Food and Agriculture Organization of the United Nations

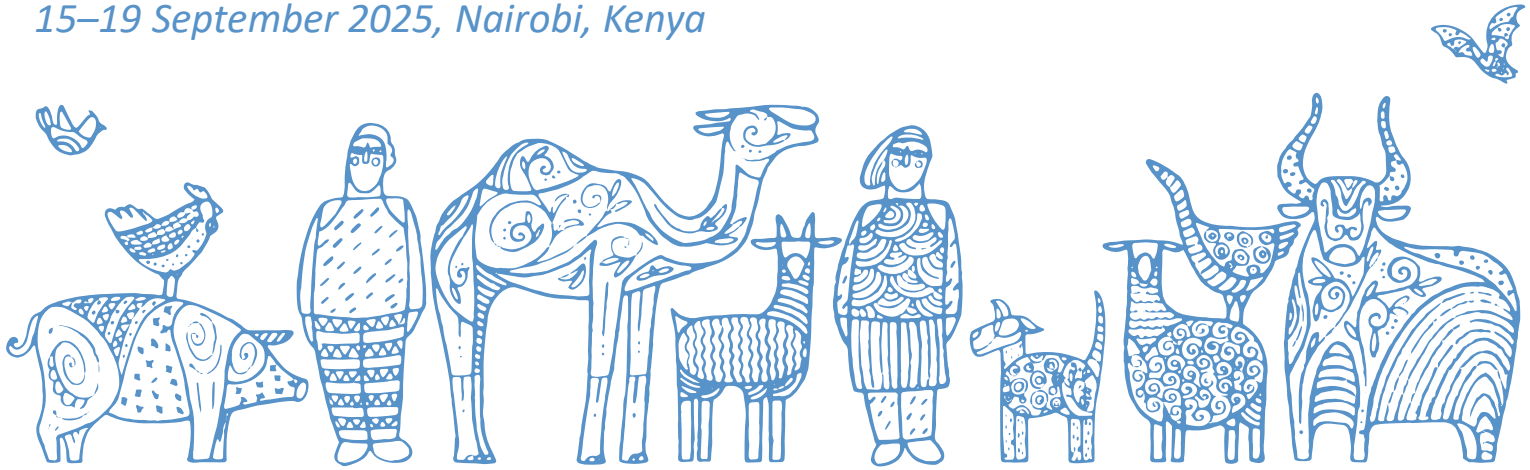
SUSTAINABLE DEVELOPMENT GOALS

Gates Foundation

The project 'Disease intelligence & modelling for progressive control of animal trypanosomosis in Africa' (DIMCAT)

37th Conference of the International Scientific Council for Trypanosomiasis Research and Control (ISCTRC)

15–19 September 2025, Nairobi, Kenya



Cecchi G.*, Ngari N., Paone M., de Gier J., Onyango S., Barreaux A., Thévenon S., Solano P., Kaye A., Tennant W., Tildesley M.J., Halos L.

**Programme Against African Trypanosomosis (PAAT), Animal Production and Health Division (NSA)*
Food and Agriculture Organization of the United Nations (FAO)

Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

Programme Against African Trypanosomosis (PAAT)

- FAO Statutory Body
  - 29th FAO Conference (Resolution 5/1997)
  - www.fao.org/paat
- Interagency collaboration
  - **FAO** (Focal Point of PAAT Secretariat)
  - World Health Organization (**WHO**)
  - International Atomic Energy Agency (**IAEA**)
  - African Union-Interafrican bureau for animal resources (**AU-IBAR**)



