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

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 Session B3: Ecosystem services from African tropical forests

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









Tropical forests in central Africa

170 million hectares



Contribution to the livelihoods of **>60 million people**

Reference: Abernethy *et al.* (2016) Design: Globaïa

Introduction

Dja region, southeastern Cameroon

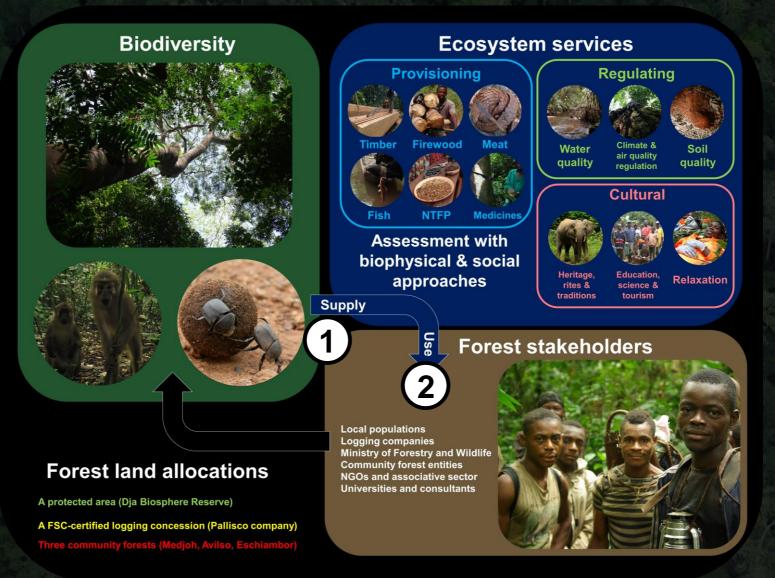


- Dense forests of the Guineo-Congolian Region
- Population density: 8 people/km²
- Local populations comprise 2 main ethnolinguistic groups: Ko'o Zime & Baka Pygmy
- Main activities: shifting agriculture, hunting, fishing, gathering, and artisanal logging

References: Cellule Aménagement Pallisco & Nature+ (2015), Ezzine de Blas *et al.* (2011), Gillet (2016), Samndong and Vatn (2012), Schwartz *et al.* (2012), Vermeulen (2000), www.citypopulation.de Photo: J. Laporte

Objective

Assess the supply, use and sustainability of ecosystem services provided by tropical forests to local populations in southeastern Cameroon



Photos: J. Atkinson, J.-Y. De Vleeschouwer, J.-L. Doucet, D. Fonteyn, J. Laporte, S. Lhoest, J. Schure

Perceptions of ecosystem services supplied by tropical forests to local populations

Lhoest S., Dufrêne M., Vermeulen C., Oszwald J., Doucet J.-L. & Fayolle A. (2019). Perceptions of ecosystem services provided by tropical forests to local populations in Cameroon. *Ecosystem Services*, 38, 100956.

Photo: Pierre Jamar

Methods



75 respondents active/living in the protected area
 75 logging concession
 75 community forests

Individual interviews with 225 forest stakeholders in 23 locations

1 open-ended question
 → Perceptions of ES significance
 16 directed questions
 → Perceptions of ES abundance



Perceptions of ecosystem services

Perceptions of ecosystem services significance Perceptions of ecosystem services abundance (percentages of spontaneous mentions) (percentages of directed mentions) **Regulating services (100.0%)** Vegetal NTFP (96.4%) **Provisioning services (100.0%)** Vegetal NTFP (83.6%) Matural hazard (93.3%) Soil formation (82.2%) Soil formation (1,8%) Provisioning services (93.3%) Natural Medi 39. Air quality (85.3%) nazard (2.70/0) Fish(36.0%) Fish (82.2%) Regulating services (16.0%) West 59 Air quality (4.0%) Wood (34.7% Climate (83.6%) Firewood (71.6%) Climate (4.4%) Water quality (5.3%) Water quality (76.0%) Medicine (30.2%) Timber (55.1%) Thousing (75, 600) Tourism (10.7%) Education (10.2%) Recreation for culture otoione? Cultural Heritage (50.2%) Cultural neritage (96.90) Medicine (97.3%) Recreation (44.9%) Tourism (23.6%) Solitio Inspiration (69.3%) Spiritual Inspiration for 50% 75% 75% Cultural & amenity services (68.0%) Cultural & amenity services (99.6%) 100% 100%

The ES most frequently perceived as important are provisioning and cultural services. Bushmeat is the only ES perceived more often as important than abundant.

