



Vers l'excellence
académique au cœur de
l'Afrique

2025
SCIENTIFIC ACTIVITIES

Report

of the Laboratory of Applied Ecology (LEA)

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Table of contents

1. Geneses and research fields.....	3
2. Human resources	5
3. Major achievements	5
4. Networks.....	6
5. Researches and publications in 2025.....	7
6. General discussions and conclusion.....	18
7. References	21
8. Data collection	21
9. Appendixes.....	23
List of Figures	
Figure 1 Scale context of research activities in LEA in 2025	7
Figure 2:Trends of types of defended and ongoing PhD Theses from 2010 to 2025	8
Figure 3: Number of students supervised per professor at LEA in 2025.....	8
Figure 4: Spectrum of ongoing PhD thesis and related field of research in 2025	8
Figure 5: Spectrum of scientific productions of LEA in 2025.....	9
Figure 6: Published articles according to the fields of research in 2025.....	10
Figure 7: Articles in press according to fields of research in 2025.....	10
Figure 8: Diversity of LEA co-publications in peer review journals at countries level in 2025	12
Figure 9: Diversity in index of LEA co-publications in peer review journals at continental level in 2025.....	12
Figure 10: Trends per types of publications from 1998 to 2025.....	13
Figure 11: Spectra of publications, projects and small grants from 2010 to 2025.....	14
Figure 12: Level of participation of LEA's researchers to international conferences in 2025.....	16
Figure 13: Spectrum of research funding in 2025.....	17
List of Tables	
Table 1: Weighted Impact Factor Indices of publications according to the disciplines of specialization	11
Table 2: Estimated cost per publication and per IF unit from 2010 to 2025	15
Table 3: Cost of participation to conferences and seminars from 2010 to 2025	16

1. Geneses and research fields



The **Laboratory of Applied Ecology (LEA)** of the Faculty of Agronomic Sciences (FSA), University of Abomey-Calavi (UAC) Benin was created in 1994 by **Professor Brice Sinsin**.

The **major** research fields in which LEA is currently involved include:

1. Desertification and land degradation,
2. Biodiversity and climate change,
3. Carbon stock measurement and monitoring,
4. Ethnobotany and new crops development,
5. Management of agroforestry systems,
6. Ecological restoration of degraded land,
7. Management of Non-Timber Forests Products,
8. Management of protected areas,
9. Bio Monitoring of wildlife,
10. Red list of threatened

11. Grassland ecology,
12. Ecological and organic agriculture,
13. Phytochemistry of medicinal plant,
14. Development of improved traditional medicines,
15. Conservation genetics.



2. Human resources

05

Full Professors (Professeur Titulaire/CAMES)

20

Associate Professors (Maître-Conférences/CAMES)

Several **Assistant Professors** (Maître-Assistant/CAMES), assistant (PhD) and junior researchers (42 PhD students, MSc and BSc students). Moreover, 5 technicians and 3 drivers are used on permanent basis for fieldworks. Details about these human resources are shown on the web site of LEA (www.leabenin-fsauac.net).

3. Major achievements

Up to date, the major achievements of LEA are the following: (i) climate change, vulnerability assessment and natural/climatic risk management in the coastal area of Benin.

(ii) conservation and management of more than 10 forest genetic resources in Benin (e.g: *Adansonia digitata*, *Blighia sapida*, *Caesalpinia bonduc*, *Irvingia gabonensis*, *Pentadesma butyracea*, *Sclerocarya birrea*, *Tamarindus indica*, *Borassus aethiopum*, *Raphia sudanica*, *Dialium guineense*, *Picralima nitida*, *Khaya senegalensis*, *Mimusops andongensis*, *Tetrapleura tetraptera*, etc.); (iii) management of more than 10 agroforestry systems involving medicinal plants in Northern Benin (e.g Community gardens of Papatia, Monts Kouffé, Dangbo, Porga, etc.) ; (iv) ecological restoration of more than 5 degraded areas (e.g. Lama forest reserve and swampy forest of Lokoli in Southern Benin; semi deciduous forest of Bassila and Wari Maro in Northern Benin; etc.); (v) management of at least 5 protected areas in Benin (Biosphere Reserves of Pendjari and W in Northern Benin, Trois Rivières forests reserves, Goungoun and Sota forests in Northern Benin, Lama forest reserve in Southern Benin, etc.) ; (vi) Red list of threatened plants and wildlife in Benin (IUCN Red Book of Benin) ; (vii) remote sensing and mapping of vegetation (swampy forest of Lokoli, dense forest of Lama; Biosphere Reserves of Pendjari and W; etc.); (viii) biodiversity atlas of Benin.

4. Networks

International scientist networks:
The Regional Universities Forum for Capacity Building in Agriculture (RUFORUM), The African Academy of Sciences (AAS), Association pour l'Etude Taxonomique de la Flore Tropicale d'Afrique (AETFAT) ;

International institutions in nature conservation and biodiversity management:
The International Union for Conservation of Nature (IUCN), World Commission on Protected Areas (WCPA), Species Survival Commission (SSC), the Crop Wild Relative Specialist Group (CWRSG), Bioversity International, World Agroforestry Centre, Wildlife Management, Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES), South Saharan African Forest Genetic Program (SSAFOGP), Society for Ecological Restoration (SER-USA), African Network for Agriculture, Agroforestry and Natural Resources Education (ANAFE/ICRAF), African Forest Forum (AFF), Nestlé Foundation etc.;



Universities and NGOs in Belgium, Burkina-Faso, Cameroon, Canada, Côte d'Ivoire, Denmark, France, Gambie, Germany, Ghana, Japan, Kenya, Mali, Mozambique, Namibia, Niger, Nigeria, The Netherlands, Senegal, Sierra Leone, South Africa, Switzerland, Togo, UK, USA, Uganda, etc.).

5. Researches and publications in 2025

5.1 Types of research in 2025

The paper published by the research's teams at LEA in 2025 were mostly produced through international team (40%). About 31% of the publications were with national research's team, while regional collaborations accounted for 29%. Overall, 46 papers were published in 2025, including 34 articles in journals with Impact Factor and 12 articles in journals without Impact Factor (Figure 1).

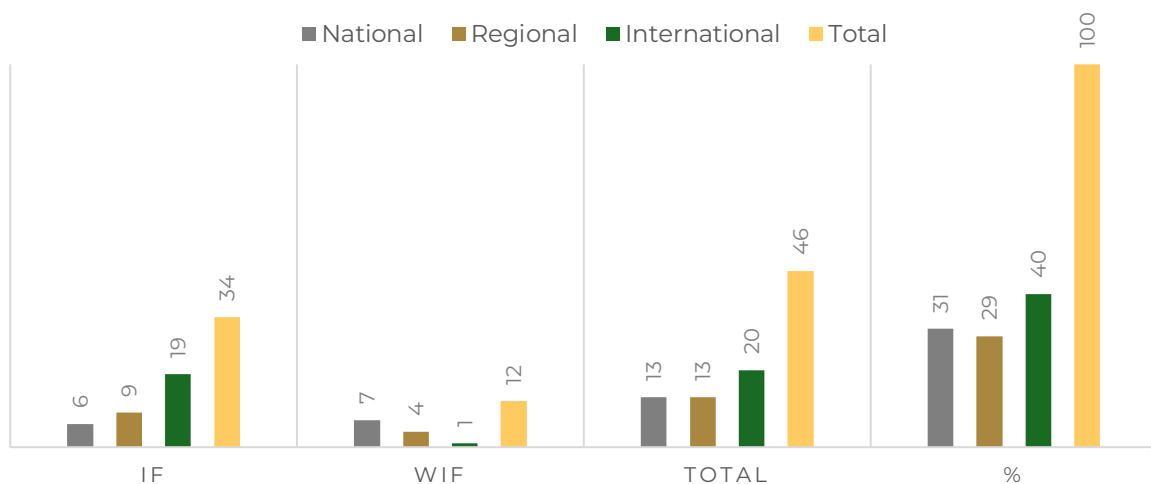


Figure 1 Scale context of research activities in LEA in 2025 | Legend: IF = Impact Factor; WIF = Without Impact Factor

5.2 Types of publications in 2025

a. Students at LEA in 2025

The number of students involved in research training at LEA showed important variations between 2010 and 2025 (Figure 2). In 2025, the laboratory recorded 15 ongoing PhD theses, 18 MSc theses defended, 6 BSc theses defended, and 4 PhD theses defended. Compared with 2024, the number of ongoing PhD theses increased from 10 to 15, while MSc theses defended also increased markedly from 6 to 18. The number of BSc theses defended rose from 1 in 2024 to 6 in 2025, whereas PhD theses defended increased from 2 to 4. Overall, the data show fluctuations in student training activities over the study period, with relatively high numbers recorded from 2016 onward.

■ Ongoing PhD thesis ■ MSc thesis defended ■ BSc thesis defended ■ PhD thesis defended

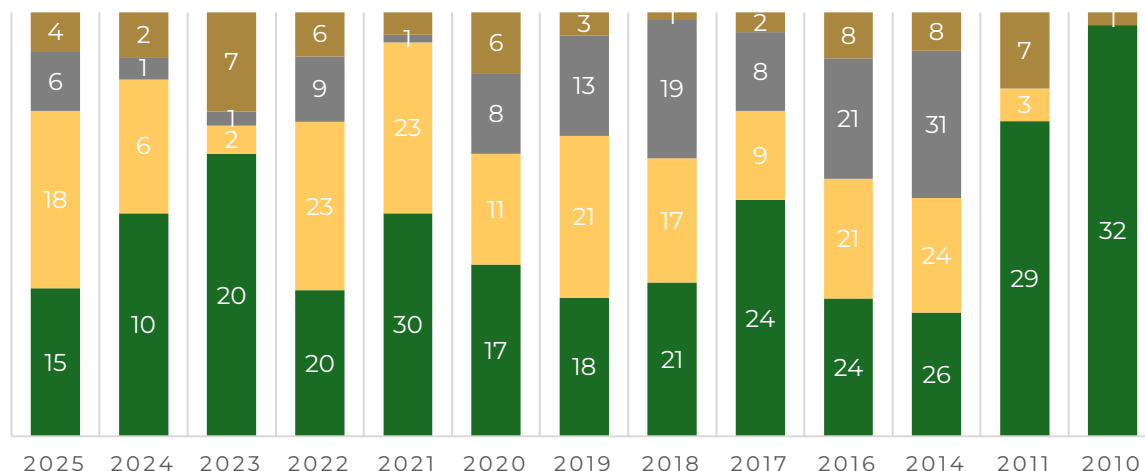


Figure 2: Trends of types of defended and ongoing PhD Theses from 2010 to 2025

The professors from LEA (full and associate) were actively involved in promoting and supervising PhD and Master students (figure 3). One professor supervised at least 2 ongoing PhD and 2 Msc in 2025.

■ PhD thesis ■ Msc thesis ■ Bsc thesis

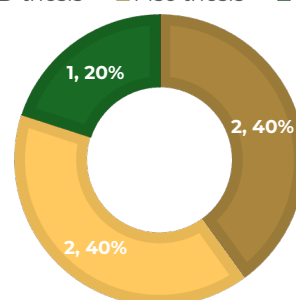


Figure 3: Number of students supervised per professor at LEA in 2025

b. Ongoing PhD theses at LEA in 2025

Forestry/Plant Ecology (28.6%) and Conservation Ecology (29%) were the most represented, followed by Landscape Ecology (21.4%). Agriculture and Agroforestry accounted for 14.3%, while Wildlife and Grassland management was the least represented field with 7.1% of the total PhD topics (Figure 4).

■ Agriculture/ Agroforestry ■ Landscape ecology ■ Wildlife and Grassland management ■ Forestry/Plant Ecology ■ Conservation Ecology/ Wildlife management

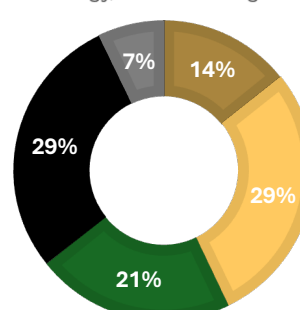


Figure 4: Spectrum of ongoing PhD thesis and related field of research in 2025

5.3. Scientific productions at LEA in 2025

A total of 47 scientific papers were published in peer-reviewed journals in 2025, including 34 papers in journals with Impact Factor and 13 papers in journals without Impact Factor. In addition, 9 articles were accepted and are currently in press, among which 9 in journals with Impact Factor and 1 without Impact Factor. Furthermore, 5 abstracts or book chapters were also produced during the same period.

5.3.1. Publications in peer review journals

i) Number, categories and impact factor indexes of publications

The scientific articles published in 2025 were mainly produced in peer-reviewed journals with impact factor (IF), which accounted for 73.9% of the total publications, whereas publications in peer-reviewed journals without impact factor (WIF) represented 26.1% of the published papers (Figure 5). In addition, 10 articles were in press, of which 9 in journals with IF and 1 without IF, and 7 articles were still under review in journals with IF in 2025. Overall, a total of 62 scientific papers were either published, in press or under review in 2025. Full references (authors, journals, etc.) of the publications are provided in Appendices 6, 7, 8, 9, 10 and 11.

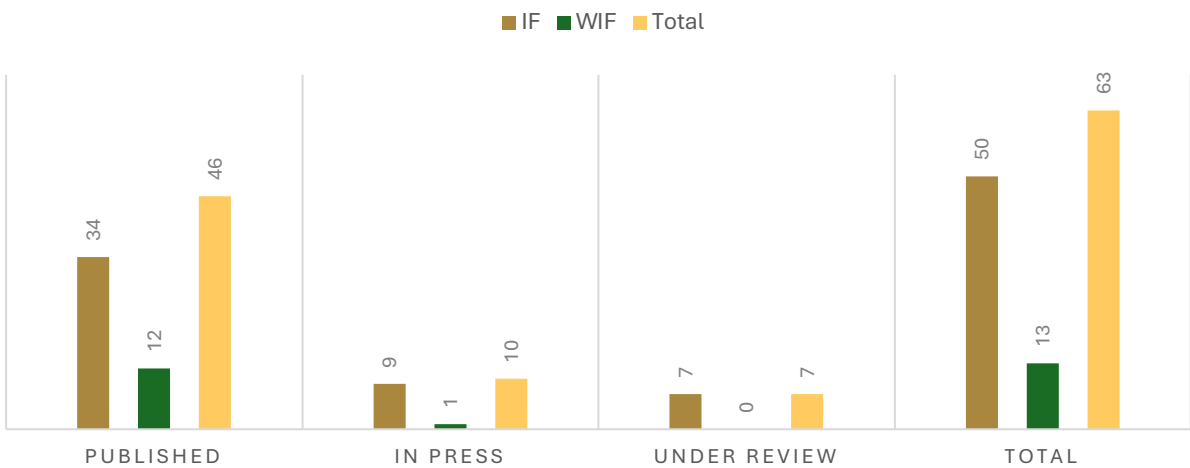


Figure 5: Spectrum of scientific productions of LEA in 2025 | Legend: IF = Impact Factor; WIF = Without Impact Factor

(ii) Specialization Indexes of publications

a) Published articles

The published articles in 2025 cover various fields of research (Figure 6) as the previous year including Forest and Plant ecology (14 papers), Agriculture and Agroforestry (11 papers), Wildlife and Grassland (7 papers), Risk assessment/ Climate change (7 paper) and Ethnobiology (5 papers) Most articles were published in Forest/Plant ecology and Agriculture/Agroforestry which are the main research's field of LEA (Figure 6).

b) Articles in press

The articles in press in 2025 were predominantly from the Wildlife/Grassland field, which accounted for 89% of the total, corresponding to 9 articles. Agriculture/Agroforestry was the only other represented field with 11% of the articles in press, corresponding to 1 article (Figure 7). Overall, a total of 10 articles were accepted and awaiting publication in peer-reviewed journals with Impact Factor during the reporting period.

■ Forestry / Plant Ecology ■ Agriculture / Agroforestry
■ Wildlife / Grassland ■ Ethnobiology
■ Risk Assessment / Climate Change

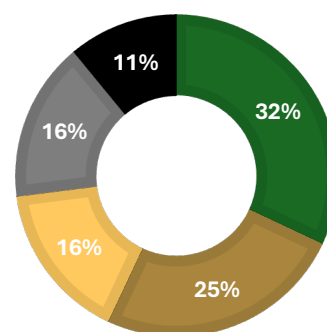


Figure 6: Published articles according to the fields of research in 2025

■ Wildlife/Grassland ■ Agriculture/Agroforestry

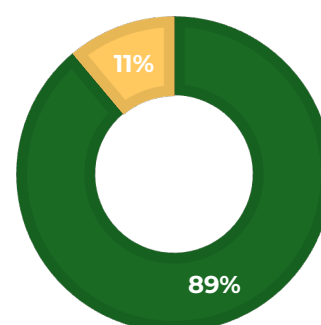


Figure 7: Articles in press according to fields of research in 2025

(iii) Weighted Impact Factor Index of publications

Publications which highly contributed to gain the Impact Factor of LEA in 2025 were related to Forest and Plant ecology, Agriculture and Agroforestry (Table 1). Therefore, these fields of publication are the ones in which the recorded scientific publications in LEA had the highest Impact Factor in 2025.

Table 1: Weighted Impact Factor Indices of publications according to the disciplines of specialization

Field of Research	Total publications	IF journals	WIF journals	Weighted IF Index
Forestry / Plant Ecology	14	12	2	43.1 (7.3, 2.9, 3.5, 2.9, 3.5, 3.5, 3.1, 5.1, 1.6, 2.1, 2.9, 4.7)
Agriculture / Agroforestry	11	8	3	17.6 (3.5, 2.9, 2.2, 1.876, 3.3, 2.0, 1.3, 0.47)
Risk Assessment / Climate Change	7	5	2	18.8 (4.2, 1.7, 8.4, 2.8, 1.7)
Wildlife / Grassland	7	5	2	15.5 (2.8 + 1.1 + 3.1 + 4.4)
Ethnobiology	5	2	3	4.2 (1.3 + 2.9)
Total	44	32	12	99.2

(iv) Indices of co-publications in peer review journals

a) Country level

The Laboratory of Applied Ecology (LEA) collaborates with a broad network of training and research institutions at national, regional, and international levels. Research teams within LEA regularly publish scientific papers in collaboration with both national and international researchers (Figure 8). Benin accounted for the largest share of co-publications (36%), reflecting its role as the host country of the laboratory. Among foreign partner countries, Germany represented the most important collaborator with 8% of co-publications, followed by South Africa and Nigeria (5.0% each). France, Togo, Cameroon, and Kenya each contributed 4% of the co-publications, while Switzerland, Senegal, Ghana, and Côte d'Ivoire accounted for 3% each. Burkina Faso, Belgium, Japan, and the United Kingdom each represented 2% of co-publications. South Korea, Uganda, Ethiopia, Rwanda, Gambia, the United States, Portugal, and China each contributed 1.0%. Overall, the distribution of co-publications highlights the strong regional integration of LEA within Africa, while also demonstrating active scientific partnerships with institutions in Europe, Asia, and North America, reflecting the laboratory's growing international visibility and collaborative research network.

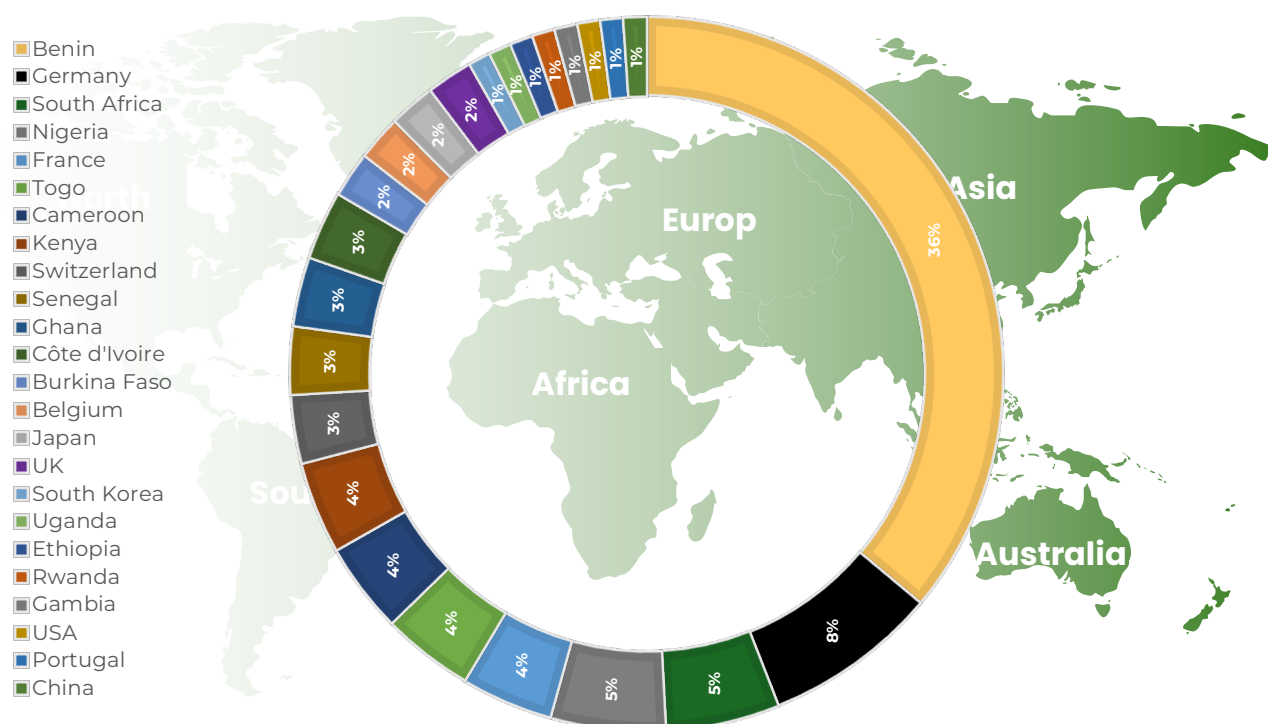


Figure 8: Diversity of LEA co-publications in peer review journals at countries level in 2025

b) Continental level

At the continental level, Africa was involved in 100% of the published articles (46 articles), which is expected given that LEA is an African institution. Europe was the most represented foreign continent, contributing to 37% of the publications (17 articles), with Germany as the leading European partner. Asia followed with 13% of the articles (6 articles), involving South Korea, Japan, China, and Iran. America contributed to 6% of the publications (4 articles), while Oceania (Australia) was involved in 2.2% of the articles (1 article). Overall, LEA's publications in 2025 reflect a truly global scientific network spanning 5 continents and 39 countries (Figure 8).

