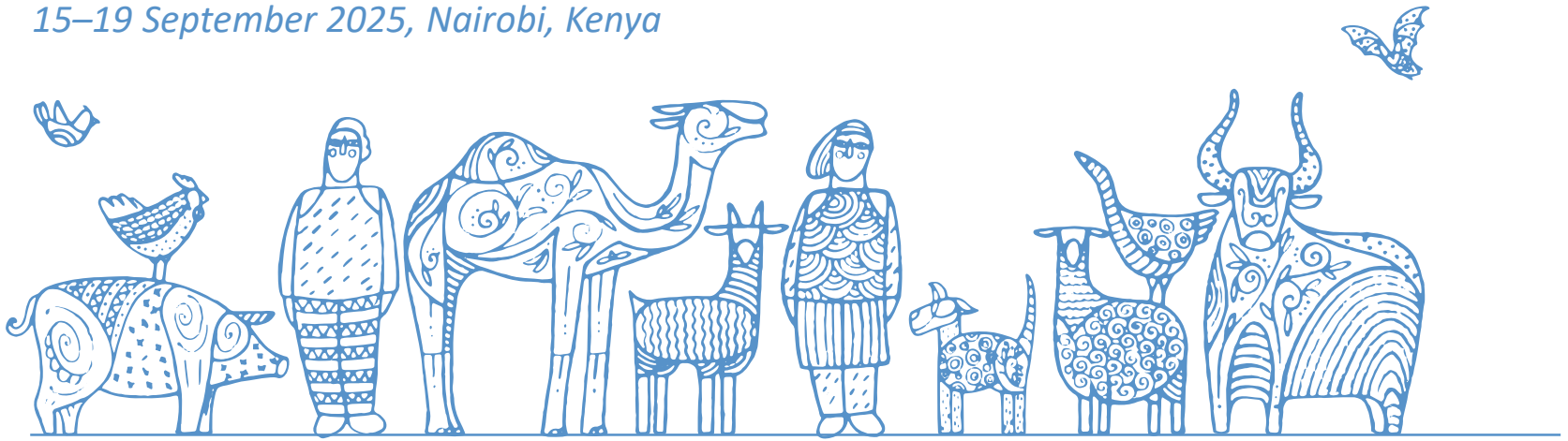
Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

A continental atlas of vector-borne animal trypanosomosis for Africa

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

15–19 September 2025, Nairobi, Kenya



Giuliano Cecchi, Massimo Paone, Jill de Gier

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

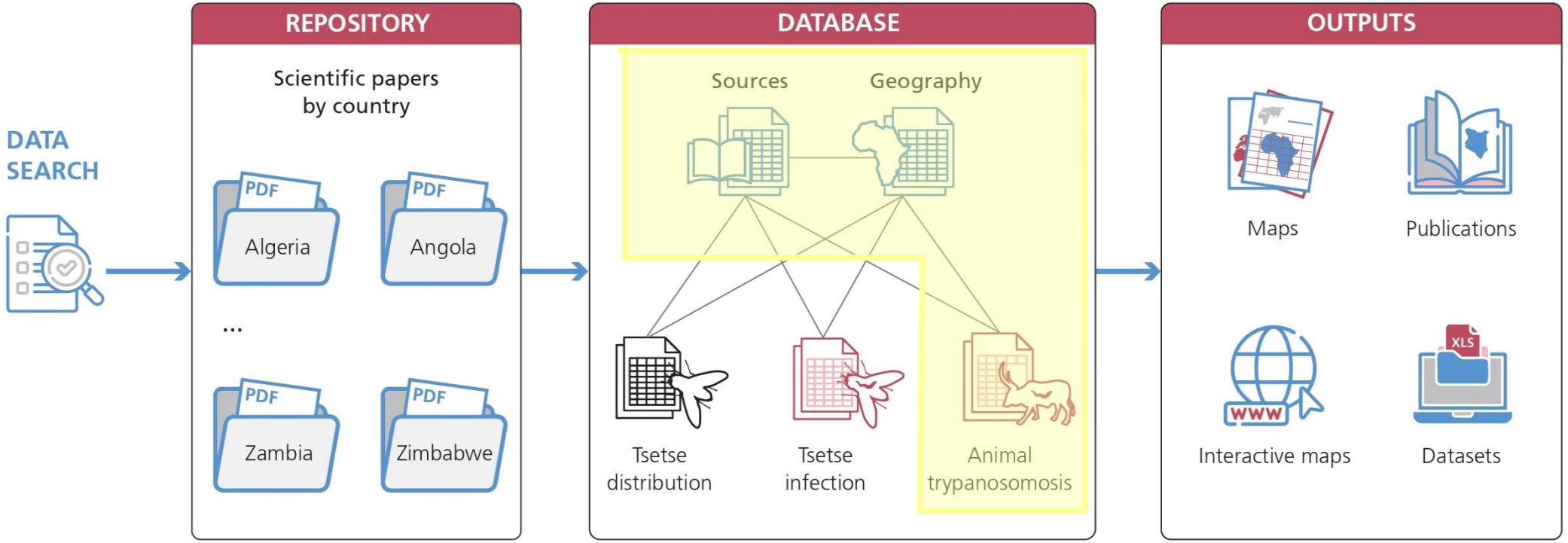
Scope and framework

- The continental atlas of vector-borne animal trypanosomosis for Africa focuses on
  - African animal trypanosomosis (AAT)/nagana
  - surra (*Trypanosoma evansi*)
- Coverage
  - 1990–2024
- The atlas is part of a broader initiative that also includes
  - Tsetse distribution (published in 2024)
  - Tsetse infection (under development)

Rationale

- Why develop the atlas?
  - No continental map of AT has ever been produced
  - Need to develop a methodology that could also be applied at the national level

Methodology



Methodology

- Developed and tested for 3 countries (Ethiopia, Kenya, Uganda)
  - Assembling a geospatial database of tsetse-transmitted animal trypanosomosis for Africa. Cecchi et al. 2014. *Parasites & Vectors*, 7:39

Parasites & Vectors

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RESEARCH

Assembling a geospatial database of tsetse-transmitted animal trypanosomosis for Africa

Giuliano Cecchi[1*], Massimo Paone[2], Udo Feldmann[3], Marc JB Vreysen[3], Oumar Diall[1] and Raffaele C Mattioli[2]

Abstract

Background: African animal trypanosomosis (AAT), or nagana, is widespread within the tsetse-infested belt of sub-Saharan Africa. Although a wealth of information on its occurrence and prevalence is available in the literature, synthesized and harmonized data at the regional and continental scales are lacking. To fill this gap the Food and Agriculture Organization of the United Nations (FAO) launched the Atlas of tsetse and AAT, jointly implemented with the International Atomic Energy Agency (IAEA) in the framework of the Programme Against African Trypanosomosis (PAAT).

Methods: The Atlas aims to build and regularly update a geospatial database of tsetse species occurrence and AAT at the continental level. The present paper focuses on the methodology to assemble a dynamic database of AAT, which hinges on herd-level prevalence data as estimated using various diagnostic techniques. A range of ancillary information items is also included (e.g. trypanosome species, survey period, species and breed of animals, husbandry system, etc.). Input data were initially identified through a literature review.

Results: Preliminary results are presented for Ethiopia, Kenya and Uganda in East Africa: 122 papers were identified and analyzed, which contained field data collected from January 1990 to December 2013. Information on AAT was extracted and recorded for 348 distinct geographic locations. The presented distribution maps exemplify the range of outputs that can be directly generated from the AAT database.

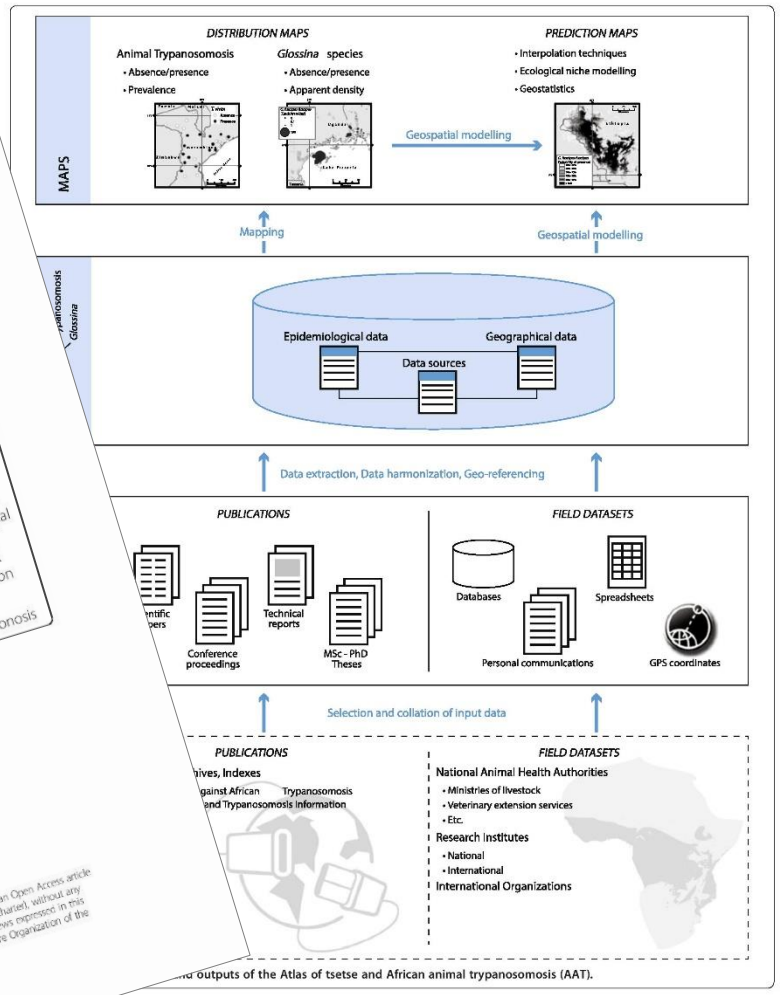
Conclusions: Activities are ongoing to map the distribution of AAT in all affected countries and to develop the tsetse component of the Atlas. The presented methodology is also being transferred to partners in affected countries, with a view to developing capacity and strengthening data management, harmonization and sharing. In the future, geospatial modelling will enable predictions to be made within and beyond the range of AAT field observations. This variety of information layers will inform decisions on the most appropriate, site-specific strategies for intervention against AAT. Data on the occurrence of human-infective trypanosomes in non-human hosts will also provide valuable information for sleeping sickness control and elimination.

