One Health approach and African trypanosomiasis in Guinea

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African trypanosomiasis is a parasitic disease caused by a protozoan of the genus *Trypanosoma*, which is transmitted from one mammal to another through the bite of the tsetse fly. In 2025, the WHO officially declared that human African trypanosomiasis (HAT) had been eliminated as a public health problem in Guinea. This disease wreaked havoc during the 20th century, particularly in the Guinée forestière. Thanks to medical surveys and improved living conditions, such as the widespread installation of wells in villages, the last cases of HAT in the Guinée forestière date back more than 20 years. However, while Guinea's goal was to eliminate human transmission by 2030, the recent massive development of pig farming in the Guinée forestière raises the question of the potential role of these animals as a reservoir for the parasite. In addition to implementing an epidemiological surveillance strategy based on the diagnosis of suspected cases, the Guinean National Control Programme for Neglected Tropical Diseases, in collaboration with the Institut de recherche pour le développement (IRD, French National Research Institute for Sustainable Development), decided to update entomological and veterinary data according to the One Health approach (Figure 1).

Surveys are ongoing in the Guinée forestière to determine the trypanosomiasis transmission route from 2022 to 2024. A strong spatial distribution pattern was observed: tsetse flies were only captured in Gouécké area (northern zone), while none were found in the Yomou area (southern zone). Analysis of pig blood samples also revealed a specific immune imprint for trypanosomes in 27% of the pigs, with parasites found in 9.5% of them. Our data show a perfect spatial correlation: in the southern zone, where no tsetse flies were caught, pigs are trypanosome-free. In the northern zone, where tsetse flies were caught, a high proportion of pigs were trypanosome carriers. Molecular studies showed the presence of *T. congolense* (9%) and *Trypanozoon* (45%), including one pig harboring *T. b. gambiense*, the agent of HAT, which could present a risk of spillover from pigs to humans.

To understand the influence of the landscape configuration on this pattern, we are exploring the digital twin paradigm[1]. We plan to integrate heterogeneous spatial data from various sources (e.g. field inventories, remote sensing) and disciplines (e.g. epidemiology, ecology, social sciences) into an information system that will enable us to analyse the interrelationships between the various One Health dimensions. Subsequently, AI-assisted participatory planning will allow stakeholders to design and implement better-informed management actions (e.g. installation of tiny targets), whose effects will be measured and monitored through the digital twin.

1. The digital twin is a virtual representation of a real-world system or process, used to simulate, analyze, and optimize its behavior in real time.

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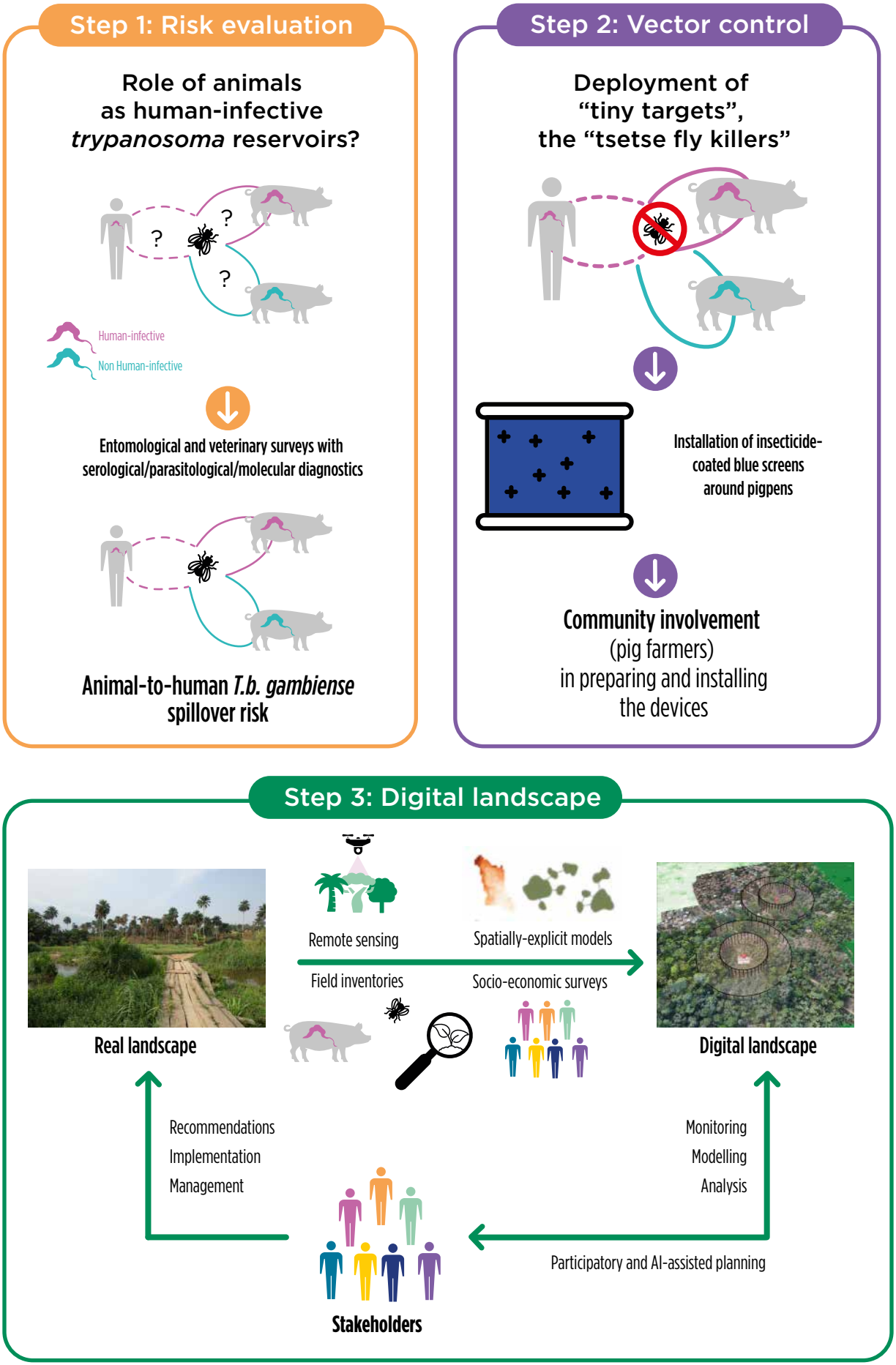

