS Network

- There are currently 135 government owned stations across the country and 50 private stations




**Source**: Editorial- South African Air Quality Information System (SAAQIS) mobile application tool: bringing real time state of air quality to South Africans

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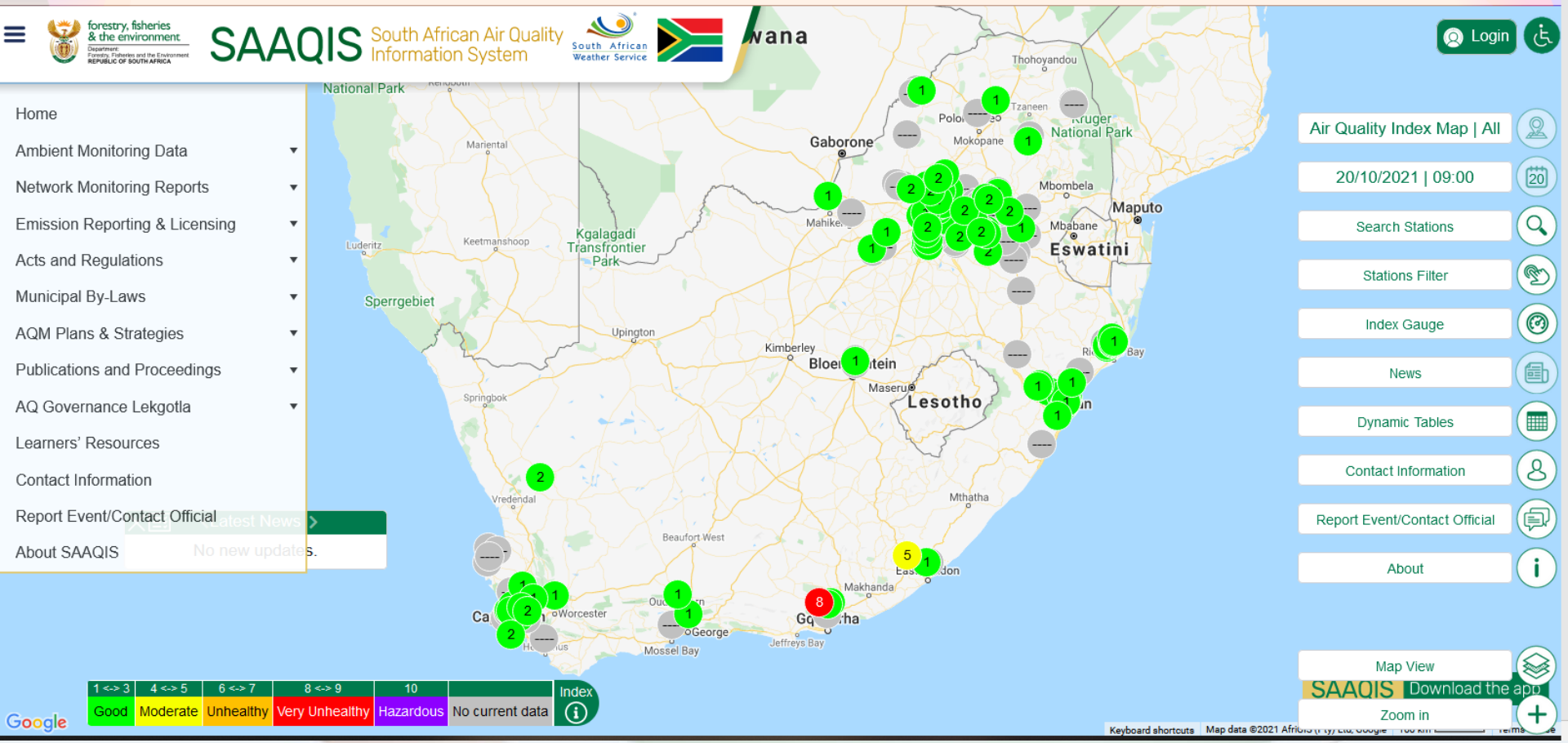
# SAAQIS Website