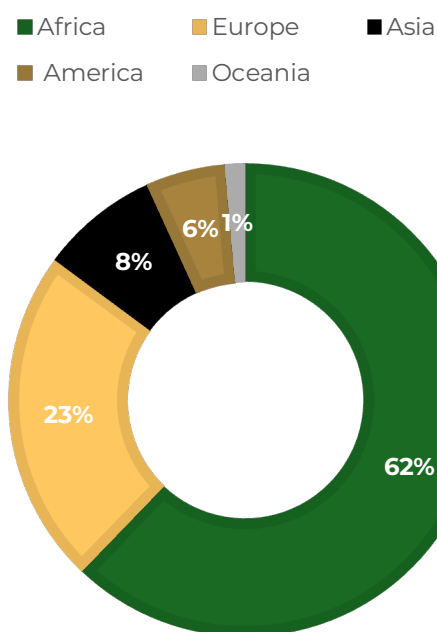


Figure 9: Diversity in index of LEA co-publications in peer review journals at continental level in 2025

5.4. Trends of publications in peer review journals and proceedings from 1998 to 2025

Publications in peer-reviewed journals globally increased from 1998 to 2025, with major publication peaks observed in 2011, 2013, 2016, 2017, 2018, and 2022. Publishing in peer-reviewed journals with Impact Factor (IF) started in the laboratory in 2000 with 1 to 3 publications per year until 2005, followed by a substantial increase over time. For most years, the number of publications in peer-reviewed journals without Impact Factor (WIF) remained higher than those published in journals with Impact Factor. However, publications in journals with Impact Factor exceeded publications in journals without Impact Factor in 2016, 2017, 2019, 2020, 2021, 2023, 2024, and 2025. In 2025, a total of 46 articles were published in peer-reviewed journals, including 34 in journals with Impact Factor and 12 in journals without Impact Factor (Figure 9).

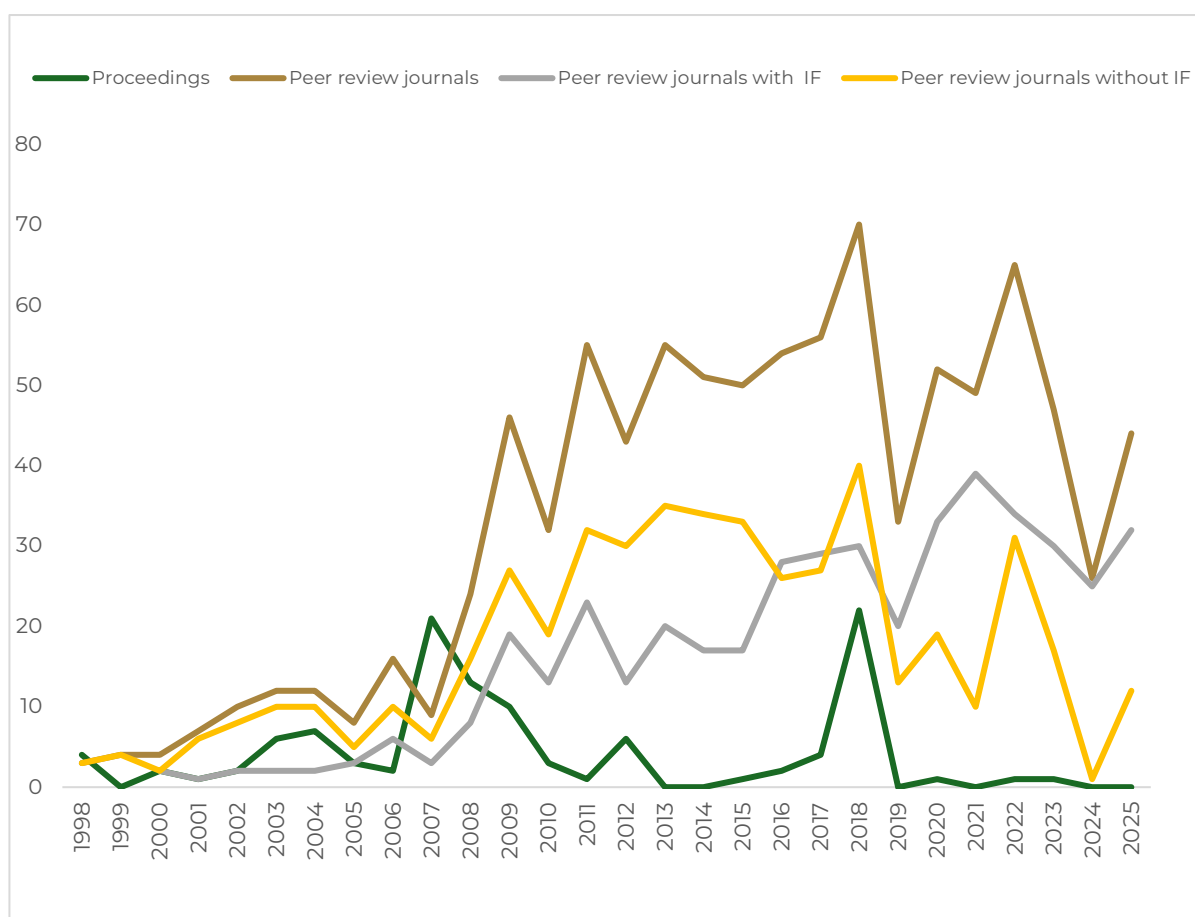


Figure 8: Trends per types of publications from 1998 to 2025

5.5. Trends of research projects, research grants and publications in peer review journals from 2010 to 2025

Research projects and small grants at LEA have generally increased since 2010, alongside the growth in scientific publications in peer-reviewed journals (Figure 10). The highest number of projects and small grants was recorded in 2018 with 21 projects, while relatively high values were also observed in 2015, 2017, 2022, and 2023. A similar trend was observed for scientific publications, which globally increased over the years, with major publication peaks recorded in 2011, 2013, 2016, 2017, 2018, and 2022. The increase in research projects and grants appears to be associated with increased scientific productivity within the laboratory. This trend is particularly evident for publications in peer-reviewed journals with Impact Factor (IF), whose numbers have substantially increased over time. In 2025, LEA recorded 12 projects and grants alongside 46 scientific publications, including 34 papers published in peer-reviewed journals with Impact Factor and 12 papers in journals without Impact Factor.

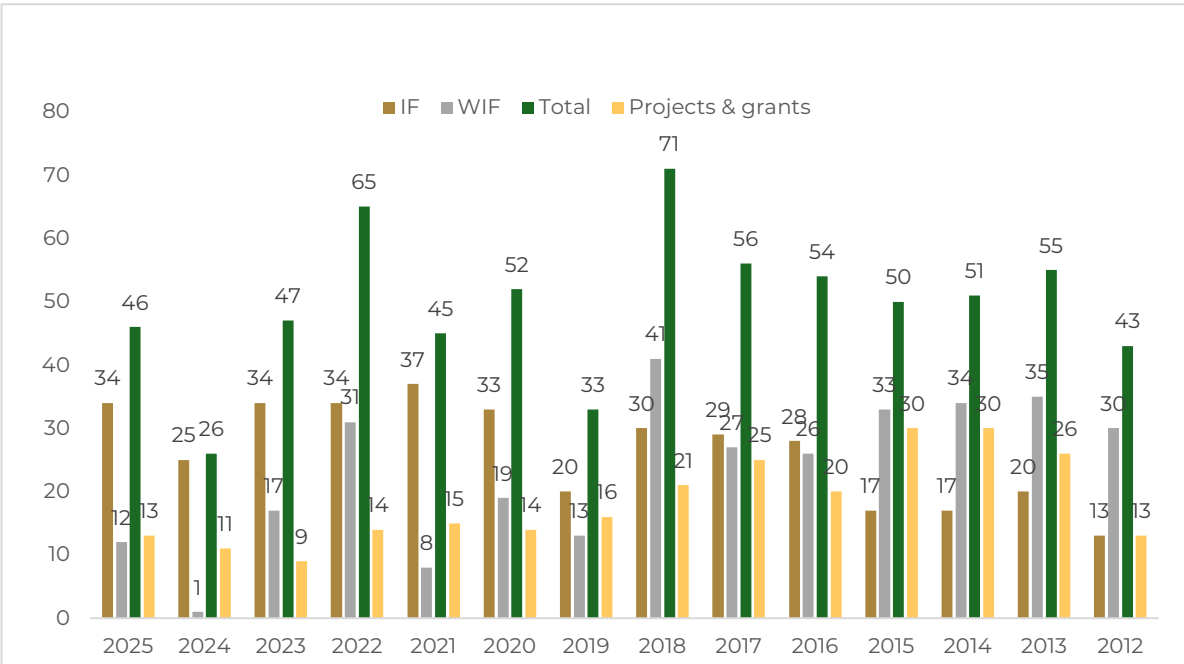


Figure 9: Spectra of publications, projects and small grants from 2010 to 2025

The budget per year at LEA from 2010 to 2025 vary from 110 000 Euro to 185 000 Euro. The budget decreased compared to the previous years. In 2025, LEA operated with an estimated annual budget of 110,000 Euro, a level comparable to those recorded during the last decade. Despite these relatively moderate financial resources, the laboratory produced 46 scientific publications, including 34 papers published in peer-reviewed journals with Impact Factor and 12 papers in journals without Impact Factor. The overall scientific quality of the publications remained high, as reflected by a cumulative Impact Factor unit of 99.7. The estimated cost per publication and cost per IF unit were 3,235 Euro and 1,109 Euro respectively (Table 2). These results demonstrate the laboratory's strong scientific productivity and its capacity to generate high-quality research outputs with relatively efficient use of available resources.

Table 2: Estimated cost per publication and per IF unit from 2010 to 2025

Year	Total Publication	Total IF unit	Estimated budget of LEA/year	Cost (Euro) /publication	Cost (Euro)/IF unit
2025	46	99.2	110000	2391	1109
2024	26	61.003	120000	4615	1967
2023	51	100.007	120000	2353	1200
2022	65	136.445	115000	1769	843
2021	48	83.234	140000	2917	1682
2020	52	87.79	130000	2500	1481
2019	33	34.4535	130000	3939	3773
2018	71	61.197	140000	1972	2288
2017	56	47.236	125000	2232	2646
2016	54	41.174	155000	2870	3765
2015	50	20.721	170000	3400	8205
2014	51	23.84	185000	3627	7760
2013	55	19.826	165 000	3000	8322
2012	43	11.6355	155 000	3605	13321
2011	55	27.0247	160 000	2909	5921
2010	32	12.628	125 000	3906	9899
2009	46	21.498	145 000	3152	6745

Mean budget of projects per year ≈ 100 000 Euro; Mean budget per grant per year ≈ 5000 Euro

5.6. Conferences and seminars from 2010 to 2025

The majority of scientific conferences, workshops, trainings, and academic events attended by LEA researchers took place in Africa, representing 60% of total participations. Europe and Asia each accounted for 13.3% of these records, while North America was the least represented continent with 3.3% (Figure 12). Details related to these conferences/workshops are listed in appendix 15. Most of the conferences and seminars at which the researchers at LEA participated were financially supported (Table 3).

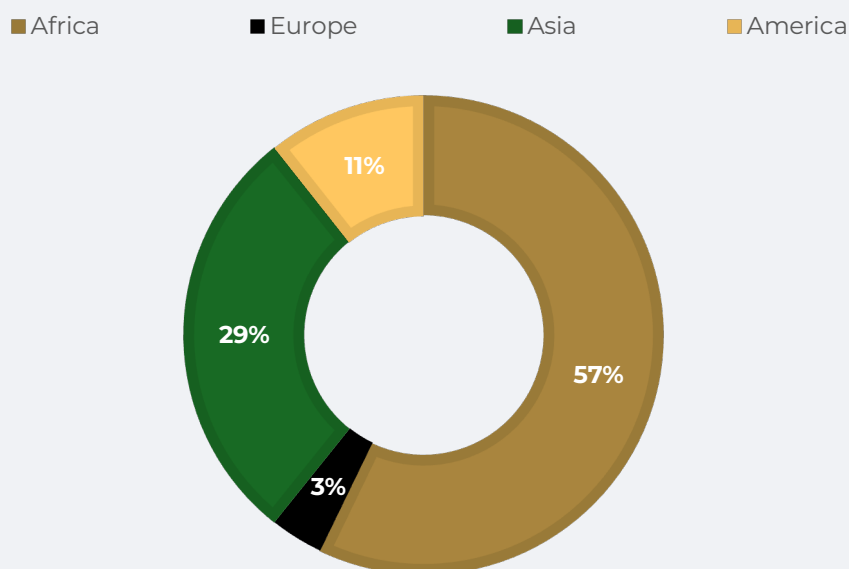


Figure 10: Level of participation of LEA's researchers to international conferences in 2025

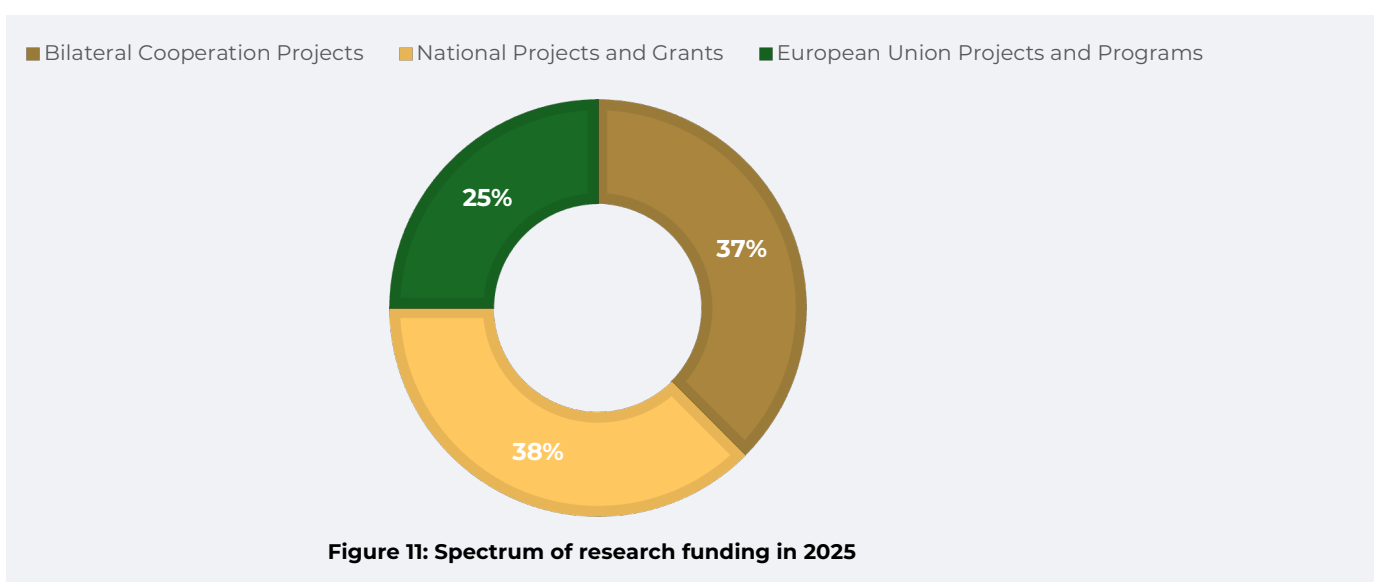
Table 3: Cost* of participation to conferences and seminars from 2010 to 2025

Year	Africa	Europe	USA	Asia	Total	Financial support	Contribution of LEA
2010	19000	10000	5000	7500	41500	35165	6333
2011	17000	27500	10000	10000	64500	58833	5667
2012	31000	15000	7500	7500	61000	50667	10333
2013	39000	10000	0	10000	59000	46000	13000
2014	27000	27500	2500	2500	59500	50500	9000
2015	33000	5000	2500	2500	43000	32250	10750
2016	17000	10000	2500	0	29500	20114	9386
2017	32000	20000	12500	2500	67000	54000	13000
2018	27000	12500	2500	0	42000	8755	33245
2019	29000	5000	2500	2500	39000	24000	15000
2020	11000	5000	2500	2500	21000	7000	14000
2021	13000	7500	0	0	20500	10000	10500
2022	15000	7500	0	0	22500	7000	15500
2023	31000	15000	0	0	46000	26000	20000
2024	10000	0	0	7500	17500	6000	11500
2025	19000	2500	0	20000	41500	25000	16500

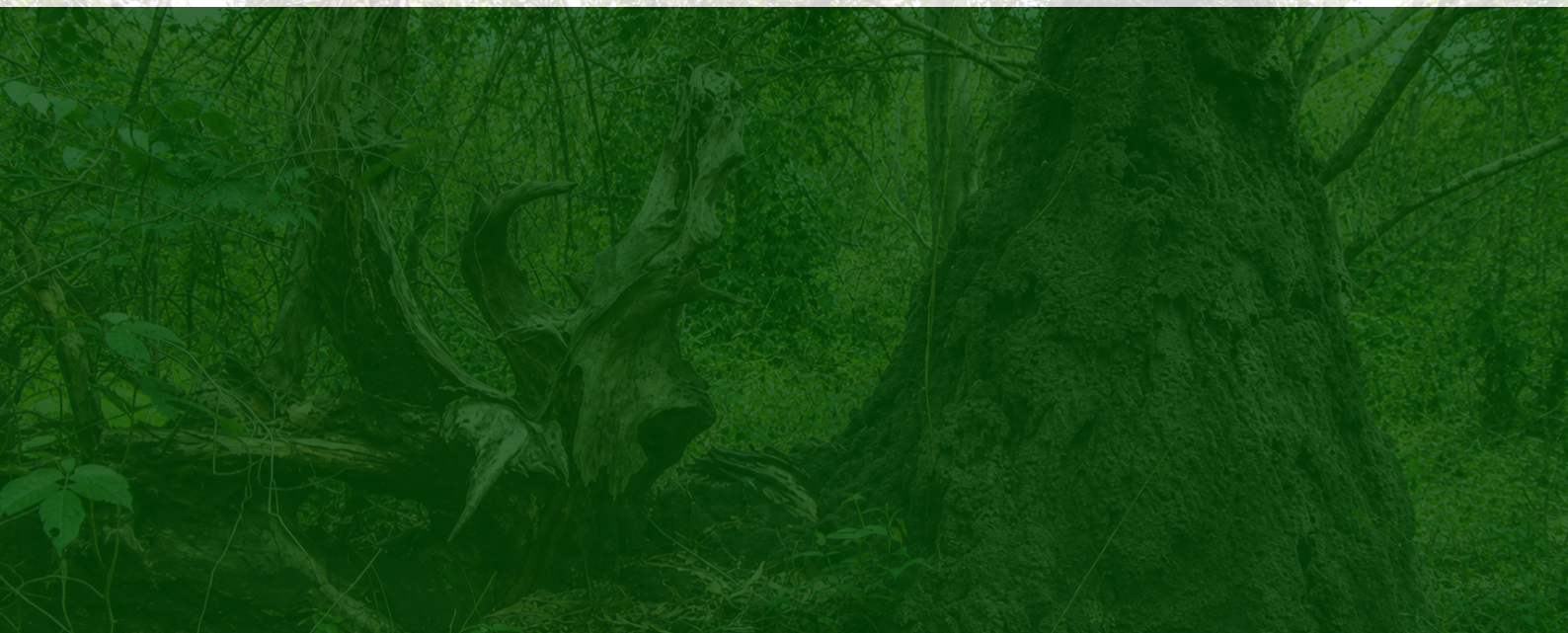
*Cost per conference: Africa ≈ 1000 Euro; International (Europe, USA, Asia) ≈ 2500 Euro

5.7 Research projects, research grants and prize in 2025

The research activities undertaken by LEA in 2025 were supported through three main funding categories. Bilateral Cooperation Projects, National Projects and Grants with each representing 37.5% of the recorded funding initiatives, while European Union Projects and Programs accounted for 25%. Bilateral cooperation involved partnerships with organizations such as ARES, ARES-PRD, the Alexander von Humboldt Foundation, Nestlé Foundation and other international partners. National projects and grants supported research, innovation and capacity building activities in Benin and the sub-region. European Union funding was provided mainly through programmes such as ACP Innovation Fund and Erasmus+. Together, these funding mechanisms contributed substantially to research implementation, student training, scientific networking and publication activities within LEA.



6. General discussions and conclusion



The Laboratory of Applied Ecology (LEA) has experienced substantial scientific growth over the past decades, as evidenced by the progressive increase in scientific publications since 2010 and the growing proportion of articles published in high-impact journals. The year 2025 marked a historic milestone for the laboratory, with 46 published articles representing the highest annual output ever recorded, including 34 papers in journals with Impact Factor (73.9%) and a cumulative weighted IF index of 99.7. Since 2020, publications in journals with Impact Factor have become increasingly predominant, and 2025 confirms this trend with a clear dominance of IF over non-IF publications. This progressive transition toward more competitive and internationally recognized scientific production reflects the scientific maturation of LEA, characterized by stronger integration into international scientific standards, increased publication competitiveness, and improved research positioning within global environmental and ecological sciences. It is worth noting that a portion of the articles published in 2025 likely resulted from research activities, data collection, and manuscript submissions carried out during previous years, given the typical delay between research implementation and final publication.

This observation is further supported by the current pipeline of 10 articles in press and 7 articles under review, which are expected to sustain and potentially increase the laboratory's publication output in the coming year. This publication pipeline suggests that LEA's scientific productivity will remain high in 2026, building on the momentum generated by the exceptional research activities of 2025.

