



Photo Credit: C. Wiederkehr

ENVIRONMENTAL CHANGE, ADAPTATION STRATEGIES AND THE ROLE OF MIGRATION IN SUB-SAHARAN DRYLANDS

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ENVIRONMENTAL
RESEARCH – UFZ

Paris, October 23, 2018

RESEARCH AIM

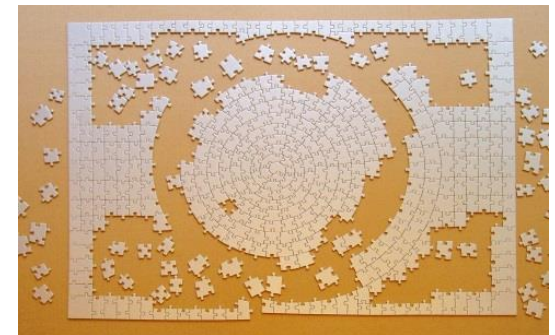
- 1) How do rural households deal with environmental change in Sub-Saharan drylands?
- 2) What is the role of migration in this context?

coping (reactive, temporary) & *adaptation* (anticipatory, long-term) strategies

environmental change → any process concerning the natural environment (incl. climate) that implies an alteration of the system

➔ address **(meta-)knowledge gap** and create bigger **trans-regional picture**

➔ methodological **recommendations** for local case studies



METHODOLOGICAL APPROACH

I. Systematic literature search

- In Web of Science (June 2017)
- Scientific literature in peer-review journals

II. Study selection

- based on formal eligibility criteria

III. Reading, data collection & coding

- Qualitative content analysis in Atlas.ti

IV. Statistical analysis & interpretation

- frequency distribution in R



Screening of
2,477 articles

63 studies
(> 9,700
households)

SYSTEMATIC LITERATURE SEARCH

(((((TS=((Sub-Sahara OR "Sub-Saharan Africa*" OR Angola* OR Benin* OR Botswana* OR Botswana* OR Burkina* OR Burundi* OR Cameroon* OR "Cape Verd*" OR "Cabo Verd*" OR "Central African Republic" OR Chad* OR Comor* OR Congo* OR "Cote dlvoire" OR "Ivory Coast" OR Ivorian* OR "Democratic Republic of the Congo" OR Djibouti OR "Equatorial Guinea*" OR Equatoguinean* OR Eritrea* OR Ethiopia* OR Gabon* OR Gambia* OR Ghana* OR Guinea* OR Guinea-Bissau* OR Kenya* OR Lesotho OR Mesotheo OR Basotho OR Mauritania* OR Mauriti* OR Liberia* OR Madagascar OR Malagasy OR Malawi* OR Mali* OR Mozambi* OR Namibia* OR Niger* OR Nigeria* OR Rwanda* OR Sao Tome* and Principe OR Senegal* OR Seychell* OR "Sierra Leone*" OR Somali* OR "South Africa*" OR Sudan* OR Swazi* OR Tanzania* OR Togo* OR Uganda* OR Zambia* OR Zimbabwe*) AND ("environment* chang*" OR "climat* chang*" OR "ecological chang*" OR "land degrad*" OR "soil degrad*" OR "soil erosion" OR "resource* degrad*" OR "environment* degrad*" OR "rainfall variab*" OR "climat* variab*" OR "precipitation chang*" OR "temperature* chang*" OR "drought*" OR "desertification" OR "flood*" OR "environmental stress*") AND (adapt* OR cop*) NOT (*biotic OR cell* OR molecul* OR photovoltaic OR photosynthe* OR pathogen* OR AMF OR genotype* OR "plant invasion*" OR "reef coral*" OR "coral reef*" OR bioapatite OR cichlid* OR "bird migration" OR "carbon sequestration" OR hydrogeochemical OR Pliocene OR "marine ecosystem*" OR "tree recruitment" OR levallois OR "fynbos biome*" OR "Afromontane taxa" OR "invasive alien tree*" OR Paleolithic OR Pleistocene OR "urban metabolism" OR lepidoptera)))))))))))))
AND LANGUAGE: (English) AND DOCUMENT TYPES: (Article)