Keywords: African animal trypanosomosis, GIS, Atlas, Kenya, Uganda, Ethiopia, Tsetse, Glossina, Epidemiology, Zoonosis

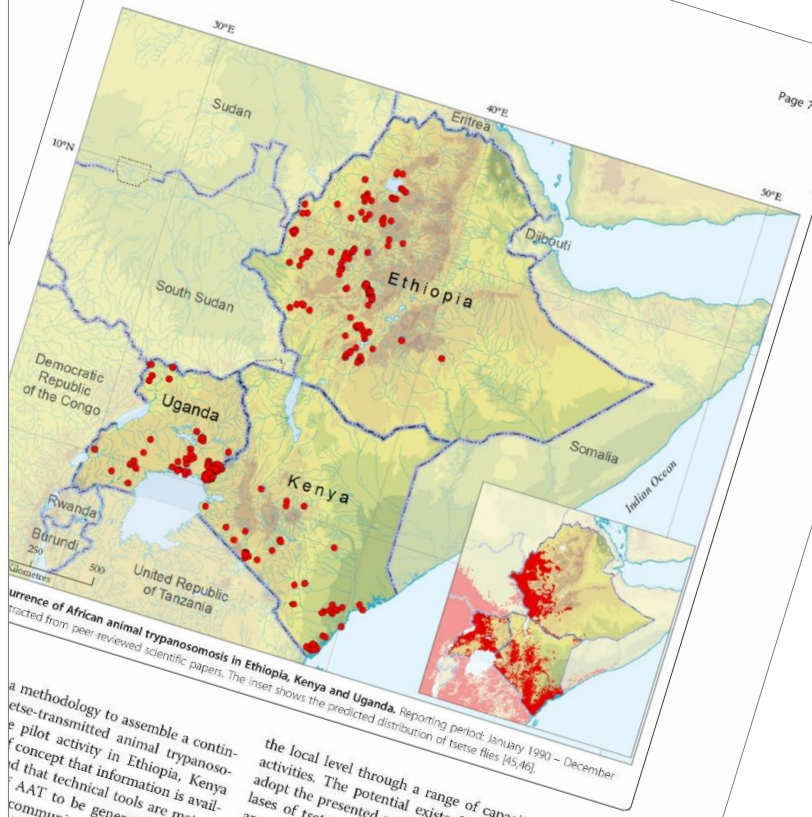
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outputs of the Atlas of tsetse and African animal trypanosomosis (AAT).



urrence of African animal trypanosomosis in Ethiopia, Kenya and Uganda. Reporting period: January 1990 – December tracted from peer-reviewed scientific papers. The inset shows the predicted distribution of tsetse flies [45,46].

a methodology to assemble a contin-
etse-transmitted animal trypanoso-
e pilot activity in Ethiopia, Kenya
f concept that information is avail-
d that technical tools are mature
AAT to be generated and dis-
communication of all the data
file 2) may enable scientists to
scientific papers for inclusion.
information gaps in numer-
require additional, unpub-
zed if a complete picture is

by FAO and IAEA to
es access to this broader
on AAT (e.g. [47,48]),
of the methodology at

the local level through a range of capacity development activities. The potential exists for affected countries to adopt the presented methodology and build national Atlases of tsetse and AAT, and activities in this direction are ongoing in a number of countries [49]. Also, data sharing tools are available through the PAAT Information System (e.g. FAO Geonetwork), which can be used to maximize dissemination of geospatial information on AAT [50].

Activities are ongoing at FAO to apply the presented methodology to all countries affected by nagana, and to develop the tsetse component of the Atlas. In the process of assembling data on the distribution of *Glossina* species, attention is also being given to trypanosomal infection in the tsetse vector, although these types of datasets are scant. Geo-referenced information on the occurrence of animal- and human-infective trypanosomes in tsetse flies will complement data on the occurrence of human and

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Protocol of data abstraction: occurrence and prevalence data on African animal trypanosomiasis

The protocol describes how data on the occurrence and prevalence of African animal trypanosomiasis (AAT) are assembled into a geospatial database within the framework of the "the Atlas of tsetse and AAT" initiative. The protocol draws on previous work carried out for other vector-borne diseases such as malaria [1] and for sleeping sickness, the human form of African trypanosomosis [2].
Data are extracted from publications stored in a central data repository (PDF format). Extracted data are assembled in a geographic database which includes three tables: one for data sources ('Sources'), one for geographical data ('Geo_data'), and one for data on AAT ('Epi_data'). Information items included in each of these tables are described below.

Data sources

The table 'Sources' provides details on the publications used to extract data on AAT distribution. The table includes the following fields:

1. SOURCE_ID. A unique numeric identifier of the source examined.
2. INITIALS. Initials of the first author. Where there is more than one initial, they are separated with a space, *e.g.* V A.
3. AUTHOR. Surname of the first author of the publication only.
4. ALL_AUTHORS. Full list of authors of the paper.
5. TITLE. Title of the paper.
6. YEAR. Year of publication of the paper.
7. COUNTRY: Country or countries for which the paper provides spatially referenced data on AAT.
8. AAT_DATA. 'Yes' identifies documents containing spatially referenced data on AAT occurrence and/or prevalence.
9. TSETSE_DATA. 'Yes' identifies documents containing spatially referenced data on tsetse absence presence and/or abundance (this flag is used to assist the development of the tsetse component of the Atlas)
10. TSETSE_INFECTION_DATA. 'Yes' identifies documents containing spatially referenced data on tsetse infection.
11. FILE_NAME: Standardized naming for PDF files, including author(s) and year of publication (e.g. Beadell_et_al_2010.pdf).
12. JOURNAL: name of the journal where the paper was published
13. PUBLISHER: name of the publisher of the journal
14. ACCESS_DATE: date when the paper was obtained/downloaded/provided from its source.
15. OPEN_ACCESS: 'Yes' identifies 'open access' sources.
16. EXTERNAL_LINK: Uniform resource locator (URL) for the source, if available. If the Document Object Identifier (DOI) is available, it is used preferentially to generate a permanent URL (e.g. http://dx.doi.org/10.1371/journal.pntd.0000636)
17. NOTES: the field contains all relevant comments concerning the source and its relevance for mapping AAT.

18. QUESTIONS: questions and requests for clarifications to the authors of the, which have the potential to contribute to the future refinement and improvement of the database

All sources are also separately stored in EndNote format, which enables additional information on the papers to be stored, as well as efficient extraction and formatting of the references.

Geographical data

The table 'Geo_data' contains detailed information on the geographical scope of study and it includes geo-positioning information. We define as 'site' the geographic location were the study was carried out, and it constitutes the basic unit for mapping. If more than one site is included in the study/paper, a separate entry for each location is recorded. All sites are represented as points in the Atlas of AAT, even when they refer to administrative areas such as districts or provinces. In the latter cases, the point normally refers to the centroid of the administrative area.
The following fields are recorded in the table 'Geo_data':

1. LOCATION_ID. A unique numeric identifier of the site.
2. SOURCE_ID. The numeric identifier of the source containing the site (it is extracted from the corresponding field in the table 'Sources').
3. COUNTRY. Country where the site is located.
4. LOCATION_NAME. Name of the site where the study was conducted. As a rule, the name as reported in the paper is recorded. Alternative spellings may be recorded in the field 'SITE_NOTES' (see below).
5. ADMIN1. Name of the first subnational administrative unit where the site is located (as reported in the paper).
6. ADMIN2. Name of the second subnational administrative unit where the site is located (as reported in the paper).
7. ADMIN3_PAPER. Name of the third subnational administrative unit where the site is located (as reported in the paper).
8. ADMIN2_ID: unique code for the corresponding admin2 as provided by the Global Administrative Unit Layers (GAUL) 2009 – reference year: 2008). The code is available from the field 'ADM2_CODE'.
9. LAT. Latitude of the study site in decimal degrees (Datum: WGS84).
10. LONG. Longitude of the study site in decimal degrees (Datum: WGS84). LAT LONG coordinates are specific to the site listed in LOCATION_NAME. More detailed information explaining how the coordinates were found and checked may be available in the field 'LOCATION_NOTES'.
11. GEO_SOURCE. Source of geo-positioning, which can be the paper itself or one of the many available gazetteers.
12. LOCATION_NOTES. Includes details on any decisions made while geo-referencing. This should help a third person understand the process and enable them to repeat the choices made.
13. AREA: Surface area of the survey (area of applicability for the recorded AAT data)
14. AREA_TYPE. Describes the size of the area of applicability for the recorded AAT data. This measure is not often explicitly detailed in the source and may need to be inferred from GIS information as well as from context. Six categories are contemplated:
    - ≤ 10 km^2;
    - >10 and ≤ 25 km^2,
    - >25 and ≤ 100 km^2
    - >100 km2 and ≤ 500 km^2
    - >500 km^2 and ≤ 1,000 km^2)
    - > 1,000 km^2 and ≤ 10,000 km^2.