Food and Agriculture Organization of the United Nations

IAEA International Atomic Energy Agency Atoms for Peace

AFRICAN UNION

World Health Organization

Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

DIMCAT in a nutshell

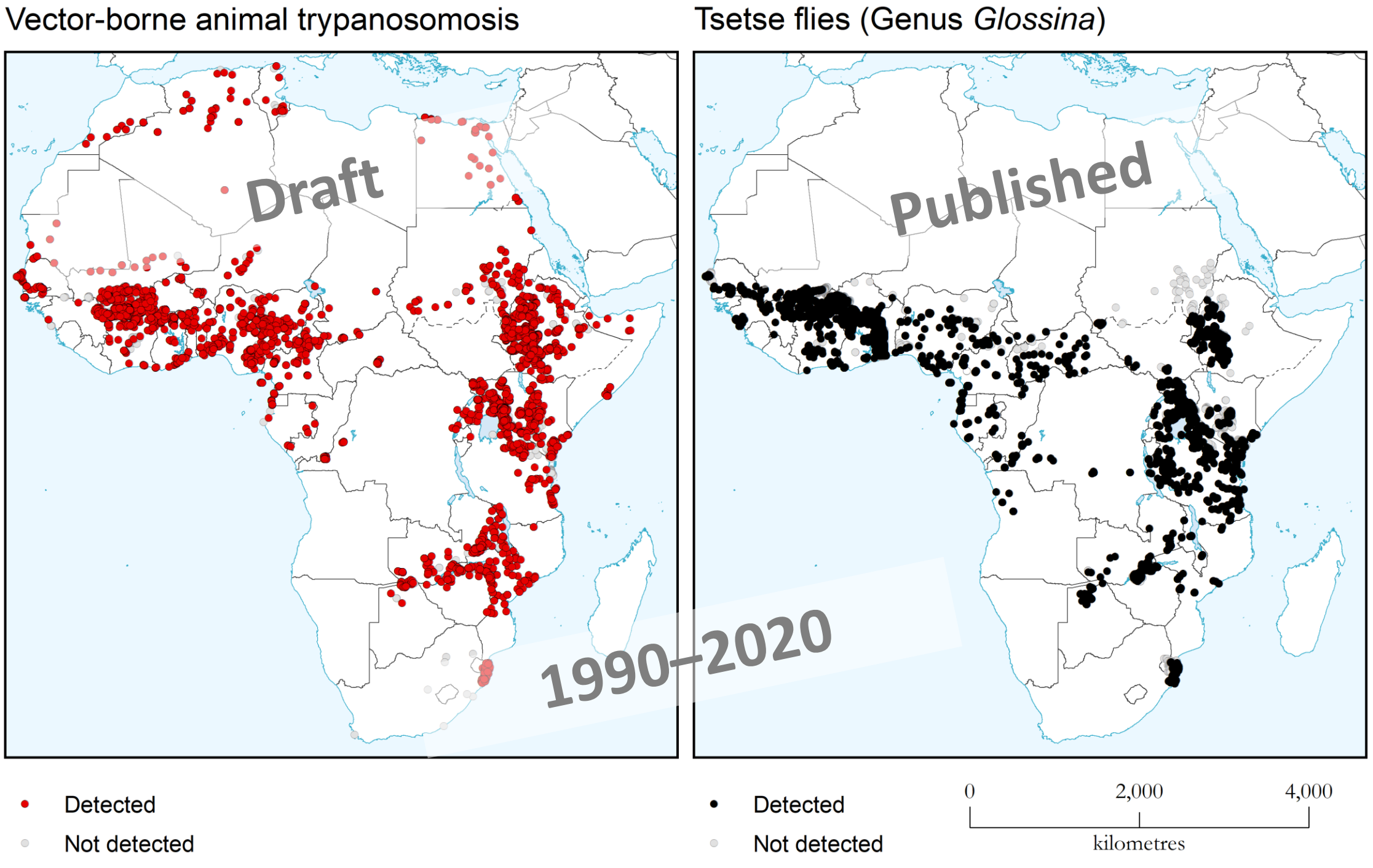
- Overall goal
  - strengthen animal trypanosomosis intelligence and data management capabilities in Africa, including data analysis and modelling
- Technical partners
  - University of Warwick
  - CIRAD/IRD Intertryp
  - Kenya Tsetse and Trypanosomiasis Eradication Council (KENTTEC)
- Duration
  - 3 years (2025–2027)
- Budget
  - 1.7M USD
- Resources partner
  - Gates Foundation

Background: FAO initiatives

- In 2013 FAO launched the development of
  - A **continental atlas** of tsetse flies and animal trypanosomosis in Africa
    - Developed by FAO
  - **National atlases** of tsetse flies and animal trypanosomosis
    - Developed by national veterinary authorities and partners, with FAO guidance and training