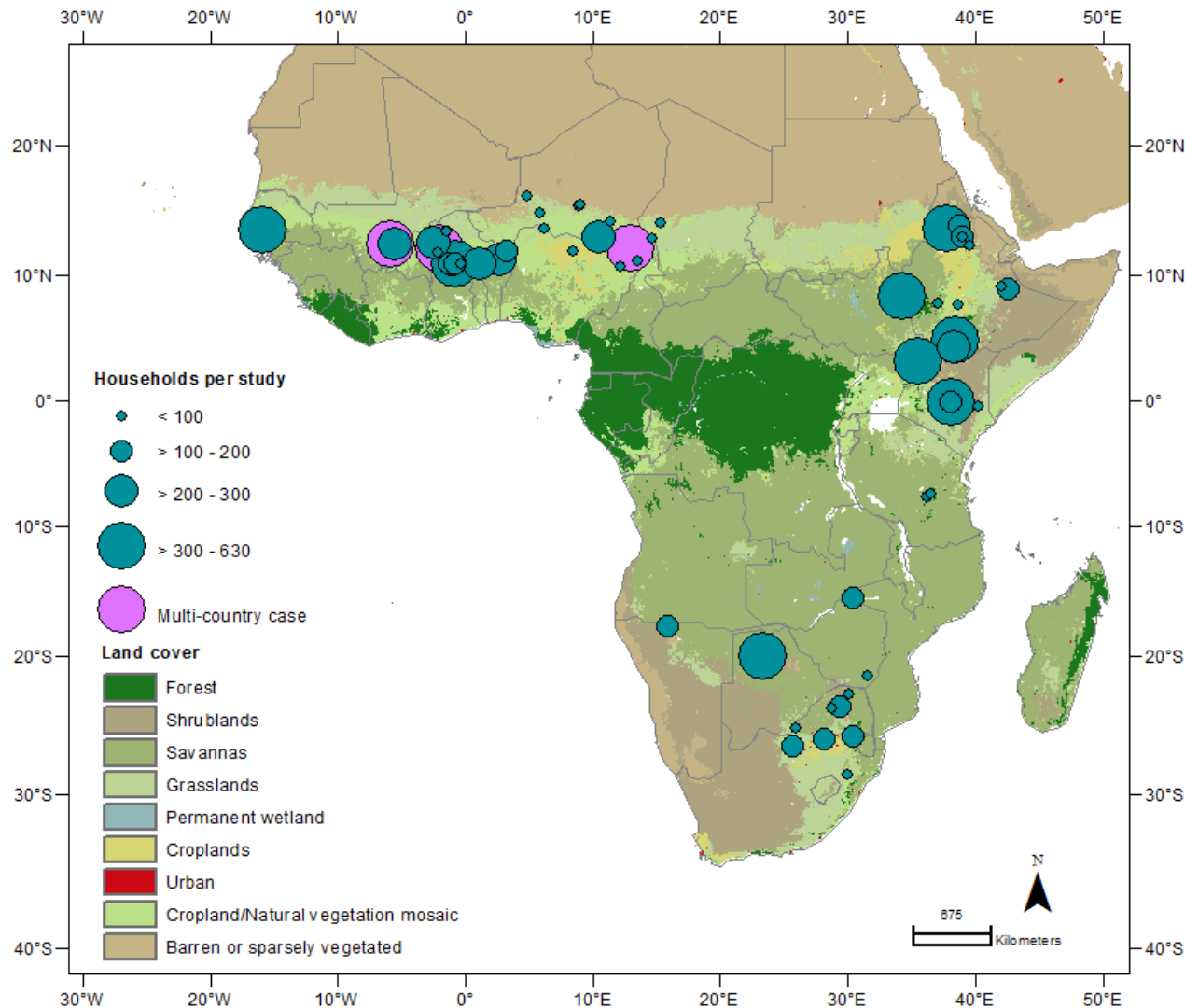
Refined by: [excluding] WEB OF SCIENCE CATEGORIES:

(ENGINEERING CHEMICAL OR GENETICS HEREDITY OR PHARMACOLOGY PHARMACY OR MEDICINE GENERAL INTERNAL OR ORNITHOLOGY OR ENDOCRINOLOGY METABOLISM OR BIOTECHNOLOGY APPLIED MICROBIOLOGY OR TOXICOLOGY OR PSYCHOLOGY CLINICAL OR NEUROSCIENCES OR PARASITOLOGY OR CHEMISTRY APPLIED OR CHEMISTRY ANALYTICAL OR MARINE FRESHWATER BIOLOGY OR ENTOMOLOGY OR BIOCHEMICAL RESEARCH METHODS OR LIMNOLOGY OR BIOCHEMISTRY MOLECULAR BIOLOGY OR TROPICAL MEDICINE OR PSYCHIATRY OR PHYSIOLOGY OR NUCLEAR SCIENCE TECHNOLOGY OR EVOLUTIONARY BIOLOGY OR OCEANOGRAPHY OR MICROBIOLOGY OR INFECTIOUS DISEASES OR CELL BIOLOGY OR PALEONTOLOGY)

Timespan: All years. Indexes: SCI-EXPANDED, SSCI



SAMPLE OF STUDIES



**63 studies in
16 countries**

Central: 3

East: 20

West: 29

Southern: 11

RESULTS (1)

RURAL LIVELIHOODS

Farmers

- subsistence/ smallholder
- crop/ livestock farming
- sedentary

Agro-pastoralists

- combination of cultivation and herding
- semi-nomadic

Pastoralists

- herders
- nomadic

Other complementary activities: fishing, petty trading, informal employment

Usually a mix of livelihood activities

 majority of respondents: **male farmers**



Photo Credit FAO.



Photo Credit Care/ Frederic Courbet.

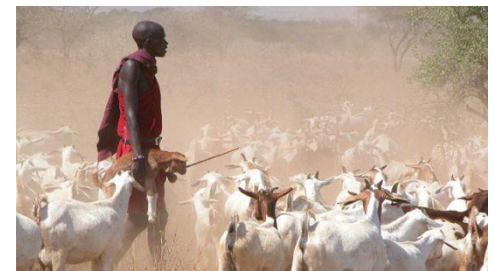
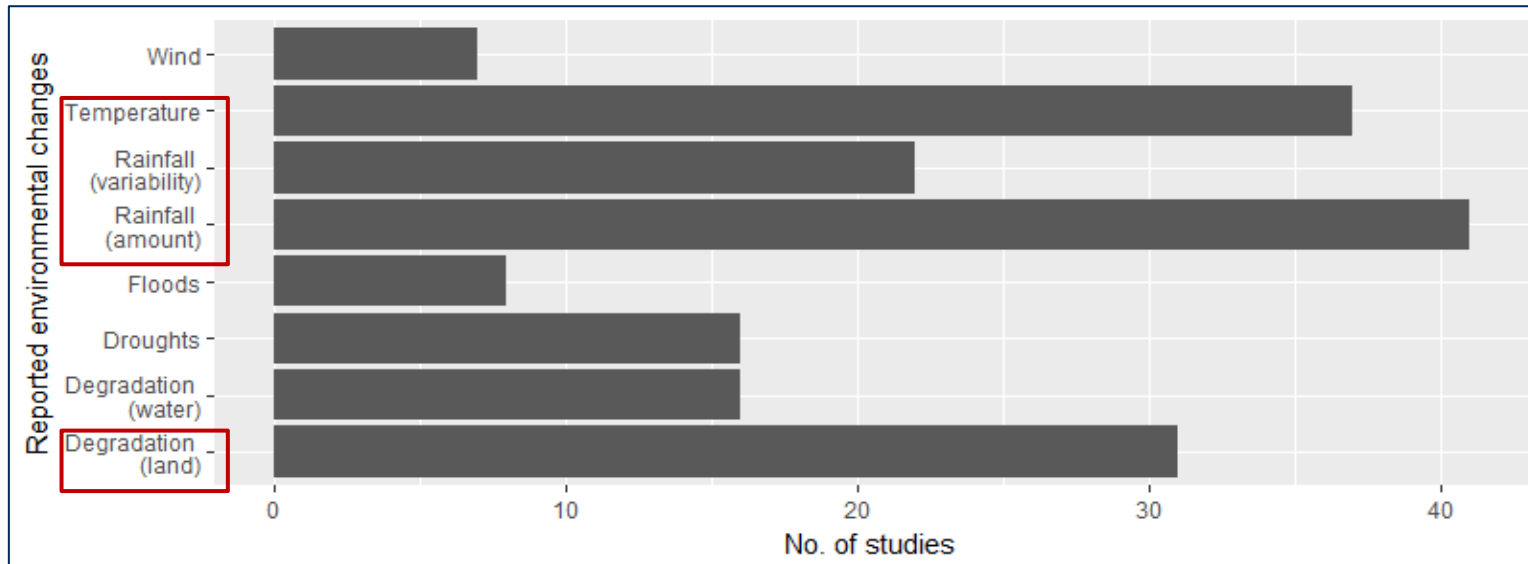


Photo Credit gritty.org.