https://saaqis.environment.gov.za/

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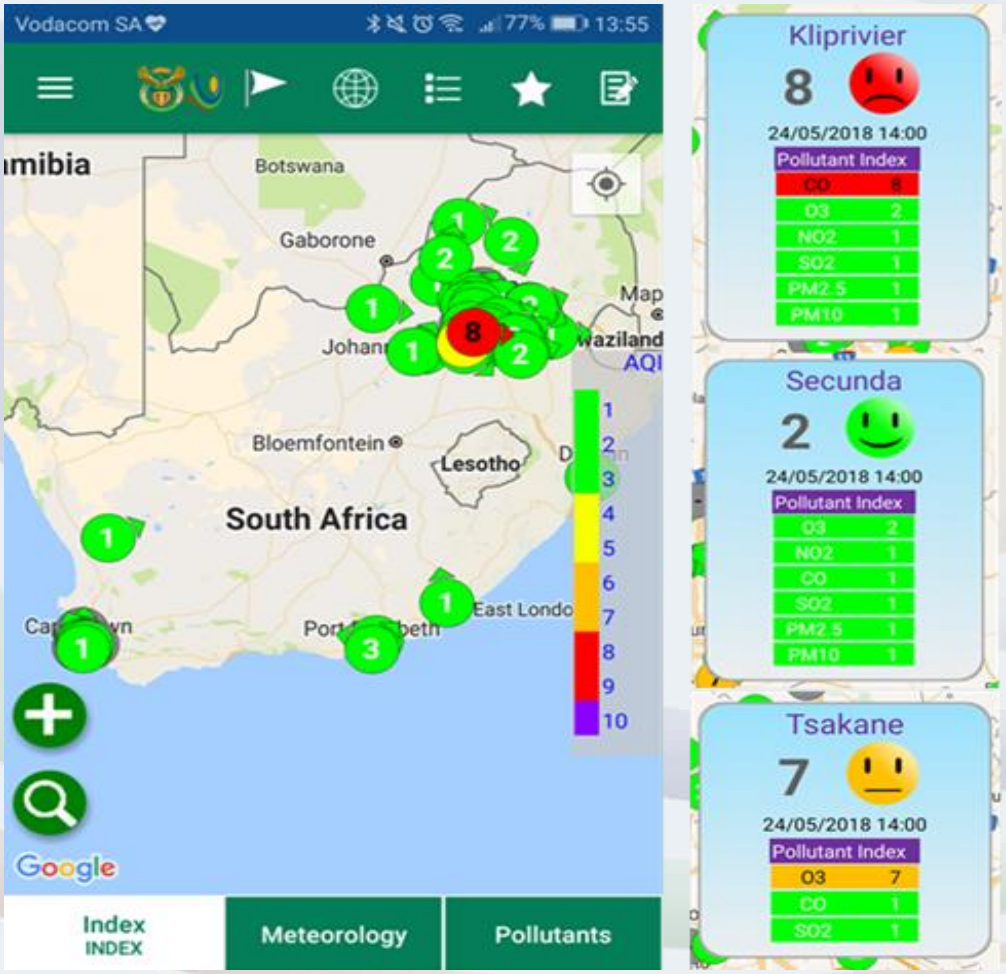
# SAAQIS APP

## Available on Android and on IOS

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# Air Pollutants

- There are many air pollutants that pollutes our environment

| Criteria Pollutants | Main Sources |
|---|---|
| Carbon monoxide (CO) | • Vehicle emissions<br>• Bush fires |
| Nitrogen dioxide ($NO_2$) | • Vehicle emissions<br>• Industry emissions<br>• Power plants<br>• Gas stoves |
| Sulphur dioxide ($SO_2$) | • Power plants<br>• Oil refineries |
| Particulate Matter ($PM_{10}$ & $PM_{2.5}$) | • Industry (mining)<br>• Vehicle emissions<br>• Dust storms<br>• Bush fires |
| Ozone ($O_3$) | • Not emitted, but form through chemical reaction of gasses in the air |

