



BOOK OF ABSTRACTS

I. SESSION DESCRIPTION

II. SESSION PROGRAM

III. ABSTRACTS

I. SESSION DESCRIPTION

ID: B3

Ecosystem services from African tropical forests

Hosts:

	Title	Name	Organisation	E-mail
Host:	Dr.	Aida Cuni-Sanchez	University of York, UK	a.cunisanchez@york.ac.uk
Co-hosts:		Gerard Imani	University Officielle de Bukavu, DRC	imanigerard2006@yahoo.fr
		Rob Marchant	University of York, UK	robert.marchant@york.ac.uk

Abstract:

Tropical forests are biodiversity rich and unique ecosystems, which provide numerous ecosystem services benefitting humankind in many ways. They provide water, timber and non-timber forest products, hazard prevention, climate modulation and carbon sequestration. They are also important to local communities' identity and cultures. This session will review current research and findings on the ecosystem services provided by African tropical forests (in both lowlands and mountains), and we will discuss the outline of a future review paper on cultural services from tropical forests in Africa. The session will also help create a network of experts working on these valuable ecosystems in Africa (e.g. a sub-working group of ESP) so we can help inform both conservation interventions and sustainable development in Africa.

Goals and objectives of the session:

- Identify the ecosystem services provided by African tropical forests, with examples from case studies
- Create an outline for a future paper
- Help create a network of experts working on African tropical forests

Planned output / Deliverables:

This session will have two deliverables: (i) a review paper on the cultural services provided by African tropical forests, and (ii) a network of experts working on these ecosystems (e.g. a sub-working group of ESP).

3rd ESP Africa Conference

8-10 June 2022 | Musanze, Rwanda

Ecosystem services for the future: Delivering value for Nature, Livelihoods and Economic Investment

HYBRID EVENT

ESP
Ecosystem Services Partnership

Related to ESP Working Group/National Network:

Biome Working Groups: BWG 3 – Forests & Woodlands

II. SESSION PROGRAM

Date of session: Thursday, 9 June 2022

Time of session: 11:30–13:00 & 14:00–16:00

Timetable speakers

Time	First name	Surname	Organization	Title of presentation
11:30– 11:45	Adedamola	Ogunsesan	York St John University, United Kingdom	30 years of the Lekki Conservation Centre: Past Achievements and Future Prospects
11:45– 12:00	Alessio	Bulckaen	BC3 (Basque Center for Climate Change)	ARIES (ARtificial Intelligence for Environment & Sustainability) for SEEA for rapid natural capital accounts generation: Towards fast, transparent and standardized yet customizable ecosystem accounts
12:00– 12:15	Grace	Nchimbi	The Nelson Mandela African Institution of Science and Technology	Habitat utilization by large mammalian herbivores in human-impacted and non-impacted areas in upgraded Marang' Forest in Northern Tanzania
12:15– 12:30	Jean Marie Vianney	Mushinzimana	Rwanda Water Resources Board	Secoko catchment restoration and its sedimentation: impact on the Nyabarongo Hydropower 1 Management
12:30– 12:45	Soule	Moussa	Department of Civil Engineering, Koforidua Technical University, Ghana	Diversity and functions of woody species in urban schoolyards in Niamey city: A call for planting multipurpose tree species for quality education in Niger
12:45– 13:00	Rodrigue	Batumike	Université du cinquantenaire de Lwiro	From Tree Species to Forest Services: Ethnic Differences

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Time	First name	Surname	Organization	Title of presentation
				in Lomami, Democratic Republic of the Congo
14:00–14:15	Moses	Sainge	Fourah Bay College, University of Sierra Leone. Research Fellow, Institute of International Education Scholar Rescue Fund (IIE SRF)	Local perceptions of forest Ecosystem services in Sierra Leone
14:15–14:30	Dorine Intwarinkase	Mutaganzwa	University of Rwanda	Climate change and local farmers in mountain regions in Rwanda– is the forest important?
14:30–14:45	Stijn	Schep	Wolfs Company	Ecosystem Services in the Inner Niger Delta under different Water Resources Management Scenarios
14:45–15:00	Catherine	Masao	Institute of Resource Assessment (IRA), University of Dar es Salaam, Tanzania	Stakeholder perspectives on nature's contribution to people at Mount Kilimanjaro
15:15–15:30	Abreham Berta	Aneseyee	Wolkite University	Quantification of Ecosystem Services associated with land use/cover change in Winike Watershed of Omo Gibe Basin, South-western Ethiopia
16:00–16:15	Simon	Lhoest	Arizona State University	Supply, use and sustainability of ecosystem services in tropical forests: insights from the Dja region in southeastern Cameroon
16:15–16:30	Bonito Chia	Ntumwel	Ministry of Environment, Nature Protection and Sustainable Development (MINEPDED), Cameroon	Towards agenda 2030: Livelihoods and dependence of Forest-driven rural economies in the Congo Basin

