

**Ref:02/1/5/2**

**MINISTER**

**QUESTION NO. 792 FOR WRITTEN REPLY: NATIONAL ASSEMBLY**

A draft reply to **Mr R K Purdon (DA)** to the above-mentioned question is enclosed for your consideration.

**MS NOSIPHO NGCABA**

**DIRECTOR-GENERAL**

**DATE:**

**DRAFT REPLY APPROVED/AMENDED**

**MS N P MOKONYANE, MP**

**MINISTER OF ENVIRONMENTAL AFFAIRS**

**DATE:**

**NATIONAL ASSEMBLY**

**(For written reply)**

**QUESTION NO. 792 {NW915E}**

**INTERNAL QUESTION PAPER NO. 9 of 2019**

**DATE OF PUBLICATION: 20 March 2019**

**Mr R K Purdon (DA) to ask the Minister of Environmental Affairs:**

What are the details of (a) the strategy adopted by the (i) South African Weather Service and (ii) South African National Parks to embrace the Fourth Industrial Revolution and (b) how the specified entities will use the Fourth Industrial Revolution to (i) track the movement of rhino horn, (ii) predict poaching, (iii) predict the migration of climate zones and (iv) predict where crops should be planted?

**792. THE MINISTER OF ENVIRONMENTAL AFFAIRS REPLIES:**

1. (i) The South African Weather Service (SAWS), as the national meteorological service, operates under the authority of the South African Weather Sevice Act, 2001 (Act No. 8 of 2001), as amended, through the SAWS Amended Act, 2013 (Act No. 48 of 2013). As mandated, SAWS contribute to solutions that relate to extreme weather, natural disasters and climate change and variability. These solutions are fundamentally aimed at saving lives, infrastructure and property, as well as supporting socio-economic development and building societal resilience. To achieve this, SAWS has developed a five-year Strategic Plan (2019/20 – 2023/24) that is particularly aligned with the Fourth Industrial Revolution (hereafter 4-IR).

SAWS strategic plan is anchored on three pillars i.e., science, technology and services. These pillars are supported by the human capital (with requisite knowledge and skills which are suited for 4-IR), inter-institutional and multi/cross-disciplinary collaboration, as well as global and regional linkages. The integration of all these systems with artificial intelligence, indigenous knowledge and machine learning are key to realising the SAWS mission of improving safety and quality of life of the people in South Africa in support of government’s priorities and programs such as the National 9 point Plan.

1. South African National Parks (SANParks) has an IT Strategy that seeks to leverage initiatives delivered over the past years and builds on the successes already achieved towards its desired future state. The strategy is adaptable to the changing technological trends moving towards the 4th industrial revolution. The implementation of the strategy towards this future state has realised a number of initiatives, such as building a sensory network (internet of things –IoT) in support of anti-poaching. SANParks management will continue to build on initiatives in the years to come.
2. (i) **South African National Parks**

SANParks does not have the capability to track rhino horn; however, we can track the movement of poachers and combat poaching as they enter the Park, in their pursuit for rhino horn. In addition, the horn can be traced back to its origin using chip technology, once it has been confiscated at or en route to destination.

(ii) In 2014, SANParks, more specifically the Kruger National Park (KNP), pioneered a multi-facetted program to enhance connectivity and situational awareness. These projects have now evolved to a system where the Internet of Things (IOT) approach resulted in the so called “smart park” concept. The core of this is the common and collaborative platform called C – MORE, developed at the CSIR jointly with Armscor and SANParks. This user friendly platform can be operated by all levels of management (rangers to park wardens) and all agencies involved in EAP, and specifically rhino protection, on any device ranging from smart phones to multi-screen computers in the operation rooms.

Through this system, information is streamed to allow surveillance, early warning, detection and tracking (SEDT), as well as fusion of all information and subsequent data from a suite of sensors. Current sensors include radar, magnetic, seismic, optronic, electronic and acoustic. These sensors can be in the rhino horn, on the rhino, on a fence, in the ground, on the ranger and on vehicles or air craft. It allows in time monitoring of animals, i.e. rhino; but also dogs utilised in the Anti-Poaching Units (APU), own forces and poachers. Intelligent collation and customised programs to process the data subsequently allows for the benefit of some Artificial Intelligence (AI) through predictive modelling in the form of heat maps, graphs, histograms and tables. This informs decision making and more intelligent deployment of resources based on validated trends.

(iii) In the context of the 4-IR, SAWS uses advanced Information and Communication Technology (ICT), Mobile Technology (MT), radar and satellite technologies, and High Performance Computing (HPC) for weather forecasting and climate predictions. Further, the institution runs earth system models on the HPC and processes weather and climate data and information for developing products and services for different climate sensitive sectors such as agriculture, water, energy, health, aviation, marine and for air quality and disaster risk reduction.

In addition, SAWS’ Integrated Service Strategic (ISS) approach integrates innovative technologies, physical, digital and biological systems to generate useful and innovative products and services. SAWS is actively implementing new weather deveopment programes to improve its capibilities in Early Warning Prediction (Weather and Climate), that includes Artifical Intelligence in Numerical Weather Prediction models and data management solutions for big data. SAWS also implemented a new Marine Research Business Unit that is active in implementing operational wave and storm surge forecasting along the coast of South Africa in support of operation PHAKISA.

In this regard, the analysis of long-term historical climatic trends and future climate projections are used for climate zoning. These results are used to derive agro-hydrological products such as heat and chill units, frost, evapotranspiration, as well as other products that are useful for identifying suitable sites and planting dates for different crops under current and future climates.

SAWS data, SANParks weather station records and satellite observations are being used to predict species’ future zones of climate suitability in combination with modeled future climate surfaces based on global circulation models, several of which have been statistically and/or dynamically downscaled for use at a South African scale through the CORDEX project   
(e.g. Engelbrecht et al, CSIR, 2018). Species-specific models are being carried out on an ongoing basis by both South African and international researchers. Amongst the correlative species distribution models used to develop these are those that rely on artificial neural networks (ANN) to predict where species will be able to survive in the future. Principles of Network Flow are being used to identify the pathways of least resistance for each to use to move through the landscape in order to reach these, enabling SANParks to plan strategies to help this climate change adaptation. We hope to use several new and emerging technologies to monitor both climate change impacts and the effectiveness of our strategies to minimise them; these could include environmental DNA, additional satellite imagery (e.g. high-resolution Lidar), more sensitive and detailed weather monitoring and new technologies for measuring air and water quality.

1. The SAWS mobile applications (WeatherSmart APP and AgriCloud APP) are also mobile APPs showing SAWS weather forecasting products, which, for example, are used for planting dates of maize crop. SAWS is constantly exploring and implementing new digital avenues to get the products and services to the citizens of the country so that they can make informed decisions on climate impact. The same solutions are also used for agricultural operational activities. Most importantly, SAWS infrastructure and knowledge generation processes (e.g. development of data mining algorithms) are suitably integrated as early warning systems for weather and climate related extreme conditions such as flooding, droughts and heat waves; thanks to 4-IR.

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