- In 2017 FAO launched the development of the
  - **Progressive Control Pathway (PCP)** for African animal trypanosomosis (AAT)

Continental atlas initiative: status before DIMCAT

- Atlas fully developed to the period 1990-2020
- Tsetse distribution component published
  - The continental atlas of the distribution of tsetse flies in Africa. Cecchi et al., 2024. PAAT Technical and Scientific Series, No. 12. Rome, FAO. https://doi.org/10.4060/cd2022en


Vector-borne animal trypanosomosis
Tsetse flies (Genus *Glossina*)
Draft
Published
1990–2020
Detected
Not detected
Detected
Not detected
0
2,000
4,000
kilometres

Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

National atlases initiative: status before DIMCAT



National atlases (progress status)

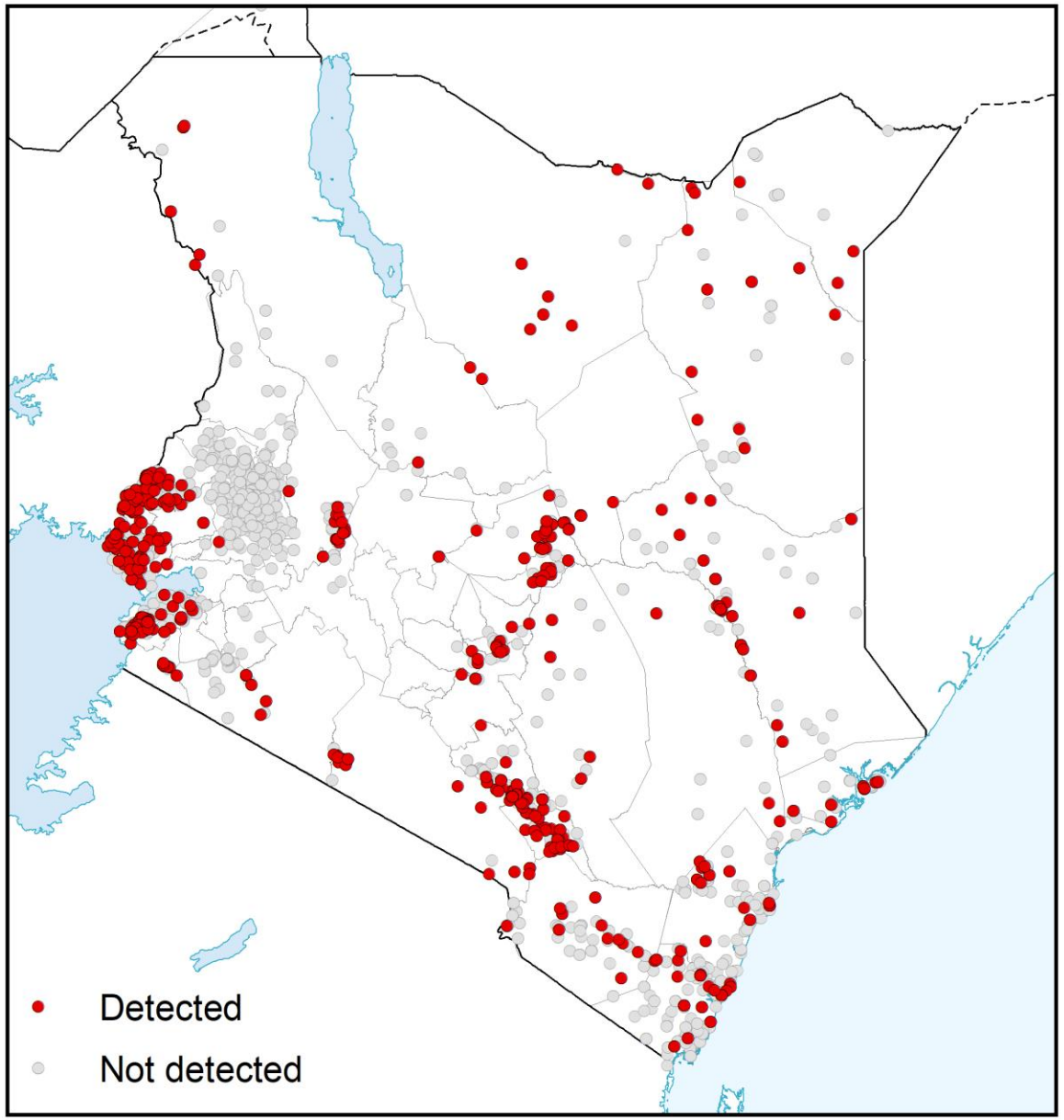
- Not initiated
- Initiated
- Developed
- Developed and published
- Developed, published and updated