RESULTS (2)

ENVIRONMENTAL CHANGE PROCESSES



- based on both perceptual and meteorological data
- focus on slow-onset hazards
- climate change framing is dominating

RESULTS (3)

HOUSEHOLD STRATEGIES



Photo Credit: CIMMYT.

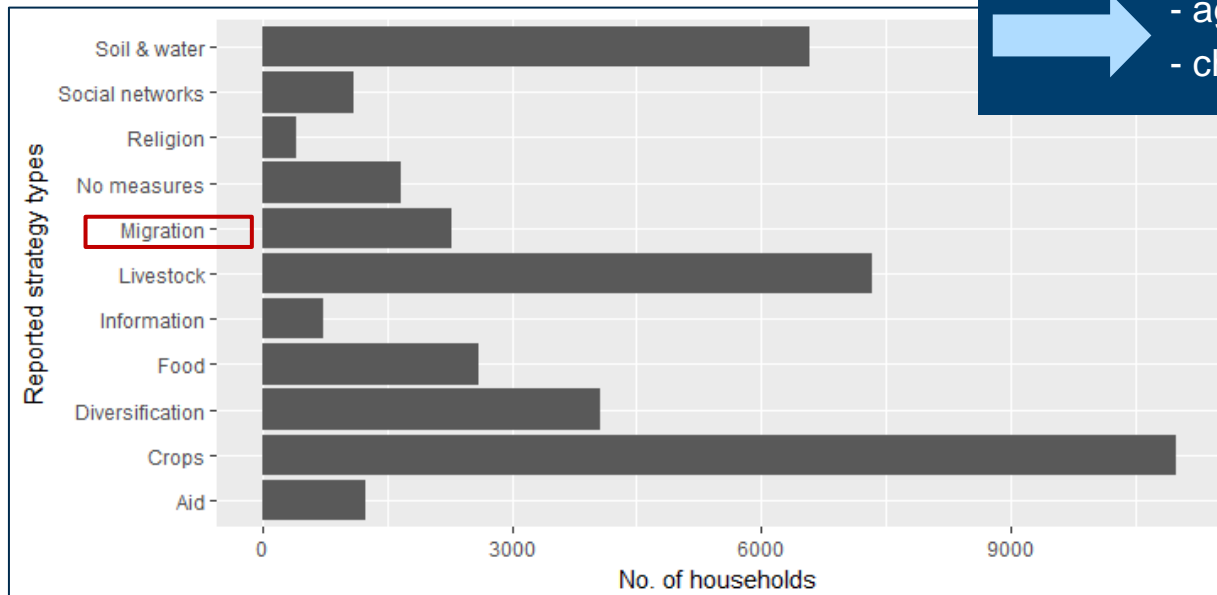
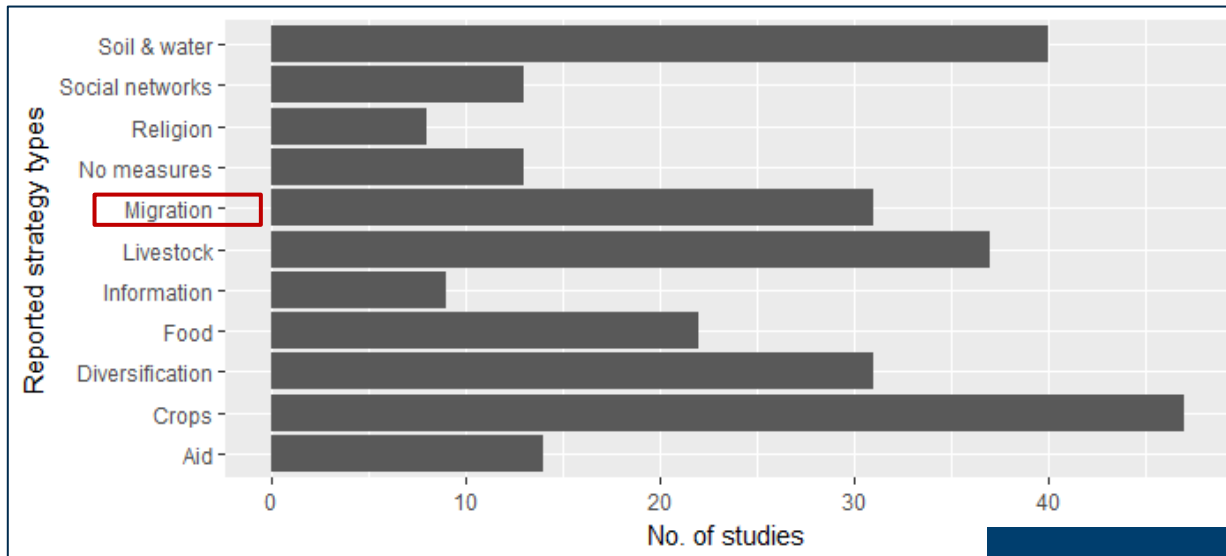