Research funding and scientific productivity at LEA appear closely interconnected, and 2025 represents a particularly distinctive period in this regard. The estimated annual budget for conferences, seminars, trainings, and scientific mobility reached €41,500, distributed across activities conducted in Africa (45.8%), Asia (48.2%), and Europe (6%). Financial support mobilized from partners amounted to €21,750, while LEA contributed €19,750. Research activities undertaken by LEA were mainly funded through National and Regional Funding Schemes and Research Grants (38%), followed by Bilateral Cooperation Projects (37%) and European Union-funded Projects and Programmes (25%). Bilateral cooperation involved organizations such as ARES, the Alexander von Humboldt Foundation, and IDRC, while European Union support was provided through initiatives such as Erasmus+ and the ACP Innovation Fund.

National and regional funding opportunities included programmes such as SG-NAPI and PRSA/FSRP.

Most PhD students, postdoctoral fellows, and senior scientists at LEA were involved in these projects for their research activities, training, field data collection, scientific networking, and publication processes. Beyond the quantitative increase in resources, these funding mechanisms contributed to strengthening LEA's research infrastructure, international visibility, and scientific productivity.

Scientific collaboration remained one of the major strengths of LEA in 2025. Publications were produced through national (31%), regional (29%), and international collaborations (40%). At country level, Benin remained the principal collaborating country, accounting for 33 publications (42.3%), followed by Germany (7 publications; 9.0%), and Togo (4 publications; 5.1%). Nigeria, Ghana, Senegal, Japan and Côte d'Ivoire each contributed 2 publications (2.6%), while several other countries contributed to one publication each. In total, researchers from 18 countries collaborated with LEA scientists during 2025. At the continental level, Africa overwhelmingly dominated the collaboration network, representing 80% of all co-authorships, followed by Europe

(10%), Asia (6%) and America (4%). This strong African anchorage confirms LEA's role as a regional hub for ecological, environmental and agroecological research, while maintaining productive partnerships with institutions in Europe, Asia and the

Americas. The high level of scientific mobility further reinforced this trend, with LEA researchers participating in 28 conferences, workshops, trainings, internships and scientific meetings during 2025. Africa hosted the majority of these events (64.3%), followed by Asia (25.0%) and Europe (10.7%), illustrating the laboratory's strong regional engagement alongside its growing international visibility.

The scientific orientation of LEA in 2025 remained strongly focused on strategic research areas such as Forestry and Plant Ecology, Agriculture and Agroforestry, Ethnobotany, Landscape Ecology, Conservation Ecology, Wildlife and grassland, risk assessment and Climate Change.

These thematic areas reflect both the historical expertise of the laboratory and its commitment to addressing major environmental, agricultural and biodiversity challenges affecting tropical and African ecosystems. The laboratory also continued to strengthen emerging research themes including neglected and underutilized species, agroecology, ecosystem restoration, climate resilience, natural resource valorisation and sustainable food systems. The supervision of 15 ongoing PhD students across multiple research fields further consolidates LEA's role not only as a research institution but also as a regional platform for scientific capacity building and postgraduate education in West Africa. The thematic diversity of ongoing doctoral research, spanning landscape ecology, wetland conservation, conservation genetics, agroforestry systems, wildlife management, food systems, and biodiversity conservation, illustrates the interdisciplinary nature of the laboratory's research agenda and its capacity to address complex socio-ecological challenges in an integrated manner. The strong mentorship culture within LEA, combined with its expanding network of international collaborations and diversified funding portfolio, positions the laboratory as an emerging scientific hub capable of sustaining high-quality research production, training future generations of environmental scientists, and contributing meaningfully to regional and global debates on biodiversity conservation, climate change adaptation, agroecological transitions, ecosystem restoration, and sustainable natural resource management in West Africa and beyond. Based on the findings of the present report, LEA should continue strengthening publication capacity in high-impact journals, expand international scientific collaborations particularly with underrepresented regions such as North America and Oceania, promote interdisciplinary environmental research, and further integrate emerging technologies into ecological research, training activities, and decision-support systems.

7. References

<http://scientific.thomson.com/products/wos/>

www.leabenin-fsauac.net

www.notesdecologie.bj.refer.org

www.fsa.bj.refer.org

Publications in LEA in 2025 (cf. appendices)

Theses in LEA in 2025 (cf. appendices: PhD, MSc and agronomist degree).

8. Data collection

The methodology used for this report was primarily based on the research, training, and scientific activities conducted by researchers and students of the Laboratory of Applied Ecology (LEA) during the year 2025. Information collected included:

- postgraduate and undergraduate dissertations and theses;
- scientific articles published in peer-reviewed journals;
- articles in press and under review;
- conference proceedings;
- books and book chapters;
- books of abstracts;
- technical reports;
- research projects, grants, prizes, and awards;
- conferences, workshops, and seminars attended by LEA researchers.

Only publications involving authors and/or co-authors affiliated with LEA were considered in the analyses. For scientific publications in peer-reviewed journals, two categories were distinguished: (i) publications in journals with Impact Factor (IF), and (ii) publications in journals without Impact Factor (WIF), based on the Web of Science database. The report also assessed scientific collaborations and co-publications at national, regional, continental, and international levels. Types of collaborations were determined according to the proportion of publications produced through national, regional, or international co-authorship relative to the total number of publications recorded by the laboratory.

Long-term publication trends from 1998 to 2025 were analysed for both proceedings and peer-reviewed journal publications. Particular attention was given to publication dynamics, publication quality, collaboration patterns, and thematic specialization.

Several indicators and indices were computed during data processing, including:

- Specialization Index of Publications: ratio between the number of publications in a given research field and the total number of publications across all fields;
- Impact Factor (IF) Index of Publications: ratio between the number of publications with Impact Factor and the total number of publications in peer-reviewed journals for a given field of research;
- Weighted Impact Factor Index: product of the IF publication index and the cumulative sum of Impact Factor values reported in the Web of Science database;
- Co-publication Index at Country and Continental Levels: ratio between the number of co-publications involving a given country or continent and the total number of co-publications recorded by the laboratory;
- Estimated Cost per Publication: ratio between the estimated annual budget of LEA and the total number of publications produced during the corresponding year;
- Estimated Cost per Impact Factor Unit: ratio between the estimated annual budget of LEA and the cumulative Impact Factor units obtained during the year.

Information related to conferences, seminars, research projects, grants, prizes, and scientific awards was also compiled and analysed in the report. To ensure traceability and verification of the information used, a dedicated appendices section was included at the end of the report, together with the full references and abstracts of scientific papers published in peer-reviewed journals.



9. Appendixes

2025 scientific activities report of the Laboratory of Applied Ecology

Appendix 1: Ongoing PhD thesis in LEA

N°	Student full name	Number of year since the start of the PhD	Research topics	Fields of Research
1	Sètondji Polynice Gédéon ANAGONOU	3 rd year	Biodiversity conservation and improving management of natural wetlands in south of Benin Republic, West Africa	Forestry/Plant Ecology
2	Yénoukounmè Germain HOUNKPONOU	2 nd year	Ecological consequences of landscape use on the flora and water resources of the lower Ouémé valley	Landscape ecology
3	François Darius ACCROMBESSI	3 rd year	Effects of Climate Change together with Forest Fragmentation on the genetic diversity, feeding behaviour and dispersal patterns of <i>Colobus vellerosus</i> in central and southern Benin, West Africa	Landscape ecology
4	AYEKO Ranmi Elsa Denise	2 nd year	Impacts of spatial landscape structure on habitats suitable for forest-dwelling mammals in southern Benin	Landscape ecology
5	KEGBE Ahuéfa Mauricel	4 th year	Wild relatives of solanaceae cultivated leafy vegetables in west africa: biodiversity, distribution, conservation gaps and adaptation	Agriculture/ Agroforestry
6	AGBOHESSOU Mariette	3 rd year	Growth, morphological and physiological responses of baobab to combined effect of drought and salinity.	Forestry/Plant Ecology
7	BIO YERIMA Sanni	2 nd year	Évaluation multicritère des mangroves pour une approche de conservation durable	Forestry/Plant Ecology
8	BOURAÏMA Raoudath A. O.	2 nd year	The food environments in shaping healthier food choices and consumption	Agriculture/ Agroforestry
10	MANDA Léonard	2 nd year	In situ conservation, floristic composition, ethnobotany, and adaptive response to drought and <i>Striga</i> stresses of <i>Vigna</i> crop wild relatives in Benin	Forestry/Plant Ecology
11	Vignonzan Morel Coffi	2 nd year	Evaluation quantitative et procédés de valorisation des déchets d'abattoirs dans l'alimentation des animaux monogastriques au Bénin	
12	SOSSA Barnabé	3 rd year	Evaluation du commerce national et international des espèces de reptiles au Bénin: conservation, politique, économie et durabilité	Wildlife/grassland
13	ADOUNKE Gilles	3 rd year	Ecological and genetic indicators of the bushmeat population status in the lama forest: implication for the sustainability of wildlife trade in southern Benin	Wildlife/grassland
14	AYEGNON David	3 rd year	Interactions écologiques entre la composition, la qualité de l'habitat et l'abondance des mammifères terrestres de la Forêt Classée de Pénésoulou : implications dans la conservation des grands ongulés sauvages	Wildlife/grassland
15	AKPONA Hugues	2 nd year	The Spatial Ecology of Elephants: Implications for Managing Human-Wildlife Conflict and Security Crises in the Pendjari Biosphere Reserve, Northern Benin	Wildlife/grassland

Appendix 2: Completed bachelor degree in 2025

N°	Student full name	Research topics	Fields of Research
1	DAGA Angelus Confiant	Diagnostic de l'association Hin-Dhòkoun et valorisation du potentiel touristique (sites d'attraction) présent au sein de l'ACCB Lac Ahémé au Bénin	Forestry/Plant Ecology
2	DENON Biowa Hintèkpo Léger	Diagnostic de l'ACCB Lac Ahémé et Analyse de la Chaîne de Value du Jonc "Cyperus articulatus" à Comé au Bénin	Forestry/Plant Ecology
3	BOSSOUSSI-AGBANNINHIN Sémontché Sorel Généreux	Diagnostic des activités de l'association Hin-Dhòkoun de l'ACCB Lac Ahémé et gestion durable des plantes médicinales : étude de la diversité, l'irremplaçabilité et valeur économique	Forestry/Plant Ecology
4	Houessou Olouwafèmi Charbel Don De Dieu	Diagnostic du système d'élevage de basse-cour sur la ferme « Jardin des Oliviers » à Sado (Avrankou, Ouémé) au Bénin	Agriculture/ Agroforestry
5	Kodagbé Sirey Sergio Prince	Diagnostic d'un système d'élevage agroécologique des Lapins au sein du CEDeC de l'ONG Bouge	Agriculture/ Agroforestry
6	Kouaro Joannel	Diagnostic du fonctionnement du ranch faunique de Gbadagba : gestion des ressources fourragères et hydriques en saison sèche	Forestry / Plant ecology

Appendix 3: Completed Master of Sciences degree or agronomist engineer degree in 2025

N°	Student full name	Research topics	Fields of Research
1	YANCLO Noris Wandel M	Diversité, distribution et conservation des populations de <i>Parkia bicolor</i> (A. Chev.) dans les forêts d'Afrique de l'Ouest et Centrale	Forestry/Plant Ecology
2	DANHOSSOU Julien	Diversité, distribution et conservation des populations de <i>Parkia filicoidea</i> (Welw. Ex Oliv.) dans les forêts et savanes d'Afrique tropicale	Forestry/Plant Ecology
3	OSSA Gbènalè Elvis Ronel	Variation du stock de carbone et ses déterminants dans les écosystèmes de mangroves du Lac Ahémé du site RAMSAR 1017	Forestry/Plant Ecology
4	NASSOUHOUNDE Sovègnon Géraud Hector	Variation du stock de carbone des mangroves, et de ses déterminants dans le pôle côtier du site Ramsar 1017	Forestry/Plant Ecology
5	IDI ABBA Mahaman Sabiou	Diversité, évaluation des connaissances locales et conservation des colorants naturels Nord-Ouest du Bénin	Ethnobiology
6	MENSAH Kossi	Ethnobotanique et structure des populations de <i>Ricinodendron heudelotii</i> (Baill.) Pierre ex heckel au Togo (Afrique de l'Ouest)	Forestry/Plant Ecology
7	OGOUBIYI AKILOTAN Billy Lionnel Kévin	Services écosystémiques et structure de la population de <i>Ricinodendron heudelotii</i> (Baill.) Pierre ex Heckel dans la zone Soudano-Guinéenne du Bénin	Forestry/Plant Ecology
8	BALLEY Mafouz W	Diversité, écologie et usages des espèces du genre <i>Momordica</i> (cucurbitaceae) au Sud Bénin	Forestry/Plant Ecology
9	BONOU Lydie Joëlla	Services écosystémiques et structure de la population de <i>Ricinodendron heudelotii</i> (Baill.) Pierre ex Heckel dans la zone humide (guinéo-congolaise) du Bénin	Forestry/Plant Ecology
10	SUKARI Agnès	Etat et tendances de la distribution spatiale d' <i>Imbrasia epimethea</i> et de ses plantes nourricières <i>Petersianthus macrocarpus</i> et <i>Ricinodendron heudelotii</i> face aux changements climatiques et globaux en République Démocratique du Congo (Bassin du Congo) et au Bénin	Forestry/Plant Ecology
11	SEGBLEVI Carlos	Distributions spatiales et niches écologiques du baobab africain (<i>Adansonia digitata</i> L.) et des chauves-souris (<i>Eidolon helvum</i> K.) polinisatrices pollinisatrices dans le contexte du changement climatique	Forestry/Plant Ecology
12	KANNINKPO Boris	Influence de la dynamique des habitats et modélisation de la distribution spatiale de <i>Tragelaphus scriptus</i> et de <i>Potamocheilus porcus</i> dans la mosaïque paysagère du Sud Bénin	Landscape ecology
13	KOUKPAKI Bill Loïc	Déterminants des performances environnementales et du bien-être animal: étude de cas de la ferme du Jardin des Oliviers à Avrankou (Ouémé)	Wildlife/grassland

14	AGBOSSOU Charabel Sèmèvo Junior	Typologie et analyse de la durabilité des systèmes d'élevage cunicole dans le Département du Zou (Centre-Bénin).	Wildlife/grassland
15	HOUEDJI Juste	Caractérisation spatio-temporelle de la dynamique des populations de <i>Parkia biglobosa</i> et des Bruchidae spp. dans les paysages agroforestiers du Bénin (Master)	Landscape ecology
16	Charlize ZOCLY	Potentiel alimentaire et modélisation des habitats favorables au cobe de Buffon (<i>Kobus kob kob</i> , Erxleben, 1777) et au cobe defassa (<i>Kobus ellipsiprymnus defassa</i> Rüppell, 1835) dans la Réserve de Biosphère du W-Bénin	Translocation
17	DOSSOU Horphet Maxime AGNILO	Etude diagnostic de la SONAB et cartographie des services écosystémiques fournis par les chauves-souris dans la forêt classée de la Lama	Ecology
18	CHABI Stella	Diagnostic de l'ONG ECOBENIN et impacte de la sacralisation dans la conservation des écosystèmes de mangrove dans l'Aire Communautaire de Conservation de la Biodiversité (ACCB) Bouche du roy	TEK

Appendix 4: Completed Doctorate thesis in 2025

N°	Student full name	Diploma (Doctor, PhD, etc..)	Research topics	Institution/Specialisation
1	Hamzath Akambi Séivè KORA	PhD	Contribution of Participatory Forest Management to forest conservation in Benin: A comparative analysis of selected forest reserves	WASCAL/Climate Change and Education
2	CHERIF Ahmat Amine	PhD	Conservation du dattier du désert (<i>Balanites aegyptiaca</i> L. Del.) au Tchad: usages, habitats et démographie	UAC/FSA/LEA
3	AKAKPO Amandine Dohoué	PhD	Domestication de <i>Balanites aegyptiaca</i> (L.) Delile au Bénin : ethnobotanique, caractérisation génétique et réponses écophysiologique	UAC/FSA/LEA
4	DAÏ Emilienne H	PhD	Domestication of the "bush banana" <i>Uvaria chamae</i> P. Beauv.: insights from ethnobotany, biochemical, and eco-phenotypic assessment in Benin	UAC/FSA/LEA

Appendix 5: Articles published in peer-review journal with Impact Factor (IF) in 2025

N°	Disciplines	Authors' Names	Title of the article	Journals	Impact Factor
1	Forestry/Plant ecology	Sylvanus Mensah, Florent Noulèkoun, Valère K. Salako, Kangbéni Dimobe, Jonathan Sheppard, Achille Assogbadjo, Romain Glèlè Kakaï, Thomas Seifert	Legacy effects of fire on tree diversity, structure and aboveground carbon in tropical semi-arid naturally assembled communities	Ecological Informatics	7.3
2	Ethnobiology	Wouyou H. G.; Avocevou-Ayisso C.; Idohou R.; Assogbadjo C. S.; Boukari N. S.; Aba S. M. I.; Houndofé E. B.; Assogbadjo A. E..	Ethnobotanical knowledge and use of natural dye plants in Benin	Ethnobotany Research and Applications	1.3
3	Forestry/Plant ecology	Gnansounou, S. C.; Salako, K. V.; Bonou, A.; Gbedomon, R. C.; Denon, L.; Assogbadjo, A. E.; Kakaï, R. G.	Mat making from <i>Cyperus articulatus</i> in mangrove areas: a value chain analysis and economic insights in Benin (West Africa)	Trees, Forests and People	2.9
4	Forestry/Plant ecology	Agbohessou, M.; Salako, K. V.; Agounde, G.; Mensah, S.; Ngom, A.; Noba, K.; Kakaï, R. G.; Assogbadjo, A. E	Variation in the potential impacts of climate change on the baobab in Sub-Saharan	Global Ecology and	3.5

			Africa: A continental analysis across major climate zones	Conservation	
5	Forestry/Plant ecology	Daï, E. H.; Idohou, R.; Toyi, S. S. M.; Houndonougbo, J. H. H.; Azihou, F. A.; Ouédraogo, A.; Hotes, S.; Assogbadjo, A. E.	Utilitarian diversity and options for the sustainable use of the bush banana <i>Uvaria chamae</i> P. Beauv. in Benin (West Africa)	Journal of Ethnobiology and Ethnomedicine	2.9
6	Forestry/Plant ecology	Kora, H. A. S.; Houndonougbo, J. S. H.; Noulekoun, F.; Agoyi, E. E.; Assogbadjo, A. E.; Sinsin, B.	Three decades of the practice of decentralised forest management in Africa: A systematic review of current knowledge and prospects	Global Ecology and Conservation	3.5
7	Agriculture/Agroforestry	Agounde, G.; Salako, K. V.; Idohou, R. A. F.; Sode, K. I.; Mensah, S.; Dimobe, K.; Assogbadjo, A. E.; Glèlè Kakaï, R.	Climate change may shift diet of the African savanna elephant: Preliminary results for 14 food tree and shrub species in the WAPOK transboundary ecosystem, West-Africa	Global Ecology and Conservation	3.5
8	Agriculture/Agroforestry	Manda, L.; Idohou, R.; Agoyi, E. E.; Agbahoungba, S.; Salako, K. V.; Agbangla, C.; Adomou, A. C.; Assogbadjo, A. E.	Progress of in situ conservation and use of crop wild relatives for food security in a changing climate: a case of the underutilised Vigna Savi	Frontiers in Sustainability	2.9
9	Forestry/Plant ecology	Avakoudjo, H. G. G.; Vodounnon, M. E. J.; Idohou, R.; Coulibaly, A.; Assogbadjo, A. E.	Ensemble modelling reveals spiny monkey orange (<i>Strychnos spinosa</i> Lam.) as a vulnerable wild edible fruit tree in West Africa	Geology, Ecology, and Landscapes	4.1
10	Agriculture/Agroforestry	Idohou, R.; Odoulami, R.; Houehanou, T.; Assogbadjo, A. E.	Top priority crop wild relatives exhibit different resilience responses to climate change in Benin (West Africa)	Journal for Nature Conservation	2.2
11	Agriculture/Agroforestry	Kégbé, A. M.; Salako, K. V.; Lokonon, B. E.; Mensah, S.; Noba, K.; Assogbadjo, A. E.	A comparative study of morpho-physiological responses of wild and cultivated Solanum species to water stress: the case of <i>S. sisymbriifolium</i> and <i>S. macrocarpon</i>	Genetic Resources and Crop Evolution	1.876
12	Agriculture/Agroforestry	Sidibé, M.; Zannou, A.; Saliou, I. O.; Sacko, I.; Aoudji, A. K. N.; Assogbadjo, A. E.; Coulibaly, H.; Koné, B.	Determining factors affecting agroecological practices' acceptance and use in Mali, West Africa	Sustainability	3.3
13	Agriculture/Agroforestry	Dogbo, S. F.; Salako, K. V.; Mensah, S.; Akakpo, D. M. A.; Assogbadjo, A. E.; Gebauer, J.; Glèlè Kakaï, R.; Adou, Y. C. Y.	Vegetation attributes in peri-urban agroforestry systems and their socio-economic determinants in Benin (West Africa)	Agroforestry Systems	2.0
14	Forestry/Plant Ecology	Accrombessi D.F.; Toyi M.S.S.; Kone I.; Zinner D.	Identifying suitable forested areas and protected forests for the conservation of white-thighed (<i>Colobus vellerosus</i>) and king (<i>C. polykomos</i>) colobus monkeys under climate change in West Africa	Global Ecology and Conservation	3.5
15	Forestry/Plant Ecology	Ahouangan B.S.C.M.; Koura B.I.; Lesse A.D.P.; Ahoyo C.C.; Toyi S.M.; Vissin E.W.; Houinato M.R.B.	Typology analysis and adaptive capacity of commercial gardening farmers to climate change in peri-urban areas along the coastal area of Benin (West Africa)	Frontiers in Sustainable Food Systems	3.1
16	Forestry/Plant Ecology	Noulèkoun F.; Mensah S.; Kim H.; Houndonougbo J.S.H.; Mensah M.; Lee W.K.; Khamzina A.	Contrasting ecological mechanisms mediate the impact of land conversion on ecosystem multifunctionality	Functional Ecology	5.1
17	Risk assessment/climate change	Quenum, I. A., Avocèvou-Ayisso, C., Padonou, E. A., Idohou, R., & Fandi, B. B.	Dynamics of Mangrove ecosystem in Ramsar site 1017 face to climate change in Southern Benin (West Africa)	Environment, Development	4.2