Source: Cecchi *et al.*, 2025

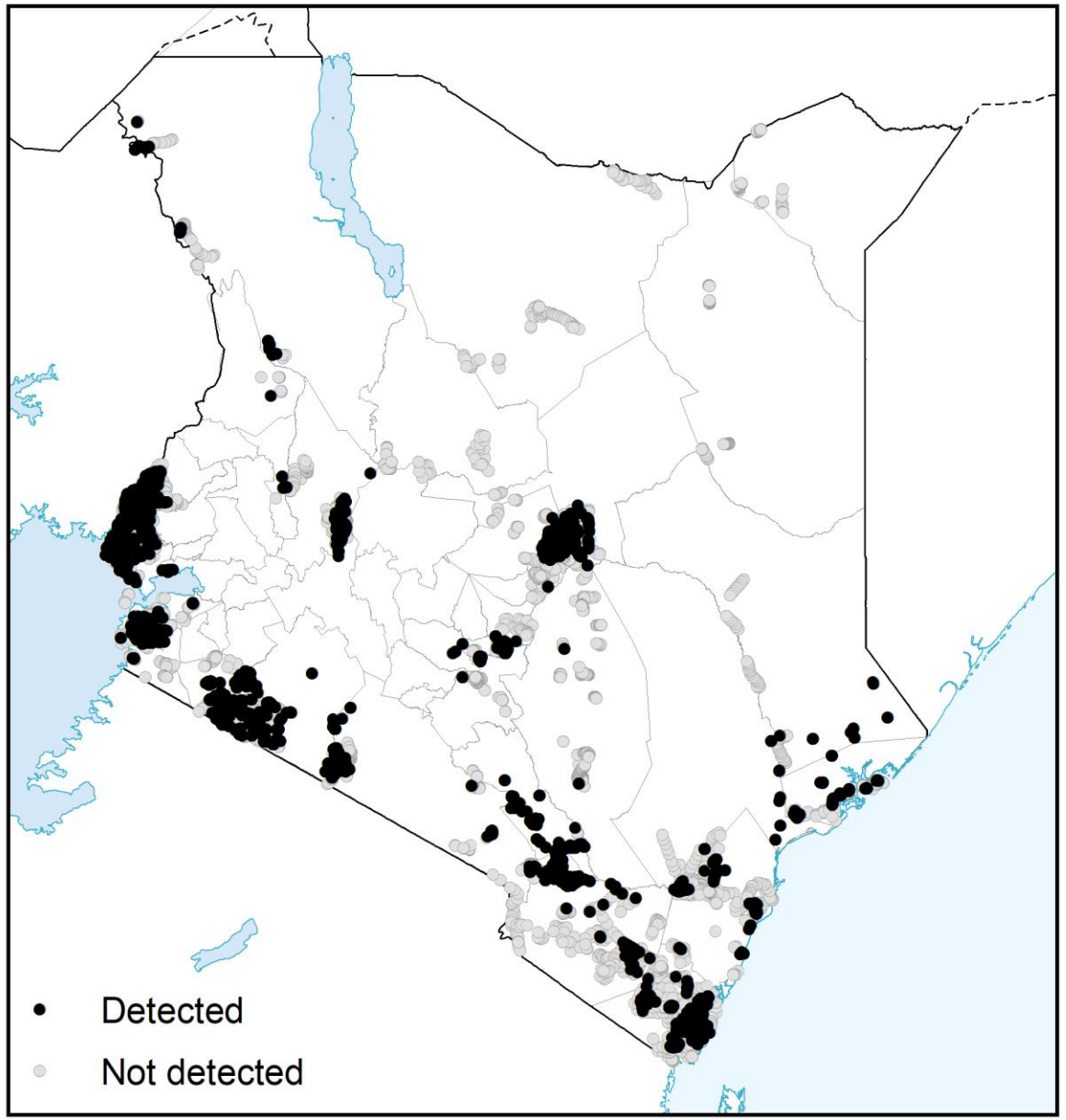
National atlases: the example of Kenya

- Epizootic/entomological atlas
- Control atlas

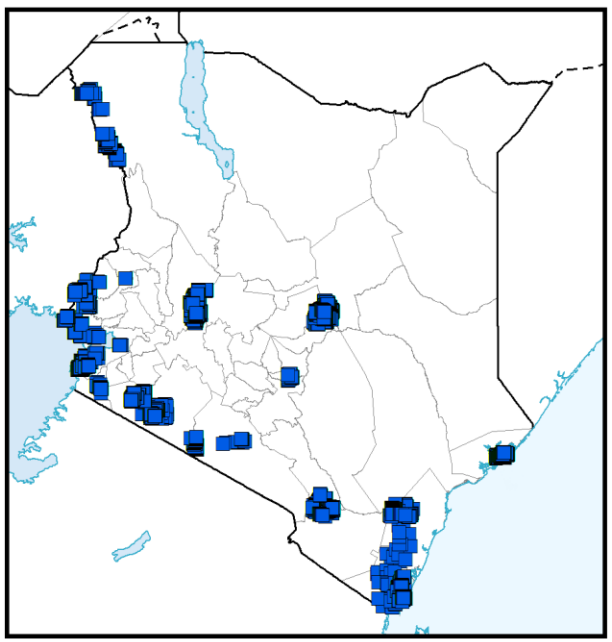
Vector-borne animal trypanosomosis



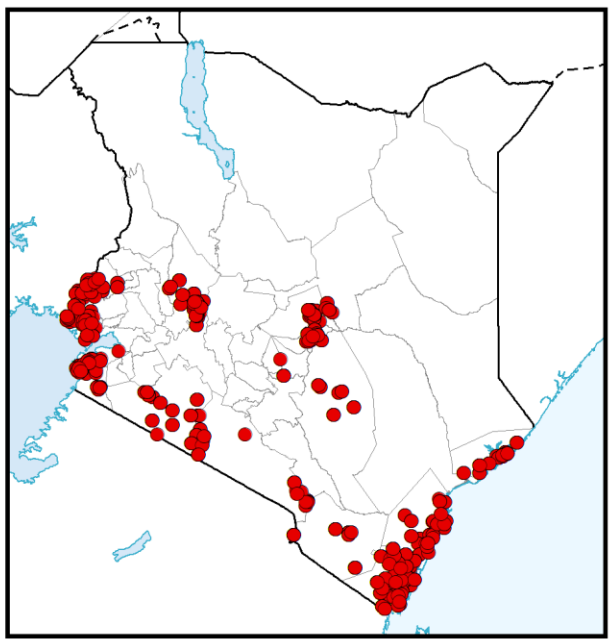
Tsetse flies (Genus *Glossina*)