Conclusions

Most frequently reported ES among local stakeholders: **Provisioning > Cultural > Regulating**

Deep disconnection between perceptions of the importance of regulating services of local stakeholders and international priorities (REDD+, PES, ...)

→ Need to integrate local actors in policy decisions for legitimacy

The most variable ES perceptions should be assessed with complementary methods: Bushmeat, firewood, timber, cultural services

2 Use of forest ecosystem services by local populations

Lhoest S., Vermeulen C., Fayolle A., Jamar P., Hette S., Nkodo A., Dufrêne M. & Meyfroidt P. (2020). Use of forest ecosystem services by local populations in southeastern Cameroon. *Sustainability*, 12(6), 2505.

Methods

- Exhaustive household census (structured interviews, n = 133)
- Sampling of 55 volunteer households stratified by: main source of income & ethnic group



Data collection in 3 villages: Field surveys (biophysical approaches) and interviews (social approaches) **3 provisioning services**: Bushmeat, firewood, timber **5 cultural services**: Cultural heritage, inspiration, spiritual experience, recreation, education

Photos: J. Laporte, S. Hette, S. Lhoest



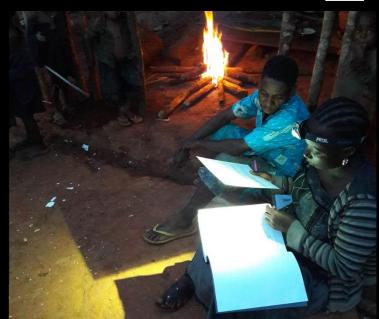
Bushmeat use

- GPS tracking of volunteer hunters (n = 651 km)
- Daily survey of dietary intake: Structured interviews
 + Weighing (n = 3291 meals)



Firewood use

- GPS tracking of volunteer villagers (n = 50 km)
- Daily survey of firewood use:
 Structured interviews +
 Weighing (n = 3367 days)



ES use

Timber use

Quantification with structured interviews + Measurements (n = 69 households)





Cultural services use

- Participatory mapping + Georeferencing (n = 26 sites)
- Evaluation of the use of cultural services:
 Structured interviews (n = 145 respondents)



Bushmeat

56 kg / person / year 57% is purchased

(n = 3291 meals)

Firewood

1 7 m³ / person / year



(n = 3367 days)

Photo: P. Jamar

Timber

003 m³ / person / year

% is purchased

17

(n = 69 households)

Photo: P. Jamar

Cultural heritage

73% of positive mentions

(n = 145 respondents)

Inspiration

25% of positive mentions

(n = 145 respondents)

Photo: S. Hette

Spiritual experience

56% of positive mentions

(n = 145 respondents)

Recreation

55% of positive

mentions

(n = 145 respondents)