**air contamination**


**Stricter regulations**

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# Air Quality Management

- Air quality management through air quality limits and thresholds
- National Ambient Air Quality Standards (NAAQS) are standards established under the National Environmental Management: Air Quality Act 39 of 2004
- Standards specify the level of concentration of number of pollutants that are allowed in the air
- Standards are set to protect human health (mostly the vulnerable), animals and properties
- Each locality and country set standards depending on number of local conditions
  - Technological feasibility (electric cars)
  - Economical factors (investments)
  - Political and social factors

**Is there compliance to the set air quality standards?**


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# Unhealthy levels of Air Pollution

## Non-compliance in $O_3$, $PM_{10}$ and $PM_{2,5}$

Summary of Exceedances of Ambient Air Quality Standards record at VTPAMN (01 January 2021 – 31 July 2021)

| Pollutant & Averaging Period | Standard | Annual Number of Permitted Exceedances | Station Name | Exceedances Per Month | | | | | | | | | | | | Total Exceedances to Date |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | January | February | March | April | May | June | July | August | September | October | November | December | |
| PM10 24h ★ | 75 µgm$^{-3}$ | 4 | Zamdela | 0 | 0 | 1 | 8 | 16 | 18 | 22 | | | | | | 65 |
| | | | Three Rivers | 0 | 0 | 12 | 19 | 9 | 8 | 22 | | | | | | 70 |
| | | | Sharpeville | | | | | | | | | | | | | 0 |
| | | | Sebokeng | 0 | 0 | 0 | 5 | 9 | 13 | 20 | | | | | | 47 |
| | | | Kliprivier | 0 | 0 | 0 | 8 | 13 | 12 | 22 | | | | | | 55 |
| | | | Diepkloof | 0 | 0 | 0 | 1 | 0 | 0 | 2 | | | | | | 3 |
| PM2.5 24h ★ | 40 µgm$^{-3}$ | 4 | Zamdela | 0 | 0 | 1 | 4 | 8 | 17 | 17 | | | | | | 47 |
| | | | Three Rivers | 0 | 0 | 2 | 8 | 6 | 7 | 3 | | | | | | 26 |
| | | | Sharpeville | | | | | | | | | | | | | 0 |
| | | | Sebokeng | 1 | 0 | 0 | 2 | 8 | 12 | 15 | | | | | | 38 |
| | | | Kliprivier | 1 | 0 | 0 | 6 | 15 | 14 | 13 | | | | | | 49 |
| | | | Diepkloof | 1 | 0 | 0 | 1 | 0 | 1 | 1 | | | | | | 4 |
| $SO_2$ 10 min | 191 ppb | 526 | Zamdela | 0 | 0 | 0 | 0 | 0 | 9 | 10 | | | | | | 19 |
| | | | Three Rivers | 0 | 0 | 0 | 2 | 2 | 0 | 2 | | | | | | 6 |
| | | | Sharpeville | | | | | | | | | | | | | 0 |
| | | | Sebokeng | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | | | | | 1 |
| | | | Kliprivier | 0 | 0 | 0 | 0 | 5 | 0 | 0 | | | | | | 5 |
| | | | Diepkloof | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| $SO_2$ 1h | 134 ppb | 88 | Zamdela | 0 | 0 | 0 | 0 | 0 | 3 | 2 | | | | | | 5 |
| | | | Three Rivers | 0 | 0 | 0 | 1 | 1 | 0 | 1 | | | | | | 3 |
| | | | Sharpeville | | | | | | | | | | | | | 0 |
| | | | Sebokeng | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| | | | Kliprivier | 0 | 0 | 0 | 0 | 3 | 0 | 0 | | | | | | 3 |
| | | | Diepkloof | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| $SO_2$ 24h | 48 ppb | 4 | Zamdela | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| | | | Three Rivers | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| | | | Sharpeville | | | | | | | | | | | | | 0 |
| | | | Sebokeng | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| | | | Kliprivier | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| | | | Diepkloof | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| $NO_2$ 1h | 106 ppb | 88 | Zamdela | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| | | | Three Rivers | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| | | | Sharpeville | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| | | | Sebokeng | | | | | | | | | | | | | 0 |
| | | | Kliprivier | 0 | 0 | 0 | 0 | 1 | 0 | 0 | | | | | | 1 |
| | | | Diepkloof | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| $O_3$ 8h (Running) ★ | 61 ppb | 11 | Zamdela | 2 | 7 | 4 | 0 | 0 | 0 | 0 | | | | | | 13 |
| | | | Three Rivers | 22 | 6 | 12 | 1 | 0 | 4 | 5 | | | | | | 50 |
| | | | Sharpville | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| | | | Sebokeng | 2 | 0 | 0 | 0 | 0 | 0 | 1 | | | | | | 3 |
| | | | Kliprivier | 10 | 3 | 9 | 0 | 0 | 0 | 0 | | | | | | 22 |
| | | | Diepkloof | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| CO 1h | 26 ppm | 88 | Zamdela | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| | | | Three Rivers | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| | | | Sharpeville | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| | | | Sebokeng | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| | | | Kliprivier | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| | | | Diepkloof | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| CO 8h (calculated on 1 hourly averages) | 8.7 ppm | 11 | Zamdela | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| | | | Three Rivers | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| | | | Sharpeville | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| | | | Sebokeng | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| | | | Kliprivier | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| | | | Diepkloof | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |