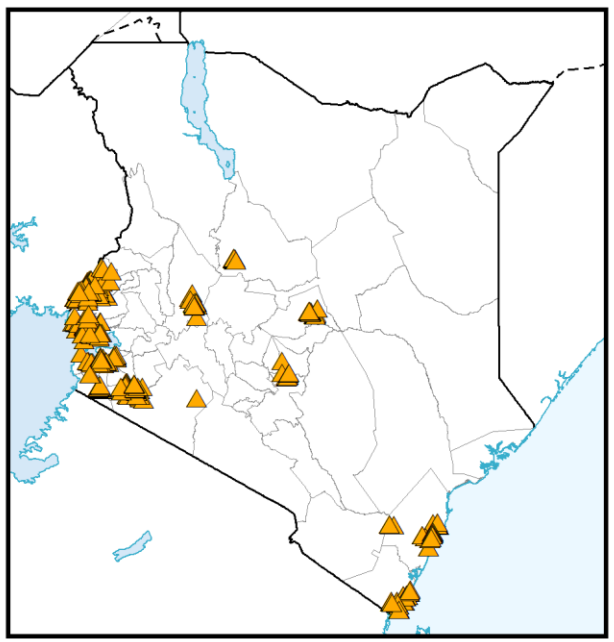
Source: Cecchi *et al.*, 2025



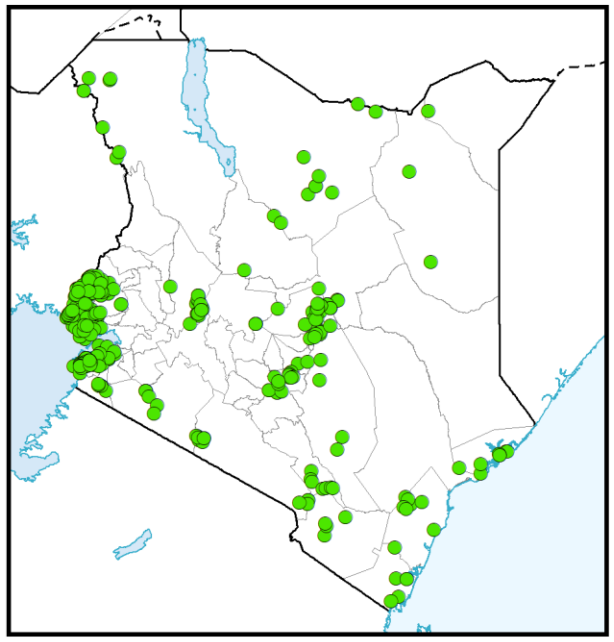
■ Insecticide treated targets



● Insecticide treated cattle



▲ Livestock protective fences



● Trypanocides

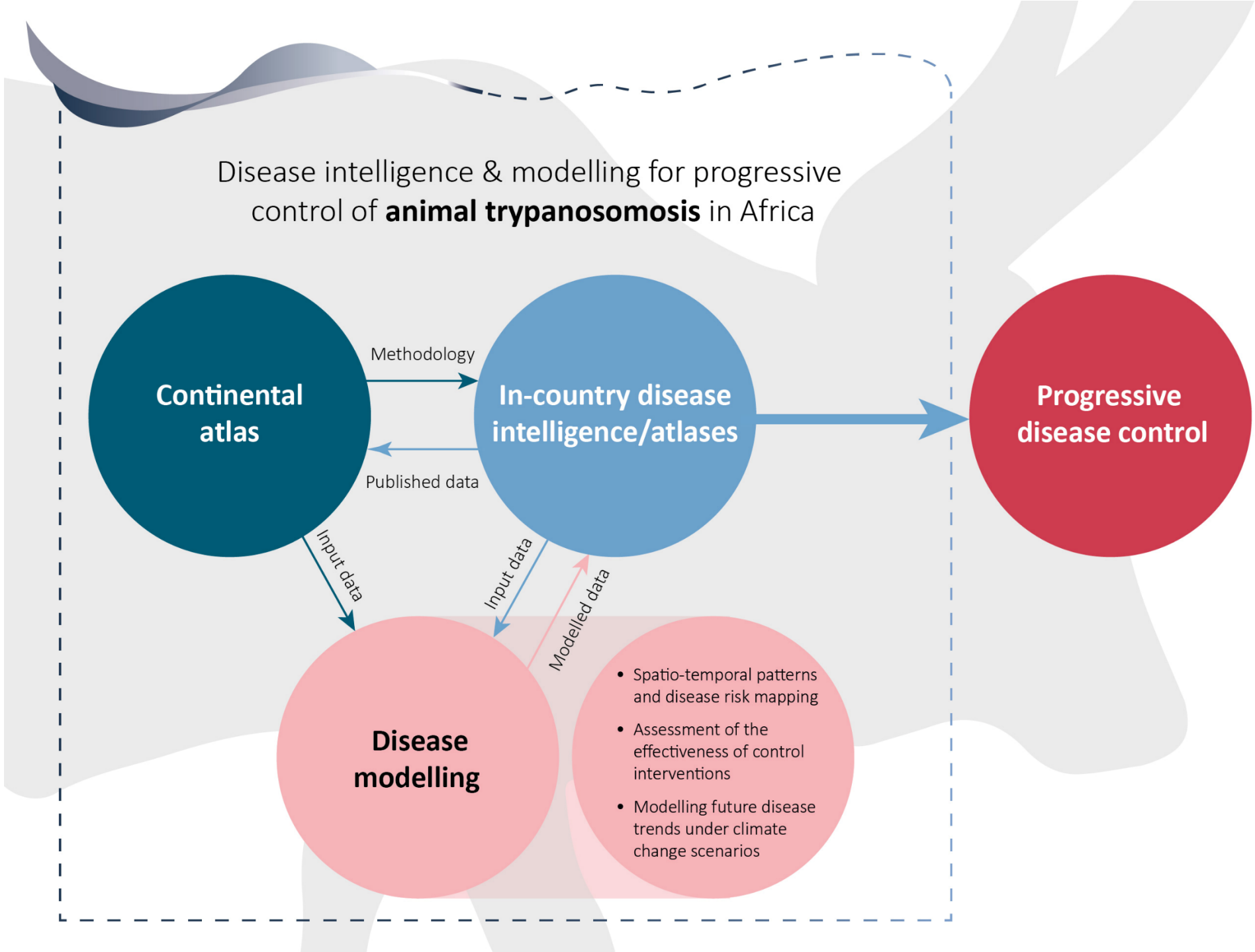
Source: Cecchi *et al.*, 2025

PCP initiative: status

- Opinion paper published
  - Developing a progressive control pathway for African animal trypanosomosis. Diall et al. 2017. *Trends in parasitology,* 33(7): 499-509
- Guidelines drafted (COMBAT project)
  - To be published in 2026
- 11 countries engaged in the development of PCP-smart national strategies and roadmaps

Rationale for DIMCAT

- Sustain FAO work on the atlases to support the PCP
- Carry out a deep-dive analysis of the atlas data to estimate disease risk across different spatial and temporal scales, and in the context of climate change



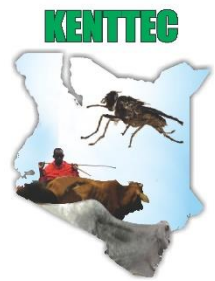
Source: Cecchi *et al.*, 2025

Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

DIMCAT direct partners

- University of Warwick
- CIRAD/IRD Intertryp
- Kenya Tsetse and Trypanosomiasis Eradication Council (KENTTEC)



Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

WP1: Update, enhance and disseminate the FAO continental atlas

- Output 1.1: Updated FAO continental atlas of animal trypanosomosis in Africa developed
  - Update period: 2021-2026
  - Number of papers to be processed: >300
- Output 1.2: FAO continental atlas of animal trypanosomosis in Africa disseminated
  - 'The continental atlas of vector-borne animal trypanosomosis in Africa' published
  - Data made freely available from different data platforms

WP2: In-country disease intelligence for the progressive AT control

- WP2A
  - Continuous FAO support to endemic country teams for national disease intelligence (national atlases)
    - Implementation: FAO
- WP2B
  - PCP-AAT map, workplan and roadmap for Kenya
    - Implementation: KENTTEC

