Is research useful for the management of protected areas in central Africa?

Conservation Innovation Lab Meeting
Tempe, November 10, 2021

Simon LHOEST
Morgane GAUDIN
Pierre PROCES
Cédric VERMEULEN

with a special thank to:
Samuel QUEVAUVILLERS
Marie-Ange GOLARD

LIÈGE université Gembloux Agro-Bio Tech

JOINT CONSERVATION LAB

ASU School of Life Sciences
Arizona State University

Landell Mills

ECOFAC

Design: Globaïa

My background

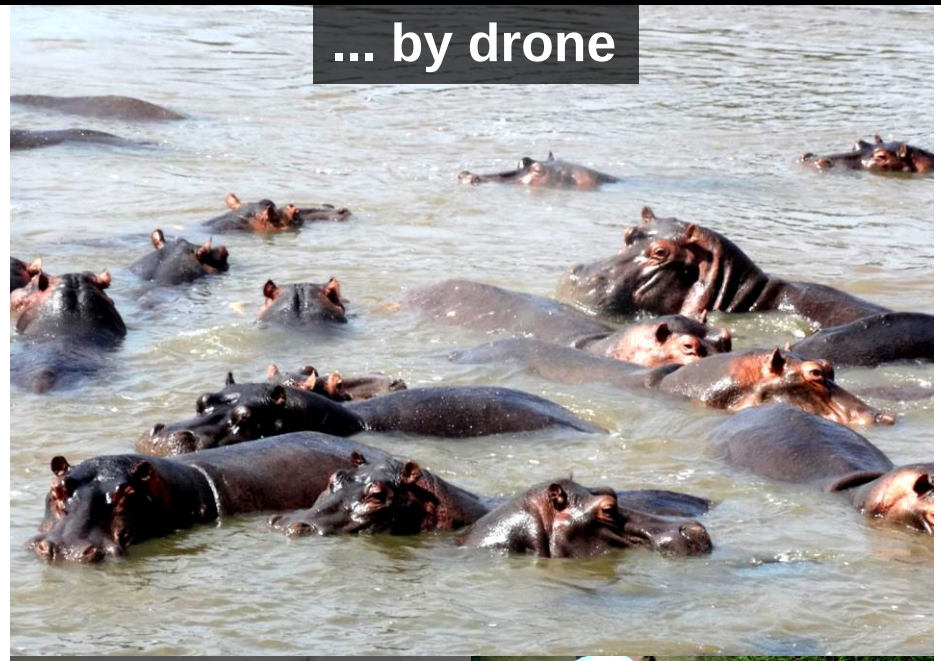
Gembloux Agro-Bio Tech, University of Liège, Belgium

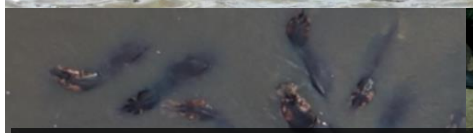
Master (2015): Bioengineering, Management of Forests and Natural Areas
PhD (2020): Agronomic sciences and biological engineering

LIÈGE université Gembloux Agro-Bio Tech

My published papers: Wildlife monitoring and ecology...

... by drone





Lhoest S. et al. (2015). How many Hippos (HOMHIP) : Algorithm for automatic counts of animals with infra-red thermal imagery from UAV. **ISPRS Archives**.

Linchant J. et al. (2015). WiMUAS: Developing a tool to review wildlife data from various UAS flight plans. **ISPRS Archives**.

Linchant J. et al. (2018). UAS imagery reveals new survey opportunities for counting hippos. **PLoS ONE**.