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HYBRID EVENT

ESP
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III. ABSTRACTS

Abstracts are ordered based on the session program. The first author is the presenting author unless indicated otherwise.

1. Type of submission: Abstract

B. Biome Working Group sessions: B3 – Ecosystem services from African tropical forests

Habitat utilization by large mammalian herbivores in human-impacted and non-impacted areas in upgraded Marang' Forest in Northern Tanzania

Presenting author: Grace Nchimbi

Other author(s): Francis Moyo

Affiliation: The Nelson Mandela African Institution of Science and Technology, Tanzania

Contact: ganchimbi@gmail.com

Protected forests are essential for providing ecosystem services such as habitat for threatened wild animal and plants species, yet are constantly exposed to destructive anthropogenic activities due to lax enforcement. Marang' Forest, in Tanzania is among the protected forest strongly impacted by human activities. Attempts to improve its protection led the Tanzanian government to annex into Lake Manyara National Park. This study assessed the impact of upgrading the Marang' Forest to higher conservation status in large mammalian herbivores habitat utilization. We found that large mammalian herbivores significantly utilised impacted areas than non-impacted areas by 35% ($t = 2.04$, $df = 118$, $p = 0.043$). We were also found that human-impacted areas had 33% more signs for different herbivores than non-impacted area. This demonstrates that upgrading the forest protection status has improved the forest's ecosystem services, including habitat to large mammalian herbivores. Therefore, we call for governmental actors and conservation agencies to reinforce protected forest conservation regulations for long-term sustainable forest resources and ecosystem services.

Keywords: Protected forest, human impact, anthropogenic activities, sustainability, ecosystem services



2. *Type of submission: Abstract*

B. **Biome Working Group sessions: B3 – Ecosystem services from African tropical forests**

Secoko catchment restoration and its sedimentation: impact on the Nyabarongo Hydropower 1 Management

Presenting author: Jean Marie Vianney Mushinzimana

Other author(s): Hussein Bizimana, Boniface Mahirwe, Alexis Musabyimana, Pamela Ruzigana, Remy Duhuze, Christine Niyotwambaza Hitimana, Bernard Musana Segatagara

Affiliation: Rwanda Water Resources Board, Rwanda

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Upper Nyabarongo Catchment (NNYU) is one of the biggest catchments of level one in Rwanda. Within the Upper Nyabarongo Catchment, Secoko sub-catchment has been identified as one of the most critical areas contributing to the sediment load brought to the Nyabarongo Reservoir, created to feed the hydropower scheme at this site. Secoko has, therefore, been selected for the pre-feasibility studies aimed at creating good conditions for sustainable land productivity, investment, and operations in hydropower generation and mining. It was prioritized for implementation in a project funded by the Kingdom of The Netherlands through which all areas under agriculture land exposed to soil erosion are going to be protected with terraces, forest, and agro-forestry. Furthermore, in order to address the issue of unsustainable mining that mostly contributes to the degradation of Secoko sub-catchment and the siltation of the Secoko River. A combination of participatory and rapid assessment techniques were used in the collection of primary data. Transect walk using the “drive, stop, observe and record” approach was utilized, one to make general observations and obtain a better impression of the main issues of erosion control and sedimentation in catchments, particularly in Secoko sub-catchment. Secoko catchment restoration projects show a positive impact on soil erosion control but rehabilitation measures need to be implemented along the full course of Nyabarongo to highly reduce its sedimentation. The main cause of sedimentation of the Nyabarongo I dam is linked to unsustainable mining activities and the high topography of the area. Technical and Environmental Management Plans (TEMP) were developed as part of the Sustainable Mining Studies in Secoko Sub-catchment, mitigation measures, and proposed. TEMP will help to avoid illegal mining and in the catchment. Hence, sediments from mining sites



and unprotected lands will be reduced and infrastructures like hydropower will increase their electricity production. The analysis covered 5829.1 ha