Data on African animal trypanosomosis

Data on the occurrence and prevalence of AAT are recorded in the table 'Epi_data'. The table includes:

1. SURVEY_ID: A unique numeric identifier of the survey. For different reasons, a single study/paper may include a number of separate surveys, which will result in different values for the SURVEY_ID. For example, if AAT is investigated separately for different animal species (e.g. cattle, goats, sheep, etc.), different SURVEY_ID will identify the data for the different species. Also, if more than one diagnostic technique is used in the same study and if this entails different estimates of AAT prevalence, different rows/SURVEY_IDs will be used to record the different estimates.
2. LOCATION_ID: The numeric identifier of the site where the survey was carried out (it is extracted from the corresponding field in the table 'Geo_data').
3. SOURCE_ID: The numeric identifier of the source containing the data recorded for the present survey (it is extracted from the corresponding field in the table 'Sources').
4. MONTH_ST. Starting month of the survey.
5. YEAR_ST. Starting year of the survey.
6. MONTH_EN. Ending month of the survey.
7. YEAR_EN. Ending year of the survey.
8. SAMPLE_SIZE: number of animals sampled.
9. SPECIES_AN: species of animal (e.g. Cattle, goats, sheep, pigs, etc...).
10. BREED_AN: animal breed. Because of the difficulties of harmonizing the descriptions and denominations of animal breeds, the sections of the paper referring to breeds are reported verbatim in this field.
11. AGE_AN: age of animals. Because of the difficulties of harmonizing the descriptions of animal ages, the sections of the paper referring to ages are reported verbatim in this field.
12. SEX_AN: sex of animals.
13. HUSB_AN: Animal husbandry system. Because of the difficulties of harmonizing the descriptions of husbandry system, the sections of the paper referring to husbandry systems are reported verbatim in this field. Attention is given to whether animals are kept in a prevalently sedentary system, or semi-pastoral/transhumant one, or pastoral. More in general, all aspects that have implications in terms of exposure to infection are noted, including grazing versus zero-grazing, extensive versus intensive, commercial versus small-hold enterprises, etc.

Infections with individual trypanosome species/subspecies/subgroups

14. Tv: Number of animals positive to the test for *Trypanosoma vivax*.
15. Tc: Number of animals positive to the test for *T. congolense*.

https://static-content.springer.com/esm/art%3A10.1186%2F1756-3305-7-39/MediaObjects/13071_2013_1198_MOESM1_ESM.pdf

Data repository: Ethiopia (example)

- 342 publications (including tsetse)

Abdeta_et_al_2016.pdf
Abebe_et_al_2010a.pdf
Abera_et_al_2014b.pdf
Abera_et_al_2022.pdf
Afewerk_et_al_2000.pdf
Alemayehu_et_al_2012.pdf
Amante_et_al_2020.pdf
Asfaw_et_al_2023.pdf
Ayano_et_al_2013.pdf
Batu_et_al_2017b.pdf
Bekele_el_al_2011.pdf
Belete_et_al_2001.pdf
Bezabih_et_al_2015.pdf
Bishaw_et_al_2012.pdf
Bogale_et_al_2012b.pdf
Cherenet_et_al_2006.pdf
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Degneh_et_al_2021.pdf
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Efa_et_al_2021.pdf
Etana_et_al_2020.pdf
Fedesa_et_al_2015.pdf
Fikru_et_al_2015.pdf
Gebisa_et_al_2020.pdf
Gechere_et_al_2012.pdf
Gerem_et_al_2020.pdf
Girmay_et_al_2016.pdf
Hagos_et_al_2009.pdf
Haile_et_al_2018.pdf
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Bezabih_et_al_2017.pdf
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Chaka_et_al_2003.pdf
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Rowlands_et_al_1999.pdf
Sciarretta_et_al_2010.pdf
Shifaw_et_al_2015.pdf
Stein_et_al_2011.pdf
Tadesse_et_al_2012.pdf
Takile_et_al_2014.pdf
Tegegn_et_al_2021.pdf
Terefe_et_al_1999.pdf
Tesfaye_et_al_2017b.pdf
Toka_et_al_2025.pdf
Tora_et_al_2024.pdf
Utino_et_al_2024.pdf
Wogayehu_et_al_2017.pdf
Yigzaw_et_al_2017.pdf
Zekarias_et_al_2014.pdf
Zeleke_et_al_2000.pdf
Lemu_et_al_2019.pdf
Mammo_et_al_2013.pdf
Meharenet_et_al_2020a.pdf
Meharenet_et_al_2025.pdf
Mekuria_et_al_2011.pdf
Melaku_et_al_2012.pdf
Miruk_et_al_2008.pdf
Muktar_et_al_2016.pdf
Negash_et_al_2007.pdf
Olke_et_al_2025.pdf
Regassa_et_al_2009.pdf
Rowlands_et_al_1994_a.pdf
Rowlands_et_al_2000.pdf
Seyoum_et_al_2016.pdf
Shumago_et_al_2016.pdf
Tadele_et_al_2019.pdf
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Tamiru_et_al_2014.pdf
Teka_et_al_2012.pdf
Terefe_et_al_2015.pdf
Tessema_et_al_2022.pdf
Toka_et_al_2025_OCR.pdf
Tsegaye_et_al_2020.pdf
Wakgari_2022.pdf
Wondimu_et_al_2017.pdf
Yimer_et_al_2015.pdf
Zekarias_et_al_2014b.pdf
Zeleke_et_al_2001.pdf

The database

- Five tables
  - Sources
  - Geographical data
  - Tsetse distribution
  - Tsetse infection
  - AAT distribution
- Format
  - Microsoft Excel for data capture and storage
  - Microsoft Access for linking tables

Sources table

- Source_ID (Primary key/unique numeric identifier)
- Author
- Year
- Title
- Country/Countries
- URL
- Publisher
- Journal
- Access date

Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

Geographical data table

- Location_ID (primary key/unique numeric identifier)
- Source_ID (foreign key linking the source table)
- Country
- Administrative units (admin 1, 2 and 3)
- Location name
- Geographic coordinates (Latitude & Longitude, Decimal Degrees, Datum WGS84)
- Area type
  - ≤ 10 km^2
  - > 10 and ≤ 25 km^2,
  - > 25 and ≤ 100 km^2
  - > 100 and ≤ 500 km^2
  - > 500 and ≤ 1,000 km^2
  - > 1,000 and ≤ 10,000 km^2

AAT distribution table (1/2)

- Survey_ID (primary key/unique numeric identifier)
- Location_ID (foreign key linking the geographical data table)
- Source_ID (foreign key linking the source table)
- Survey period
  - Start month and year
  - End month and year
- Sample size (number of animals tested)
- Animal species
- Animal breed, age and sex
- Husbandry system
- Recent or ongoing interventions against tsetse
- Recent chemotherapy or chemoprophylaxis

AAT distribution table (2/2)

- Diagnostic method
  - Blood films (wet, thick or thin smears)
  - Centrifugation techniques (HCT, BCT)
  - Serological methods (Ab-ELISA, etc.)
  - Molecular methods (PCR, etc.)
  - Others
- Infections
  - absence/presence, number, prevalence
  - *T. vivax, T. congolense* (+ subgroups/types), *T. brucei* (+ subspecies), *T. simiae*
  - mixed-infections
- Packed Cell Volume (PCV) - Mean
  - all tested animals
  - positive animals
  - negative animals