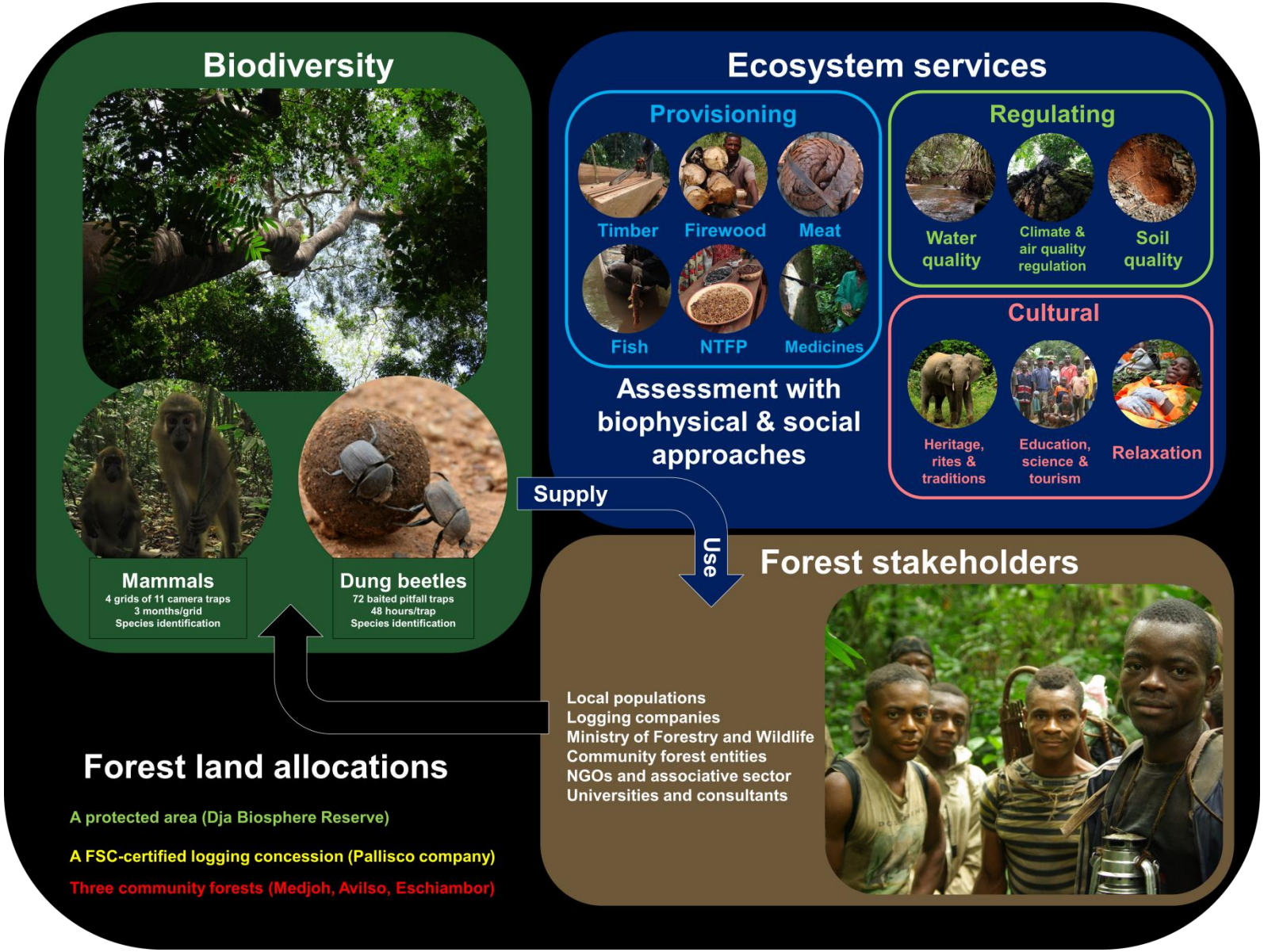
... with camera traps

Lhoest S. et al. (2020). Conservation value of tropical forests: Distance to human settlements matters more than management in Central Africa. **Biological Conservation**.

Fonteyn D. et al. (2020). Wildlife trail or systematic? Camera trap placement has little effect on estimates of mammal diversity in a tropical forest in Gabon. **Remote Sensing in Ecology and Conservation**.

Houngbégnon F.G.A. et al. (2020). Daily Activity Patterns and Co-Occurrence of Duikers Revealed by an Intensive Camera Trap Survey Across Central African Rainforests. **Animals**.

My published papers: Ecosystem services



Lhoest S. et al. (2019). Perceptions of ecosystem services provided by tropical forests to local populations in Cameroon. **Ecosystem Services**.