Keywords: Catchment; Sedimentation; Saltation; Mining; Hydropower; Electricity

3. Type of submission: Abstract

[G. General sessions: B3 – Ecosystem services from African tropical forests](#)

30 years of the Lekki Conservation Centre: Past Achievements and Future Prospects

Presenting author: Adedamola Ogunsesan

Other author(s): Olalekan Adekola

Affiliation: Lekki Conservation Centre

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Only relatively recently have we begun to understand the many benefits associated with urban nature reserves and their significance to wellbeing in Africa. This paper provides an overview of the achievements, challenges and future prospects of Nigeria's pioneer urban nature reserve (Lekki Conservation Centre (LCC)) established in 1990 as a biodiversity conservation and environment education centre. The LCC provides many benefits to society – such as fish and wildlife habitats, flood storage, opportunities for recreation and aesthetic appreciation, and spawning ground for aquatic animals. The centre not only provides ecosystem services but also indirectly support the livelihoods of thousands within the local community. With over 200 school visits annually, LCC supports education and is the major hub bird conservation in Nigeria through the Lekki Bird Club (LBC) established in 2009. Attracting over 75,000 tourists annually, LCC is a location of choice for local and international tourists. However, in recent times, inadequate funding has limited the achievements of the centre. The LCC is wholly owned by the Nigerian Conservation Foundation but supported by other stakeholders, mainly Chevron Nigeria Limited, (CNL) which has provided fund for the operations of the centre since its establishment. Considering competing demands for funds, important ecosystems areas are at the risk of being degraded because of lack of money set aside for management. There is an opportunity to



leverage on the increasing community awareness as a strategy for attracting local goodwill and funding. To achieve this, the managers of the centre will need to do more to engage with the general public surrounding the importance of the LCC and how it is relevant to them. We conclude that the incorporation of community groups, and their stewards and institutions, into co-management designs holds the potential for improving conditions for the centre, reducing transaction costs in ecosystem management, and realizing local priorities.

Keywords: Ecosystem services, Nigeria, Urban green infrastructure, Urban nature reserve., Community engagement

4. Type of submission: Abstract

B. Biome Working Group sessions: B3 – Ecosystem services from African tropical forests

Diversity and functions of woody species in urban schoolyards in Niamey city: A call for planting multipurpose tree species for quality education in Niger

Presenting author: Soule Moussa

Other author(s): Clement Nyamekye, Hamidou Taffa Abdoul-Azize

Affiliation: Department of Civil Engineering, Koforidua Technical University, Ghana, Niger

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Urban green school environments render various services. Although many studies focus on urban forest diversity and values, this study focuses particularly on the diversity and functions of green schoolyards which are unforgotten urban forest models in the literature of urban forestry in West Africa Sahel cities. We used purposive and quota sampling methods for data collection in the schoolyards in Niamey city. Forest inventory and ethnobotanical survey were used for urban school tree species diversity and its values. Tree biodiversity indices were calculated for the primary school, secondary school, and tertiary schools. The study recorded 49 tree species, *Azadirachta indica* (54%), and Fabaceae as dominant families. There were more exotic tree species than local tree species in schoolyards in Niamey city. The stem tree density was 74 stems/ha in the school environment in Niamey. While the carbon density 31.77 t/ha.



The tree species diversity varied significantly ($p < 0.05$) from the primary, secondary and tertiary schools in Niamey. We identified that the school management planted for tree species for shading purpose, ornamental, food, school temperature regulation, and biodiversity conservation, climate change mitigation, for vehicle and motorcycles parking, recreational activities and for educational purpose. The study recommends the use of food tree species in urban school environments for school feeding and nutrition, which are central to quality education. Furthermore, the future creation of school environments in Niamey must augment the use of indigenous and multipurpose tree species to improve the quality of the learning environment.