				and Sustainability	
18	Risk assessment/ climate change	Padonou E.A., Anignikin H., Akakpo B.A., Obe M.M., Akabassi G.C. Sinsin B.	The Role of the Mangrove Ecosystem in Supporting the Resilience of Local Communities in Ouidah Municipality, Benin (West Africa).	Human Ecology	1.7
19	Forestry/Plant Ecology	Padonou, E. A., Avocèvou-Ayisso, C. M., Sewade, C., Hovozounkou, G. M., Akakpo, B. A., & Sinsin, B.	Plant diversity, population structures and carbon stock of mangrove ecosystems of Ramsar Site 1017 in Benin	Wetlands Ecology and Management	1.6
20	Risk assessment/ climate change	Ofori, S. A., Hugé, J., Gnansounou, S. C., Ximenes, A. C., Asante, F., Bagbohouna, M. K., Comte, A., Longépée, E., Lang'at, S. K., Bandeira, S. O., Omollo, D., Onyena, A. P., Sam, K., Hamza, A. J., Tahiri, A. Z., Daf, A. S., Goudiaby, K. D., Olatunji, E. T., Golléty, C., Padonou, E. A., & Dahdouh-Guebas, F	Leveraging mangroves to advance climate action in Africa: Zooming in on Nationally Determined Contributions (NDCs).	Journal of environmental management	8.4
21	Agriculture/Agroforestry	Palanga, K. K., Bawa, A., Modom, B. E., Tchabana, B., Akabassi, G. C., Dicko, A., & Tozo, K	Utilization and producers' knowledge of pigeon pea (<i>Cajanus cajan</i> (L.) Millsp.) in Togo (West Africa) Pigeon Pea (<i>Cajanus cajan</i>) in Togo.	Economy Botany	1.3
22	Risk assessment/ climate change	Ahononga, F. C., Sonounameto, R. C., Akabassi, G. C., Gouwakinnou, G. N., Biaou, S., & Biaou, S. S. H.	Impacts of land-use change on carbon storage and sequestration in forest ecosystems of in Benin.	Discover Applied Sciences	2.8
23	Agriculture/Agroforestry	Koffi, K. P., Yao, D. D., Anissou, B. A. W. A., BAMMITE, D., Ghislain, C. A., & Koffi, T. O. Z. O.	Évaluation de la gestion traditionnelle et de la diversité génétique des variétés locales de niébé [<i>Vigna unguiculata</i> (L.) Walp.] cultivées au Togo.	Tropicultura	0.47
24	Wildlife/grassland	Dognimon, S., Zanzo, S., Djagoun, C. A. M. S., & Sinsin, B.	Geographic distribution and supply chain of vultures in Benin, West Africa.	Conservation Science and Practice	2.8
25	Wildlife/grassland	Akpona, H. A., Vargas-Aguilar, J., Akpona, J. D. T., Kassa, B., & Djagoun, C. A. M. S.	Burrows spatial patterns and factors predicting habitat selection of aardvark (<i>Orycteropus afer</i>) in West African semi-arid savannah.	African Journal of Ecology	1.1
26	Wildlife/grassland	Lewis C., van der Merwe R., Djagoun Chabi AMS, Sogbohossou E. A., Codron D.	Intrapopulation isotopic niche structure in mammalian carnivores and herbivores across contrasting habitats	African zoology	0.5
27	Ethnobiology	Zandebasiri, M., Pourhashemi, M., Djagoun, C. A. M. S., Sayedena, S. V., Ghahfarokhi, Z. M., Azadi, H., & Witlox, F.	An investigation on the local community's traditional knowledge of Iranian mountain forests using a qualitative assessment.	Trees, Forests and People	2.9
28	Wildlife/grassland	Moloney, G. K., Heighton, S. P., Parthuisot, N., Missoup, A. D., Momboua, B. R., Djagoun, C. A. M. S., Gonedele-Bi, S., Chaber, A., & Gaubert, P.	Improving DNA detection sensitivity for the white-bellied pangolin (<i>Phataginus tricuspis</i>) via digital PCR.	Forensic Science International: Genetics	3.1
29	Wildlife/grassland	Odongo, L. A., Adeola, A. C., Msalya, G. M., Olaniyan, O. F., Njuki, R. N., Mauki, D. H., Ndiema, E. K., Shi, X., Cai, Z.-F., Yin, T.-T., Fu, Y., Liu, X., Zhao, S., Djagoun, C. A. M. S., Luka, P. D., Wanzie, N. K., Niba, G., Oluwole, O. O., Olaogun, S. C., Omotosho, O., Sanke, O. J.,	Integrated mitogenome and Y-chromosome analysis untangles the complex origin of African pigs.	iScience	4.1

		Greiner, E., Okoro, V. M. O., Omitogun, O. G., Dawuda, P. M., Souron, A., Xie, H.-B., Agwanda, B., Mwacharo, J. M., Bishop, R. P., Han, J.-L., Peng, M.-S., Zhang, Y.-P.			
30	Wildlife/grassland	Adoukè, G. R. M., Lecompte, E., Azihou, A. F. Toyi, M. S., Sinsin, B. A., Hugueny, B., Gaubert, P., Djagoun C. A. M. S.	Systematic review of sustainability assessment approaches for wildlife exploitation: Uncovering limitations in tackling the bushmeat crisis.	Biological Conservation	4.4
31	Wildlife/grassland	Lewis C., van der Merwe R., Djagoun Chabi AMS, Sogbohossou E. A., Codron D.	Intrapopulation isotopic niche structure in mammalian carnivores and herbivores across contrasting habitats	African zoology	0.5
32	Ethnobiology	Zandebasiri, M., Pourhashemi, M., Djagoun, C. A. M. S., Sayedena, S. V., Ghahfarokhi, Z. M., Azadi, H., & Witlox, F.	An investigation on the local community's traditional knowledge of Iranian mountain forests using a qualitative assessment.	Trees, Forests and People	2.9
33	Wildlife/grassland	Moloney, G. K., Heighton, S. P., Parthuisot, N., Missoup, A. D., Momboua, B. R., Djagoun, C. A. M. S., Gonedele-Bi, S., Chaber, A., & Gaubert, P.	Improving DNA detection sensitivity for the white-bellied pangolin (<i>Phataginus tricuspis</i>) via digital PCR.	Forensic Science International: Genetics	3.1
34	Forestry/Plant Ecology	Biah, I., Azihou, A.F., Guendehou, S.G.H.S., Sinsin, B.	Influence of stem layer characteristics on biomass accumulation in forest ecosystems in Benin	Trees	2.1
35	Forestry/Plant Ecology	Hepner, S., Ekebil, P.P.T., Mintah, F., Azihou, A.F., Sinsin, B., Fischer, M., Speranza C.I.	Perceived and Measured Forest Degradation across Western Africa: Insights for Sustainable Forest Management	Trees, Forests and People	2.9
36	Forestry/Plant Ecology	Bezeng, B.S., Ameka, G., Angui, C.M.V., Atuah, L., Azihou, F., Bouchenak-Khelladi, Y., ..., Savolainen V	An African perspective to biodiversity conservation in the twenty-first century	Philosophical Transactions B	4.7
37	Risk assessment/climate change	Hepner, S., Agonvonon, G.A., Ehbrecht, M., Iheaturu, C., Azihou, A.F., Ifejika Speranza C	Degradation and Fragmentation Effects on Structural Complexity in West-African Forest Patches	Biotropica	1.7

Appendix 6: Articles published in peer-review journal without IF in 2025

N°	Disciplines	Authors' Names	Title of the article	Journals
1	Agriculture/Agroforestry	Kpoviessi, A. D.; Adipala, E.; Nampala, M. P.; Bobe, B.; Makhoka, J. W.; Edema, R.; Dramadri, I. O.; Ozimati, A. A.; Assogbadjo, A. E.; Sinsin, B.; Kawuki, S. R.; Dusengemungu, L.	Multi-stakeholder approaches to food security and adaptive governance for sustainable agriculture in Sub-Saharan Africa.	African Journal of Rural Development
2	Forestry/Plant Ecology	Kégbé, A. M.; Idohou, R.; Dieng, B.; Agounde, G.; Egeru, A.; Noba, K.; Assogbadjo, A. E.	Solanum wild relative species indicate varying ecological resilience to climate change in Benin (West Africa)	Genetic Resources
3	Ethnobiology	Assogbadjo, C. S.; Avocèvou-Ayisso, C.; Idohou, R.; Wouyou, H. G.; Houndonougbo, J. S. H.; Hounsou-Dindin, G.; Assogbadjo, A. E.	A review of <i>Momordica species</i> in Africa (Cucurbitaceae): current knowledge and perspectives for sustainable management	Ethnobotany Research and Applications

4	Ethnobiology	Djogo J.G.M.; Ossounlanan R.	Analyse ethnobotanique et facteurs de menaces des plantes utilisées contre les maladies mentales dans la commune de Kétou au Bénin	Revue RAMReS – Série Pharm. Méd. Trad. Afr.
5	Ethnobiology	Wouyou H.G.; Avocèvou-Ayisso C.; Idohou R.; Assogbadjo S.C.; Houndonougbo J.S.H.; Assogbadjo A.E.	Current knowledge and future prospects of African plants providing natural dyes: a systematic review	Discover Plants
6	Agriculture/ Agroforestry	Mensah E.; Kindomihou V.; Vodouhè D. S.; Saidou A.; Aiyelaagbe I.; Sinsin B.	Stratégies fonctionnelles de Cymbopogon schoenanthus cultivée sous compost au Sud Bénin	Revue Marocaine des Sciences Agronomiques et Vétérinaires
7	Agriculture/ Agroforestry	Padonou, E. A., Watson, C., Akakpo, B. A., & Wichern, F.	Impact of crop production on selected soil physicochemical properties in semiarid climate zone of Benin, West Africa	Discover Soil
9	Risk assessment/ climate change	Gbaï, N. I., Akabassi, G. C., Djafarou, A., Dagou, P. F., & Adjire, C.	Diachronic analysis of land vegetation around the mouth of the Sô River.	Discover Environment
10	Risk assessment/ climate change	AKABASSI, G. C., Quenum, I. A., Avocèvou-Ayisso, C., Padonou, E. A., Idohou, R., & Agbodainon, P. S. B.	Perception des populations locales des facteurs de dégradation des écosystèmes de mangroves et les mesures d'atténuation.	Sciences et Technologies pour l'Agriculture Durable
11	Ethnobiology	Anissou, B., Kibalou, P. K., Kpatcha, K. A., Ghislain, A. C., & Komlan, B.	Protection of Animal Health through Traditional Use of Plants in the Central Region of Togo, West Africa.	Current Journal of Applied Science and Technology
12	Forestry/Plant Ecology	Biah, I., Azihou, A.F., Guendehou, S., Sinsin, B.	Aboveground biomass variation in relation to woody species dominance in West Africa	Discover Forests
13	Wildlife/grassland	Noundja Liyabin, Foléga Fousseni, Eve Bohnett, Aniko Polo-Akpisso, Chabi Djagoun, Wala Kperkrouma, Komlan Batawila, Gabriel Hoinsoude Segniagbeto	Spatial Dynamics of Human-Primate Conflicts and Adaptive Coexistence Strategies in Togo: Contributions of Participatory Mapping and Community Perceptions	Sciences and Technologies for Sustainable Agriculture (STSA)

Appendix 7: Articles in press in peer-review journal with IF in 2025

N°	Disciplines	Authors' Names	Title of the article	Journals	Impact Factor
1	Agriculture/ Agroforestry	Aboudou Hack Arouna, Elie Antoine Padonou, Ghislain Comlan Akabassi, Bokon Alexis Akakpo, Mouritala Sikirou, Bruno Agossou Djossa	Diversity of cocoyam-based agroforestry systems in Benin, West Africa	Agroforestry systems	2.2
2	Wildlife/ grassland	Akpona, H. A., Gandaho, S.M., Gbemavo, C.D.S.J., Kassa B., Djagoun C. A. M. S.	Seasonal and environmental determinants of African elephant (<i>Loxodonta africana</i>) movement in the W-Arly-Pendjari complex. Journal for Nature Conservation	Journal of Nature for Conservation	2.5
3	Wildlife/ grassland	Ayegnon, D. T., Nobimè, G., Azihou, A. F., Houinato, M. C., & Djagoun, C. A. M. S.	Seasonal variation in the diversity, abundance, and spatial distribution of terrestrial mammals in the Pénésoulou Classified Forest.	Wild	2.7

4	Wildlife/ grassland	Noundja Liyabin, Folega Fousseni, Polo-Akpisso Aniko, Beckline Mukete, Eve Bohnett, Chabi Djagoun, Segniagbeto Hoinsoude Gabriel, Wala Kperkouma, Komlan Batawila	<i>When the local meets the global: models and challenges of primate conservation in the Fazao-Malfakassa National Park, Togo</i>	Zookeys	1.3
5	Wildlife/ grassland	Serges B. Gandaho, Stanislas Mahussi Gandaho, Galvius Degbelo, Venceslas Taiwo, Barthélémy Kassa, Chabi A. M. S. Djagoun	<i>Dormitory Trees Preference and Distribution of the Tree Hyrax (<i>Dendrohyrax interfluvialis</i>) in a West African Forest</i>	African Journal of Ecology	1.1
6	Wildlife/ grassland	Sean P. Heighton, Jérôme Murienne, Mukesh Thakur, Alain Didier Missoup, Wirdateti, Chabi Sylvestre Djagoun, Sery Bi Gonedélé, Gabriel Ngua Ayecaba, Brice Roxan Momboua, Flobert Njiokou, Anne-Lise Chaber, Helen C. Nash, Barbora Černá Bolfíková, Sylvain Dufour, Guy T. Gembu, Ayodeji Olayemi, Jordi Salmona, Amaia Iribar, Yves Cuenot, Philippe Gaubert	Targeted sequencing enhances detection of pangolin trafficking hotspots and dynamics of both domestic and global trade markets	PLOS Biology	7.2
7	Wildlife/ grassland	DJAGOUN , Joël ; Djossa, Bruno; DJAGOUN, Chabi Adéyèmi Marc Sylvestre; Lecompte, Emilie; ALES, Nazif; HUGUENY, Bernard; Vodouhè, Fifanou; Gaubert, Philippe	Beyond supply: determinants of the bushmeat trade economy in Benin, West Africa	Oryx	2.1
8	Wildlife/ grassland	Ranmi Ayeko, Fortuné Azihou, Chabi Sinsin, Philippe Gaubert, Brice Emilie Lecompte, Mireille Toyi	Long-term analysis of Land Use and Land Cover Change to identify ecological functioning forest fragments (Suitable Habitats) for Forest-Dwelling Ungulate in the southern Benin Republic	Discover Forests	0.5
9	Wildlife/ grassland	Gilles Renaud Mahugnon Adoukè, Chabi Adéyèmi Marc Sylvestre Djagoun, Lucie Moreau, Anne-Sophie Benoiston, Akomian Fortuné Azihou, Mireille Scholastique Toyi , Joël Djagoun, Brice Augustin Sinsin, Emilie Lecompte, Philippe Gaubert	Terrestrial eDNA metabarcoding as a tool for biodiversity and bushmeat monitoring in tropical Africa	Environmental DNA	6.7

Appendix 8: Articles in press in peer-review journal without IF in 2025

N°	Disciplines	Authors' Names	Title of the article	Journals
1	Agriculture/ Agroforestry	Elie Antoine Padonoua, Elvire Line Sossa, Ghislain Comlan Akabassi, Narcisse Dakou, Brice Augustin Sinsin	Comparative effects of traditional fertilization practices and compost on vegetable crops at Ramsar site 1017 in Benin	Ecological Frontiers

Appendix 9: Articles under review in peer-review journal with IF in 2025

N°	Disciplines	Authors' Names	Title of the article	Journals	Impact Factor
1	Forestry/ Plant Ecology	Isaac A. Quenum, Chrisologue houndjemou, Carolle Avocèvou-Ayisso, Rodrigue Idohou, Ghislain C. Akabassi, Bokon A. Akakpo, Sébastien Kouta, Elie A. Padonou	Assessment of the effectiveness of restoration methods for mangrove ecosystems at Ramsar site 1017 in Benin	Discover Applied Sciences	2.8
2	Wildlife/ grassland	Daniel Pires, Cidalia Gomes, Belinda Groom, Sylvain Dufour, Emmanuel Danquah, Nathalie Van Vliet, Gabriel Ngua Ayecaba, Alain Didier Missoup, Komlan Afiademanyo, Chabi Djagoun, Sery Bi Gonedele, Anne-Lise Chaber, Ayodeji Olayemi, Agostinho Antunes, Philippe Gaubert.	Advancing global DNA-referencing of bushmeat in African tropical forests: a tool for identifying trade hotspots and dynamics in western and central Africa.	Molecular Ecology Resources	5.5
3	Wildlife/ grassland	Accrombessi F. Darius, S. S. Mireille Toyi, Inza Kone, David J. Zinner, David Djimenou, Chabi A. M. S. Djagoun, Christian Roos, Dietmar Zinner	Low genetic diversity in <i>Colobus vellerosus</i> populations in Kikélé Sacred and Okuta Kobunan Forests, Benin	Primates	1.5
4	Wildlife/ grassland	Zoffoun, Omobayo; Djagoun, Chabi A. M. S.; Linsoussi, Côme ; Sogbohossou, Etotepe	Assessment of the role of fire regime as a determinant of habitat selection by grazers species in a West African Savanna	Ecology and Evolution	2.3
5	Wildlife/ grassland	Chabi A.M.S. Djagoun, Nicole Wrage-Mönnig, Brice Sinsin, Daryl Codron	Individual niche variation reduces intraspecific competition but increases interspecific competition in a West African grazer community	Ecological Complexity	3.4
6	Wildlife/ grassland	Florian CODJIA; Frank Kanyamula; Antoine Souron; Chabi A.M.S. Djagoun	Climate driven shifts in the ecological niches of African suids revealed by ensemble modelling with the kuenm2 framework	Global Ecology and Conservation	3.4
7	Wildlife/ grassland	Adoukè, G. R. M., Lecompte, E., Azihou, A. F Toyi, M. S., Sinsin, B. A., Hugueny, B., Gaubert, P., Djagoun C. A. M. S.	Spatiotemporal dynamics and drivers of illegal hunting in a tropical forest remnant of the Dahomey Gap in southern Benin	Journal of Nature for Conservation	2.5

Appendix 10 : Articles under review in peer-review journal without IF in 2025

Disciplines	N°	Authors' Names	Title of the article	Journals
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Appendix 11 : Abstracts in books of abstracts in 2025

N°	Field of research	Authors' Name	Title	Full References
1	Agriculture/Agroforestry	Ida Tognisse ; Jules Degila ; Marius Sounouvou ; Achille E. Assogbadjo	Digital Technology and the Crop Calendar for Efficient Agriculture in West Africa	Tognisse, I., Degila, J., Sounouvou, M., & Assogbadjo, A. E. (2025). <i>Digital Technology and the Crop Calendar for Efficient Agriculture in West Africa</i> . In: Conference Proceedings / Book Chapter, pp. 37–51.