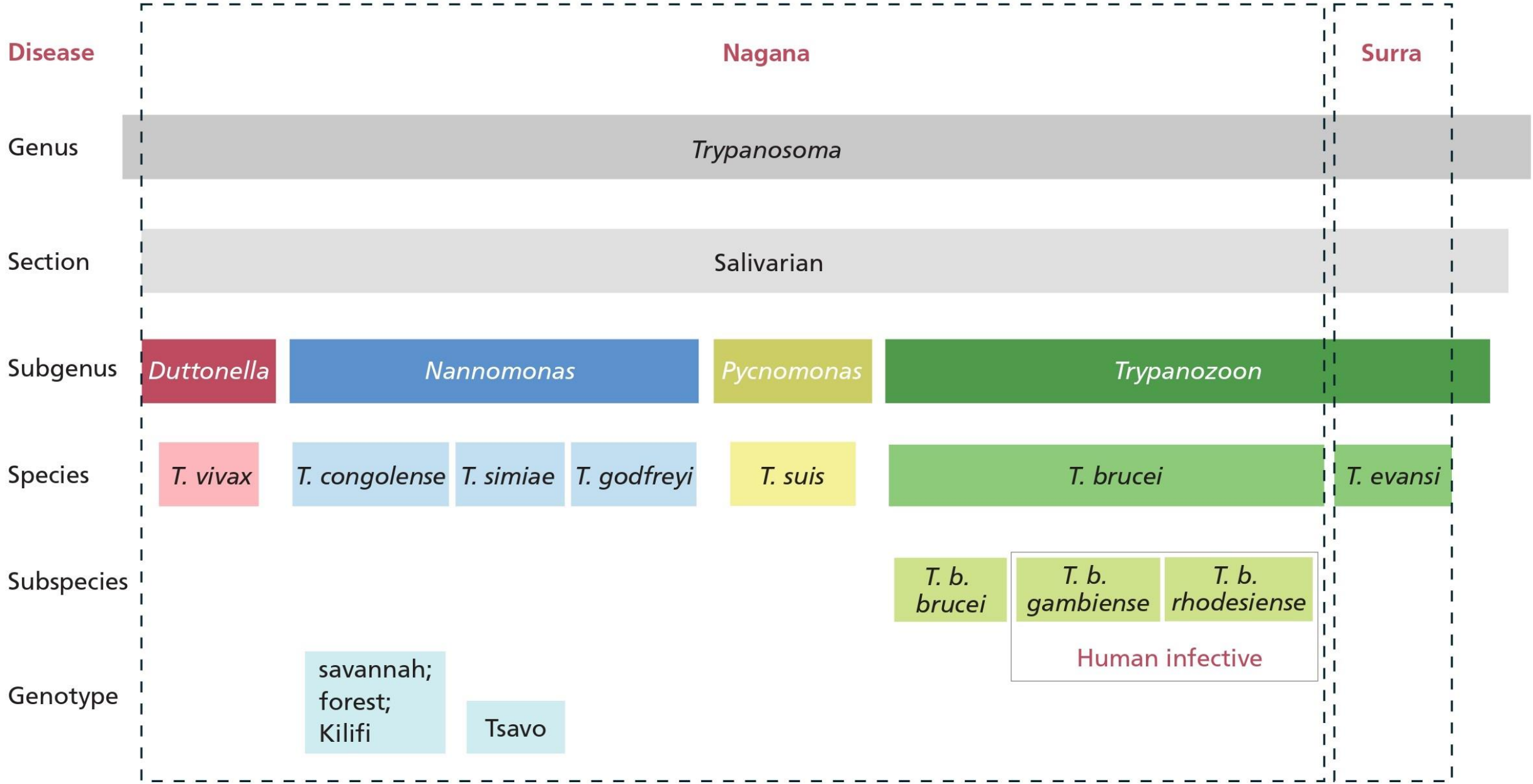
Results

- Over 1000 scientific publications processed
- Almost 1 million animals tested
- More than 3500 locations mapped in 37 countries
  - No data found for eleven countries in mainland Africa
    - Angola, Burundi, Djibouti, Eritrea, Eswatini, Guinea-Bissau, Lesotho, Liberia, Libya, Sierra Leone and South Sudan

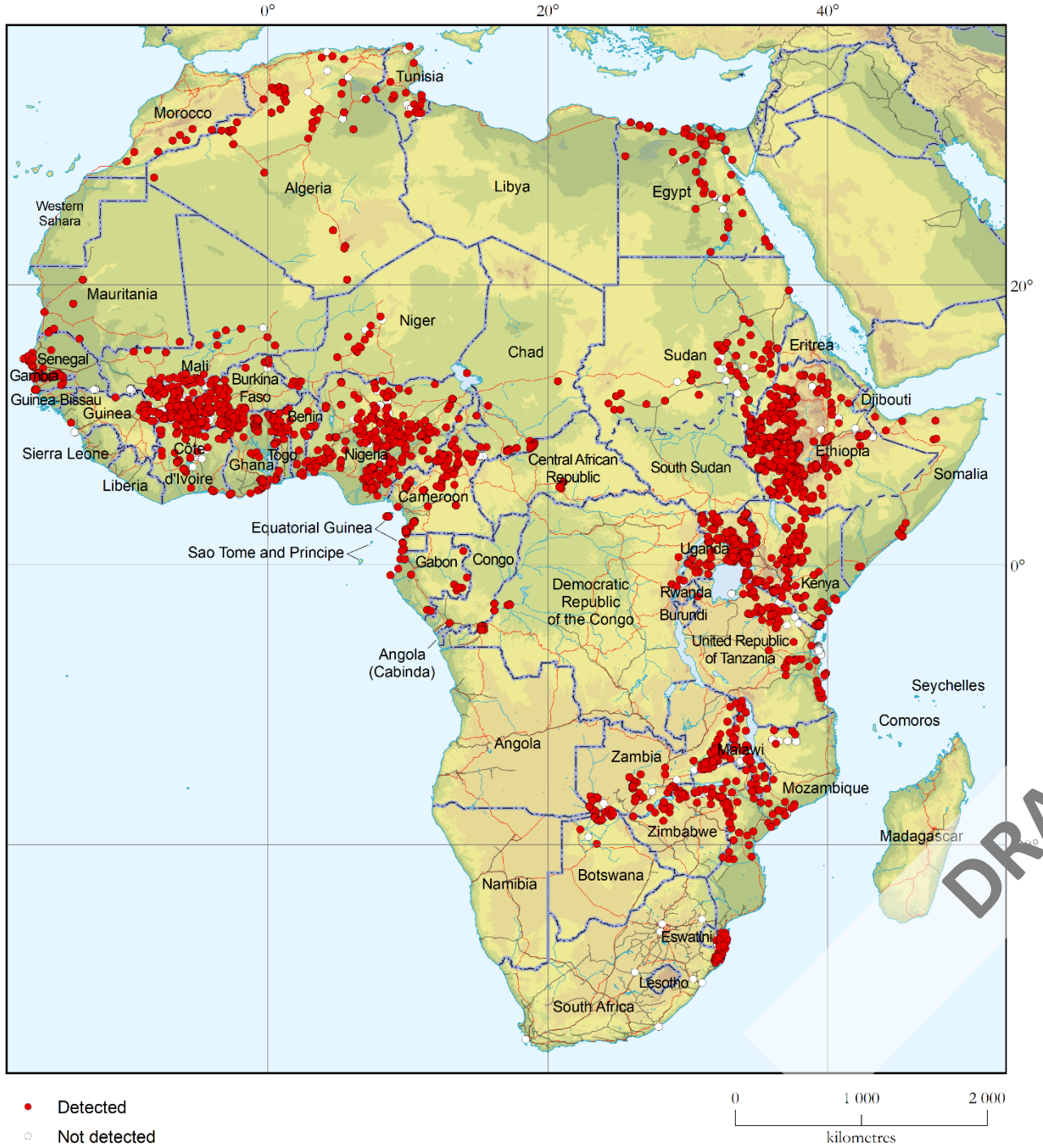
DRAFT

Country	Papers [n]	Country	Papers [n]
Algeria	11	Mali	11
Benin	7	Mauritania	4
Botswana	1	Morocco	2
Burkina Faso	37	Mozambique	9
Cameroon	45	Namibia	1
Central African Republic	3	Niger	3
Chad	12	Nigeria	161
Congo	1	Rwanda	2
Côte d'Ivoire	21	Senegal	7
Democratic Republic of the Congo	7	Somalia	5
Egypt	36	South Africa	12
Equatorial Guinea	3	Sudan	25
Ethiopia	297	Togo	9
Gabon	7	Tunisia	8
Gambia	21	Uganda	59
Ghana	17	United Republic of Tanzania	28
Guinea	4	Zambia	42
Kenya	84	Zimbabwe	8
Malawi	3	**Total**	**1 008**