Keywords: Eco-school, Green student, fruit tree

5. Type of submission: Abstract

[B. Biome Working Group sessions: B3 – Ecosystem services from African tropical forests](#)

From Tree Species to Forest Services: Ethnic Differences in Lomami, Democratic Republic of the Congo

Presenting author: Rodrigue Batumike

Other author(s): Christian Urom, Aida Cuni Sanchez

Affiliation: Université du cinquantenaire de Lwiro, Congo, The Democratic Republic Of The

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From tree species to forest services: ethnic differences in Lomami, Democratic Republic of the Congo. Ethnicity is well known to affect plant species' utilization, but how ethnicity affects the identification and importance ranking of forest ecosystem services has been less documented, particularly in the Congo Basin. This research investigates how six different ethnic groups (farmers of Bantu origin and Mbote hunter-gatherers) use and value tree species and forest ecosystem services in Lomami National Park, in central Democratic Republic of the Congo (DRC). Data were collected through 24 focus-group discussions with village elders, four for each ethnic group studied. Considerable variation in preferred tree species was observed: of the



89 morphospecies cited in total only two were cited by all ethnic groups for the same usage. Ethnicity also affected the identification and importance ranking of forest ecosystem services. Mbote hunters-gatherers prioritized bushmeat, honey, and identity, while farmer groups prioritized bushmeat, fish, and microclimate regulation. We discuss the implications of the findings for forest management in the Buffer Zone of the national park.

Keywords: Sociocultural assessment, tropical forests, forest use, ecosystem services, local communities.

6. Type of submission: Abstract

[B. Biome Working Group sessions: B3 – Ecosystem services from African tropical forests](#)

Local perceptions of forest Ecosystem services in Sierra Leone

Presenting author: Moses Sainge

Other author(s): Santijah Conteh, Bridget M-H Musa, Martin J. P. Sullivan, Aida Cuni-Sanchez, , ,

Affiliation: Fourah Bay College, University of Sierra Leone. Research Fellow, Institute of International Education Scholar Rescue Fund (IIE SRF), Sierra Leone

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There is an increasing recognition of the importance of including socio-cultural evaluation criteria on the assessment of ecosystem services (ES), particularly for conservation projects to be successful. We investigated local peoples' perceptions of forest ES in two protected areas of Sierra Leone. Data were collected through 20 focus-group discussions in fishing and urban villages (Western Area Peninsula or WAP) and farming and mining villages (Kangari Hills or KH). About 20 forest ES, including provisioning, regulating and cultural, were identified in each site. In WAP, water and firewood were identified as the two more important forest ES- with no differences across villages types. In KH farming villages cited water and fertile soils while and mining villages cited water and timber. The commercialization of forest ES was more widespread in WAP than in KH, driven by WAP vicinity to Freetown. Our findings help highlight the different needs of the communities, which are not a homogenous group. We discuss the implications of the findings for forest management in these protected areas.



Keywords: Ecosystem services, implications, Local, Protected area, villages.

7. Type of submission: Abstract

B. Biome Working Group sessions: B3 – Ecosystem services from African tropical forests

Climate change and local farmers in mountain regions in Rwanda– is the forest important?

Presenting author: Dorine Intwarinkase Mutaganzwa

Affiliation: University of Rwanda

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Mountain environments experience more rapid changes in temperature than lower elevations. However, little is known about the climatic changes already observed in African mountains, their impacts on the biological domain, or the adaptation strategies used by local farmers. We aim at filling in some of these knowledge gaps. Semi-structured interviews were administered to 300 small-scale farmers living near Nyungwe Forest in Rwanda (n=150). In all study sites farmers reported changing rainfall patterns, reduced rainfall and fog, and increased temperatures. They also reported reduced crop yields and increased pests and diseases, for both food and cash crops. Different strategies were used in different locations, including greater use of inputs and increased livelihood diversification, including farming and non-farming activities. There was an interest in agroforestry using indigenous fruit trees– we discuss why.