Education

86% of

22

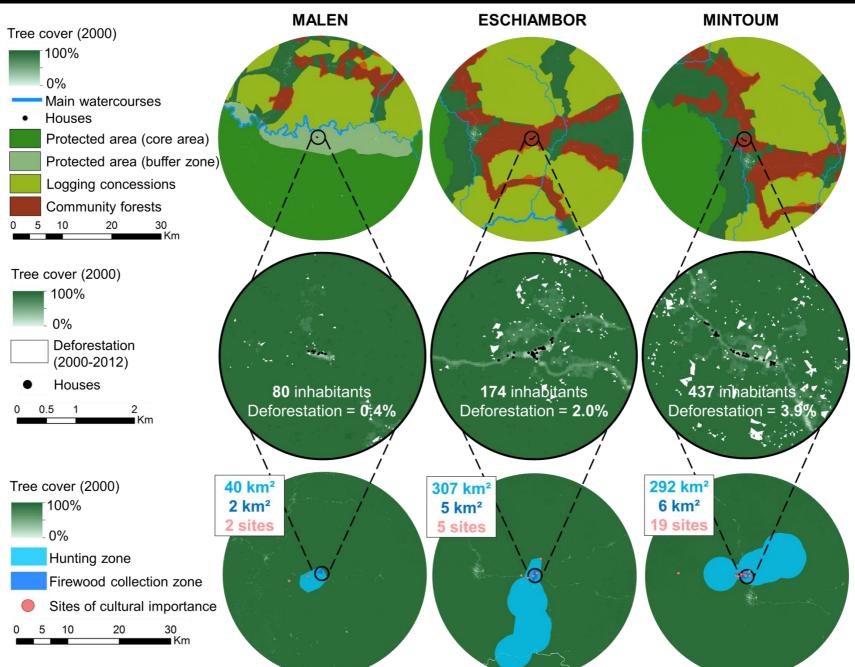
Z

positive mentions

(n = 145 respondents)

Mapping of ES use at the village scale

ES use



Sustainability of bushmeat consumption in the Dja area

This study (2018)Delvingt et al. (2001)

4.7 km²/household

32 kg/km²/year

93 to 173 kg/km²/year

2.0 km²/household

→ Extension of hunting areas

24

→ Decrease of hunting catch

 Decrease of animal populations since decades (according to 100% of 24 interviewed hunters)
 → Defaunation & unsustainable hunting practices

ES use

Sustainability of firewood and timber use

Mean use of firewood: 1.8 kg/person/day Mean use of timber: 3.75 m³/household Firewood use = 39 x timber use

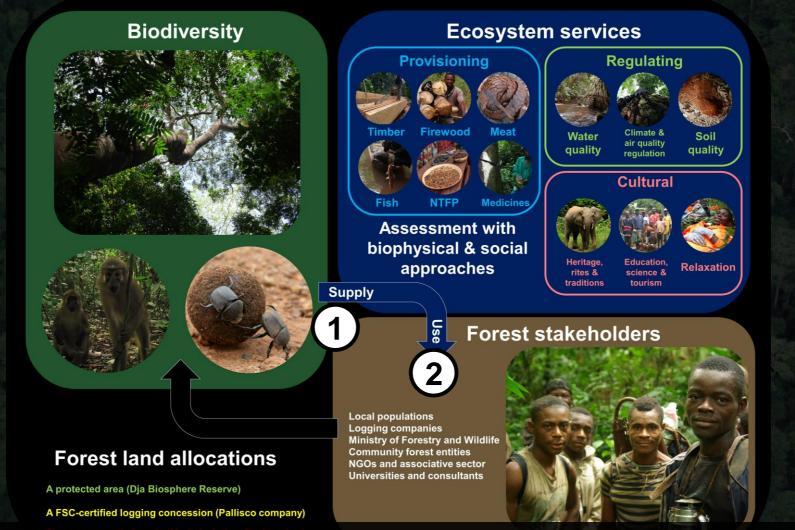
Total firewood mass used annually in each village = 0.20 to 0.69 Mg/ha/year = 4 to 13% of the natural growth of the wood resource*

Sustainable use of wood by rural populations, minor impact on forest ecosystems

*based on a biomass increment of 5.46 Mg/ha/year estimated in Cameroon agro-forest areas (Djomo et al., 2011)

Photo: P. Jamar

Take-home message



Any policy and management decisions regarding the use of ecosystem services should be based on such assessment of the sustainability of use, and the match of human needs with the natural supply.



Perceptions of ecosystem services provided by tropical forests to local populations in Cameroon

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Article

Quantifying the Use of Forest Ecosystem Services by Local Populations in Southeastern Cameroon

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Thank you for your attention! slhoest@asu.edu / similto:similto