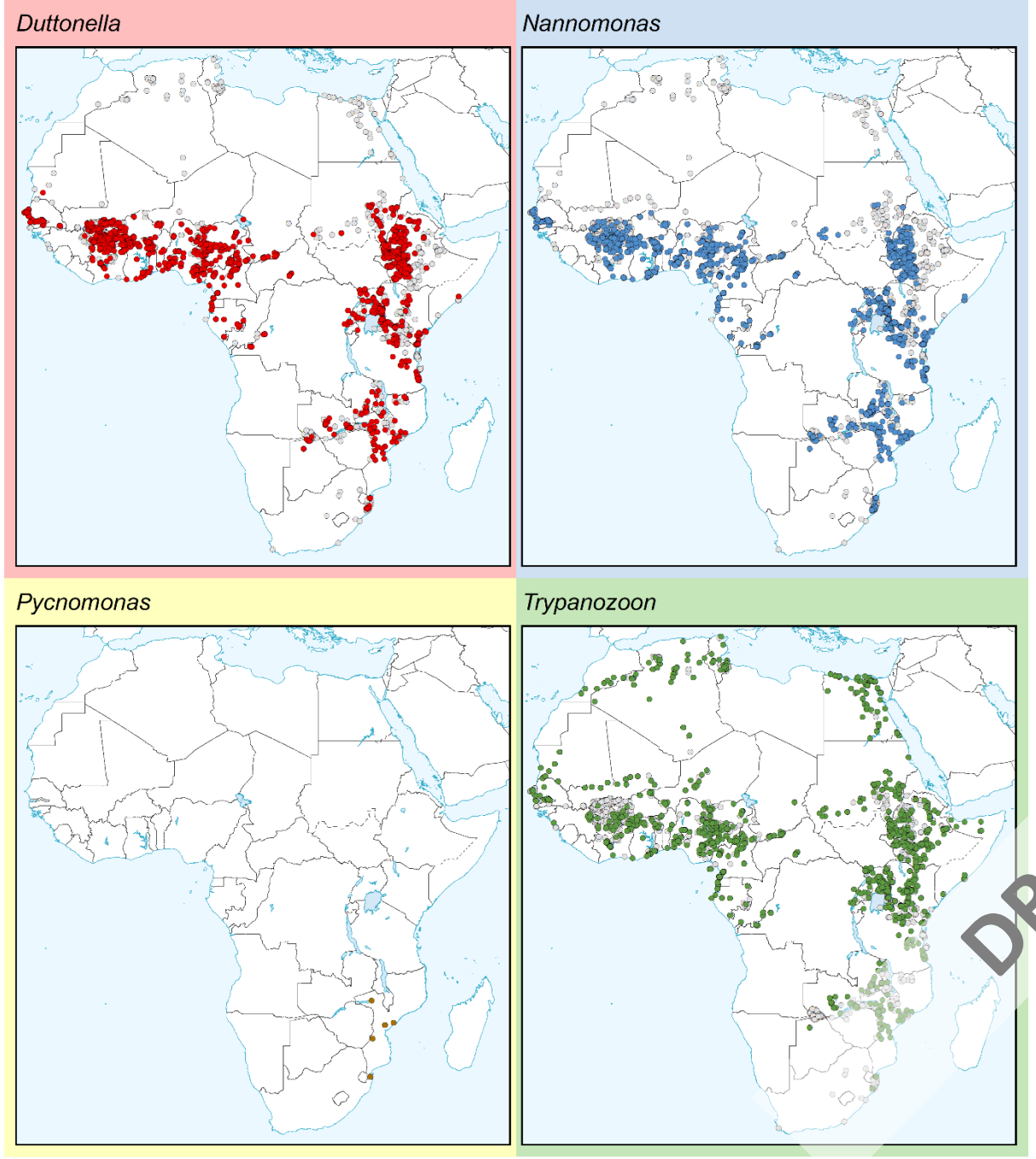
DRAFT


Disease
Nagana
Surra
Genus
Trypanosoma
Section
Salivarian
Subgenus
Duttonella
Nannomonas
Pycnomonas
Trypanozoon
Species
T. vivax
T. congolense
T. simiae
T. godfreyi
T. suis
T. brucei
T. evansi
Subspecies
T. b. brucei
T. b. gambiense
T. b. rhodesiense
Human infective
Genotype
savannah; forest; Kilifi
Tsavo