Photo Credit: Kato Holt, Eyevine, Redox.

Crop management	Livestock management	Soil & water management
Income diversification	Migration	Social networks
Food provision	Religious activities	Humanitarian aid
Information	No action	(others)

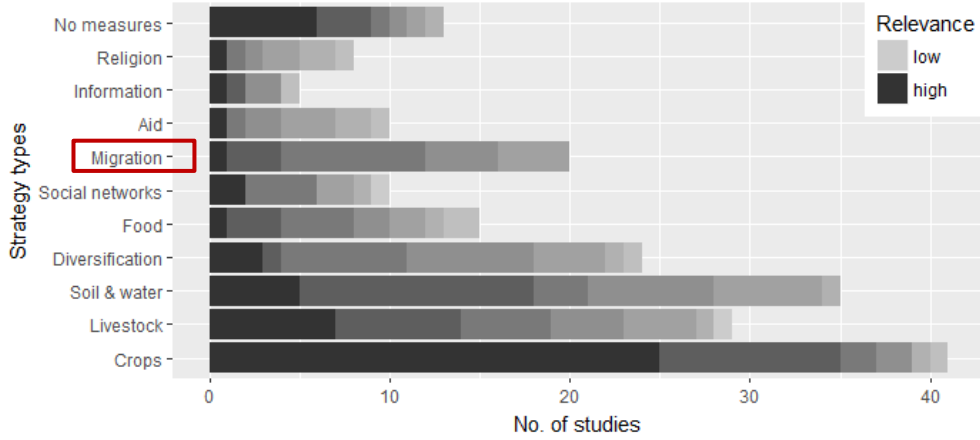
RESULTS (4)