Figure 1. One Health strategies to unravel the role of animals as reservoirs of human African trypanosomiasis.

ONE HEALTH ATLAS

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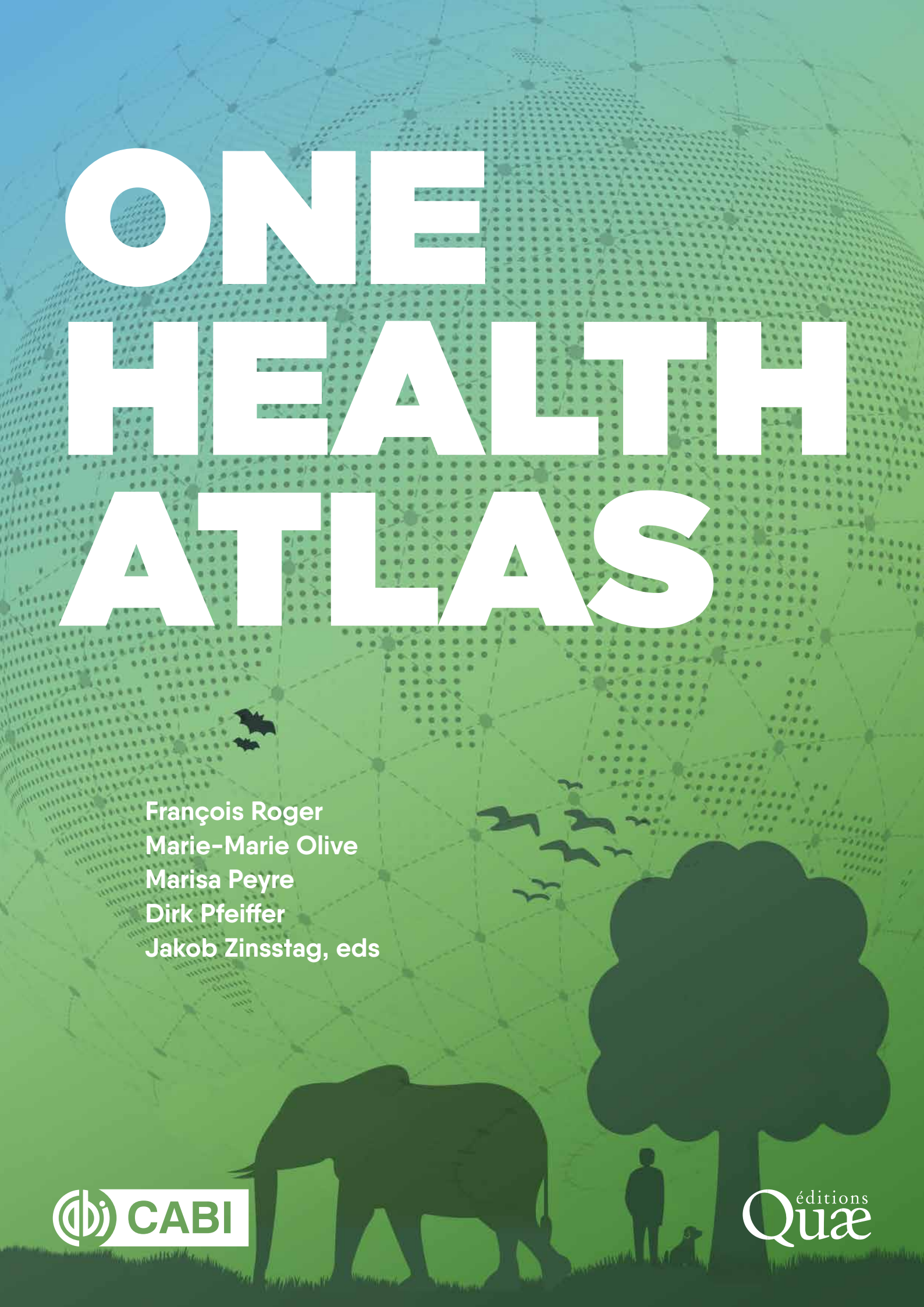

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