WP2A: FAO support to countries for disease intelligence/atlases

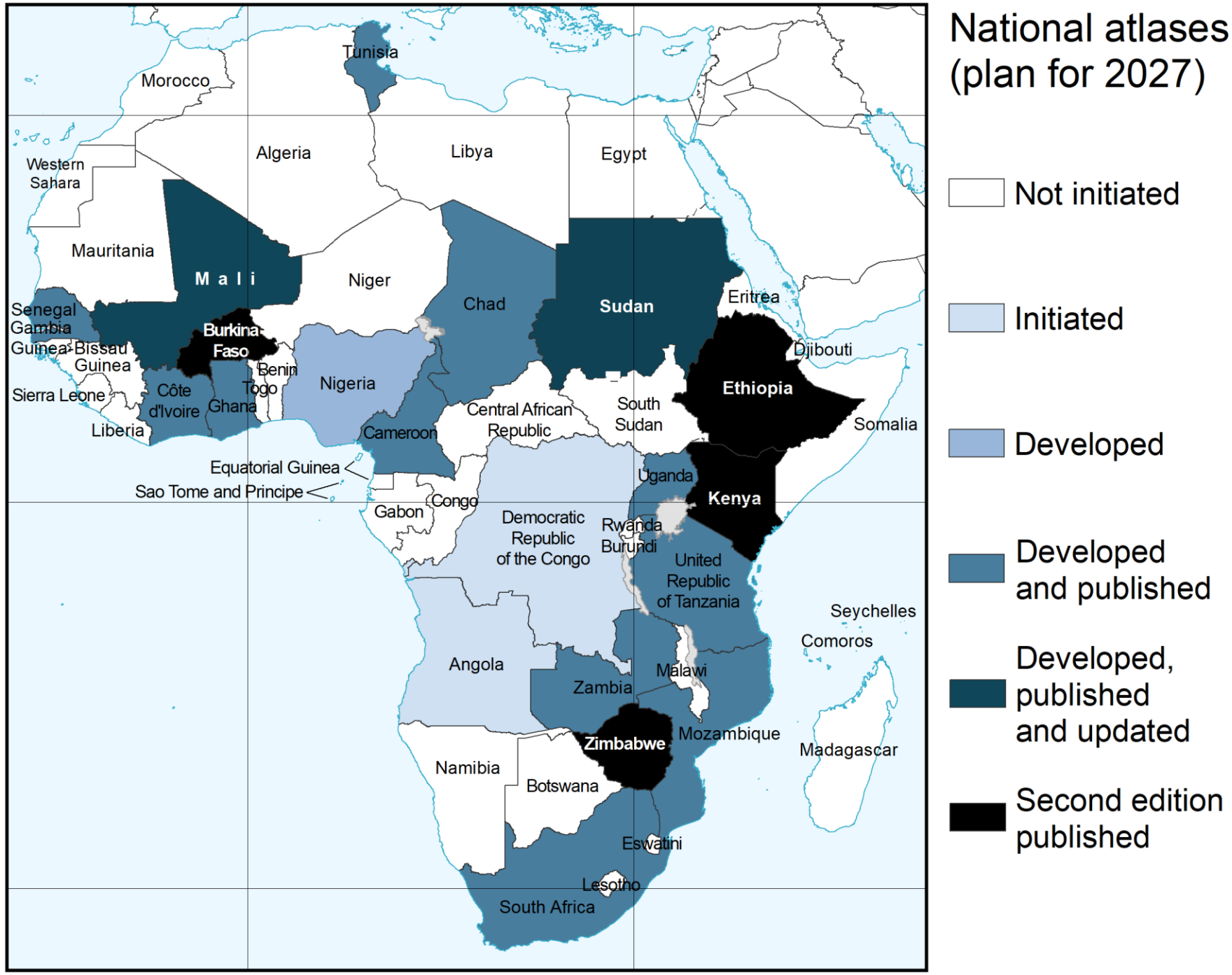
- Output 2A.1: In-country capacities strengthened through FAO support and training (virtual and in person)
  - Priority countries (13 COMBAT countries)
    - Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Ethiopia, Kenya, Mauritania, Mozambique, Senegal, South Africa, Tunisia, Zambia and Zimbabwe.
  - Additional countries, as needed/possible (6)
    - Ghana, Malawi, Mali, Nigeria, Uganda and United Republic of Tanzania
  - Collaboration with IAEA for regional training courses and exchange visits
- Output 2A.2: Elearning course for self-paced learning developed
- Output 2A.3: National atlases documented/disseminated/published



National atlases (progress status)

- Not initiated
- Initiated
- Developed
- Developed and published
- Developed, published and updated

Source: Cecchi *et al.*, 2025



National atlases (plan for 2027)

- Not initiated
- Initiated
- Developed
- Developed and published
- Developed, published and updated
- Second edition published

WP2B: PCP-AAT map, workplan and roadmap for Kenya

- Activity 2B.1.1: To identify stakeholders for engagement
- Activity 2B.1.2: To convene a first multi-stakeholders engagement workshop at the national level
- Activity 2B.1.3: To enhance the national atlas of AT in Kenya, including both epidemiological and control data, by adding existing data from stakeholders (including use of trypanocides).
- Activity 2B.1.4: To share data and expertise with the WP3 partners for the development and testing of a methodology/tool to estimate the impact on disease prevalence of past control activities against tsetse and AT in Kenya.
- Activity 2B.1.5: To combine epidemiological and control data from the Kenya atlas to generate the PCP map at the national level.
- Activity 2B.1.6: To draft a PCP-smart workplan and roadmap
- Activity 2B.1.7: To convene a second multi-stakeholders workshop to present, validate and endorse the PCP-smart workplan and roadmap