HOUSEHOLD STRATEGIES



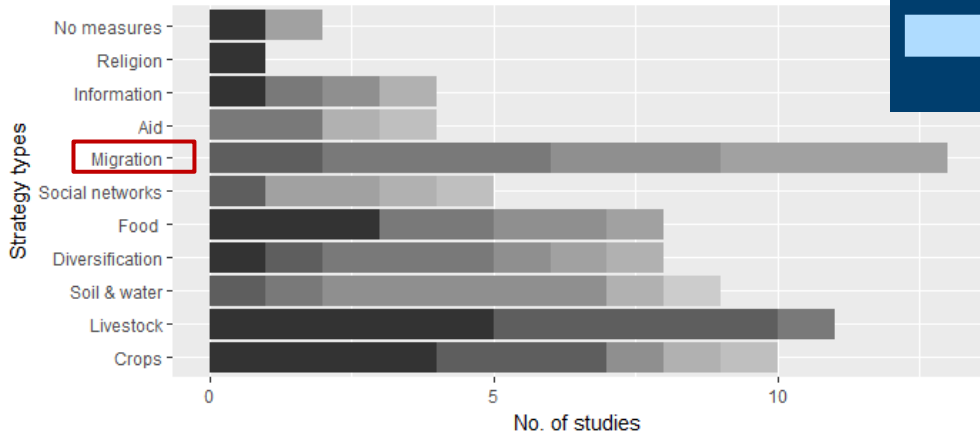

 - agricultural character of livelihoods
 - challenging environmental conditions

Farmers



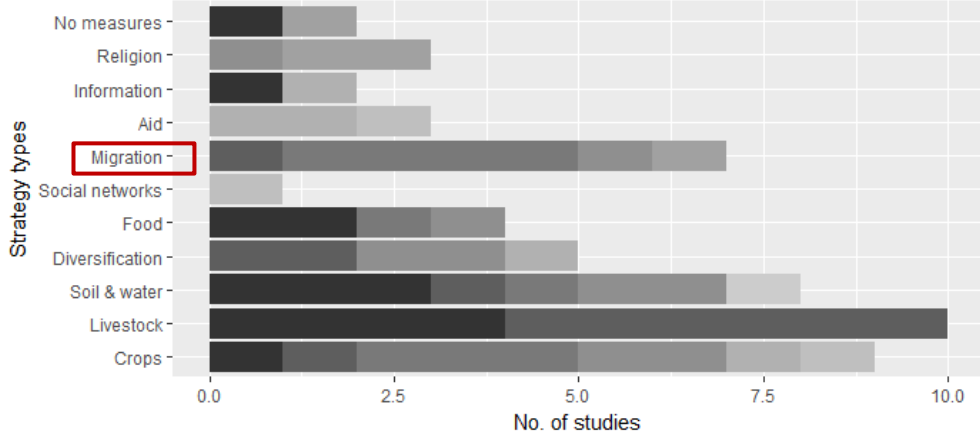
ranking approach based on frequency of adoption of each strategy relative to other strategies per study!

Agro-pastoralists



when migration is used as a strategy it is usually not the most common among households

Pastoralists



RESULTS (5)

THE ROLE OF MIGRATION



Photo Credit: Columbia Gbbal.

- **Diverse range of migration types** (esp. temporary and labour migration)
- Reported in almost **50% of studies** and by **approx. 23% of households**
- Out-migration often mentioned as a phenomenon but not framed as response to environmental change

Possible explanation:

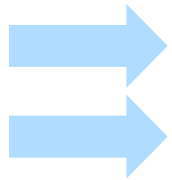
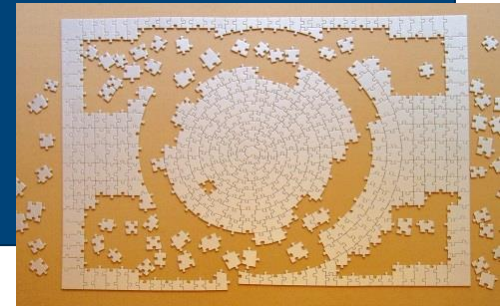
- migration more often associated with (direct) socio-economic drivers
- general challenges of grasping environment-migration-nexus



RECOMMENDATIONS

Recommendations for local case studies from a synthesis perspective:

- 1) Clear definition of used terminology
- 2) Reliable indication of case study site
- 3) Basic socio-economic characteristics of study population



Enhance comparability of case study results

Draw meaningful and generalizable conclusions

Source: Wiederkehr et al. (2018) *Environmental Research Letters* 13

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MOTIVATION



Photo Credit: Paul Brenton, Miles McKenna/World Bank Group.



Photo Credit: Steve Mann/ILRI.