Nagana & surra



Trypanosoma subgenera



Trypanosoma vivax



Trypanosoma congolense



Trypanosoma brucei



Trypanosoma simiae



Trypanosoma godfreyi

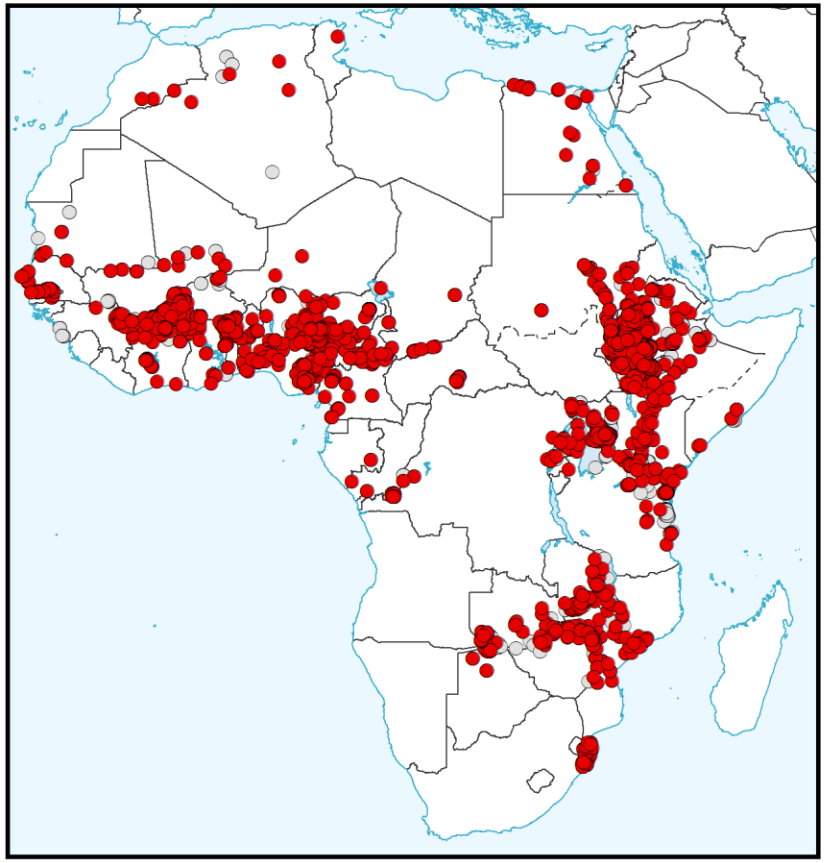


Trypanosoma evansi

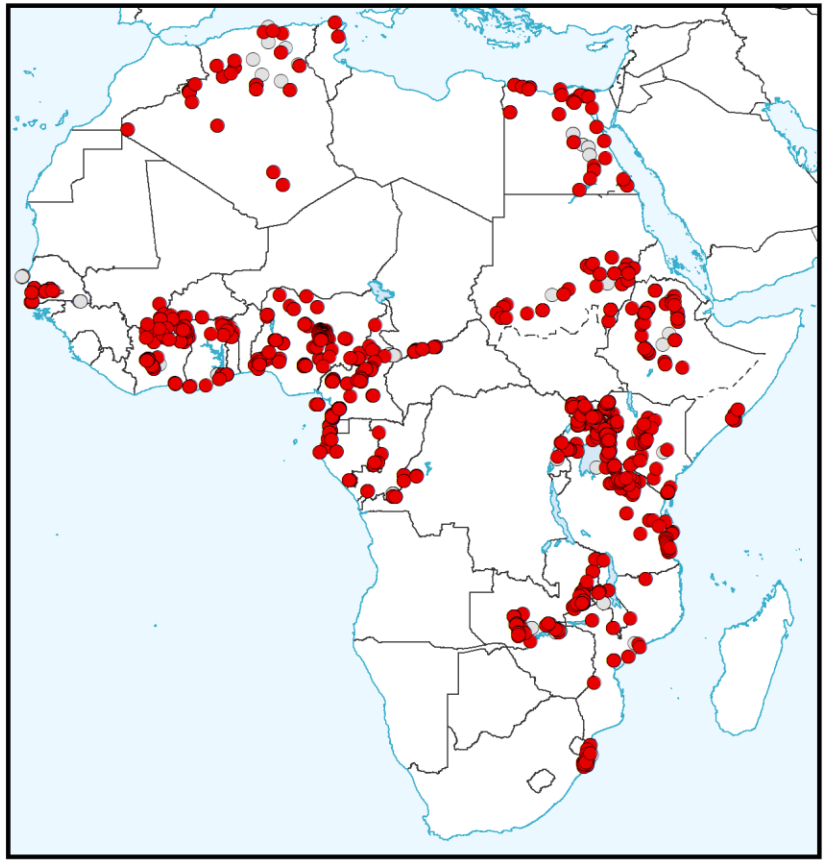


Nagana & surra

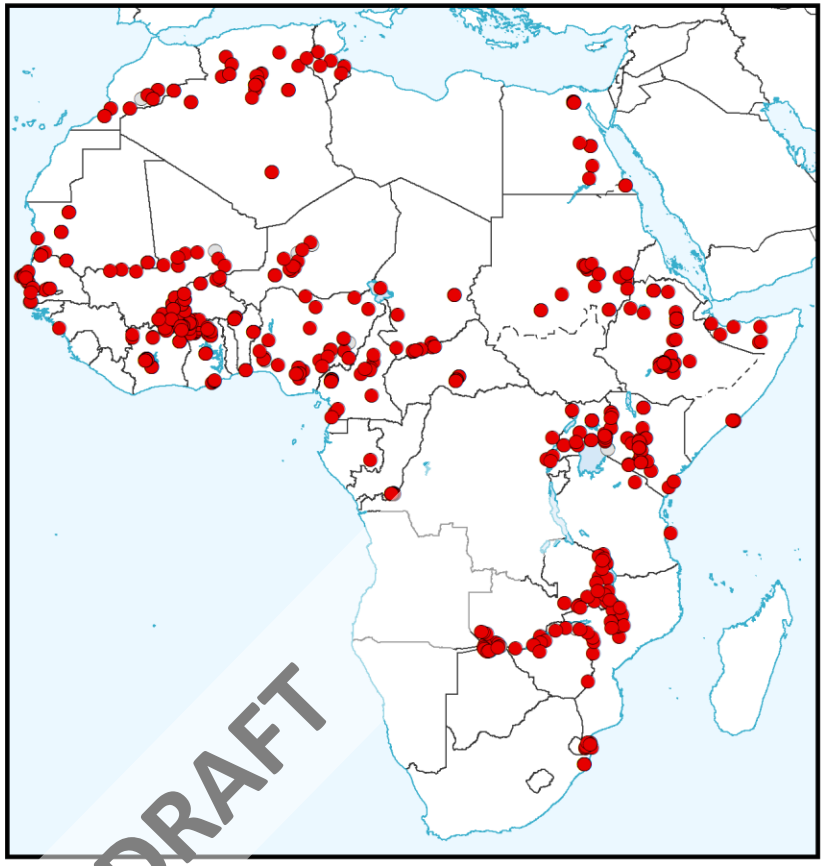
Parasitological/subinoculation



Molecular



Immunological



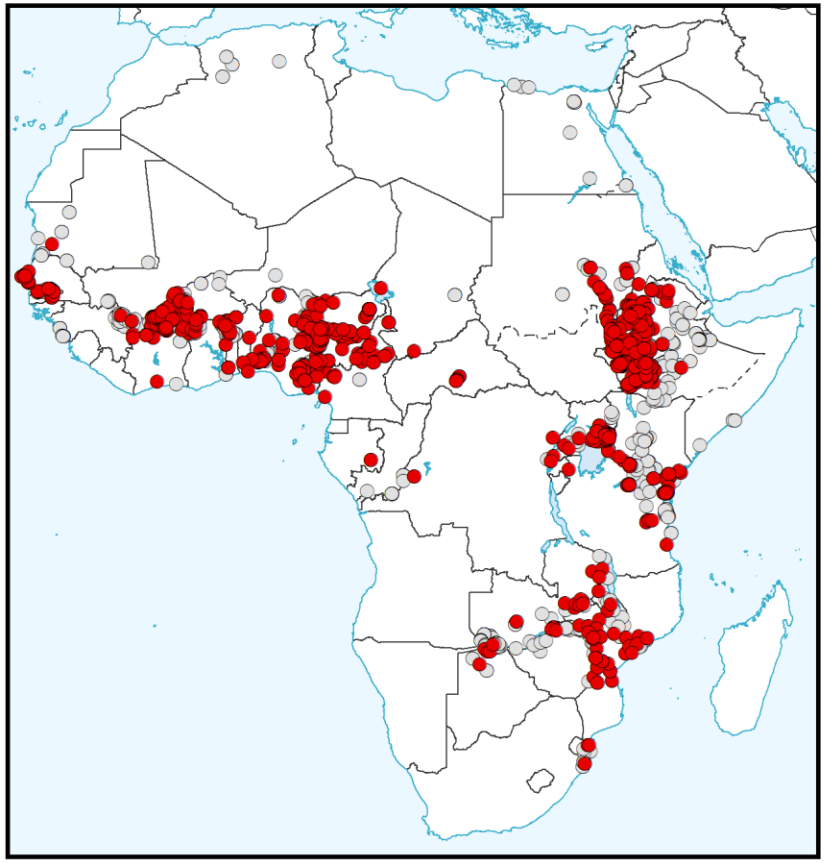
- Detected
- Not detected

0 3 000 6 000

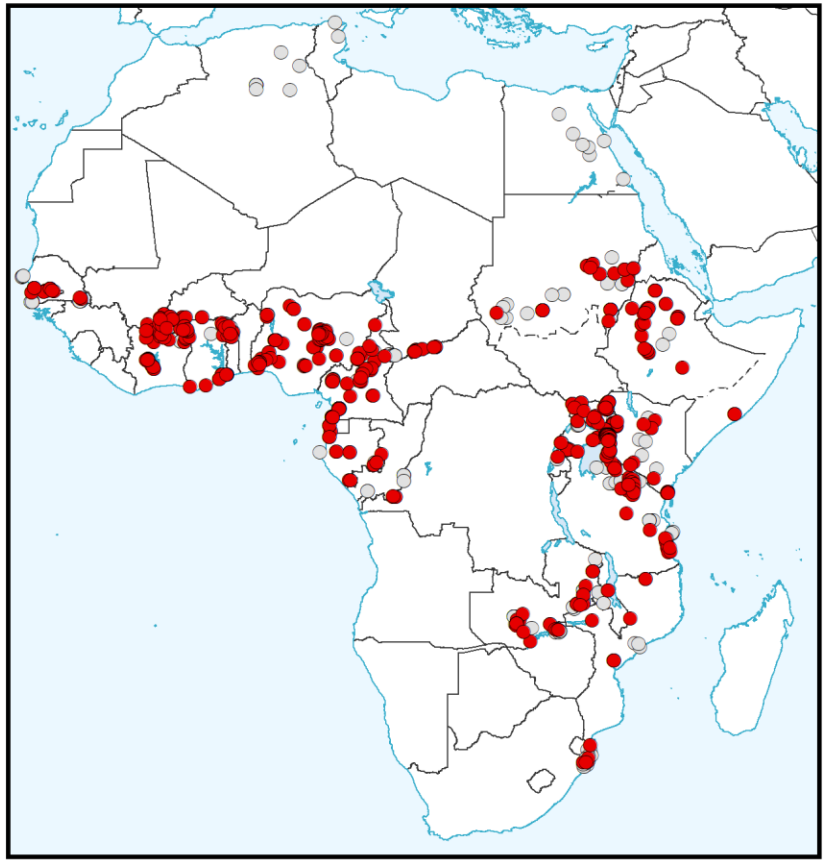
kilometres

Trypanosoma vivax

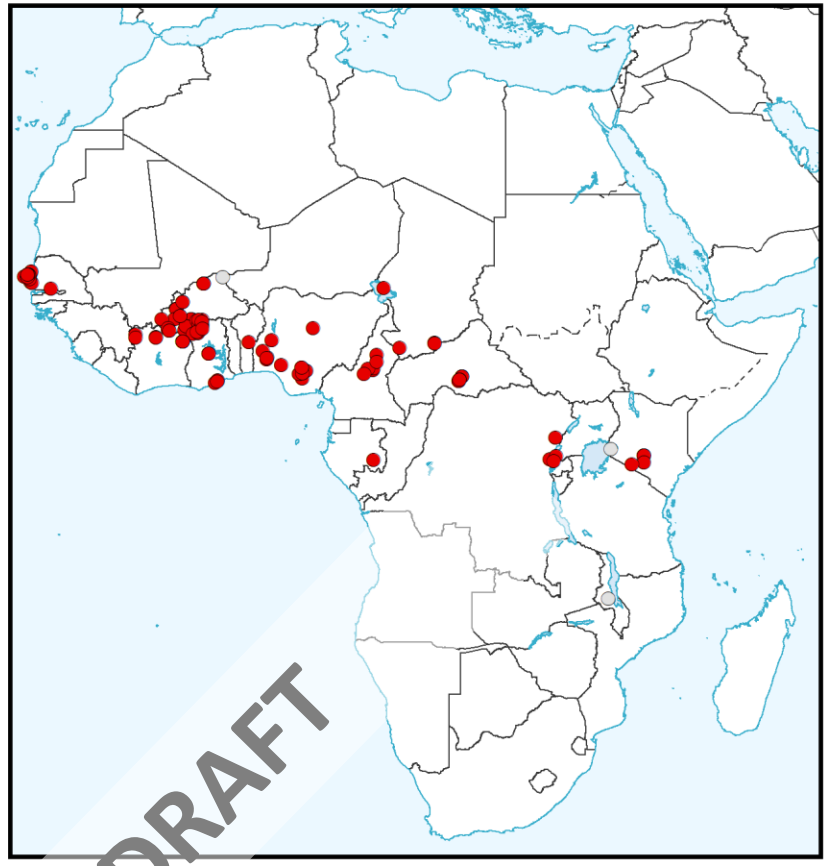
Parasitological/subinoculation



Molecular



Immunological



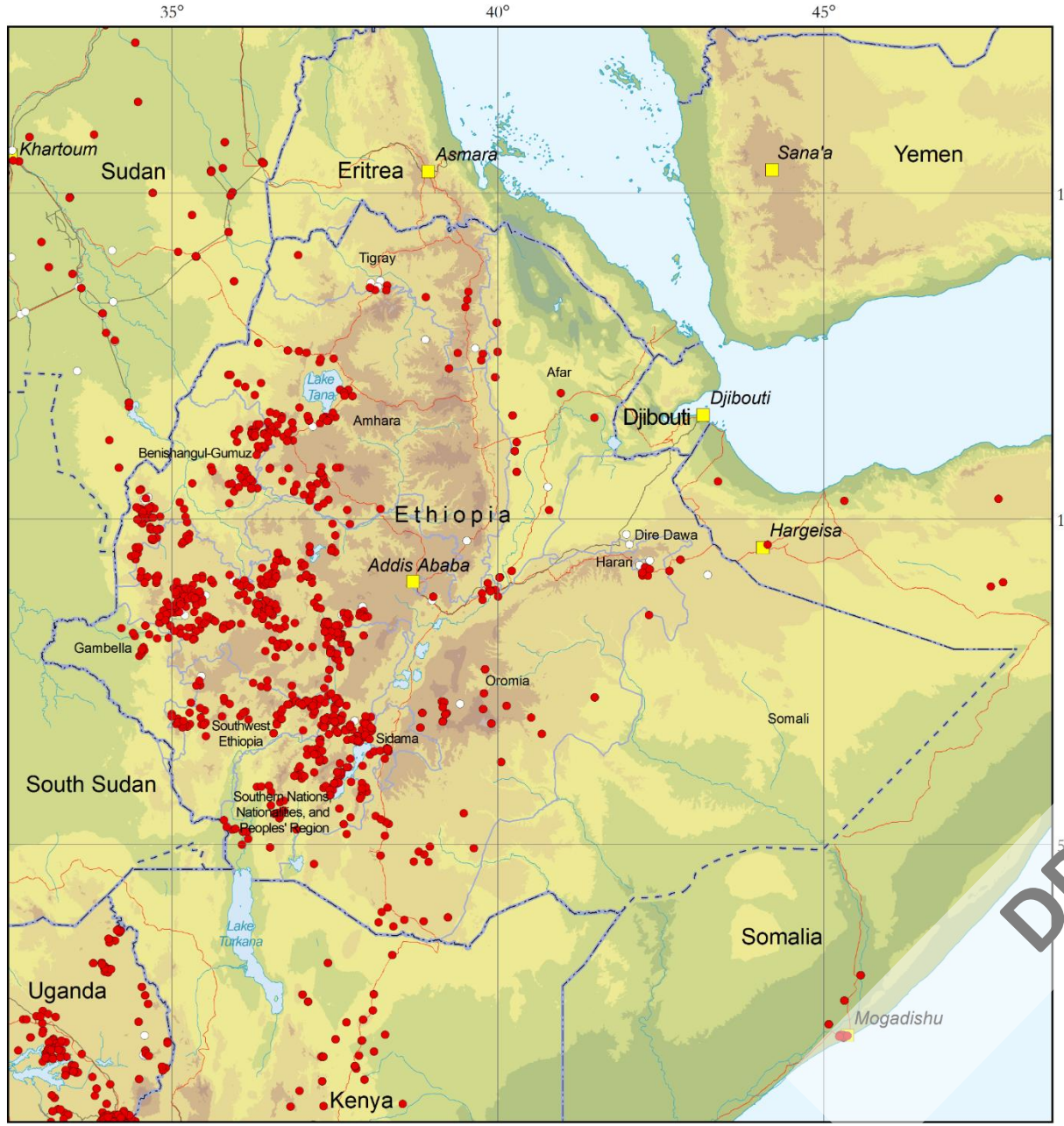
- Detected
- Not detected

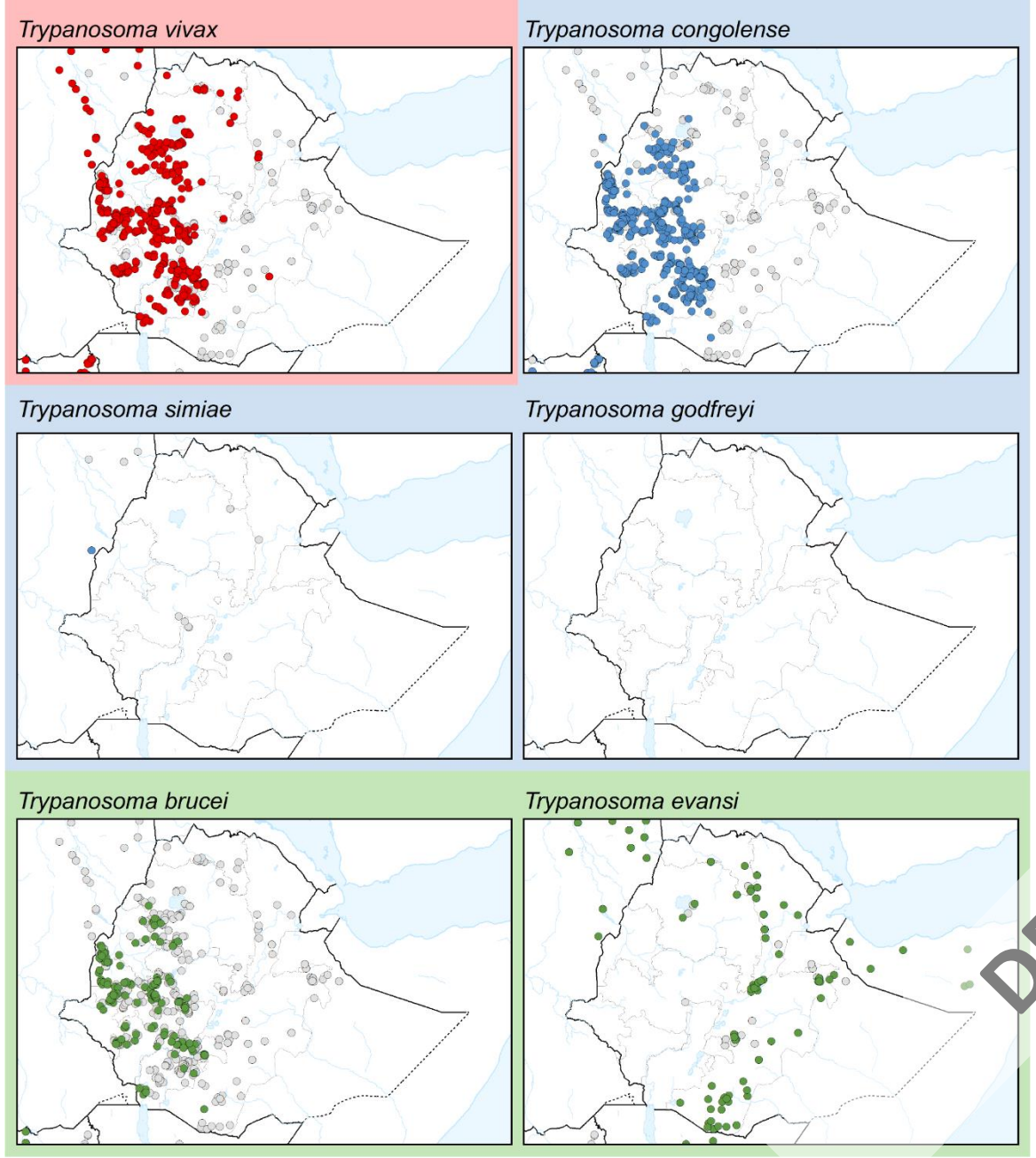
0 3 000 6 000

kilometres

Vector-borne animal trypanosomosis

Ethiopia




Trypanosoma vivax
Trypanosoma congolense
Trypanosoma simiae
Trypanosoma godfreyi
Trypanosoma brucei
Trypanosoma evansi
DRAFT
Species of the subgenus Duttonella
Detected
Not detected