WP3: Geospatial modelling and disease risk mapping

- Output 3.1: Refined work plan for WP3 developed
  - All partners
- Output 3.2: Geospatial model of AT prevalence and risk developed for Africa
  - Lead: University of Warwick
- Output 3.3: Environmental niche model for AT in Africa and projections under climate change scenarios developed
  - Lead: CIRAD
- Output 3.4: Tractable analytical/modeling tool for impact/trend assessment at the country level developed and tested in Kenya.
  - Lead: University of Warwick

Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

More information on the DIMCAT project

- FAO/PAAT web site
  - New FAO project targets animal trypanosomosis disease control and intelligence in African countries
- Opinion paper
  - Cecchi, G., Ngari, N., Paone, M., de Gier, J., Onyango, S., Barreaux, A., Thévenon, S., Solano, P., Kaye, A., Tennant, W., Tildesley, M.J., Halos, L., Disease intelligence and modelling for progressive control of animal trypanosomosis in Africa. *Trends in parasitology*, 41(9):734-745. https://doi.org/10.1016/j.pt.2025.07.003

Trends in Parasitology

CellPress

Opinion

Disease intelligence and modelling for progressive control of animal trypanosomosis in Africa

Giuliano Cecchi[1,8,*], Nancy Ngari[2,8], Massimo Paone[1], Jill de Gier[1], Seth Onyango[2], Antoine Barreaux[3,4,5], Sophie Thévenon[3,4], Philippe Solano[3], Alexander Kaye[6], Warren Tennant[6], Michael J. Tildesley[6], and Lénaïg Halos[7]

The transformation of livestock production underway in Africa to support a growing population and the livelihood of farmers cannot be implemented without controlling major endemic diseases, such as vector-borne animal trypanosomosis (AT). Evidence-based decision-making is crucial for cost-effective trypanosomosis control, and through coordinated efforts, disease intelligence is being enhanced at the continental and national level. Information systems on the disease and its vectors ('atlases') have been established for Africa and in 14 high-burden countries. These initiatives underpin the progressive control pathway (PCP), a strategic approach that is being rolled out across the continent. However, information systems need continuous updates, enhanced dissemination and in-depth data analysis, including modelling, if their full potential is to be realized.

Highlights

Fourteen animal trypanosomosis (AT) enzootic countries have developed information systems/atlases that enhance surveillance capacity and generate evidence to inform the implementation of the progressive control pathway (PCP).

The continental atlas for Africa is a unique tool enabling analysis of disease trends and patterns across space and time, and supporting forecasting of global change impacts on AT burden.

Robust analysis and modelling of atlas data are urgently needed to enhance AT risk estimation and to assess the effectiveness of control efforts.

There is a need to sustain ongoing disease intelligence initiatives, expand them to other AT-enzootic countries, and improve data accessibility and dissemination.

The project 'Disease intelligence and modelling for progressive control of animal trypanosomosis in Africa' (DMCAT) will drive significant progress in these priority areas.

Why do we need disease intelligence and modelling for progressive control of animal trypanosomosis in Africa?

Vector-borne animal trypanosomosis (**AT**) (see Glossary) is a disease caused by single-celled parasites of the genus *Trypanosoma*. In Africa, the main species responsible are *Trypanosoma vivax*, *Trypanosoma congolense*, *Trypanosoma brucei*, and *Trypanosoma simiae*, which are transmitted mainly by **tsetse flies** and together cause a form of the disease known as **African animal trypanosomosis (nagana)** [1]. Another *Trypanosoma* species, *Trypanosoma evansi* – closely related to *T. brucei* and transmitted by tabanides and Stomoxys – causes a similar disease called **surra** [2]. While some types of AT also occur in Asia, the Americas, and occasionally Europe [3,4], the disease causes the most serious impact in Africa.

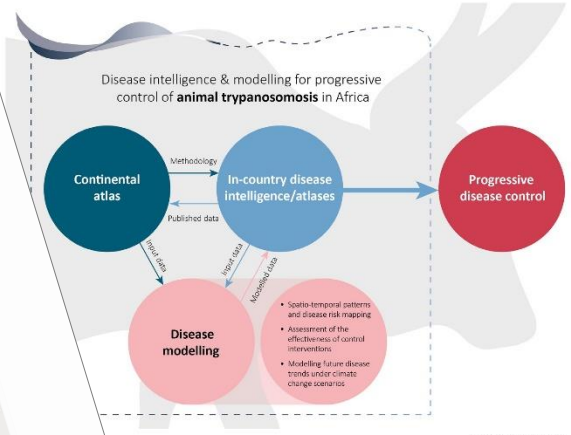
AT remains one of the most severe endemic diseases of livestock in sub-Saharan Africa. The tsetse-transmitted disease threatens more than 55 million cattle [5] as well as other livestock species, and is recognized as a critical barrier to the achievement of the Sustainable Development Goals [6].

By 2050, the population of sub-Saharan Africa is projected to double relative to 2010 levels – an increase of nearly 900 million people. Concurrently, rising incomes and accelerating urbanization are expected to nearly triple the demand for meat, milk, and other animal-sourced foods [7,8]. Improving livestock productivity is a critical engine to bridge the nutrition gap whilst reducing emission intensity and mitigating the sector's projected carbon footprint [9]. This cannot

[1]Food and Agriculture Organization of the United Nations (FAO), Rome, Italy
[2]Kenya Tsetse and Trypanosomiasis Eradication Council, Nairobi, Kenya
[3]INTERTRYP, Univ Montpellier, Cirad, IRD, Montpellier, France
[4]Cirad, UMR INTERTRYP, F-34398 Montpellier, France
[5]CIPE, Animal health theme, Nairobi, Kenya
[6]University of Warwick, Coventry, UK
[7]Gates Foundation, Seattle, USA

https://doi.org/10.1016/j.pt.2025.07.003

© 2025 Food and Agriculture Organization of the United Nations. Published by Elsevier Ltd.