# Unhealthy levels of Air Pollution

Non-compliance in $O_3$, $PM_{10}$ and $PM_{2,5}$

**Table 4: Summary of exceedances of ambient air quality standards record at WBPAMN (December 2018).**

| Pollutant & Averaging Period | Standard | Annual Number of Permitted Exceedances | Station Name | January | February | March | April | May | June | July | August | September | October | November | December | Total Exceedances to date |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PM10 24h ★ | 75 µgm$^{-3}$ | 4 | Lephalale | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Mokopane | 0 | 0 | 2 | 1 | 12 | 23 | 12 | 26 | 23 | 9 | 0 | 1 | 109 |
| | | | Thabazimbi | 0 | 0 | 0 | 0 | 2 | 8 | 5 | 3 | 9 | 0 | 0 | 0 | 27 |
| | | | Xanadu | 0 | 0 | 0 | 2 | 3 | 3 | 1 | 20 | 7 | 0 | 0 | 0 | 36 |
| PM2.5 24h ★ | 40 µgm$^{-3}$ | 4 | Lephalale | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Mokopane | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 4 |
| | | | Thabazimbi | 0 | 0 | 1 | 0 | 0 | 7 | 1 | 0 | 1 | 0 | 0 | 0 | 10 |
| | | | Xanadu | 0 | 0 | 10 | 9 | 1 | 26 | 9 | 27 | 26 | 8 | 12 | 2 | 130 |
| $SO_2$ 10 min | 191 ppb | 526 | Lephalale | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | | | Mokopane | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Thabazimbi | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Xanadu | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $SO_2$ 1h | 134 ppb | 88 | Lephalale | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| | | | Mokopane | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Thabazimbi | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Xanadu | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $SO_2$ 24h | 48 ppb | 4 | Lephalale | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Mokopane | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Thabazimbi | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Xanadu | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $NO_2$ 1h | 106 ppb | 88 | Lephalale | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Mokopane | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Thabazimbi | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Xanadu | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $O_3$ 8h (Running) ★ | 61 ppb | 11 | Lephalale | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 54 | 0 | 0 | 0 | 62 |
| | | | Mokopane | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Thabazimbi | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Xanadu | 12 | 9 | 4 | 0 | 0 | 0 | 0 | 24 | 75 | 48 | 42 | 51 | 265 |