2	Risk assessment/climate change	J. Avakoudjo, F. Kouélo Alladassi, V. Kindomihou, T. M. Akplo, A. Azontondé, G. L. Amadji & B. Sinsin	Infiltration de l'eau dans les sols des dongas à Karimama dans le Parc W et sa périphérie dans le Nord du Bénin	Actes des résumés du quatrième Colloque Scientifique de la Journée Mondiale des sols de la FSA, Campus universitaire d'Abomey-Calavi, Bénin. p 36. Dépôt légal N° 16698 du 05 février 2025. ISBN : 978-99982-2-239-7
3	Risk assessment/climate change	Nishi M.; Subramanian S.M.; Varghese P.; Houndonougbo J.S.H. (Eds.)	Ensuring Ecological Connectivity in Socio-Ecological Production Landscapes and Seascapes (SEPLS)	Nishi M., Subramanian S. M., Varghese P., & Houndonougbo J. S. H. (Eds.). (2025). <i>Ensuring Ecological Connectivity in Socio-Ecological Production Landscapes and Seascapes (SEPLS)</i> . Springer Nature.
4	Risk assessment/climate change	Guendehou F.J., Kpadédji L.A., Hountondji B., Gbèssémèhlan J.	Assessing the Impact of Climate Change on Agricultural Yield in Benin: Trends, Vulnerabilities and Adaptation Strategies	Guendehou F.J., Kpadédji L.A., Hountondji B., Gbèssémèhlan J. (n.d.). Assessing the Impact of Climate Change on Agricultural Yield in Benin: Trends, Vulnerabilities and Adaptation Strategies. Applied Laboratory Ecology (UAC); LSTEE (INE/UAC); LACEEDE (UAC), Cotonou, Benin.
5	Agriculture/Agroforestry	Moussa H., Kindomihou V., Soumana I., Houehanou T.D., Chaibou M., Souleymane O., Sinsin B	Farmers' Strategies for Managing Forage Supply Crises in Niger	Moussa H., Kindomihou V., Soumana I., Houehanou T.D., Chaibou M., Souleymane O., Sinsin B. (2025). Farmers' Strategies for Managing Forage Supply Crises in Niger. In: <i>Grazing Strategies and Animal Production Systems</i> , edited by Arnoldo González-Reyna, IntechOpen, pp. 1–25. DOI: http://dx.doi.org/10.5772/intechopen.115291

Appendix 12 : Technical Reports and books in 2025

N°	Field of research	Authors' Name	Title	References
1	Risk assessment/climate change	Sêwanoudé Scholastique Mireille TOYI ; Mama DJAOUA ; Dramane ISSIAKO ; Ranmi Elsa Denise AYEKO	Atlas des localités du Bénin	Académie des Sciences, Arts et Lettres du Bénin, éditions DAGAN, 956 pages

Appendix 13 : Participation at workshops/conferences in 2025

N°	Title and period	Type of presentation (oral, poster, ..)	Name of the participants from LEA	Cost
1	21st RUFORUM Annual General Meeting, Gaborone, Botswana, 1st–5th December 2025	Oral (Participation)	Assogbadjo Achille Ephrem	-
2	Workshop on Transformative Teaching of Neglected and Underutilized Species, Nairobi, Kenya, 11–12 December 2025	Oral (Participation)	Assogbadjo Achille Ephrem	-
3	Initiative des sciences africaines de l'agroécologie, des sciences de la nutrition et de l'ethnobotanique (ASANE), Accra, Ghana, 2–3 August 2025	Oral (Participation)	Assogbadjo Achille Ephrem	-
4	4th International Conference on Sustainable Chemical and Environmental Engineering (SUSTENG 2025), Thessaloniki, Greece, 1–4 September 2025	Oral (Participation)	Assogbadjo Achille Ephrem	-
5	Enseignant du Supérieur, un miroir pour la jeunesse en quête de boussole. Laboratoire d'Écologie Appliquée (éd.), Hommages et Mélanges au Professeur Brice SINSIN « Professeur Brice SINSIN, de l'ingénieur forestier de terrain au Recteur de l'Université d'Abomey-Calavi », University of Abomey-Calavi, Bénin, 5–7 February 2025	Oral communication	Toyi S. Mireille	-

6	Integrating social and environmental dimensions for sustainable landscape management: a case study of the Lama Forest, Benin. 5th World Teak Conference, Kotchi, India, 17-20 September 2025	Oral communication	Toyi S. Mireille	-
7	Landscape dynamics and key drivers of degradation in Benin, China, 7 November 2025	Oral communication	Toyi S. Mireille	-
8	Utilitarian diversity and options for the sustainable use of the bush banana <i>Uvaria chamae</i> P. Beauv. in Benin (West Africa), Direction Générale de INRAB, Bénin 05 - 07 Novemebre 2025	Oral	DAï Emilienne Houévo	-
9	Proposal writeshop for Intra Africa Mobility proposal design, Uganda 10-20 February 2025	Oral	KPOVIESSI Dieudonné.	-
10	- IFS Conference on "Young Researchers in the Global South: Past and Future Challenges and Opportunities". Golden Tulip Hotel, Cotonou, Benin, 24-25 Fevrier 2025	Oral	Avakoudjo Hospice Gerard Gracias	-
11	Reaching common goals from contrasting starting points – sustainable development solutions for Benin and Japan: an introduction to Benin from a sustainability perspective. Joint SDGs Seminar, Chuo University / Yamagata University, Tokyo, Japan, 19 February 2025	Oral	Houndonougbo Juliano	-
12	Global Gathering Workshop "Agriculture and Environmental Sciences", JSPS (Japan Society for the Promotion of Science), Chuo-ku, Tokyo, Japan, 28-31 January 2025	Oral	Houndonougbo Juliano	-
13	Nobel Prize Dialogue Tokyo 2025 "The Future of Life", JSPS (Japan Society for the Promotion of Science), Tokyo, Japan, 31 January 2025	-	Houndonougbo Juliano	-
14	AETFAT Conference 2025	-	Ahossi Oscar	-
15	Quantification et procédé de valorisation des déchets d'abattoir dans l'alimentation des monogastriques d'élevage. 2e Journées des Étudiants du CORAF, Saly, 24-25 March 2025	Oral communication	Kindomihou Valentin	-
16	Potentiel nutritionnel et zootechnique des déchets d'abattoir : état des connaissances et défis d'application. IX Colloque des Sciences, Cultures et Technologies de l'Université d'Abomey-Calavi, UAC, 22-26 September 2025	Oral communication	Kindomihou Valentin	-
17	Valorisation des déchets d'abattoir dans l'alimentation animale : une approche durable pour garantir la sécurité alimentaire et promouvoir une économie circulaire résiliente. VIe Colloque scientifique international de l'Université de Kara, Kara, 6-10 October 2025	Oral communication	Kindomihou Valentin	-
18	Understanding AI to Strengthen Agricultural Research and Development. Formation sur l'intelligence artificielle appliquée à la recherche agricole. CORAF, Dakar, 10 Décembre 2025	Training	Kindomihou Valentin	-
19	- Sustainable Food System, Organic and Regenerative Farming", Speech in the Conference "Building Innovative Agriculture for Sustainable Development". International Conference on Innovative Agriculture, Lagos state University of Agriculture, Lagos 13-17 July 2025	Training	Kindomihou Valentin	-
20	Using UAV to assess the spatial pattern of small termite mounds and trees in altered lands in Benin (West Africa). 6 - 10 mai 2025, Lomé, Togo	Oral	Padonou, E	
21	Renommée Scientifique du Professeur Brice SINSIN. Colloque en hommage au Professeur Brice Sinsin. 5-7 février, 2025, Abomey-Calavi, Bénin.	Oral	Padonou, E	
22	Atelier du programme Accélération des impacts de la recherche climatique du CGIAR pour l'Afrique (AICCRA). 24 - 26 juin 2025, Université KNUST, Kumasi – Ghana	Training	PADONOU Elie	
23	Atelier de validation de la note politique sur la neutralité en matière de dégradation des terres au Bénin. 3-4 février 2025, Abomey, Bénin	Training	PADONOU Elie	
24	China-Benin Joint Laboratory for Desertification Control, National Key R&D Program of China (2024YFE0116900), 1 August – 11 November 2025 ; Beijing, China	Internship	PADONOU Elie	
25	CAS-TWAS International Workshop, Beijing, China, 24-26 June 2025	Oral	Sylvestre DJAGOUN	5000 USD

26	TYAN Satellite meeting to the 17th TWAS GENERAL ACADEMY, 22-25 september 2025	Oral	Sylvestre DJAGOUN	8000 USD
27	Third Meeting of the COMSATS Technical Advisory Committee and the Training Workshop on Artificial Intelligence, Amman, Jordan, 14–15 October 2025	Instructor	Sylvestre DJAGOUN	7000 USD
28	Participant to IUFRO board meeting	Board member	Sylvestre DJAGOUN	5000 USD

Appendix 14 : Research projects of LEA in which you have been involved in 2025

N°	Title of the project	Sources of Funding	Objectives of the project	Status (ongoing or ended)	Estimated fund
1	Valorisation des graines de <i>Ricinus communis</i> et <i>Momordica</i> spp., des sources d'acides gras bioactifs, pour promouvoir l'emploi et l'entrepreneuriat des femmes et des jeunes au Bénin (Afrique de l'Ouest)	ARES (Belgique)	Promotion de l'emploi et entrepreneuriat femmes/jeunes	Ongoing	-
2	AGriDI – Accelerating inclusive green growth through agri-based digital innovation	European Union – ACP Innovation Fund	Promote inclusive green growth through agri-digital innovation	Ongoing	-
3	Training epidemiologists and biostatisticians for enhanced response to disease outbreak and epidemic in West Africa (TEBWA Project)	IDCTP Fund	Strengthen epidemiology and biostatistics capacity	Ongoing	-
4	Strengthening Agri-Entrepreneurship and Community Engagement Training in East, West and North Africa (AgriENGAGE)	Erasmus+ (EU)	Capacity building in agri-entrepreneurship and community engagement	Ongoing	-
5	Plateforme de recherche et d'innovation pour la production et la commercialisation des médicaments à usage humain et vétérinaire issus de la Pharmacopée Africaine (PMTA)	PTR PMTA	Développement de médicaments issus de la pharmacopée africaine	Ongoing	-
6	Restauration des paysages urbains à base des essences forestières anciennement domestiquées (RESFORD)	ARES-PRD	Restauration écologique des paysages urbains	Ongoing	500,000 €
7	Physiological Performance and Molecular Genetic Diversity Response of <i>Uvaria chamae</i> : Adaptive Strategies Under North-South Climatic Gradient in Benin	Alexander von Humboldt Foundation	Study adaptation strategies under climate gradient	Ongoing	-
8	Genetic diversity and adaptive responses of <i>Annona senegalensis</i> Pers. to climate change: implications for resilience, sustainable valorisation, and agro-industrial development in West Africa	SG-NAPI (2025)	Climate resilience and agro-industrial development	Ongoing	64,000 USD
9	Programme de Résilience des Systèmes Alimentaires (PRSA/FSRP) en Afrique de l'Ouest	World Bank (CORAF)	Strengthen food system resilience	Ongoing	33,000 USD
10	Solar Energy for the Productivity of Women-Led Enterprises and Women's Empowerment in Rural Areas of Benin – IDRC Grant No. 110443-001	IDRC	This project aims to assess the impact of access to solar cooker technology on the productivity of women	Ongoing	CA\$ 700,000

entrepreneurs in the salt and gari value chains, and to generate evidence on how solar cooker technology enhances women's empowerment in Benin.

Appendix 15 : Research Grants in 2025

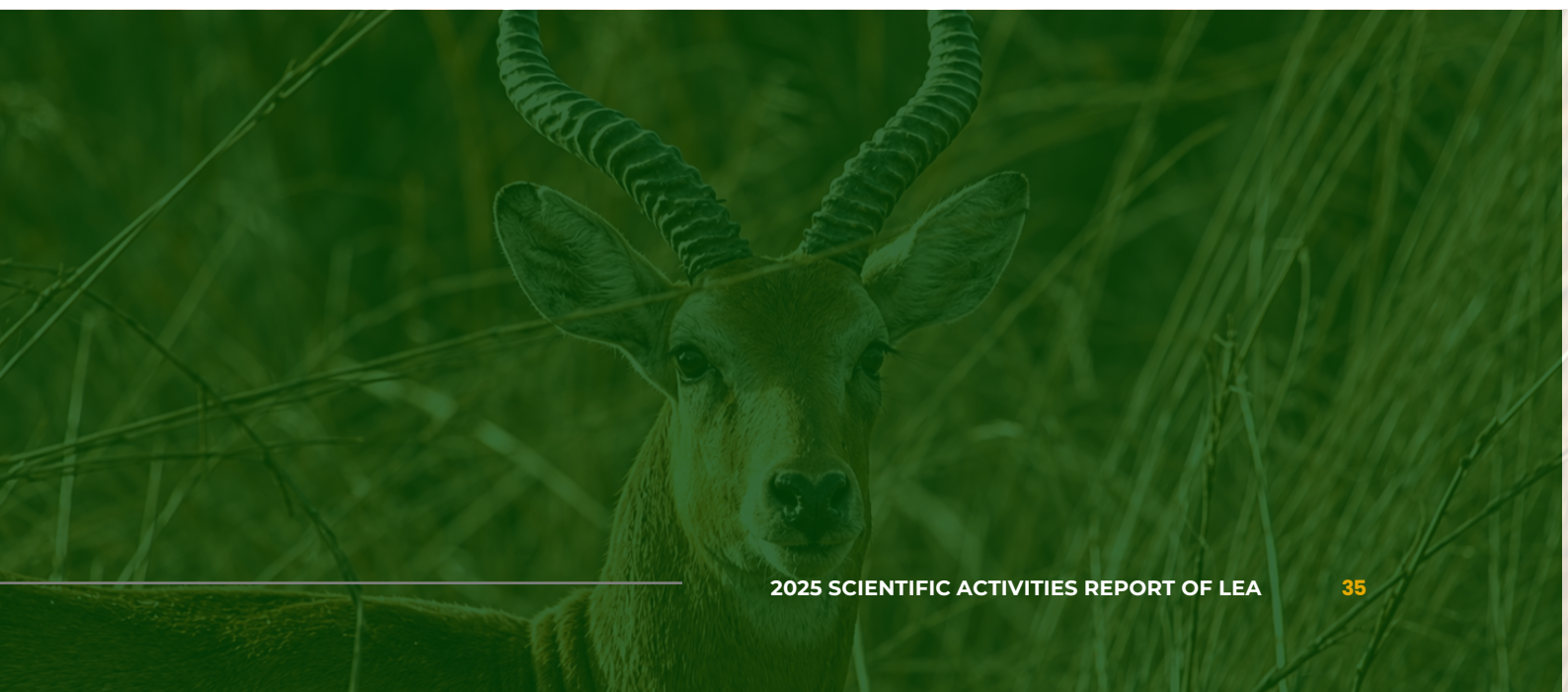
N°	Title of Grant	Beneficiaries	Status (ongoing or ended)	Estimated fund
1	Pesticides' impact on watermelon quality and consumer health	AKABASSI Ghislain	Ongoing	20000 USD
2	Solar cookers and alternative fuels as key solutions to firewood pressures and women domestic hassles in the Itchède-Toffo forest neighbouring villages (Benin)	AHOSSOU Oscar	Ongoing	7000 Pounds

Appendix 16 : Prizes and nomination in 2025

N°	Title of prize / nomination	Nominee	Estimated fund
1	2025 AGNES Junior Researcher Grant (JRG)	AKABASSI Ghislain	1000 Euro

Appendix 17 : Visitors received in 2025

N°	Full names of visitors	Provenance	Responsibles in LEA	Topics
01	GAUBERT Philippe	France	Sylvestre DJAGOUN	Conservation Genetic



Abstracts of published articles in peer reviewed journals in 2025

Legacy effects of fire on tree diversity, structure and aboveground carbon in tropical semi-arid naturally assembled communities

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Abstract

Seasonal fires are integral to the ecological functioning of tropical savannas; however, increasing fire frequency threatens the integrity of these ecosystems by reducing their productivity and the ecosystem services they support. The role of species population demography, functional traits and

phylogenetic structure in regulating plant community responses to repeated fires is crucial in this context. Combining plot-based tree inventory data with two decades (2001– 2021) of remotely sensed fire history across West African tree and shrub savannas, we examined climate-fire feedback, and assessed how multiple components of tree diversity – taxonomic, structural, functional and phylogenetic – as well as key stand characteristics, relate to fire frequency, climate variability, and aboveground tree carbon stock. Fire frequency was closely associated with rainfall and its seasonality, highlighting the role of prolonged dry spells in fuel load accumulation. Although repeated fires did not significantly impact tree diversity in any dimension, they were negatively related to both the density of the largest trees (top 5 % by size) and aboveground carbon stock. Notably, plots that burned more than five times over two decades, showed substantial declines in tree carbon storage. Among all measured variables, the density of the largest trees emerged as the strongest correlate of aboveground carbon, alongside species richness and phylogenetic diversity. However, it was the only variable consistently mediating the negative pathway between fire frequency and aboveground carbon. Our findings (i) show a convergence of multiple tree diversity dimensions in their response to frequent fires, pointing to the resilience of savanna tree diversity to repeated burning, potentially due to long-term adaptations of the local species pool, but also (ii) underscore the vulnerability of biomass accumulation and carbon storage to fire-induced demographic shifts. Increased fire frequency propelled by both climate change and human

interactions in the surrounding agricultural lands would jeopardise the capacity of these plant communities to maximize carbon storage, highlighting the need for fire management strategies that sustain ecosystem functions under future environmental pressures.

Keywords: Carbon stock; fire functional traits; phylogeny stand structure; West Africa ecosystem functioning

Ethnobotanical knowledge and use of natural dye plants in Benin

Hyacinthe Gbètoyénnonmon Wouyou^{1}, Rodrigue Idohou^{2,3}, Cossi Sosthène Assogbadjo¹, Nouroudine Saley Boukari⁴, Sabiou Mahaman Idi Aba⁴, Esquilin Balt Houndofi¹, Achille Ephrem Assogbadjo⁴*

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Abstract

The use of natural dyes in Benin varies across cultural and regional contexts. This study explores traditional knowledge and practices while testing Phillips and Gentry's hypothesis linking plant utility to taxonomic group, growth form, abundance, and size. Ethnobotanical surveys were carried out in 31 communes (May–October 2024) with 722 participants selected using Dagnelie's (1998) formula. Data on dye species, categories of use, determinants, and harvesting methods were analysed through informant consensus factor (ICF), fidelity level (FL), use value index (UVi), cultural importance index (CII), and statistical tests including Chi-square and correspondence factor analysis (CFA). Food-related dye use had the highest ICF (0.98), followed by

cosmetics (0.92). *Daniellia oliveri* (Rolfe) Hutch. & Dalziel recorded the highest UVi (1.00), while *Corchorus olitorius* L., *Spondias mombin* L., and *Khaya senegalensis* (Desv.) A. Juss. showed moderate values (0.33–0.50). *Parkia biglobosa* (Jacq.) R. Br. ex G. Don, *Philenoptera cyanescens* (Schumacher & Thonn.) Roberty, and *Sorghum bicolor* (L.) Moench were culturally significant. The dominant uses were food (31.89%) and medicine (24.60%). Influencing factors included ancestral knowledge (21.91%), colour (20.92%), rituals (15.51%), availability (8.57%), and accessibility (8.12%). CFA highlighted socio-cultural variation, while Chi-square revealed gender differences ($p = 3.454 \times 10^{-5}$): women mainly used food dyes, men handicrafts. Occupation was also significant ($p = 2.2 \times 10^{-16}$), with weavers, chiefs, and artisans as key users. Dye plant use in Benin is diverse and shaped by socio-cultural drivers. Results partly support Phillips and Gentry's hypothesis. Further studies should evaluate species threats and promote sustainable conservation.

Keywords: Producing-dye plants; indigenous dye plants; traditional knowledge; use determinant; Benin

Multi-stakeholder approaches to food security and adaptive governance for sustainable agriculture in Sub-Saharan Africa

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Abstract

In Africa, the great challenge posed by climate change, population growth, and economic instability to food and agricultural sustainability represent a complex landscape which necessitates a multi-stakeholder approach and adaptive governance strategies in order to set up a sustainable and resilient food system. To direct attention to this problem, this paper examines systematically the common point of economic development, plant breeding, policy practices and agricultural reinvestment. The agricultural landscape is modified by the climate change effect, requiring advanced plant breeding techniques to create crop varieties capable of resisting or be resilient to extreme weather events, pests and diseases. These efforts are pivotal for preserving and improving food security in Africa. Simultaneously, there is an urgent demand to grow African economies and at the same time assure food availability and accessibility for African fast-growing population. However, economic trends, best practices and future policies are crucial to adapt the future of African agriculture. The reinforcement of current policies and by increasing the reinvestment in the agricultural sector, African countries can create good environments for food security and sustainable economic growth. This requires multiple stakeholders like government agencies, research institutions, private sector entities and local communities. Importantly, adaptive governance structures are essential for addressing African agriculture dynamic challenges. The governance structures must be flexible enough to satisfy the market fluctuations, respond to the changing climatic conditions and technological

advancements while remaining rooted in the local contexts and traditional knowledge. The multi-stakeholder approach purposely supports collaboration and knowledge sharing within agricultural sector actors. By creating platforms encompassing plant breeders, economists, policymakers, farmers, and other relevant stakeholders, we can develop global solutions to face the interconnected challenges of agricultural sustainability and food security in Africa. These challenges were discussed at the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) 2nd Triennial Conference in Windhoek, Namibia, where experts shared insights on shaping sustainable food security policies.

Keywords: Food security; adaptive governance; sustainable agriculture; multi-stakeholder approach; Sub-Saharan Africa

Mat making from *Cyperus articulatus* in mangrove areas: a value chain analysis and economic insights in Benin (West Africa)

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Abstract

Coastal zones offer more than fishery and wood. They also harbour overlooked

resources vital to economic and social development. This study highlights *Cyperus articulatus*, a plant species thriving in Benin's mangrove areas and mainly used for artisanal mat-making, a product essential to millions across West Africa. The main aim was to analyse the value chain and the economic performance of the species' mat making sector. More specifically, the study used the case of the "la Bouche du Roy" protected area to map the value chain of the species' mat making sector and assess its economic performance, as well as key factors that influence its exploitation for appropriate decision-making. A mixed-method approach was employed, combining literature reviews, focus groups (n = 18), interviews (n = 20), and surveys (n = 602), while the data was collected from 2023 to 2024. Findings show that the collection of *C. articulatus* alone contributes 1.21 % to Benin's artisanal GDP. Among all sectors, only collection significantly reduces poverty, with collector profits surpassing the national poverty line. Annually, collectors earn €2.6 million, substantially more than processors (€1.5 million), dried plant sellers (€1.1 million), and mat sellers (€880,402). Furthermore, geographical location (village), age, gender and household size influenced both the rate of exploitation, and the benefits derived from *C. articulatus*. As a predominantly women-led activity, *C. articulatus* exploitation presents a strong opportunity for empowering women. The study urges policymakers to implement conservation strategies to sustain this resource which strengthens the blue economy and enhances local livelihoods and resilience in coastal Benin.

Keywords: Mat making; Ecosystem services; Provisioning services; Mangroves; Blue economy

Solanum wild relative species indicate varying ecological resilience to climate change in Benin (West Africa)

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Abstract

Crop wild relatives are rich reservoirs of valuable genes for improving crop yields, but they have long been underestimated and neglected. Unfortunately, these resources are severely threatened in their natural habitats due to increasing stress caused by climate change and human disturbance. Recently, these wild species began receiving increasing attention for their effective inventory and sustainable conservation and use for the benefit of humanity. This study investigated the current distribution and forecasted the potential future climate change impact on ten *Solanum* wild relative species in Benin, assessed the effectiveness of protected areas in maintaining viable populations, and evaluated their conservation status using the International Union for Conservation of Nature Categories and Criteria. We used species distribution models under two socioeconomic pathways SSP370 and SSP585 projecting species ranges for the 2055 and 2085-time horizons. The models demonstrated high accuracy with an average value of the Area Under the Curve and True Skill Statistic of 0.89 and 0.74, respectively. The most suitable areas were located in the Sudano-Guinean and

Guineo-Congolian zones of Benin. Furthermore, a significant proportion of these suitable areas is projected to become unsuitable for most wild *Solanum* species. Surprisingly, most of the identified hotspots were poorly represented within the existing protected area network, which appears insufficient to provide long-term refugia for the species. Nevertheless, new suitable areas were identified outside the current protected zones. Coordinated efforts are urgently needed to sustainably manage the populations of target species to enhance their future persistence in Benin.