Trends in Parasitology

anosomosis intelligence and modelling for progressive control in Africa. Schematic repre-ns between the continental and national atlases of animal trypanosomosis and the related disease d how they inform and drive progressive disease control.

absence thereof) of AT and tsetse flies in Africa for the period 1990–2020. on more than 1200 scientific publications, tsetse data for over 7000 loca-imately 7600 locations, and almost 1 million animals tested.

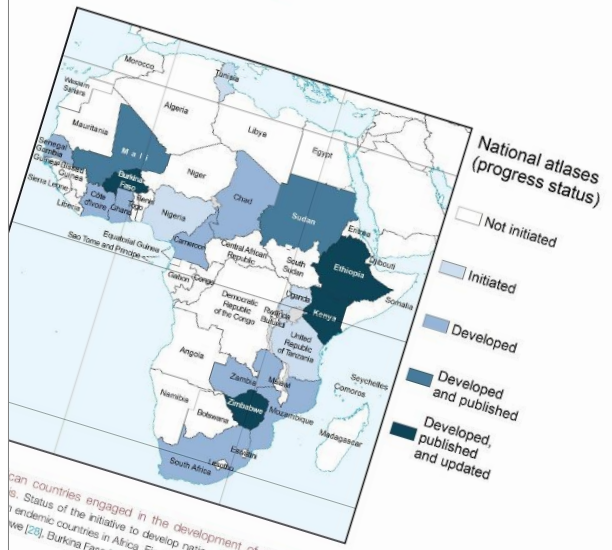
on **Open access** and **Open data**, the continental atlas is published license and the already-published tsetse component includes down-

ystems for decision-making

atlas initiative, FAO also started guiding and supporting endemic f national atlases. The main goal was to strengthen in-country e, and to tap into the vast amount of relevant data that are ature. Over the following years, Sudan [24], Mali [25], Kenya [27], and Ethiopia [26] were the first countries to develop lases, with the publication of the atlas for Ghana in the pipe-, Côte d'Ivoire, Mozambique, Senegal, South Africa, and d developed their atlases in the framework of the project ing the Burden of Animal Trypanosomosis' (COMBAT) in preparation. The methodology was also adopted to ential vectors in Spain [30], with a focus on the Canary eak on mainland Spain [31]. As a general trend, an increasing es are taking steps to develop national-level information systems using

Glossary

African animal trypanosomosis (nagana): the form of animal trypanosomosis caused by parasites mainly transmitted cyclically by tsetse flies in sub-Saharan Africa; the main trypanosome species involved are *Trypanosoma vivax*, *Trypanosoma congolense*, *Trypanosoma brucei*, and *Trypanosoma simiae*, but also a few rarer species (i.e., *Trypanosoma godfreyi* and *Trypanosoma suis*).
Atlas: an information system composed of a data repository for input data and a harmonized, georeferenced database on the occurrence of animal trypanosomosis and its vectors at the national or continental level.
Buffy coat technique (BCT): a parasitological method developed in the 1970s for AT diagnosis based on the centrifugation of blood and the concentration of trypanosomes in the buffy coat layer to facilitate the detection of the parasites; thanks to its relative simplicity and affordability, and despite its limitations in terms of sensitivity, it remains the most widely used diagnostic method for AT surveillance in Africa.
Disease intelligence: data, systems, and procedures that enable decision-making in disease surveillance and control to be based on the best available evidence.
Food and Agriculture Organization of the United Nations (FAO): an agency of the United Nations specialized in supporting governments and partners to design policies and programmes to end hunger and promote food security and sustainable agriculture.
Human African trypanosomiasis (HAT) or sleeping sickness: tsetse-transmitted infection in humans with either *T. brucei gambiense* or *T. brucei rhodesiense*. *T. brucei rhodesiense* is a zoonotic parasite present in livestock and wildlife in eastern and southern Africa. *T. brucei gambiense*, found in western and central Africa, is mainly anthroponotic, although it is sometimes found in nonhuman animals.
Kenya Tsetse and Trypanosomiasis Eradication Council (KENTTEC): a specialized national structure in charge of coordinating all activities of surveillance and control of AT and tsetse flies in Kenya, with the stated mission of eradicating tsetse and trypanosomosis at the national level.
Open access: immediate, irrevocable, and free online access to research



Trends in Parasitology

can countries engaged in the development of national atlases of vector-borne animal s. Status of the initiative to develop national information systems (atlases) of vector-borne animal r endemic countries in Africa. First editions of the atlases already published by Sudan [24], Mali [25], we [28], Burkina Faso [27], and Ethiopia [26].

tional atlases' data beyond the institutions that developed them has been very the existing restrictions also limit the way in which national atlases can contrib-al atlas initiative. There would be merit in promoting a more open data access ases, which could draw on the approach adopted by FAO for the continental ccess to the data underpinning all cartographic products under the terms of ve Commons). However, any envisaged data policy for national atlases izant and respectful of the policies of the countries and institutions that e restrictions that they may entail.

shment of the atlases of AT and its vectors, a similar methodology should ent of comprehensive databases of AT control activities, because it is entomological, and control data that the PCP status of each country nd that progress along the PCP can be measured and mapped.

delling of AT data

of data compiled within the AT atlases, limited analytical work has ck of in-depth analysis significantly hinders the full realization of support tools. Notably, key knowledge gaps persist regarding estock populations, as well as the effectiveness and outcomes this context, a few priorities emerge for advancing the use of ing.

https://doi.org/10.1016/j.pt.2025.07.003

Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

Thank you



Protecting people, animals, and the environment every day

Gates Foundation