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■ OPINION

When human diseases trample on animal health

Realising that all life is intertwined is crucial to the well-being of man and other species

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THIS year World Wildlife Day (March 3) is celebrated under the theme "Sustaining all life on Earth" and reminds us of the urgent need to intensify the fight against wildlife crime and human-induced reduction of species.

As South Africans, we are familiar with the threats against our wildlife by poachers; however, very few of us realise that there is a silent killer claiming many more lives, namely tuberculosis.

The Kruger National Park (KNP) and Hluhluwe-Imfolozi Park (HiP) are home to some of the largest free-roaming wildlife populations in the world, but here an invisible killer, bovine tuberculosis (bTB) caused by *Mycobacterium bovis* (*M. bovis*), is endemic. Numerous studies have reported on *M. bovis* in more than 27 wildlife species in South Africa, including African elephants, lions, black and white rhinos and wild dogs.

In a 2019 article in *Frontiers in Veterinary Science*, our colleague Michelle Miller and her co-researchers indicated that in 2016 the emaciated carcass of a wild elephant bull had been found near a rest camp in KNP.

Post-mortem examinations revealed that the severely diseased animal had died as a result of tuberculosis-related suffocation, with 80% of the left lung completely diseased.

Shockingly, the bacteria identified to be the cause of the infection was *Mycobacterium tuberculosis* (*M. tuberculosis*), more commonly associated with human tuberculosis (TB).

According to the World Health Organisation's 2019 Global Tuberculosis Report, TB is one of the leading causes of death in people worldwide and it is believed that one third of the world's population is infected with *M. tuberculosis*, with an estimated 10 million new cases in 2018.

There is, however, a neglect towards the potential impact of human TB on other species, especially livestock and wildlife.

Despite the emerging field of One Health – a collaborative, multisectoral, and inter-disciplinary approach to achieve optimal health recognising the inter-

connections between people, animals, plants and their shared environment (One Health Commission, 2020), – few studies have assessed the impact of human diseases on animal health and biodiversity.

More current research has disproven the previous dogma that human TB only affects animals in prolonged contact with infected individuals, such as in the case of companion and zoo animals; confirming that infection can occur following a single brief exposure with limited or indirect contact.

This finding should significantly influence the way we think about the transmission of TB from animals to humans (zoonotic) and from humans to animals (anthroponotic), especially as it relates to wildlife and endangered species.

Although chronic *M. tuberculosis* infection has been extensively documented in captive Asian elephants over the past decade, this case of anthroponosis in a free-roaming environment shows us that human diseases may have a greater impact on wildlife populations in Africa than we previously thought.

Interestingly, the strain (type) of *M. tuberculosis* obtained from the African elephant bull in KNP is commonly found in human TB

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Stellenbosch University (SU)'s Animal TB Research Group implemented a multi-pronged approach to improve knowledge of the epidemiology, pathogenesis and immunology of TB, particularly bTB, in both domestic and wildlife species in southern Africa.

This includes investigating the role of host genetics and immunology in susceptibility to TB; the genetic diversity of mycobacterial pathogens and their impact on wildlife and livestock; and the development of diagnostic tests for numerous host species.

The group has a long-standing relationship with both KNP and HiP and continuously conducts TB and bTB surveillance research in all their infected wildlife species.

Additionally, with state veterinarians the group also assists in all livestock surveillance programmes and supports the community with disease management strategies.

The research done by the SU Animal TB Research Group advances both molecular diagnostics and our understanding of the epidemiology of TB in South African animals.

This research contributes to informing policy, strengthens conservation efforts and guides public health decisions regarding the human-animal interface.

With the increasing interaction between humans and animals, a renewed global commitment to the One Health approach is required in order to manage zoonotic and anthroponotic diseases.

The realisation that all life on earth is intertwined, that the lines between the health and well-being of all species is blurred, is crucial to global health and preventing the collapse of delicate biodiverse ec systems.

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patients in South Africa, and it is thought that transmission may have taken place during indirect contact through contaminated food or infectious biological discharge, such as urine.

Researchers from Finland have shown that pathogenic mycobacteria in fresh human urine from TB patients could survive for up to two weeks at 30°C and up to six weeks at 15°C. This highlights the impor-

wildlife, and are a global health concern.

To bridge these research gaps, continued disease surveillance in domestic animals and wildlife is required to determine the presence and extent of infection with both TB and bTB. To this extent