Data synthesis

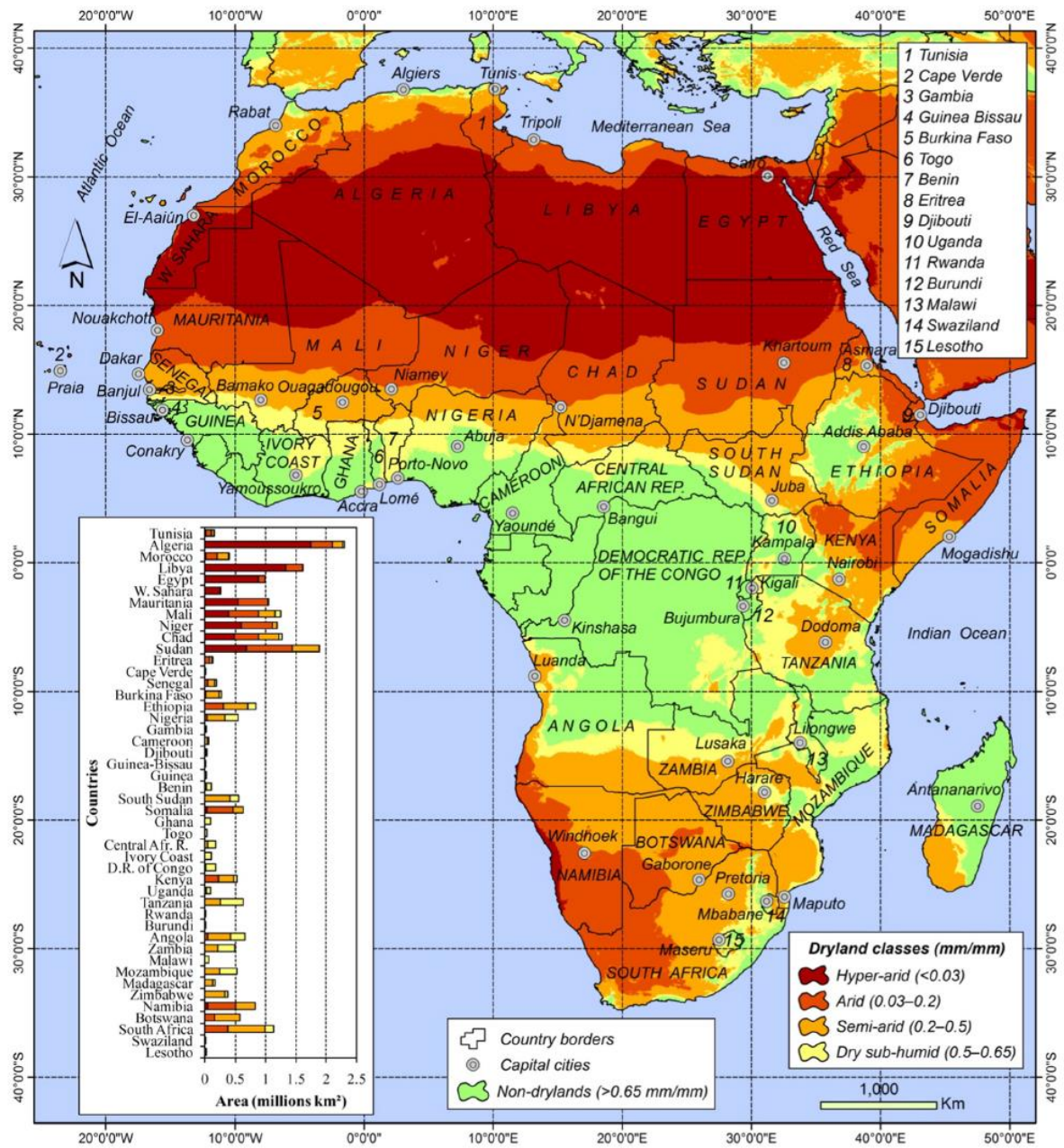
- Global environmental change generating trans-regional challenges
- Important political processes take place at different scales

Role of migration

- ‘environmental refugees’ vs. ‘migration as adaptation’ paradigms
- No. of climate-induced migrants expected to increase, especially in SSA

Sub-Saharan dryland populations

- Geographical, ecological and demographic dimension of drylands
- High vulnerability of Sub-Saharan countries



Spatial representation of dryland systems in Africa (from: Pravalie, 2016).

SYSTEMATIC LITERATURE SEARCH

Eligibility criteria:

- English-speaking literature in peer-review journals
- Local case studies with primary data
- Rural areas in SSA
- Predominantly arid and semi-arid lands*
- Environmental change process reported
- Subsistence livelihoods
- Household-level data
- Various actually adopted strategies
- Quantitative information (frequency of adoption)