**Table 6: Summary of exceedances of ambient air quality standards record at HPAMN (01 January 2018 – 31 December 2018).**

| Pollutant & Averaging Period | Standard | Annual Number of Permitted Exceedances | Station Name | Exceedances Per Month | | | | | | | | | | | | Total Exceedances to Date |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | January | February | March | April | May | June | July | August | September | October | November | December | |
| PM10 24h ★ | 75 µgm$^{-3}$ | 4 | Ermelo | 4 | 15 | 8 | 5 | 17 | 20 | 20 | 18 | 19 | 9 | 4 | 4 | 143 |
| | | | Hendrina | - | - | - | - | - | 4 | 5 | 7 | - | - | 0 | 0 | 16 |
| | | | Middelburg | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | | | Secunda | 18 | 5 | 1 | 4 | 16 | 16 | 3 | 22 | 17 | 1 | 0 | 0 | 103 |
| | | | Witbank | - | 0 | 0 | 7 | 11 | 13 | 10 | 21 | 21 | 8 | 1 | 0 | 92 |
| PM2.5 24h ★ | 40 µgm$^{-3}$ | 4 | Ermelo | 4 | 12 | 4 | 6 | 17 | 19 | 17 | 11 | 10 | 0 | 0 | 0 | 100 |
| | | | Hendrina | - | - | - | - | - | 3 | 1 | 3 | - | - | 0 | 0 | 7 |
| | | | Middelburg | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | | | Secunda | 20 | 5 | 2 | 5 | 16 | 17 | 9 | 17 | 12 | 0 | 0 | 0 | 103 |
| | | | Witbank | - | 0 | 1 | 7 | 9 | 12 | 11 | 16 | 17 | 1 | 0 | 0 | 74 |
| $SO_2$ 10 min | 191 ppb | 526 | Ermelo | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| | | | Hendrina | 3 | 0 | 3 | 1 | 2 | 0 | 1 | 0 | 4 | 0 | 4 | 1 | 19 |
| | | | Middelburg | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| | | | Secunda | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Witbank | 0 | 0 | 0 | 1 | 2 | 0 | 4 | 0 | 0 | 6 | 1 | 0 | 14 |
| $SO_2$ 1h | 134 ppb | 88 | Ermelo | 0 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| | | | Hendrina | 1 | 0 | 1 | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 6 |
| | | | Middelburg | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Secunda | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Witbank | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 3 |
| $SO_2$ 24h | 48 ppb | 4 | Ermelo | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Hendrina | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Middelburg | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Secunda | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Witbank | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| $NO_2$ 1h | 106 ppb | 88 | Ermelo | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Hendrina | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Middelburg | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Secunda | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Witbank | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $O_3$ 8h (Running Averages) ★ | 61 ppb | 11 | Ermelo | 4 | 0 | 2 | 0 | 0 | 0 | 0 | 7 | 36 | 3 | 0 | 10 | 62 |
| | | | Hendrina | 7 | 2 | 0 | 0 | 0 | 0 | 0 | 9 | 69 | 15 | 14 | 0 | 116 |
| | | | Middelburg | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 5 |
| | | | Secunda | - | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 11 | 5 | 0 | 0 | 22 |
| | | | Witbank | 187 | 90 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 284 |

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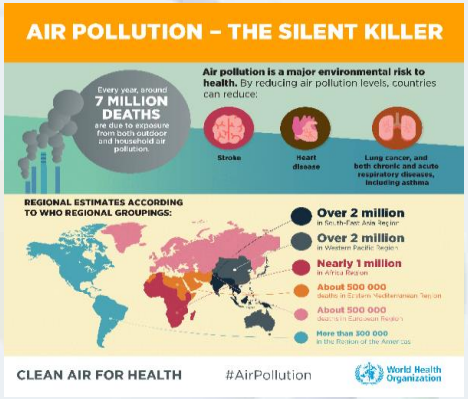
# Air Pollution, Human Health and Well-being

- Air quality is an important public health issue
- Exposure to air pollution cause short-term and long-term health effects
- Health effects depend on number of factors (type of pollutant, concentration, length of exposure and individual characteristics)
- Symptoms vary from minor (irritation of the nose, eyes and throat) to severe medical conditions such as: lung diseases, heart diseases, stroke and cancers)
- Increase in hospital admission and mortality
- The most vulnerable include the elderly, children  under the age of 5, people with pre-existing chronic or lung diseases





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# Air Pollution, Human Health and Well-Being Global Perspective