Keywords: Climate change, Rwanda, Mountain forests, Adaptation, Local farmers



8. *Type of submission: Abstract*

G. **General sessions: B3 – Ecosystem services from African tropical forests**

Ecosystem Services in the Inner Niger Delta under different Water Resources Management Scenarios

Presenting author: Stijn Schep

Other author(s): Elena Palacios, Chris Duinmeijer, Pieter van Beukering, Tim Polaszek, Mori Diallo, Beteo Zongo

Affiliation: Wolfs Company, Netherlands

Contact: chris.duinmeijer@wolfscompany.com

The annual flooding regime of the Niger in West Africa forms a lifeline for the Inner Niger Delta (IND) in Mali, the second largest wetland in Africa. During wet years, over 25,000 km² of land is flooded providing livelihoods to around 1.5 million inhabitants. The flooding regime of the IND is threatened, however, by a proposed hydropower dam upstream of the IND, in the Guinea highlands. In addition to electricity generation, this dam will also provide controlled irrigation for the gradual expansion of the Office du Niger agricultural region in Mali. We studied how ecosystem services (ES) and associated livelihoods downstream in the IND are affected by this proposed infrastructure project. Hydrological analysis indicated that the proposed dam will significantly reduce water availability and flooding extent in the IND. To assess the effects of these hydrological changes on ES a survey of 1200 households was undertaken, and secondary data was collected. A scenario analysis was then conducted, considering various dimensions and operational goals of the potential Moussako dam. Results suggest that the dam will have a significant effect on the provisioning of ecosystem services in the delta, with the total annual economic value of ES expected to decrease by 2.2% to 11.5%, or between 6 and 24 billion FCFA per year. Thus, if these infrastructure projects are to be implemented, it is essential that they are accompanied by well-structured policy controlling the management of the flooding regime and programmes to compensate the inhabitants of the IND for their losses.

Keywords: Integrated Water Resource Management, Floodplain, Agriculture, Fisheries, Wetland.



9. *Type of submission: Abstract*

B. **Biome Working Group sessions: B3 – Ecosystem services from African tropical forests**

ARIES (ARTificial Intelligence for Environment & Sustainability) for SEEA for rapid natural capital accounts generation: Towards fast, transparent and standardized yet customizable ecosystem accounts

Presenting author: Alessio Bulckaen

Other author(s): Ferdinando Villa, Stefano Balbi, Amelia Ochoa, Kenneth Bagstad

Affiliation: BC3 (Basque Center for Climate Change), Spain

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The Artificial Intelligence for Environment & Sustainability (ARIES) team, in collaboration with the United Nation, is developing a web-based application for System of Environmental Economic Accounting – Ecosystem Accounting (SEEA-EA), enabling rapid and standard ecosystem account production, even in countries with limited resources or technical expertise. SEEA-EA quantifies changes in the extent and condition of ecosystems and the services they provide in physical and monetary terms. It has a strong emphasis on spatial modelling, which can be time-consuming, require substantial expertise and can be very challenging in data-limited locations.

To overcome these limitations, ARIES technology enables automation of data and model integration to provide transparent assembly and reporting in a faster, cheaper way than past ecosystem service modeling. The system identifies the content of a dataset or model, and is able to choose the best-available combination of web-hosted data and models (from global to local) for the analysis context. For example, the re-use of national data is automatically prioritized over global data, and a crop production account would only include those crops grown in the context where a user's analysis is focused. With the ARIES technology, scientific experts can contribute their knowledge, data and models more successfully and on a larger scale, reusing past data and models where appropriate. The ownership of data is also prioritized, with the system designed to guarantee that the data owner maintains control of data and that it is accessed only by authorised users. SEEA-EA already includes features of interest to the environmental modelling community, such as the integration of remote sensing data and access for data and models, both for experts and nontechnical users.



This event could be a showcase to demonstrate the potential of this technology to the African community and boost the adoption of ecosystem service assessments and SEEA– EA applications on the continent."