*based on the Global Aridity Index

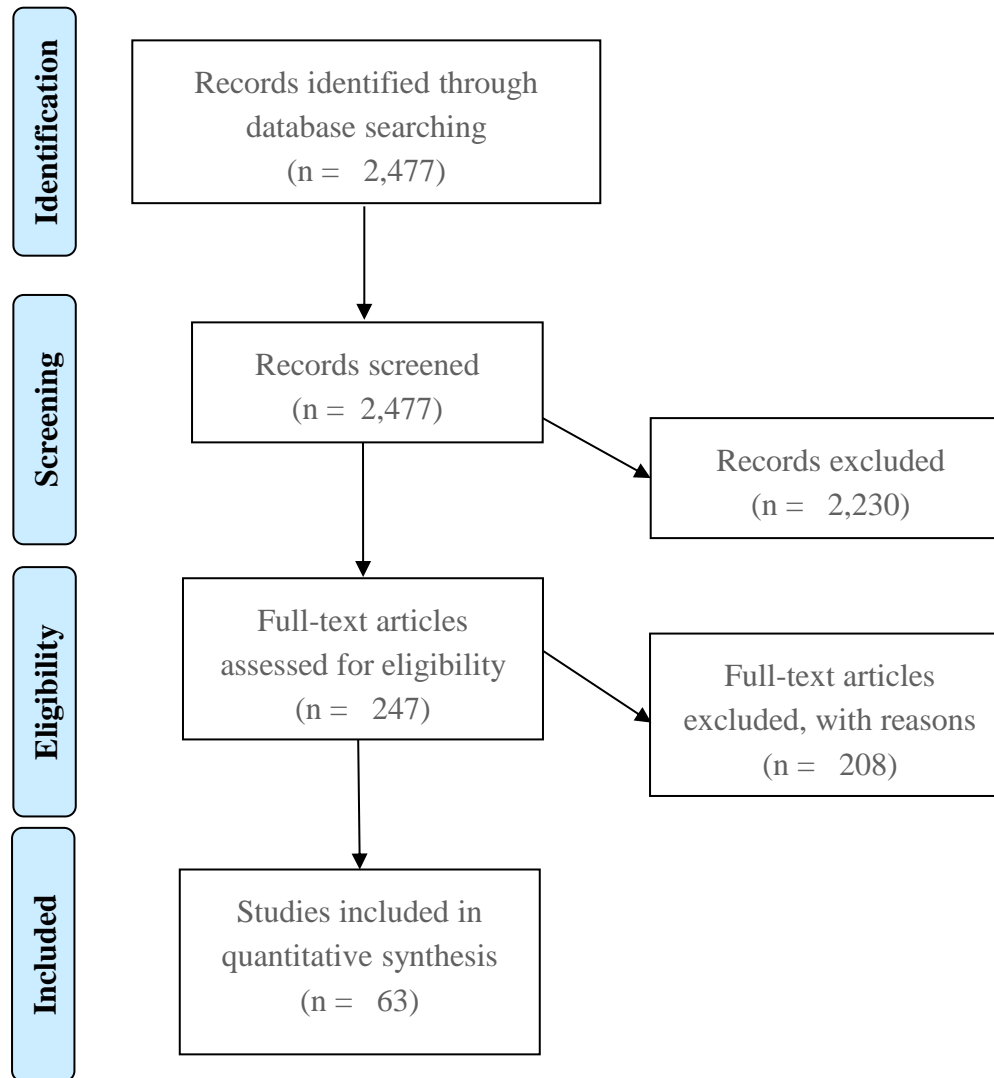


Photo Credit: Daniel Tiveau/CIFOR.



Photo Credit: Z. Sewunet/ILRI.

SYSTEMATIC LITERATURE SEARCH



Adapted from: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med* 6(7): e1000097. doi:10.1371/journal.pmed1000097

KEY CONCEPTS

Coping	Adaptation
<p><i>The use of available skills, resources, and opportunities to address, manage, and overcome adverse conditions, with the aim of achieving basic functioning in the short to medium term. (IPCC, 2012)</i></p>	<p><i>In human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. (IPCC, 2012)</i></p>
<ul style="list-style-type: none">- Short-term- Reactive/spontaneous- Temporary	<ul style="list-style-type: none">- Long-term- Proactive/planned- Permanent

RESULTS

CONTEXTUAL FACTORS

- **characteristics** of the study area & population

e.g.: infertile soils, land tenure issues, weak infrastructure, ethnic diversity, gender inequalities

- **causes and consequences** of environmental change

e.g.: overexploitation, land use change, crop failure, livestock death, health issues

- **adaptation barriers**

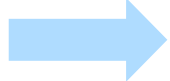
e.g.: lack of financial capital, farm inputs and information, inaccessibility of markets



acting at different scales



strongly intertwined, but interlinkages often not addressed



enabling or constraining?

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