- **92%** of the world's **population** lives in places where air quality levels exceed **WHO limits**
- Exposure to air pollution causes millions of premature deaths and healthy years of life lost every year *[WHO 2021 AQ Guidelines]*
- **About 7 million** people are killed by air pollution **annually** *[https://www.who.int/health-topics/air-pollution#tab=tab_1]*
- Of that, about **4.2 million** people exposed to ambient air pollution die **from stroke, heart disease, lung cancer,** and **acute and chronic respiratory diseases** *[https://www.who.int/health-topics/air-pollution#tab=tab_2]*
- **Low- and middle-income countries**, and **vulnerable groups** such as **children, women and people with pre-existing diseases** are at greatest risk
- Exposure to **household air pollution** is a leading cause of **disease and premature death** in the above-mentioned countries and groups
- In 2013, the World Health Organization's International Agency for Research on Cancer (IARC) classified outdoor air pollution and specifically **Particulate Matter as carcinogenic** *[WHO 2021 AQ Guidelines]*

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# Air Pollution, Human Health and Well-being South African Perspective

- Few local studies on air quality and human health
- **Evidence** on air pollution and human health is **growing** (through research and publication output)
- Local scientists are conducting research that will **inform policy** to **transit to low carbon economy**

- Previous studies estimated:
  - In 2000, **outdoor pollution** contributed **4%** to **national mortality** from **cardiopulmonary disease** and **5% attributable** to **cancers** of the **trachea, bronchus and lungs** in adults 30 years and older *[Norman et al., 2007, S Afr Med J]*
  - In 2000, household **air pollution** affected **20%** of **households** in South Africa and caused **2 500 deaths** mainly among **Black Africans** *[Norman et al., 2007, S Afr Med J]*
  - **7.4%** of all **deaths** in South Africa in **2012** were due to chronic exposure to fine **PM,** costing the country up to **6%** of its **GDP** (IGC study, 2016)
  - In 2016 **PM emissions** caused **305** to **650 deaths** in the Highveld Priority Area [Gray 2016]


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# SAWS contribution to Air Quality and Human Health Research

- SAWS in collaboration with South African Medical Research Council (SAMRC) and the Department of Health (DoH) has completed the National Burden of Disease (NBD) study attributable to ambient air pollution

- **The following diseases attributed to poor air quality were assessed:**
  - Lower Respiratory Tract Infection (LRTIs)
  - Trachea
  - Bronchus
  - Lung cancers
  - Diabetes
  - Ischemic Heart Disease (IHD)
  - Stroke
  - Chronic Obstructive Pulmonary Disease (COPD)

- The impacts are presented at both national and provincial scales in terms of death, disability-adjusted life years, years of life lost, and years of life lived with a disability
- The NBD study is currently under review and will be released soon by the Department of Health along with SAWS and SAMRC
- The outcome of the NBD will be communicated to the public, scientific communities, as well as to both regional and national decision/policy makers through scientific publications and etc

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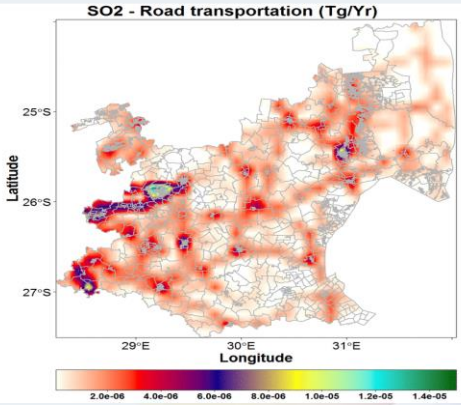
# SAWS contribution to Air Quality and Human Health
# Product: Scenario-Based Air Pollution Management Tool