Keywords: SEEA–EA (System Environmental Economic Accounting – Ecosystem Accounting), Natural Capital Accounting, Interoperability, Artificial Intelligence, Integrated–modelling

10. Type of submission: Abstract

B. Biome Working Group sessions: B3 – Ecosystem services from African tropical forests

Stakeholder perspectives on nature’s contribution to people at Mount Kilimanjaro

Presenting author: Catherine Masao

Other author(s): Graham W., Prescott, Mark A., Snethlage, Davnah, Urbach, Amor, Torre–Marin Rando, Rafael, Molina–Venegasd, Neduvoto P. , Mollel, Andreas, Hemp

Affiliation: Institute of Resource Assessment (IRA), University of Dar es Salaam, Tanzania

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Collecting a diverse array of stakeholder perspectives is essential for effective conservation. We applied the conceptual framework of the Intergovernmental Science–Policy Platform on Biodiversity and Ecosystem Services (IPBES) in a participatory assessment of local perspectives on nature, people, and visions for a sustainable future on Mount Kilimanjaro, Tanzania. This assessment took the form of a three–day workshop, to which five different groups of stakeholders were convened. Following the IPBES framework, we collected information on the state of and trends in biodiversity, ecosystems, and nature’s contributions to people (NCP), and on the main drivers of these changes. In addition, we collected perspectives on the needs and opportunities for the sustainable management and conservation of natural resources. Participants recognized the importance of the mountain in supporting NCPs, particularly material ones and water, and agreed on a general trend towards a decline in access to NCPs. The recurrent mention of water points to its importance for local populations and



contextualizes evidence for increasing social tensions in the context of growing demand and decreasing access and availability. Further importance was given to food and energy, which also speaks to the role of Mount Kilimanjaro as a primary source of food, fuel, and building materials for people in north-central Tanzania. The detected differences in stakeholder perceptions about the importance of individual NCPs confirm that different factors (e.g. geographic, socio-economic, and cultural) shape people's valuation of NCPs. The willingness of a diversity of participants to engage in a structured discussion about all the elements of the IPBES framework supports its applicability in participatory workshops aimed at collecting stakeholder perspectives on social-ecological systems.

Keywords: Nature's Contributions to People, Mount Kilimanjaro, mountain biodiversity, participatory workshops, social-ecological system

11. Type of submission: Abstract

B. Biome Working Group sessions: B3 – Ecosystem services from African tropical forests

Quantification of Ecosystem Services associated with land use/cover change in Winike Watershed of Omo Gibe Basin, South-western Ethiopia

Presenting author: Abreham Berta Aneseyee

Other author(s): Teshome Soromessa, Eyasu Elias, Gudina Legese

Affiliation: Wolkite University, Ethiopia

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Ecosystems Services (ESs) are fundamental to sustaining life. However, they are under pressure due to anthropogenic activities such as the expansion of agricultural land and the decline of forest cover, which causes the loss of ecosystem services. This study aims at quantifying and mapping ESs, associated with Land Use/ Cover (LUC) in the Winike watershed of the Omo-Gibe Basin of Ethiopia. LU/LC change was analyzed from 1988 to 2018 using ENVI v5.3. The Integrated Valuation of Ecosystem Services and Trade-offs (InVEST) model was used to estimate these ecosystem services. The Revised Universal Soil Erosion Equation (RUSLE) factors,



topographic maps, meteorological and soil data were used as input data for modelling of soil loss and sediment delivery of the watershed. Evapotranspiration, root depth, available water content, meteorological data and Z- factors were also required to analyze the water yield. The carbon pools were estimated under each LU/LC to investigate the spatial carbon stock. The threat types, their maximum distance, mode of decay, and sensitivity to threats were investigated to model the habitat quality. Eight major land-use types were identified: cultivated land, woodland, forestland, grazing, shrubland and bare land, built-up area and water body. Soil erosion modelling results showed that the total soil loss increased from 774.86 thousand tons in 1988 to 951.21 thousand tons in 2018. Cultivated fields generated the highest soil erosion rate, increasing from 10.02 t/ha/year in 1988 to 43.48 t/ha/year in 2018. This is logical as the correlation between soil loss and sediment delivery and expansion of cultivated area is highly significant ($p < 0.01$). The water provision was increased by 16% in the last 30 years. Built-up and bare land areas were the most contributing to the generation of water provision capacity of the ecosystem. Habitat degradation has continuously increased driven by agricultural expansion (25.41%) followed by population pressure (17.3%) and the majority of the area has become degraded. A substantial loss of carbon storage occurred in the watershed (11 t/ha) following the loss of forest cover at an annual rate of 35 t/ha. Overall, changes in LU/LC significantly affect watershed ecosystem services. This study helps decision-makers to further look into the conflict between economic development and conservation activities and integrated watershed development strategy.