Species of the subgenus Nannomonas
Detected
Not detected
Species of the subgenus Trypanozoon
Detected
Not detected
0
500
1 000
kilometres

Bovine trypanosomosis prevalence (examples)

- HCT/BCT
- PCR

HCT/BCT

Country*	Animals tested	Positive animals	
	(No.)	(No.)	(%)
Benin	1,528	285	18.65
Botswana	3,618	527	14.57
Burkina Faso	14,140	1,239	8.76
Cameroon	5,105	760	14.89
Central African Republic	647	49	7.57
Chad	1,588	51	3.21
Côte d'Ivoire	3,190	251	7.87
Ethiopia	137,235	14,299	10.42
Gabon	20	13	65.00
Gambia	624	10	1.60
Ghana	2,222	63	2.84
Guinea	1,958	53	2.71
Kenya	11,683	1,275	10.91
Malawi	9,309	187	2.01
Mali	3,040	187	6.15
Mozambique	20,170	4,269	21.17
Namibia	1,481	66	4.46
Nigeria	34,390	3,149	9.16
Rwanda	1,034	79	7.64
Senegal	4,840	47	0.97
Somalia	202	14	6.93
South Africa	2,083	342	16.42
Sudan	3,657	396	10.83
Togo	2,849	245	8.60
Uganda	23,840	3,123	13.10
United Republic of Tanzania	4,171	18	0.43
Zambia	22,303	2,432	10.90
Zimbabwe	6,751	150	2.22
Total	**323,678**	**33,579**	**10.37**