Keywords: Crop wild relatives; climate change; protected area networks; *Solanum*; species distribution modelling

Current knowledge and future prospects of African plants providing natural dyes: a systematic review

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Abstract

Natural plant dyes are essential products of biodiversity, providing numerous benefits to humanity. However further research is needed to ensure the conservation of dye-producing plants for future use. This systematic review aims to explore the existing knowledge on natural plant dyes, identify critical knowledge gaps and suggest future research directions for improved utilisation and conservation of these species. Seven online search engines, including Web of Science, ResearchGate, ScienceDirect,

Research4Life, Google Scholar, PubMed and African Journals Online, were used to gather relevant literature following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework. A total of 632 publications were examined, of which 112 were finally selected based on the inclusion criteria. The results showed a peak in publications in 2024, with eighteen articles published that year. Geographically, the largest number of studies focused on West Africa (n = 68), followed by East Africa (n = 23), North Africa (n = 13), Southern Africa (n = 5), and Central Africa (n = 3). Notably, Nigeria accounted for 44.6% of all studies reviewed, followed by Ghana and Ethiopia with 7.1%. A total of 555 species were identified as natural dye-producing plants, mainly used in textiles, traditional practices, cosmetics, food and dye solar cell. However, an analysis of research limitations revealed significant knowledge gaps in plant biodiversity, spatial distribution, climate modelling, ecosystem services, physico-chemical properties, and economic valuation which are essential for the sustainable valorisation and conservation of natural dye-producing plant species in Africa.

Keywords: Colouring plants; Natural colouring; Natural plant dyes; Systematic review; Conservation; Africa

Variation in the potential impacts of climate change on the baobab in Sub-Saharan Africa: A continental analysis across major climate zones

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Abstract

Baobab, *Adansonia digitata* L. is a widespread multipurpose savannah tree in Africa. Although previous studies highlighted the potential impacts of climate on the species, we still lack sufficient understanding of how regional variation in ecological tolerance might influence its future resilience across the continent. This study used ensemble species distribution models (SDMs) to forecast suitable habitats for *A. digitata* under two climate scenarios (SSP 245 and SSP 585) for 2050 and 2070, across four climate zones: humid, subhumid, semi-arid, and arid. We built both whole-species and climate-zone-specific models to assess the role of niche differentiation on projected habitat suitability. Isothermality (36.75 %) was the most influential variable in the whole-species model, while soil properties (26.41 %) constrained habitat suitability. In zone-specific models, key drivers changed with the zone: precipitation of the driest month and soil properties dominated in the subhumid zone; annual precipitation and soil properties in the semi-arid; maximum temperature and annual precipitation in the humid; and mean diurnal temperature range in the arid. Niche overlap between zones was low (Schoener's $D = 0.06 - 0.13$), suggesting a broad climate tolerance. Whole-species models predicted slight habitat loss (0.5 – 1.12 %) by 2070, especially under SSP 585, whereas zone-specific models showed increases (1.48 – 3.13 %), irrespective of the scenarios and horizons, particularly in the humid zone. These findings underscore the importance of accounting for regional variation in SDMs for widespread species. Baobab's broad climatic tolerance may support resilience to climate change, though reciprocal transplant experiments are needed to disentangle the role of local adaptation from plasticity.

Keywords: *A. digitata*; Species distribution models; Regional variation; Climate change

Utilitarian diversity and options for the sustainable use of the bush banana *Uvaria chamae* P. Beauv. in Benin (West Africa)

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Abstract

Background The bush banana (*Uvaria chamae* P. Beauv.) is a wild edible fruit, but its population has declined recently in Benin. This study assessed the traditional knowledge and use of *U. chamae*, along with the key factors relevant to its conservation and sustainable management. The study reports (i) traditional knowledge and effective use of the species by local communities in relation to socioeconomic factors, (ii) local perceptions of threats to *U. chamae*, and (iii) conservation strategies suggested by local communities to ensure its sustainable use and management in Benin.

Methods This study was carried out in the Guineo-Congolian and Sudano-Guinean

zones of Benin where the species occurs. The data were collected from June to December 2021. The study sites were selected based on the occurrence and geographical distribution of *U. chamae*, while taking into account the representativeness of the diversity of sociolinguistic groups in the overall sample. Semi-structured questionnaires were administered to 434 respondents belonging to 15 sociolinguistic groups living in the phytodistricts of *U. chamae* distribution. The relative frequency of citation of the different uses was analyzed in relation to the socioeconomic attributes of the respondents. A principal component analysis was performed to highlight the relationships between the different uses and the sociolinguistic groups. Finally, a linear model was used to assess the effects of the sociocultural factors of the respondents on the use values of *U. chamae*.

Results A total of 71 traditional use categories were identified for *U. chamae*, sixty of which were used by the respondents. Women and elderly members of the Fon, Aizo and Mahi sociolinguistic groups, particularly those involved in traditional medicine and living in the phytodistrict of Plateau, were the primary users of *U. chamae*. The main use categories, summarized from all the respondents, were medicinal (97%), food (84.10%), magico-religious (52.92%), firewood (25.52%), and material for handicrafts (7.30%). The most valued plant parts were roots, fruits, leaves, and branches. The main threats to *U. chamae* are largely due to human activities rather than climatic factors.

Conclusion This study revealed that *U. chamae* is a multipurpose shrub, mainly used in traditional medicine and as a food source. There is little consensus among local people about its medicinal uses. Investigating the nutritional, biochemical, and toxicological properties of *U. chamae* extracts could help to verify the claims attributed to the plant. Local communities suggested the promotion of home and botanical gardens as the main conservation measures to ensure the sustainable use and management of *U. chamae* in Benin.

Keywords: Traditional medicine; Wild edible fruits; Domestication; Forest resources; Local perception

Three decades of the practice of decentralised forest management in Africa: A systematic review of current knowledge and prospects

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Abstract

Decentralised Forest Management (DFM), a forest management approach involving local communities, has been implemented in many countries worldwide to remedy the failure of state-centred forest management to conserve resources. This review shed new insights into the progress of DFM in Africa. Despite the great interest in forest management, many African countries have limited awareness of DFM. Our in-depth bibliometric analysis based on multiple online search engines covered the period 1992–2021 and yielded 1064 articles, of which 245 were selected for this review. Publications recorded on DFM came from 25 countries, covering four of the five African sub-regions. Approximately 77 % of the retained publications came from East Africa alone. Community participation, institutional arrangements, and contribution of DFM to forest conservation and community livelihoods

were the main foci of the studies. Apart from the Village Land Forest approach, which devolves full power to local communities in Tanzania, most DFM schemes in Africa are implemented through deconcentration or delegation, whereby the local communities are primarily used as a workforce. This resulted in low interest among local people in forestry activities and limited implementation of DFM following the cessation of the initial DFM projects. Our analysis also highlighted gaps in knowledge about DFM regarding adjacent land use, conflict resolution, and ethnobotanical study. Our findings should guide scholars in their future research, as well as decision-makers in developing sound community-based management strategies for tropical forests in the context of their overexploitation and rapid degradation. We argue that significant efforts are still needed to achieve the ideal implementation of the DFM approach in Africa.

Keywords: Bottom-up approach; Community livelihoods; Women involvement; Community forest association; Forest conservation; Africa

Climate change may shift diet of the African savanna elephant: Preliminary results for 14 food tree and shrub species in the WAPOK transboundary ecosystem, West-Africa

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Abstract

Climate change through an increase in temperature and a reduction of rainfall constitutes a serious threat to the African savannah elephants *Loxodonta africana* Cuvier. Climate change can directly shrink suitable habitats of the main food resources of elephants, hence reducing their food availability. In this study, we assessed the present-day and future suitable habitat for 14 tree and shrub species previously identified as main components of the elephant diet in the W-Arli-Pendjari-Oti-Mandouri-Keran (WAPOK) ecosystem, the largest savannah ecosystem in West Africa. Bioclimatic and soil data were used to build the present-day and future models under two representative concentration pathway scenarios: RCP4.5 and RCP8.5. We further explicitly accounted for dispersal constraints and compared "actually" colonized habitats to suitable habitats based on the traditional assumption of unlimited dispersal. Mean diurnal temperature range, isothermality, temperature seasonality, annual temperature range, annual precipitation, number of dry months, and soil were the seven most important drivers of the distribution of the species. However, their relative importance varied greatly among species. Annual precipitation had a high contribution (47–77%) for nine out of the 14 species. Compared to present-day, results showed a moderate decrease in suitable habitats for seven species under both scenarios, while others showed an increase of 2.58–53.55%. Incorporation of dispersal constraints showed that only 9.26–48.26% of currently suitable habitats would be occupied depending on species. Some species such as *Adansonia digitata*, *Vitex doniana*, and *Vachellia sieberiana* showed moderate probabilities of colonization, while others such as *Balanites aegyptiaca* and *Tamarindus indica* showed low probabilities. This study demonstrates that climate change may shift the diet of African savanna elephants by altering availability of key food resources. It also highlights the importance of incorporating dispersal constraints in species distribution

modeling and provides key insights for conservation planning in the WAPOK ecosystem.

Keywords: Climate change; WAPOK; Habitat suitability modeling; Dispersal limitation; Species distribution modeling; Conservation

Progress of in situ conservation and use of crop wild relatives for food security in a changing climate: a case of the underutilised *Vigna Savi*

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Abstract

Crop wild relatives (CWRs) - wild plant taxa genetically closely related to domesticated plants - are considered an alternative pathway to solving global food insecurity in a changing climate. However, their potential contribution is undermined by fundamental knowledge gaps in taxa diversity, distributions, taxonomic affiliations, conservation strategies, and valuable traits. To address these gaps, we reviewed the literature on the progress made between 2000 and 2021 in support of in situ conservation and use of CWRs under the changing climate in five thematic areas focusing on the genus *Vigna*: (1) species diversity, global distribution, conservation status, gene pools, and importance of the genus; (2) CWR-in situ conservation-protected area

debate; (3) cultivation and domestication of CWR populations; (4) adaptive response to drought stress; and (5) adaptive response to *Striga* stress. We report that 104 *Vigna* CWR species in five subgenera, *Ceratotropis*, *Haydonia*, *Lasiosporon*, *Plectotropis*, and *Vigna*, are distributed mostly in Africa and Asia. Nine species are domesticated while six are threatened. *Vigna* gene pools remain poorly understood. Many *Vigna* CWRs provide various ecosystem services for human and environmental health. Attention is increasing towards in situ conservation of CWRs, within and outside protected areas, and complemented by ex situ conservation approaches. Several *Vigna* CWR taxa exhibit good agronomic traits for potential cultivation and neo-domestication. Many taxa have demonstrated tolerance to drought stress and race-specific *Striga* resistance. We conclude that if effectively conserved and used, *Vigna* CWRs can contribute to sustainable and climate-resilient food systems, either as wild edible plants, new plants for neo-domestication or novel sources of genetic material for use in pre-breeding programmes to improve the resilience, quantity and quality of *Vigna* domesticates under the changing climate. This study could stimulate further research and policy change for effective CWR conservation and use for sustainable food security in a changing climate.

Keywords: Climate change WAPOK Habitat suitability modeling Dispersal limitation Species distribution modeling Conservation

Ensemble modelling reveals spiny monkey orange (*Strychnos spinosa* Lam.) as a vulnerable wild edible fruit tree in West Africa

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Abstract

This study aimed at modelling the historical distribution and assessing the potential impacts of future climate on spiny monkey orange (*Strychnos spinosa* Lam.) population across West Africa using the Shared Socio-economic Pathways (SSP 245 and SSP 585) scenarios at the 2041–2060- and 2081–2100-time horizons. Bioclimatic and soil variables were used at a resolution of 30 arcseconds with 588 occurrence records analysed using five algorithms (Random Forest (RF), Maximum Entropy (MaxEnt), Support Vector Machine (SVM), Boosted Regression Trees, and Generalized Linear Model (GLM)) and four global climate models (CanESM5, CNRM-CM6-1, HadGEM3-GC31-LL, and MIROC6). The models' performance was evaluated using the Area Under the Curve (AUC), True Skill Statistic (TSS), Correlation coefficient (COR), and the Deviance. The most efficient algorithm (RF) was employed for the modelling, and the resulting maps were overlaid on the existing protected area network. The distribution modelling under future climate revealed an increase in the high and moderate suitability areas for *S. spinosa* at 2041–2060 and 2081–2100 horizons. Based on the results, *circa-situm* conservation and *ex-situ* conservation strategies should be encouraged in addition to the protected area network (PAN). Based on the results, *circa-situm* conservation and *ex-situ* conservation strategies should be encouraged in addition to the protected area network (PAN).

Keywords: Climate change; Conservation; Potential distribution; *Strychnos spinosa*

Top priority crop wild relatives exhibit different resilience responses to climate change in Benin (West Africa)

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Abstract

Climate change exacerbates biodiversity loss and contributes to disrupting ecosystem functioning, diminishing ecosystem services, and further endangering vulnerable populations of species. This study explores how different climate scenarios may impede the probable resilience of top-priority crop wild relatives in Benin. Records of the species were combined with climate and soil layers in a maximum entropy modeling algorithm. For the future models, two shared socio-economic trajectories were considered: Shared Socioeconomic Pathway SSP2-4.5 and Shared Socioeconomic Pathway SSP5-8.5 from the CMIP6 scenarios for the period 2040–2070. Niche dynamics as well as similarity of the niches were assessed for all species for the proposition of sustainable conservation strategies. Results showed that all models yielded very good performance, as revealed by the AUC and TSS values. For most species, much of the distribution will remain stable across time, though some expansion or retraction will be observed in some cases. Most of the pairs of species display low similarity in the suitable areas for conservation. However, a higher similarity of the background was observed among some groups including *Ipomoea* and *Dioscorea* species. Further development of these models could help to get a complete view of the distribution

of the species and set long-term conservation strategies for this group.

A comparative study of morpho-physiological responses of wild and cultivated *Solanum* species to water stress: the case of *S. sisymbriifolium* and *S. macrocarpon*

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Abstract

Crop wild relatives are closely related taxa of cultivated crops and are well adapted to a wide range of environmental conditions. With the current global warming and challenges in agriculture and food production, increasing attention must be given to these crop wild species as they can provide genetic resources that may be helpful to address some of the current challenges in agriculture (e.g., adaptation to drought). In this study, we compared the morpho-physiological performances of *Solanum macrocarpon* and its wild relative *Solanum sisymbriifolium* under different watering conditions in Benin. Seedlings were grown in plastic pots under shade-house and subjected to low, moderate, and high-water supply (i.e., 25%, 50% and 75%, respectively of the pot holding capacity). Parameters related to seedlings growth, biomass allocation and

stomatal density were investigated. Descriptive statistics and linear mixed effect models were used for data analysis. Results revealed highly significant differences of morpho-physiological parameters between wild and cultivated *Solanum* species along the watering gradient. First, seedlings from the wild relative demonstrated higher morphological growth parameters than seedlings of the cultivated species irrespective of the watering level. Second, the wild relative also showed better performances in terms of biomass allocation and number of stomata, regardless of leaves faces and watering level than the cultivated species. Water stress reduced values of morpho-physiological parameters for both wild and cultivated species. Contrary to our expectations, the wild relative instead of being resistant, was found to also be sensitive to water stress. However, it was found to be more tolerant to drought than the cultivated species, and therefore could be considered when selecting rootstocks for crop improvement.

Farmer-perceived phenotypic variation and preferences reveal potential for multi-traits selection in the desert date *Balanites aegyptiaca* (L.) Delile in Benin

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Abstract

Due to their historical interactions with plants, farmers have gained knowledge of natural variations in plant traits that can

be useful for the domestication and sustainable management of genetic resources. This study focused on *Balanites aegyptiaca* (L.) Delile, a neglected and underutilized wild fruit tree species in Benin. The objectives of the study were to assess farmers' (1) perceived phenotypic variations in fruit, seed, leaflet, thorn, and stem bark, (2) desirable and undesirable traits, and (3) on-farm management of the species. Using semi-structured interviews (461) in 14 communities spanning the species distribution area, data were collected on perceived phenotypic variation, criteria of classification, desirable and undesirable traits, and on-farm management practices of the species. Descriptive statistics and principal component analysis were used for the data analysis in R software. Results revealed 10 criteria to differentiate morphological types of the species, the most cited criteria being thorns length (100%), stem bark color (91.1%), leaf shape (70%), fruit size (54.2%), and fruit pulp taste (45.8%). Preferred characteristics were large fruits (50.4%), sweet fruits (42.8%), elongated leaf (70%), yellowish stem bark (88.9%), long thorn (64.5%) and fruiting trees (100%) and depended on age, geographical location, and gender. Interestingly, reasons supporting these preferences reveal potential for multi-traits selection. The most encountered farmer management practices were tree sparing on-farm (18.5%), and protection against grazing (10.2%) and fire (10.4%). However, the extent of these practices does not guarantee sustainable management of the species. Our findings provide interesting insights for further domestication initiatives. However, further research is needed to understand the interrelated relationship between genotypes and environmental factors in shaping the observed morphological variations.

A review of *Momordica* species in Africa (Cucurbitaceae): current knowledge and perspectives for sustainable management

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Abstract

African Indigenous Vegetables (AIVs), particularly species of the genus *Momordica*, are crucial for West African communities, offering nutritious leaves, fruits, and seeds used both as food and traditional medicine. Earlier publications emphasized the significance of the genus *Momordica*, focusing on pharmacology, traditional uses, and biochemical components. However, current knowledge and research on sustainable management policies remain limited. This study presents a comprehensive systematic review of the past three decades, highlighting publication trends and key insights on the conservation ecology and domestication of *Momordica* species in Africa. The search was conducted in four academic databases and covered peer-reviewed literature from 1993 to 2023. This systematic review initially identified 1,480 potentially relevant publications. Through a sequential screening process, 128 studies (8.6%) were ultimately selected for in-depth analysis. Results reveal that research on *Momordica* species is geographically uneven, with West Africa dominating (n = 89 studies). *Momordica charantia*, *M. balsamina*, and *M. foetida* are the most studied species. However, major gaps remain in ecosystem services, genetic diversity, and conservation status. Addressing these gaps could support better decision-making and sustainable domestication strategies for *Momordica* species in Africa.

Keywords : African Indigenous Vegetables; Momordica; Ethnobotany; Conservation biology; Domestication

Ethnobotanical analysis and threat factors for plants used to treat mental illness in the municipality of Kétou, Benin

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Abstract

Mental illness in Benin is a major public health challenge, marked by stigma, a lack of human and financial resources, and limited access to appropriate care. In this context, people resort to medicinal plants, although the indigenous knowledge used remains poorly documented. The objective of this study is to identify the plants and recipes used in the traditional treatment of mental illness and to identify the pressures and threats to these species with a view to their sustainable conservation. Data was collected from 52 phytotherapists through semi-structured interviews conducted using a flexible guide focused on predefined themes and open-ended questions. Ethnobotanical indices were calculated and ecological characteristics were analyzed. A total of 40 species belonging to 25 botanical families were identified, with Fabaceae (24%) and Euphorbiaceae (12%) being the most represented. *Rauvolfia vomitoria* Afzel was the most frequently cited species (90.38%). The most commonly used organs were leaves (66%). Decoction (30%), trituration (20%), and pulverization (18%) were the main forms of preparation. Oral administration (55%) and head baths (25%) were the dominant modes of administration. The species were often harvested in anthropized plant formations. The main threats identified were extensive agriculture (51.6%), overexploitation, and habitat degradation (30.38%). Raising awareness among populations to protect these species and cultivate them appears essential to ensure their sustainable availability and

facilitate access to phytotherapies for mental illnesses.

Keywords: Mental illness, medicinal plants, anthropogenic pressures, Kétou, Benin.

Identifying suitable forested areas and protected forests for the conservation of white-thighed (*Colobus vellerosus*) and king (*C. polykomos*) colobus monkeys under climate change in West Africa

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Abstract

Colobus vellerosus and *Colobus polykomos* are closely related, parapatric species endemic to West Africa. Both species face severe threats from illegal hunting and habitat destruction, with population declines exceeding 80 % for *C. vellerosus* and 50 % for *C. polykomos* over the past 30 years. Particularly, the critically endangered *C. vellerosus* necessitates urgent conservation initiatives, including potential reintroductions into suitable habitats where the species has been extirpated in recent decades. We used ensemble modelling to assess habitat suitability for both species under current and future climate conditions and identified suitable habitats within and outside protected areas for reintroduction. Under current climate conditions, the climatically suitable area was estimated at 520,193 km² for *C. vellerosus* and 240,398 km² for *C. polykomos*. However, within the study region (1,624,800 km² including 370,000 km² of forest cover), only 7.3 % of forests

were suitable for *C. vellerosus* compared to 43.3 % for *C. polykomos*. A large proportion of these suitable habitats (47.9 % and 82.9 %, respectively) are located outside protected areas. Under a low greenhouse gas emission scenario projected for 2050, suitable habitats may decline by 58.7 % for *C. vellerosus* and 71.8 % for *C. polykomos*. The study recommends prioritizing habitat protection, assessing genetic population structure, implementing reintroduction programs (especially for *C. vellerosus*), and establishing ecological corridors to enhance connectivity.