Keywords: Ecosystem service; InVEST model; Land use/cover; Omo Gibe Basin; Winike Watershed



12. *Type of submission: Abstract*

B. Biome Working Group sessions: B3 – Ecosystem services from African tropical forests

Supply, use and sustainability of ecosystem services in tropical forests: insights from the Dja region in southeastern Cameroon

Presenting author: Simon Lhoest

Affiliation: Arizona State University, United States of America

Contact: slhoest@asu.edu

Tropical forests provide numerous ecosystem services (ES) to human populations, but human-induced deforestation, degradation and defaunation are major threats to the structure, diversity and functioning of these ecosystems. In central Africa, tens of millions of people depend on the forest ecosystems for their daily livelihoods. In the specific context of extremely high poverty, the growing human population and their needs for forest products increase the threats on forest ecosystems. An integrated assessment of ES is needed in order to improve the sustainability of their use and to design adaptive management strategies. Here, we assessed the supply and use of ES by local populations in three contrasted forest management types in southeastern Cameroon: a protected area, a Forest Stewardship Council (FSC)-certified logging concession, and three community forests.

First, we evaluated the perceptions of ES significance and abundance, based on 225 individual interviews of forest stakeholders. The ES most frequently reported and thus considered as the most important for the people were provisioning (93% of respondents) and cultural services (68%). In contrast, regulating services were less mentioned (16%) and thus considered less important.

Second, we quantified the use and sustainability of ES provided by tropical forests to local populations, through interviews and field surveys with 133 households in three villages. Sustainability was evaluated in terms of how consumption volumes correspond to the resource natural regeneration rate. We focused on three provisioning services (bushmeat, firewood, and timber), and five cultural services (cultural heritage, inspiration, spiritual experience, recreation, and education). Our data showed that local populations consumed a mean of 56 kg of bushmeat/person/year (hunting zones covering on average 213 km²), 1.17 m³ of firewood/person/year (collection zones covering on average 4 km²), and 0.03 m³ of



timber/person/year. A majority of 59% of respondents also recognized the importance of forest cultural services, notably by identifying culturally important sites and cultural rites.

The results of such ES assessments deserve to be integrated in adaptive ecosystem management for identifying and resolving conflicts among stakeholders, raising awareness, making decisions, and evaluating the effectiveness of conservation measures. In the Dja social-ecological system, firewood and timber have been shown to be used sustainably by local populations, whereas bushmeat hunting and consumption have exceeded sustainability thresholds despite a still insufficient supply of this very important ES. The high demand and low supply of bushmeat point the major challenge of reconciling wildlife conservation and sustainable hunting. Efficient management systems of village hunting are still to be invented...

Keywords: Ecosystem services, central Africa, Cameroon, tropical forest, local population

13. Type of submission: Abstract

[B. Biome Working Group sessions: B3 – Ecosystem services from African tropical forests](#)

Towards agenda 2030: Livelihoods and dependence of Forest-driven rural economies in the Congo Basin

Presenting author: Bonito Chia Ntumwel

Other author(s): Dominique Endamana

Affiliation: Ministry of Environment, Nature Protection and Sustainable Development (MINEPDED), Cameroon

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In recent times, the role of forests in maintaining vital ecosystem functions and societal well-being of more than 60 million people in the Congo basin is being jeopardized and is a matter of global concern. The current health crisis is further sounding the alarm bells as to the importance of the services provided by these forest ecosystems. Yet, countries are increasingly striving at economic growth and development driven by political emergence visions and related strategies, that are placing high expectations on forest products and services. In this paper, we are consolidating reliable data collected from stratified samples of over 2000 households using



the Forest–Poverty Linkages Toolkit to portray the value of forest income among rural households in Cameroon, Republic of Central Africa, Republic of Congo, Democratic Republic of Congo and Gabon. Besides, we evaluate dependence and the contribution of key sectors like agriculture, livestock and fishery to sustaining local livelihoods and portray their collective role towards the achievement of the Sustainable Development Goals in these countries. The paper concludes by discussing the importance of the findings for policy–making by these governments in compliance with their international commitment to Agenda 2030.

Keywords: Forest products and services, Local people, SDG, Forest poverty toolkit, Congo Basin