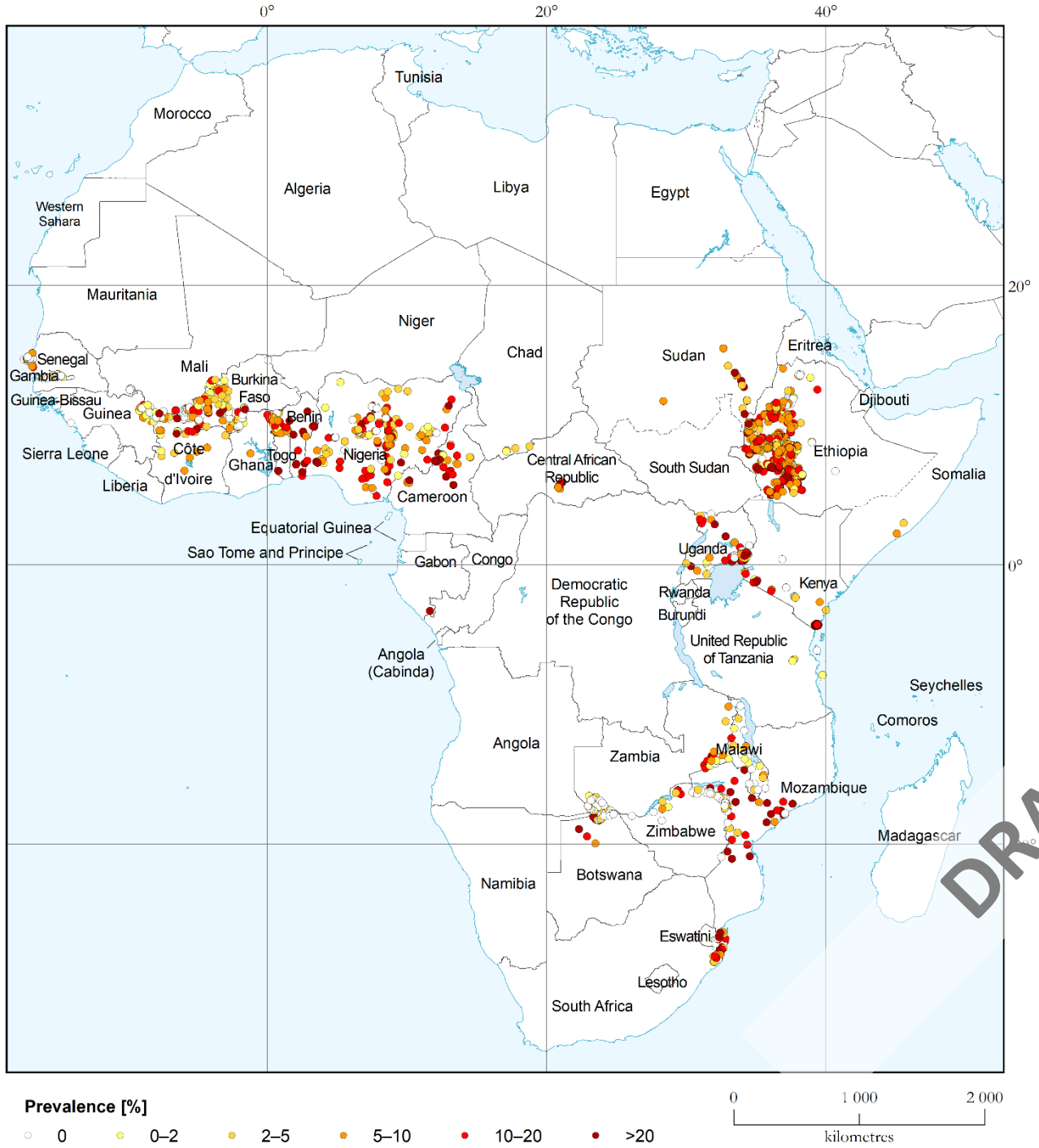
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PCR

Country*	Animals tested	Positive animals	
	(No.)	(No.)	(%)
Algeria	16	0	0.00
Burkina Faso	517	127	24.56
Cameroon	3,300	818	24.79
Chad	2,150	345	16.05
Congo	7	0	0.00
Côte d'Ivoire	1,350	230	17.04
Democratic Republic of the Congo	1,074	10	0.93
Egypt	1,591	253	15.90
Ethiopia	4,226	814	19.26
Gabon	224	72	32.14
Gambia	577	69	11.96
Ghana	677	225	33.23
Kenya	6,096	957	15.70
Malawi	1,334	88	6.60
Mozambique	2,428	1,149	47.32
Nigeria	5,670	567	10.00
Rwanda	1,034	207	20.02
Senegal	1,028	5	0.49
Somalia	202	48	23.76
South Africa	1,023	177	17.30
Sudan	140	88	62.86
Tunisia	96	16	16.67
Uganda	42,211	5,600	13.27
United Republic of Tanzania	3,524	435	12.35
Zambia	3,273	508	15.52
Zimbabwe	400	10	2.50
Total	**84,168**	**12,818**	**15.23**

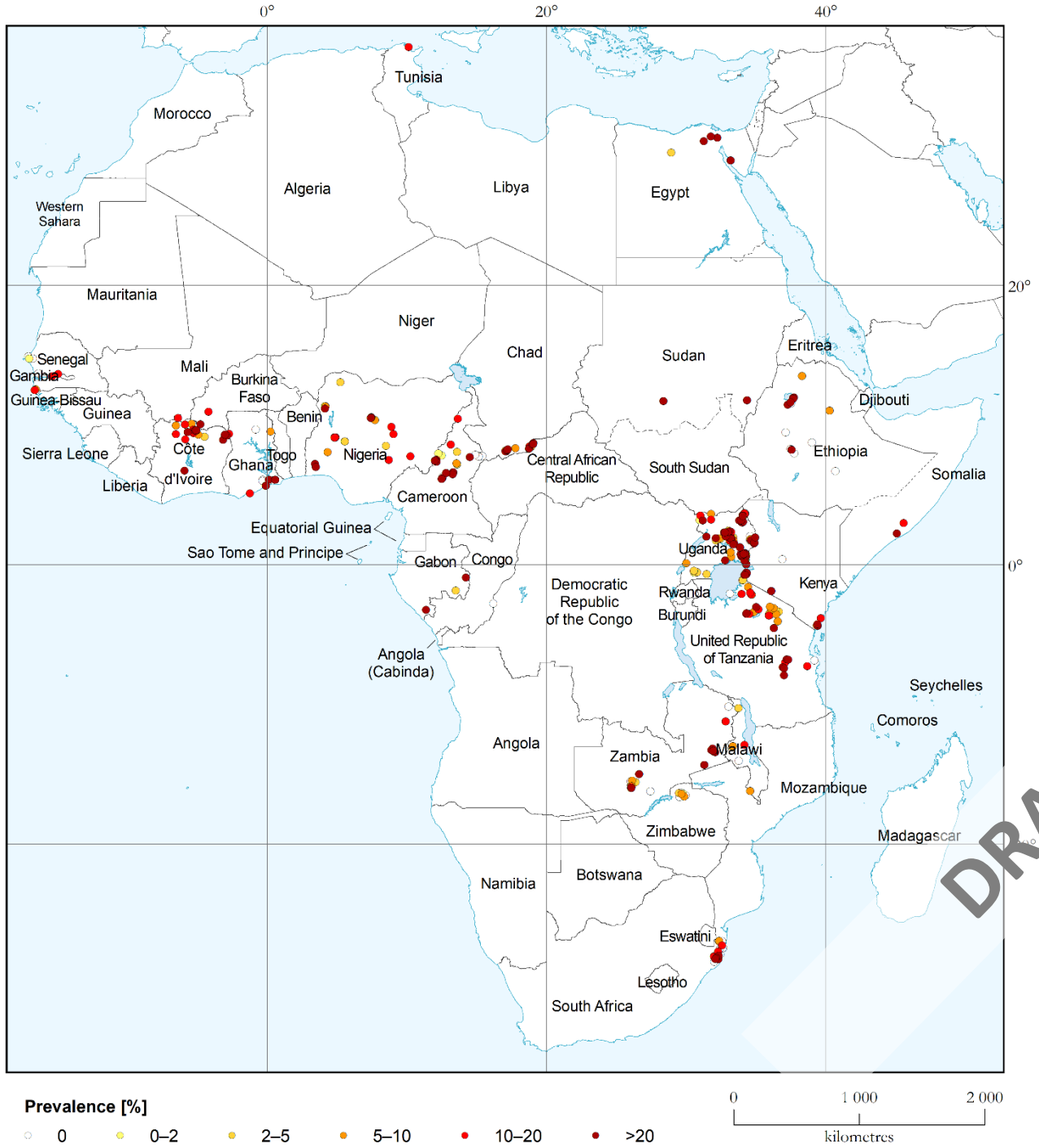
DRAFT

HCT/BCT



DRAFT

PCR


0°
20°
40°
20°
0°
Tunisia
Morocco
Algeria
Libya
Egypt
Western Sahara
Mauritania
Niger
Chad
Sudan
Eritrea
Djibouti
Senegal
Gambia
Mali
Burkina Faso
Guinea-Bissau
Guinea
Benin
Sierra Leone
Liberia
Côte d'Ivoire
Ghana
Togo
Nigeria
Central African Republic
South Sudan
Ethiopia
Somalia
Cameroon
Equatorial Guinea
Sao Tome and Principe
Gabon
Congo
Uganda
Democratic Republic of the Congo
Rwanda
Burundi
Kenya
United Republic of Tanzania
Angola (Cabinda)
Seychelles
Comoros
Angola
Zambia
Malawi
Mozambique
Zimbabwe
Madagascar
Namibia
Botswana
Eswatini
Lesotho
South Africa
DRAFT
Prevalence [%]
0
0–2
2–5
5–10
10–20
>20
0
1 000
2 000
kilometres

Next steps

- Publish the paper in 2026 (period 1990–2024)
  - **Cecchi, G., Paone, M., de Gier, J.** 2026. The continental atlas of vector-borne animal trypanosomosis in Africa. PAAT Technical and Scientific Series, No. XX. Rome, FAO.
- Update to 2026
- Data dissemination and ‘socialization’ with other datasets
  - Freely downloadable data (Excel files)
  - High resolution maps on FAO/PAAT web site [PDF files (English and French)]
  - Wikipedia
  - FAO Agro-informatics platform
- In depth data analysis and modelling
  - DIMCAT project

Funding/Acknowledgements

- Government of Italy
  - FAO regional project
    - 2013-2018
    - Title: ‘Improving food security in sub-Saharan Africa by supporting the progressive reduction of tsetse-transmitted trypanosomosis’
    - Budget: USD 2M
- European Commission
  - COMBAT project (grant agreement n°101000467)
    - 2021–2025
    - Budget (FAO): EURO 400,000
- Gates Foundation
  - DIMCAT project (Investment ID: INV-067581)
    - 2025–2027
    - Budget: USD 1.7MFAO/WHO
- Regular Budget for PAAT

Food and Agriculture Organization of the United Nations

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Thank you



Protecting people, animals, and the environment every day