Keywords: Habitat suitability; Climatic refugia; Colobines; Ensemble modelling; Reintroduction

Typology analysis and adaptive capacity of commercial gardening farmers to climate change in peri-urban areas along the coastal area of Benin (West Africa)

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Abstract

The coastal environment represents a special site for human and economic activities. The population growth in this area has led to strong urbanization and, therefore, to the establishment of small-scale vegetable farms to feed the growing urban and peri-urban populations. This is an opportunity for youth employment and reduce poverty as this activity

generates reliable incomes. However, in recent years, climatic changes and rapid urbanization have influenced agricultural activities in this area. The aim of this study was to characterize market gardening systems along the coastal area of Benin and understand farmers' perceptions and adaptation strategies in response to the ongoing environmental changes. Data was collected from 130 farms using individual semi-structured questionnaires. A principal component analysis (PCA), K-Mean multivariate classification and statistical inference were used for data analysis. Three farm groups were identified from the hierarchical bottom-up classification: modern coastal farms (MCF, 59.24%), small-scale intra-urban farms (SIF, 35.38%) and traditional co-managed lowland farms (TCF, 5.38%). The perceived environmental changes were mainly temperature increases, strong winds and migration to another farmland. The criteria differentiating the groups were strong winds and variation in the start date of the rains ($p < 0.05$). According to current strategies farmers in groups 1 and 2 preferred crop diversification, those in group 3 moved their farms. Future strategies range from the early sale of crops to the use of modern watering equipment to the cessation of farming. Thus, sustainable farm management requires the involvement of decentralized structures and local stakeholders to maintain the livelihoods of local populations.

Keywords: coastal environment, climate change, urbanization, adaptation strategy, agricultural policy

Contrasting ecological mechanisms mediate the impact of land conversion on ecosystem multifunctionality

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Abstract

Land use/cover (LULC) changes have unequivocally affected biodiversity and ecosystem functioning, with significant implications for human well-being. However, the ecological mechanisms underlying the impact of land conversion on ecosystem multifunctionality (EMF) remain insufficiently understood, particularly in dryland regions experiencing increasing deforestation. This study investigated how the conversion of natural forests and savannas into agroforestry parklands modifies the relationships between multiple biodiversity attributes (taxonomic, functional, phylogenetic, and structural) and EMF, while accounting for environmental factors in dryland landscapes in Benin. Data were collected from 145 plots across forests, savannas, and agroforestry parklands. EMF was assessed using eight ecosystem functions related to productivity and nutrient cycling. Results indicated that EMF was positively associated only with structural diversity in forests. Conversion of forests and savannas into agroforestry parklands reduced EMF both directly and indirectly. Indirect effects were mediated by contrasting biodiversity mechanisms: shifts toward species with acquisitive traits in forest-to-parkland transitions, and loss of species diversity in savanna-to-parkland transitions. Environmental factors such as aridity index and soil texture influenced biodiversity attributes but had no direct effect on EMF. The study highlights that biodiversity–EMF relationships depend on land use type and are primarily maintained in natural

ecosystems through structural diversity. Land conversion weakens ecosystem multifunctionality via biotic homogenization driven by biodiversity loss and shifts in species functional strategies.

Keywords: Agroforestry parkland; Carbon stock; Mean pairwise distance; Soil phosphorus content; Structural equation modelling; West Africa

Current knowledge and future prospects of African plants providing natural dyes: a systematic review

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Abstract

Natural plant dyes are essential products of biodiversity, providing numerous benefits to humanity. However, further research is required to ensure the conservation of dye-producing plants for future use. This systematic review aims to synthesize existing knowledge on natural plant dyes, identify critical knowledge gaps, and propose future research directions for improved utilization and conservation of these species. A comprehensive literature search was conducted using seven databases (Web of Science, ResearchGate, ScienceDirect, Research4Life, Google Scholar, PubMed, and African Journals Online) following the PRISMA framework. A total of 632 publications were screened, with 112 studies retained for analysis. Results revealed a peak in publications in 2024. Most studies were conducted in West

Africa, particularly in Nigeria, followed by Ghana and Ethiopia. Overall, 555 plant species were identified as sources of natural dyes, with applications in textiles, traditional practices, cosmetics, food, and dye-sensitized solar cells. Despite this diversity, significant knowledge gaps persist, particularly regarding biodiversity assessment, spatial distribution, climate modelling, ecosystem services, physico-chemical characterization, and economic valuation. Addressing these gaps is essential to support sustainable use and conservation of dye-producing plant species in Africa.

Keywords: Colouring plants; Natural colouring; Natural plant dyes; Systematic review; Conservation; Africa

Assessing the Impact of Climate Change on Agricultural Yield in Benin: Trends, Vulnerabilities and Adaptation Strategies

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Abstract

Agriculture in Benin, predominantly rainfed, is increasingly affected by climate change, with rising temperatures, irregular rainfall, and recurrent droughts threatening food security and rural livelihoods. This study provides an empirical assessment of the impacts of climate variability on key staple crops and farmer adaptation strategies across agroecological zones in Benin. A triangulated methodological approach combining a systematic literature review (PRISMA), analysis of 30 years of climate and yield data (1990–2020), and field surveys was used to ensure robust findings. Results indicate an increase of +0.9°C in average annual temperature

and a 12.5% decline in rainfall consistency. These changes have resulted in significant yield reductions, notably in maize (18%) and sorghum (12%), while cassava and yam demonstrated relative resilience. The northern Sahelian and Sudano-Guinean zones were identified as the most vulnerable due to delayed onset of rains and prolonged dry periods. Farmers have adopted adaptation strategies such as adjusting planting dates, intercropping, and cultivating drought-tolerant varieties. However, these efforts remain constrained by limited access to credit, insufficient agricultural inputs, and weak extension services. The study highlights that climate change is already reducing agricultural productivity in Benin, with spatially differentiated impacts across regions and crops. It recommends the promotion of climate-smart agriculture, improved dissemination of climate information, development of resilient crop varieties, expansion of irrigation systems, and strengthening of financial and advisory support to enhance farmers' adaptive capacity and ensure long-term food security.

Keywords: Climate change; Agricultural yield; Food security; Climate variability; Adaptation strategies; Benin

Farmers' Strategies for Managing Forage Supply Crises in Niger

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Abstract

In Niger, in recent years, there has been a systematic cutting and collection of millet straw after the grain harvest in order to feed livestock. This appears in many ways to be a very worrying phenomenon. This study seeks to determine the factors involved in the collection of millet straw based on farmers' perceptions and following the analysis of local pastoral strategies. This specifically involves the following: (i) identifying the motivating

factors for collecting millet straw, (ii) evaluating farmers' strategies for adapting to the effects of the factors incriminated, and (iii) analyzing farmers' knowledge and choices of fodder resources used to feed livestock. The motivations for collecting millet straw indicated four determining factors: fodder deficit, climate change, and the fodder use of straw and poverty. However, the analysis of the factors in question showed a general trend toward achieving livestock food security. As a result, three types of livestock farming were considered on the basis of the animal feed resources used: the urban type using more coarse fodder with legume tops supplements, the peri-urban type combining coarse fodder and small quantities of legume tops, and the rural type where the supplementation is based on cereal straw.

Keywords: millet straw; fodder; adaptation strategies; livestock farming; Niger

Stratégies fonctionnelles de *Cymbopogon schoenanthus* (Citronnelle du désert), graminée fourragère soudanienne cultivée sous compost au Sud Bénin

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Cette étude teste l'effet du compost sur les stratégies fonctionnelles de *Cymbopogon schoenanthus* (CS), graminée des milieux soudanais valorisable comme alicament dans les élevages bioécologiques de ruminants, en vue de sa domestication. Le dispositif expérimental est un bloc aléatoire complet de trois traitements (0 t/ha (témoin), 5 t/ha et 10 t/ha de compost) en 3 répétitions. Des données morphométriques sur souches, tiges et limbes foliaires, collectées sur 5 souches par placette ont été soumises à une analyse de la variance. La hauteur totale des souches (HAT), le nombre total de talles (NTT) sont significativement plus élevés sous la dose de 5 t/ha de compost

par souche et plus faibles sous le témoin: HAT= 149, 0 cm contre 132, 2 cm; NTT= 112, 9 talles contre 45, 9 talles. La fertilisation a induit une augmentation du taux de matière sèche (TMS) de 22, 8% et de 48, 1% et une réduction de la surface foliaire spécifique (SFS) de 34, 2 à 46, 6%. Cette augmentation du TMS, couplée avec la réduction de la SFS, indique une stratégie de conservation de ressource chez les souches de CS fertilisées. Par contre, les souches témoins ont adopté une stratégie de capture de ressources. La dose de 5 t/ha de compost semble être plus favorable à la production agro-écologique de CS.

Keywords: *Cymbopogon schoenanthus*; compost; functional traits; biomass; resource strategy; agroecology

Dynamics of Mangrove ecosystem in Ramsar site 1017 face to climate change in Southern Benin (West Africa)

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Abstract

Mangrove ecosystems in developing countries are undergoing accelerated degradation due to intensified human activities, particularly those related to the direct exploitation of forest resources by riparian communities. In Benin, these anthropogenic pressures have led to a significant decline in mangrove cover, decreasing from 13,306.05 hectares in 1995 to 9,452.52 hectares in 2015, representing a 29% reduction over twenty years. In response, Benin has ratified several international conventions, including the Ramsar Convention, to strengthen mangrove protection. This study focuses on the spatio-temporal dynamics of land use, particularly mangrove ecosystems, at Ramsar Site 1017. A mixed-methods approach was adopted. First, a cartographic analysis was conducted using Landsat, SPOT, and Sentinel satellite imagery for the years 1980, 1990, 2000, 2010, and 2020. Second, data from national forest inventories (IFN1 and IFN2) were analyzed to validate observed trends. Results show a significant decline in mangrove cover from 1980 to 2020, with

the most severe reduction over 11,432 ha, occurring between 1990 and 2000. However, the rate of decline slowed in the subsequent decades, with net losses reduced to 430 ha (2000–2010) and just 27 ha (2010–2020). This trend reversal reflects the positive impact of reforestation and conservation measures implemented in the 2000s. These findings highlight the effectiveness of conservation efforts and underscore the critical need to sustain and scale up such initiatives. Continued monitoring, community engagement, and integrated management are essential to safeguarding mangroves and enhancing their resilience against ongoing environmental and human-induced threats.

The Role of the Mangrove Ecosystem in Supporting the Resilience of Local Communities in Ouidah Municipality, Benin (West Africa)

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Abstract

We aim to understand the role of mangroves in helping coastal communities recover, evaluate their vulnerability index, and identify main adaptation strategies. Questionnaire data were collected from 224 randomly selected households in the Ouidah district, including salt producers, fish smokers, and market gardeners, because they depend on activities related to mangroves. In data analysis, we used descriptive statistics and the household livelihood vulnerability index (LVI). The χ^2 test examined the relationship between perceived ecosystem services and specific localities. Results identified eleven mangrove ecosystem services in Ouidah,

with perceptions varying across localities (p -value < 0.05). Significant differences in perceptions were found in services such as firewood provision, spiritual support, and tourism. The vulnerability index (0.071) indicates a low to moderate overall vulnerability, which increases in areas where mangroves are more degraded. This highlights the critical importance of mangrove conservation in reducing climate vulnerability. Sustainable management strategies that balance economic activities like salt production with conservation are essential for enhancing stakeholders' resilience to climate change impacts.

Plant diversity, population structures and carbon stock of mangrove ecosystems of Ramsar Site 1017 in Benin

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Abstract

Mangroves in Benin are facing rapid degradation as a result of anthropogenic disturbances. Since Benin adopted the Ramsar Convention on Wetlands conservation treaty, several projects have been carried out to promote the sustainable conservation of mangroves at Ramsar Site 1017. However, how these initiatives have sustained the conservation of mangrove ecosystems remains largely unknown. In this study, species composition, tree density, structure, natural regeneration and carbon stock of mangrove ecosystems were investigated to assess the impact of the management policies on mangrove conservation. Using the quadrat sampling method, 54 plots of 100 m² were established along 10 transects of

200×10 m. Overall, 65 plant species were recorded, including ten tree species and seven endangered species. The Shannon diversity index ($H' = 1.57$) indicated low tree diversity, while Pielou's evenness index ($E_q = 0.26$) showed an uneven distribution of abundance among species. Of the ten tree species, *Rhizophora racemosa*, *Avicennia germinans* and *Dalbergia ecastaphyllum* were the most dominant. The total carbon stock was $175.10 \pm 39.12 \text{ Mg ha}^{-1}$, with $138.06 \pm 31.28 \text{ Mg ha}^{-1}$ from aboveground tree biomass and $35.75 \pm 7.50 \text{ Mg ha}^{-1}$ from belowground tree biomass. The mean tree density and basal area were 3018 trees ha^{-1} and $29.04 \text{ m}^2 \text{ ha}^{-1}$, respectively. The diameter size class distribution (SCD) showed an inverted J-shape with 98% of tree species in the first three classes (1–30 cm), suggesting a sustainable management of the mangrove ecosystems. Moreover, the saplings and seedlings density was $1308 \pm 46 \text{ trees ha}^{-1}$ with a high proportion of saplings. It is evident that conservation efforts and long-term monitoring, as well as awareness raising among local communities, are needed for the management and preservation of mangroves.

Leveraging mangroves to advance climate action in Africa: Zooming in on Nationally Determined Contributions (NDCs)

Samuel

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Abstract

Mangroves are vital for climate change adaptation and mitigation due to their efficient carbon sequestration and coastal protection roles providing often untapped opportunities for countries to enhance their national climate commitments (including the so-called Nationally Determined Contributions) under the Paris Agreement adopted at the United Nations Framework Convention on Climate Change (UNFCCC) COP21 in 2015. In Africa, several countries possess mangroves and have signed the Paris Agreement, however, the level of integration of mangrove actions into the Nationally Determined Contributions (NDCs) has not been adequately explored. Using a systematic review methodology, 33 African countries possessing mangroves were selected and their NDCs were reviewed, scored, and ranked to assess their level of integration of mangrove ecosystems into their NDCs. Countries like Equatorial Guinea, Nigeria, Senegal, and Sudan demonstrate commendable progress and leadership in integrating mangroves within their NDCs. However, gaps in budgetary commitments, spatial planning, and temporal specificity for mangrove actions among a majority of the countries hinder broader mangrove inclusion. The study also revealed a disconnect between research outputs and policy frameworks, where countries with increased mangrove research output in Africa failed to integrate mangrove actions into their NDCs. To increase African countries' resilience to climate risks and contributions to global climate goals, there is a need to increase effective collaboration between mangrove researchers, local communities, and policymakers in mangrove-possessing countries. This will bolster public education on mangroves and their inclusion of mangrove actions in their NDCs, ultimately enhancing the implementation of mangrove actions on the ground.

Impact of crop production on selected soil physicochemical properties in semiarid climate zone of Benin, West Africa

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Abstract

Land and soil degradation caused by arable farming affects the livelihoods of the local population in semiarid climate regions, such as in West Africa. In particular, cotton (*Gossypium hirsutum* L.) production is a crucial driver of soil degradation. However, the extent of soil degradation under cotton compared to other crops and the natural vegetation as a possible benchmark for non-degraded soil needs to be better understood. Topsoil at 0–10 cm depth from fields of cotton (*G. hirsutum*), three cereal species (maize [*Zea mays* L.], millet [*Eleusine corocana* L.] and sorghum [*Sorghum bicolor* (L.) Moench]), three legume species (cowpea [*Vigna unguiculata* L.], peanut [*Arachis hypogaea* L.] and soybean [*Glycine max* L.]) and woodland as natural vegetation were analyzed for soil porosity, water stable aggregates, water holding capacity, pH, electrical conductivity, soil organic carbon, total nitrogen and total sulfur. A simple soil degradation index was derived from the measurements. Findings revealed that the topsoil of cereal crop fields was more compacted, with less porosity, than the topsoil of cotton and legume crop fields. However, the soil degradation index was higher in the cotton fields than in the legume and cereal fields. The soil fertility was reduced on cropland compared with natural vegetation, following the order of woodland > legumes > cereals > cotton. Integration of tree components in agricultural production systems through agroforestry may provide an option to improve soil fertility in semiarid regions.

Évaluation de la gestion traditionnelle et de la diversité génétique des variétés locales de niébé [*Vigna unguiculata* (L.) Walp.] cultivées au Togo

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Résumé

Cette étude a été menée dans le but de documenter les différents cultivars et les systèmes traditionnels de gestion et de conservation des ressources génétiques de niébé au Togo. Pour parvenir, une enquête ethnobotanique structurée a été conduite dans 50 villages et les données ont été collectées en utilisant les méthodes de la recherche participative basée sur des observations directes, des discussions libres, des entretiens de groupes et des entretiens individuels. 147 accessions de niébé ont été inventoriées. Le nombre moyen de cultivars est de 6 par village et de 2 par ménage. La diversité et la distribution des cultivars ont été appréciées par la méthode de Four square. Le taux de perte de la diversité varie de 14,28 à 60% avec un taux moyen de 20,78% par village. La couleur de la graine, la saison de culture, le port de la

plante, la forme de la gousse, le rendement et le goût étaient les critères utilisés par les producteurs pour la dénomination et l'identification des cultivars. Il existe une grande diversité variétale du niébé qui est toutefois menacée car la conservation de l'espèce reste délicate. Pour préserver cette diversité il est urgent de mettre en place des stratégies de conservation. En outre, pour faire face aux contraintes liées à la culture du niébé, il faut utiliser des cultivars adaptés et performants, existants ou à créer. Pour une bonne conservation et utilisation de cette diversité déjà existante, il faut clarifier la synonymie entre les cultivars, les identifier et les caractériser à base de marqueurs moléculaires afin d'établir une banque de gènes.

Impacts of land-use change on carbon storage and sequestration in forest ecosystems of in Benin

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Abstract

Modeling the impacts of land-use change has become a critical concern in developing strategies to mitigate climate change. This study aims to assess the impact of land-use change on carbon flux. To simulate land-use changes by 2035, SPOT satellite images from 1995, 2005, and 2015 interpreted visually were integrated into the MOLUSCE module, which combines cellular automata and artificial neural network algorithms. These images, coupled with default carbon values, served as the basis within the InVEST model to estimate carbon storage over time. Results indicate that natural formations have been reduced in favor of agricultural land and settlements, with a carbon loss between 12.79 and 14.53% from 2005 to 2015. If this trend continues, an additional 5% carbon loss could occur between 2015 and 2035, highlighting that the destruction of natural formations would disrupt the carbon cycle and

contribute to climate variability. In Toucountouna, projections indicate that the total estimated carbon stock in natural formations will decrease to 4,007,320.67 tons by 2035 if no action is taken. In Matéri, it is expected to decline to 292,256.58 tons. In Ségbana, the net loss is projected to reach 5,590,827.33 tons by 2035. Similarly, in Dassa-Zoumé, Ouaké, and Parakou, the estimated net losses by 2035 are 202,936 tons, 379,165.76 tons, and 841,667.1 tons, respectively. It appears important to implement effective land-use planning to restore forest ecosystem functions. **Keywords:** Climate change · Land-use dynamics · InVEST model · MOLUSCE

Utilization and Producers' Knowledge of Pigeon Pea (*Cajanus cajan* (L.) Millsp.) in Togo (West Africa)

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Modom, Béré
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Pigeon pea (*Cajanus cajan* (L.) Millsp.) is a legume crop that plays an important role in the family farming system in sub-Saharan Africa. It provides additional income for farmers and contributes significantly to food security. In Togo, however, little is known about this crop, its uses and diversity. This study aimed to investigate farmers' knowledge of pigeon pea uses and diversity in Togo. A total of 501 pigeon pea growers belonging to 13 ethnic groups were selected in 41 villages across the country's five regions. Data on pigeon pea uses, diversity, distribution of landraces, and local nomenclature were collected through focus group discussions and semi-structured interviews. Farmers in Togo cultivated pigeon pea mainly for home consumption and for its commercial value. Other uses included firewood, medicinal purposes, soil fertilization, poultry and cattle feeding, and traditional potash production. Four vernacular names were reported for the species and the names of the different landraces were based on their morphology, productivity, organoleptic, and culinary properties. A total of 19 landraces were recorded. The

data indicated that women preserve a higher diversity of landraces than men, with some female-headed households reporting up to five distinct landraces. The information gathered through this survey will contribute to the promotion of pigeon pea local diversity through sustainable breeding and conservation programs.

Diachronic analysis of land vegetation around the mouth of the Sô River

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Abstract

Large estuarine lakes such as Lake Nokoué are increasingly exposed to intense demographic pressure, resulting in persistent environmental disturbances, particularly in areas adjacent to watercourses and wetland systems. This study aims to assess the temporal dynamics of land use around Lake Nokoué, focusing on the Sô-Ava district. The methodological approach combines documentary review, field verification, and remote sensing techniques. Landsat 7 ETM+ (2005) and Landsat 8 OLI-TIRS (2022) satellite images both with a spatial resolution of 30 m were processed using a supervised classification method based on the Maximum Likelihood algorithm. A 1.5 km buffer zone from the centroid of the lake portion in Sô-Ava was used to define the study area. Predictive modeling using the CA-Markov model in the IDRISI Selva environment was applied to project land use changes by 2050. Analysis of land use maps from 2005 and 2022 revealed a sharp decline in forests and marshy savannas from 956.13 ha to 453.80 ha indicating a net loss of 502.33 ha. Meanwhile, water bodies and wooded savannas remained relatively stable. Projections for 2050 indicate a significant expansion of the lake area (from 714.43 ha in 2022 to 827.03 ha), along with a decline in agricultural lands, especially oil palm fields and fallows, in favor of expanding residential zones.