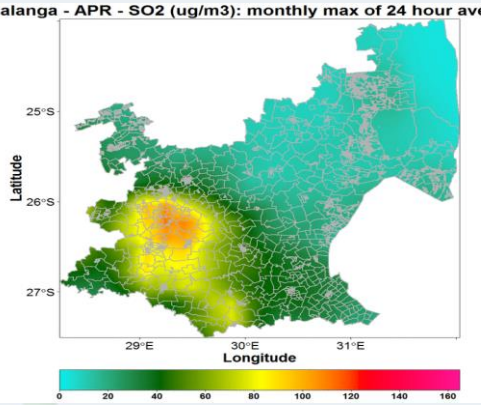
- ❑ Quantile downscaling of sector-based emission scenarios and multi-scenario model simulations for Mpumalanga
- ❑ The product package includes 4 major components:

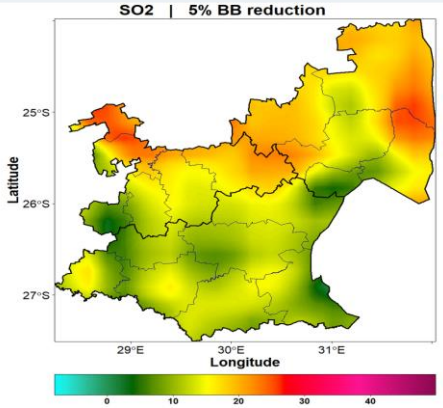
i. Downscaled localized emission estimates
ii. Spatio-temporal distributions and threshold of photochemical pollutants
iii. long-term climatological information
iv. Sector-based simulations of photochemical pollutants

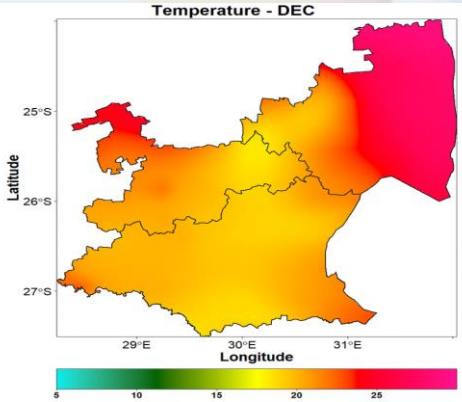
- ❑ Benefits

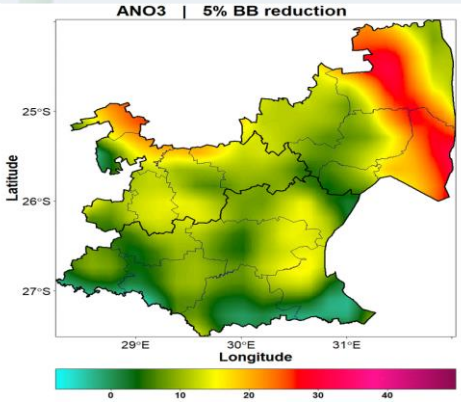
Support provincial and national policies and strategies on Air quality and health

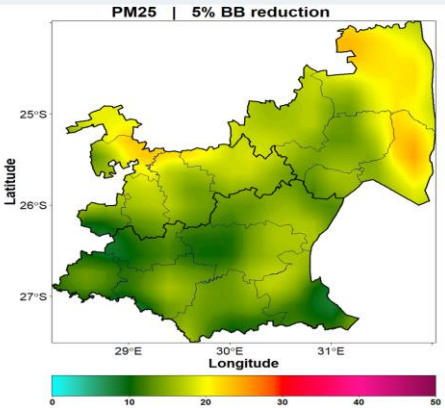


# Concluding Remarks

- South Africans are affected and vulnerable to poor air quality
- Mortality and morbidity cases are high, straining our health system
- Enforce compliance through targeted regulatory actions on taxes and polluting activities
- Reduce sources of air pollutants by adopting low emissions technologies (shift to energy efficient and cleaner energy sources and public transportation)
- Behavioral changes in business model and lifestyle (e.g., travel actively (walking and cycling), car sharing, teleconferencing, teleworking)
- Improve monitoring (more stations should report to SAAQIS)
- Expand scientific research to inform policy
- Conduct cost-benefit analysis studies that will determine the impact of air pollution on the economy of South Africa
- Seize low carbon opportunities across all sectors
- Decarbonized economic growth that "ensure healthy lives and promote well-being for all at all ages" (SDG 3)

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# Thank you

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