Keywords: Sô-Ava · Nokoué lake · Modelling · Land use · Sô-Ava district

Perception des populations locales des facteurs de dégradation des

écosystèmes de mangroves et les mesures d'atténuation

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Résumé

Les mangroves sont des écosystèmes riches en biodiversité, jouant un rôle clé dans la protection des côtes, la séquestration du carbone et le maintien des habitats naturels. Au Bénin, elles sont gravement menacées, notamment en raison de la forte dépendance des populations locales à leurs ressources. Alors que la majorité des recherches existantes s'appuie sur la télédétection et la cartographie, cette étude se distingue en mettant l'accent sur la perception communautaire des facteurs de dégradation des mangroves dans le site Ramsar 1017. À travers une enquête semi-structurée menée auprès de 306 ménages répartis dans dix villages côtiers, des données socioéconomiques, démographiques et de perception ont été recueillies. Les principaux facteurs identifiés sont d'ordre environnemental (crues, sécheresse, vents violents, érosion) et anthropique (exploitation du bois, agriculture, pêche), renforcés par la pauvreté et l'insuffisance dans l'application des lois. L'étude distingue trois types de ménages : le premier, composé surtout de femmes et de

personnes âgées, pratique la saliculture ; le deuxième, plus instruit, est centré sur la pêche ; le troisième, dominé par les jeunes hommes, combine pêche et agriculture. Chaque groupe perçoit différemment les causes et la gravité de la dégradation, soulignant la nécessité d'approches différenciées. Les communautés proposent comme solutions la restauration, la conservation et la sacralisation des mangroves. L'étude conclut sur l'urgence d'établir un cadre législatif clair et de promouvoir des projets de restauration pour assurer une gestion durable de ces écosystèmes indispensables. **Mots-clés :** dynamique spatio-temporelle, mangroves, dégradation des mangroves, mesures d'atténuation, type de ménage

Protection of Animal Health through Traditional Use of Plants in the Central Region of Togo, West Africa

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Abstract

Background and Aims: Animal health is a major concern in developing countries. This study, in addition to conventional methods, has inventoried, based on indigenous knowledge, the plants used in managing common pathologies in animal production in central Region of Togo. It describes the various uses of these plants and assesses the variation in knowledge among ethnic groups. **Methodology:** The method used is based primarily on ethnobotanical surveys coupled with direct observations from 141 farmers and traditional healers. The data analysis focuses on the frequency of citations (Fr), use values (VU), usage diversity indices (IDU), specific use importance value indices (IVIs_{sp}), and the Sorenson index (IS). **Results:** In total, 37 plant species were reported in the management of 9 pathologies frequently encountered in animal production. These plants belong to 34 genera and 20 families. The Lamiaceae (12.6%), Meliaceae (11.9%), Euphorbiaceae (12.6%), and Fabaceae (10.7%) are the most represented families. The Importance

Value Index (IVIs_{sp}) shows that *Khaya senegalensis* A.Juss., *Ocimum americanum* L., and *Tridax procumbens* L. are the most useful species. The formulation of remedies often involves the whole plant (24.5%), leaves (33.7%), barks (22.0%), or fruits (5.0%). **Conclusion:** Studying plant species traditionally used for veterinary practices from the local flora is potentially useful for isolating natural extracts of phytotherapeutic interest to improve animal well-being in organic agriculture.

Geographic distribution and supply chain of vultures in Benin, West Africa

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ABSTRACT

Illegal trade poses a significant threat to African vultures, particularly in Benin, which stands as the second major hotspot for vultures' trade in West Africa. To address gaps in research on distribution, supplying habitat sources and trade dynamics, we conducted semi-structured interviews with 150 sellers in traditional medicine markets (TMM) and surveyed 590 local residents in villages surrounding five protected areas. We used a chord diagram to visually represent the frequency of reports of countries involved in the trade, and mapped local ecological knowledge (LEK)-based geographic distribution of vultures across Benin. Our findings revealed that seven West African countries, as well as Cameroon from Central Africa supplied vulture specimens to TMM. We recorded 491 vultures specimens from various species such as Hooded, white-headed, white-backed, Rüppell's, Egyptian, and lappet-faced vulture. Among the six vulture species recorded in TMM, five were still found in Benin, primarily in the north of the country. Our study provides insights into the supply chain and LEK-based geographic distribution of vultures in Benin. It highlights the pressing need for further research using conventional methods to study the diversity and distribution of vultures in Benin, as well as concerted and coordinated conservation

interventions to support vulture populations in the region.

Key words: distribution, local ecological knowledge, trade, traditional medicine market, vultures

Burrows spatial patterns and factors predicting habitat selection of aardvark (*Orycteropus afer*) in West African semi-arid savannah.

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ABSTRACT

Understanding the ecological requirements of species in arid and semi-arid ecosystems is critical for effective biodiversity conservation. In this study, we investigated the spatial distribution of aardvark (*Orycteropus afer*) burrows and the environmental factors influencing their habitat selection in the Pendjari Biosphere Reserve, Benin. Using a grid-based field survey and spatial point-pattern analysis, we explored the occurrence of aardvark burrows across heterogeneous savannah landscapes. We then employed resource selection functions (RSFs) implemented as logistic regression models to assess the role of vegetation structure, fire intensity, water availability and anthropogenic factors in shaping aardvark habitat preferences. Our findings reveal a non-random spatial distribution of burrows and highlight the importance of specific habitat features, such as tree density, tree dbh, fire intensity and distance from water sources. These patterns suggest behavioural adaptations to vegetation structure and predator avoidance. The spatial clustering detected is consistent with previous estimates of aardvark home ranges, while providing novel insights into aardvark ecology in West Africa, a region where data on the

species remain scarce. The results underscore the importance of incorporating fine-scale habitat features into conservation planning for semi-arid savannahs.

Key words: *Orycteropus*, Resource selection functions (RSFs), Spatial point-pattern analysis

Intrapopulation Niche Structure in Mammalian Carnivores and Herbivores Across Contrasting Habitats.

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ABSTRACT

Natural communities exhibit ecological gradients that result in a variety of competitive interactions and variations in niche patterns. Changes in resource availability affects the size of a species' niche; it expands when a variety of resources are abundant and contracts when these resources are scarce. The prevalence of ecologically diverse individuals within populations influences individual responses to inter- and intra-species competition or predation, as well as their fitness and population dynamics. Our aim was to compare the isotopic niche width and structures of two trophic groups residing in a xeric and more mesic environment. We tested an existing the hypothesis, based on differences in absolute intake requirement, that large mammalian carnivores exhibit intrapopulation niche structure more frequently than herbivores, and whether this was influenced by habitat conditions. Data was collected for within-population trophic niche variation using stable carbon and nitrogen isotope analysis of faeces collected in the Tswalu Kalahari Reserve, South Africa, and the Pendjari

Biosphere Reserve, Benin. By analysing the ellipses in isotopic bi-space and employing community-wide metrics on cross-sectional data, we found that populations of carnivores exhibit greater individual separation compared to herbivores, even when accounting for species-level differences in isotopic niche breadths. This supports the prediction that, despite promoting population fitness through reduced competition effects, niche variation across individuals is only a viable strategy if intake requirement is not limiting.

Keywords: community-wide metric; dispersion; ecological conditions; individual niche variation; stable isotope analysis; carbon and nitrogen isotopes.

An investigation on the local community's traditional knowledge of Iranian mountain forests using a qualitative assessment

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ABSTRACT

Identifying the role and position of local communities in forest management, both in terms of different forms of harvesting and indigenous knowledge, is

essential for proper forest planning. Hence, the aim of this study is to investigate the role of local communities in the management of mountain forests in the Zagros region of Iran that local communities are the most important factor in forest planning. In forests that have public ownership and simultaneously local communities are highly dependent on forest resources; it is necessary to consider the role of local communities in goal-setting for forest management. Concepts and principles of social or community-based forestry can be used for such situations in forests that have public ownership. In this condition, local communities try to manage the ecosystem with their indigenous knowledge. Accordingly, a traditional system for forest management needs to be formed in these ecosystems. This study examines the evidence of forest management in the Zagros forests of Iran which have mountainous heights with traditional knowledge of local communities. Participatory rural appraisal and interties with critical informants of local communities are applied in this study. Systematic analysis and PEST (Political, Economic, Social, Technological) framework strengthened these methods. Indigenous knowledge of resource management was registered for policy-making in forest management. Results show this indigenous knowledge has the capability of cooperative planning by the forest managers so that local community benefit from the ecosystems with some controls and adjustments in their relationship with the ecosystems, and the sustainability of the ecosystems is also maintained. Setting goals in managing such forests should be subject to both the demands of the public sector and local communities. We conclude appropriate policies to forest resources such as making contracts between forest management and local communities as well as modifying the social demands of local communities towards sustainable resource management in these forests.

Keywords: Public ownership, Private ownership, Traditional knowledge, Ownership systems, SWOT & PEST analysis

Improving DNA detection sensitivity for the white-bellied pangolin (*Phataginus tricuspis*) via digital PCR

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ABSTRACT

Pangolins are widely regarded as the world's most trafficked mammals, with their populations plummeting due to intense poaching to supplement the illegal trade in their scales, meat, and other derivatives. A persistent limitation in accurate trade tracing and successful criminal prosecution is the poor quality of seized specimens available for analysis, requiring the development of sensitive detection methodologies. Here, we

developed a specific mtDNA-based digital PCR (dPCR) assay for the highly trafficked African white-bellied pangolin (*Phataginus tricuspis*) and applied it to a wide range of sample types. DNA extract concentration and quality, as assessed via fluorometry and 260/230–260/280 nm absorbance ratios, were highly heterogeneous among sample types due to differences in their inherent biological characteristics. To maximise the sensitivity of the dPCR assay, we used a ten-fold dilution series, resulting in an optimal dilution factor of 1/1000 applicable to any sample type. Due to cross-reactivity in the sister-species samples (*P. tetradactyla*), we developed a two-fold strategy to define assay detection limits based on the proportion of positive partitions (PPP). This resulted in a conservative threshold (PPP > 0.00012, approximately 0.16 copies/μL) for *Phataginus* DNA detection, appropriate for general trade investigations, and a species-specific threshold (PPP > 0.004, approximately 4.7 copies/μL) for the specific detection of *P. tricuspis*. Our success rate in identifying analysed *P. tricuspis* samples based on these thresholds was 80–70%, respectively. Negative dPCR outputs were significantly associated with lower DNA concentrations and poor-quality samples deviating from ideal absorbance ratio ranges, hence we recommend assessment of DNA quality indicators prior to dPCR testing to ensure optimal resource allocation. Levels of target DNA were variable among sample types. The positive correlation between DNA concentration and PPP indicated high levels of host-specific DNA in (i) rectal swabs, which were overall the best quality sample assessed, and (ii) bone and scale samples, which are the main materials available for trade scenarios. We present, to our knowledge, the first dPCR assay developed for pangolins, thus adding to the forensic toolkit available to curb their illegal trade. Despite our precautionary dPCR threshold estimation, we recommend that future studies reevaluate detection limits using available sample types and dilution series testing, while in the near future a multiplexing assay for all species seems reachable.

Keywords: Conservation, DNA quality, dPCR, Forensics, Illegal wildlife trade, Trade tracing

Integrated mitogenome and Y chromosome analysis untangles the complex origin of African pigs

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ABSTRACT

The genetic history of African indigenous pigs remains poorly documented due to scarce archaeological and genomic data. Here, we analyzed 473 mitogenomes and 202 Y chromosome sequences from indigenous pigs in Africa, alongside 901 published mitogenomes and 715 Y chromosome sequences from Eurasian pigs and wild boars. Our results reveal that African pigs predominantly descend from European (haplogroup E, 44.8%) and East Asian (haplogroup D, 53.3%) lineages. Interestingly, there was a novel detection of Asian wild boar haplogroup A* (1.9%) in Tanzania. This pattern is congruent with that of Y chromosome analysis. Further maternal analyses confirm a genetic link between western African and Iberian pigs dating to about 4.5 ka, and dispersal into eastern Africa coinciding with the Bantu expansion around 2 ka. Our findings demonstrate complex human-mediated dispersal routes, highlighting the role of Bantu societies in shaping the genetic architecture of African indigenous pigs. Keywords: Indigenous pigs, Mitochondrial DNA, Bantu expansion

Systematic review of sustainability assessment approaches for wildlife exploitation: Uncovering limitations in tackling the bushmeat crisis

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ABSTRACT

Wildlife exploitation constitutes an important socio-economical and nutritional resource to many communities worldwide. Yet, wildlife exploitation -whether legal or illegal- may be conducted at an unsustainable rate, notably with the globalization of the socio-economical context in the tropics. Our systematic review provides an update on the approaches employed to evaluate wildlife exploitation sustainability in fisheries, recreational hunting and bushmeat harvesting, while critically assessing their relevance to the ongoing bushmeat crisis in Africa. From an initial pool of 2803 documents retrieved from Web of Science using Boolean search, 125 peer-reviewed articles covering 66 countries across five continents were selected for analysis. A total of 15 index- and model-based approaches were used to study wildlife exploitation, with fisheries being the most investigated, driving the overall predominance of model-based approaches. GLM analysis showed that wildlife exploitation assessment outcomes were significantly influenced by species' reproductive strategy (positive effect for r-strategists) and type of exploitation (negative effect for fisheries). Bushmeat exploitation has been studied -mostly in South America- through a mixture of index- and model-based approaches, with a series of important methodological limitations related to species-specific traits, spatio-temporal dynamics of hunting areas, model parameter assessment and hunting offtake calculations. In tropical Africa, research has primarily focused on two genera of mammals (duikers and guenons), not reflecting the wide spectrum of species targeted. We conclude that a multifaceted approach integrating societal involvement, long-term monitoring for data collection, and the full adoption of advanced wildlife survey technologies is needed, in conjunction with long-term policies prioritizing the bushmeat issue.

Keywords: Bushmeat, Recreational hunting, Fisheries, Exploitation, Sustainability, Indices, Models

Perceived and measured forest degradation across Western Africa:

Insights for sustainable forest management

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ABSTRACT

Tropical forests face fragmentation, degradation, and conversion, leading to biodiversity loss, reduced carbon storage, and diminished ecosystem services. While local populations depend on forest products, the intensity of these extractions can lead to forest degradation. This paper examines the interplay between socio-economic pressure, perceived and measured forest degradation, and the insights to be gained for informed forest management. A survey of 1956 respondents was conducted across seven forests in Togo, Benin, Nigeria, and Cameroon, from which 328 forest users were identified who regularly work in one of the seven studied forests. In semi-structured questionnaires, we asked about forest uses and perceptions of corresponding impacts on forest integrity. We integrated spatially explicit demographic and governance data (forest pressure) with interview-based insights (perceived degradation) and quantitative assessments of forest structural complexity (measured degradation). Most forest users gather non-timber forest products, though hunting and logging were also important activities. Generally, forests affected by logging and fire, or conversion to agriculture, were perceived as degraded. Further, the disappearance of large, old trees, different plant and animal species, and the loss of forested areas were observed over the years. However, perceptions did not always reflect forest uses. The community with the highest pressure on forests was least

concerned about forest degradation, while people near strictly protected and sacred forests were most concerned. The different relationships between local perceptions, measurable forest degradation, and pressure on forest resources need to be considered to guide sustainable forest management and reduce ongoing forest degradation and biodiversity loss in Western Africa.

Keywords: Ecosystem degradation
Ecosystem services
Sacred forests
Shifting baseline syndrome
Species loss
Sustainability

Perceived and Measured Forest Degradation across Western Africa: Insights for Sustainable Forest Management

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ABSTRACT

Tropical forests face fragmentation, degradation, and conversion, leading to biodiversity loss, reduced carbon storage, and diminished ecosystem services. While local populations depend on forest products, the intensity of these extractions can lead to forest degradation. This paper examines the interplay between socio-economic pressure, perceived and measured forest degradation, and the insights to be gained for informed forest management. A survey of 1956 respondents was conducted across seven forests in Togo, Benin, Nigeria, and Cameroon, from

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Keywords: Ecosystem degradation; Ecosystem services; Sacred forests; Shifting baseline syndrome; Species loss; Sustainability

Influence of Stem Layer Characteristics on Biomass Accumulation in Forest Ecosystems in Benin

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ABSTRACT

Assessing carbon stocks in forest ecosystems is key to developing effective climate change mitigation strategies. However, the role of plant traits, particularly bark, sapwood, and

heartwood, in biomass accumulation remains poorly understood. Clarifying these relationships can improve predictions of tropical forest carbon storage and management strategies. This study investigated the contributions of these stem layers to aboveground biomass in four vegetation types in Benin: semi-deciduous forest, gallery forest, swamp forest, and woodland. Data were collected using a non-destructive method; 470 trees across 25 species with diameters ranging from 5 to 77 cm were sampled from 111 plots. Multiple linear regressions and analysis of variance were performed to determine the contribution of each stem layer to aboveground biomass. The findings revealed significant variations in bark, sapwood, and heartwood characteristics across different vegetation types and among species. Woodland species presented the thickest bark (1.38 cm), whereas semi-deciduous forest species at seasonally flooded sites had the thinnest bark (0.80 cm). Bark and sapwood thickness were identified as key predictors of biomass accumulation ($p < 0.000$ and adj R^2 between 53.04 and 76.39%). Lower bark mass density was generally observed in semi-deciduous forest, gallery forest, and woodland species than in sapwood and heartwood. Notably, *Daniellia oliveri* in woodland revealed an atypical pattern, with the bark mass density exceeding that of the inner wood layers. A consistent increase in wood mass density from the bark to the pith was observed in the swamp forest. These findings highlight the importance of incorporating bark and sapwood traits into tropical biomass models to enhance carbon stock estimates and guide more effective, ecosystem-specific forest management for climate change mitigation.

Keywords: Bark; Sapwood; Heartwood; Mass density gradient; Drivers of aboveground biomass

Aboveground Biomass Variation in Relation to Woody Species Dominance in West Africa

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ABSTRACT

Disturbance affects ecosystem composition and structure, influencing biomass accumulation and carbon regulation. However, limited research in West Africa has explored the role of species diversity and structural attributes in determining aboveground biomass (AGB), particularly the contributions of dominant and non-dominant species in forest and savannah ecosystems. This study examines how species richness, basal area, and tree density of each species category affect AGB accumulation across five vegetation types: semi-deciduous forest, swamp forest, gallery forest, woodland, and savannah. Data were collected from 186 plots (45.15 ha) through a forest inventory. Biomass was estimated using species- and site-specific allometric models and analysed by vegetation type, tree category, and diameter class. Across all vegetation types, species richness and tree density decreased with increasing diameter class, regardless of species category. Dominant species generally had higher relative contribution to species richness than non-dominant species. Mean AGB peaked in the medium diameter class, reaching 208.98, 123.52, and 85.78 t ha⁻¹ in semi-deciduous, swamp, and gallery forests, respectively, while woodland and savannah had the highest AGB in the smallest diameter class (39.98 and 34.77 t ha⁻¹, respectively). Large dominant trees significantly contributed to biomass accumulation in semi-deciduous (143.67 t ha⁻¹) and swamp forests (39 t ha⁻¹) but were negligible or absent in other vegetation types. Across all ecosystems, dominant species accounted for 60–90% of total AGB. Basal area and density of dominant species were the primary drivers of AGB, with species richness having a more variable effect ($p < 0.000$, adjusted R^2 between 68.85 and 89.44%). Effective strategies should consider ecosystem-specific drivers of biomass accumulation, prioritising the protection of dominant species in forest ecosystems while

ensuring tree composition and structure stability.

Keywords: Biomass allocation; Dominant species; Large trees; Drivers of aboveground biomass; Forest ecosystems

An African Perspective to Biodiversity Conservation in the Twenty-First Century

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ABSTRACT

Africa boasts high biodiversity while also being home to some of the largest and fastest-growing human populations. Although the current environmental footprint of Africa is low compared to other continents, the population of Africa is estimated at around 1.5 billion inhabitants, representing nearly 18% of the world's total population. Consequently, Africa's rich biodiversity is under threat, yet only 19% of the landscape and 17% of the seascape are under any form of protection. To effectively address this issue and align with the Convention on Biological Diversity's ambitious '30 by 30' goal, which seeks to protect 30% of the world's land and oceans by 2030, substantial funding and conservation measures are urgently required. In response to this critical challenge, as scientists and conservationists working in Africa, we propose five recommendations for future directions aimed at enhancing biodiversity conservation for the betterment of African society: (i) accelerate data collection, data sharing and analytics for informed policy and decision-making; (ii) innovate education and capacity building for future generations; (iii) enhance and expand protected areas, ecological networks and foundational legal frameworks; (iv) unlock creative funding channels for cutting-edge conservation initiatives; and (v) integrate indigenous and local knowledge into forward-thinking conservation strategies. By implementing these recommendations, we believe Africa can make significant strides towards preserving its unique biodiversity, while fostering a healthier society, and contributing to global conservation efforts. This article is part of the discussion meeting issue 'Bending the curve towards nature recovery: building on

Georgina Mace's legacy for a biodiverse future'.

Keywords: Africa; key biodiversity areas; 30×30 target; indigenous peoples and local communities; green bonds; robotics and autonomous systems

Degradation and Fragmentation Effects on Structural Complexity in West-African Forest Patches

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ABSTRACT

Tropical forests face alarming rates of deforestation and degradation, driven mainly by agricultural land expansion. West Africa is particularly affected by widespread forest fragmentation, leaving behind isolated forest patches in an agriculture-dominated landscape. Forest fragmentation and isolation can impact forest structural complexity, biomass, and species richness through various edge effects. The consequent loss of

biodiversity and ecosystem services is expected to be more prominent in small and fragmented forests and closer to forest edges. We used terrestrial laser scanning to investigate patterns of forest structural complexity in 84 plots across seven forest patches in Togo, Benin, Nigeria, and Cameroon. We quantified forest structure using the stand structural complexity index (SSCI) and related it to tree species composition, distance to edge, and the modeled potential SSCI of primary forests as an ecological reference value to identify forest degradation. Spatial variability of SSCI within forest patches and plots indicates various areas of disturbance, ultimately accumulating to forest degradation. The overall trend suggests an increase in structural complexity, tree height, basal area, and tree species richness with increasing distance to the edge. However, these correlations were only significant for some of the forest patches analyzed. Comparison with the ecological reference value showed significant deviations for two forests, indicating degradation of forest structural integrity. Our results confirm and challenge theories of ecological dynamics in tropical forest patches in West Africa. Quantifying structural integrity helps to locate degradation and preserve the last remaining forest patches crucial for biodiversity, climate regulation, and forest products.

Keywords: basal area; degradation; edge effect; sacred grove; stand structural complexity index; terrestrial laser scanner; tree species richness; tropics

Photos of research interest



Inception meeting of the project RETraViA (funded by TWAS-UNESCO)