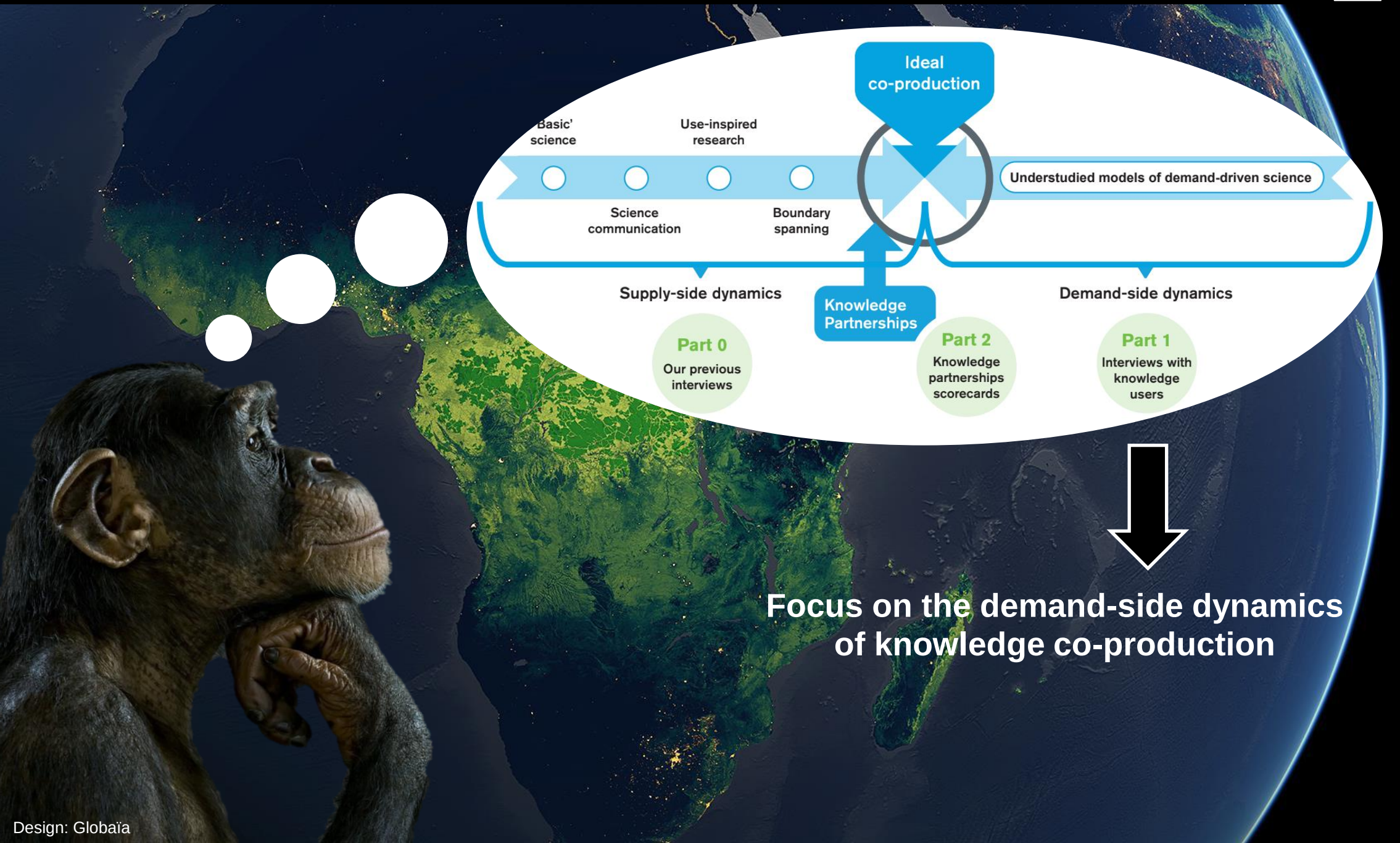
Lhoest S. et al. (2020). Use of forest ecosystem services by local populations in southeastern Cameroon. **Sustainability**.

Objective of my PhD thesis: Assessing the **conservation value** of tropical forests in southeastern Cameroon, as well as the **supply** of ecosystem services and **use** by local populations, in three contrasted forest land allocations

Ongoing collaborations

- Conservation biology
- Mammal biogeography
- Conservation perceptions
- Plant-animal interactions (seed dispersal, forest regeneration...)
- Mangrove restoration
- Hunting, poaching and illegal logging
- Protected area management plans
- Sustainable forest management across the tropics

Is research useful for the management of protected areas in central Africa?



Focus on the demand-side dynamics of knowledge co-production

Design: Globaïa

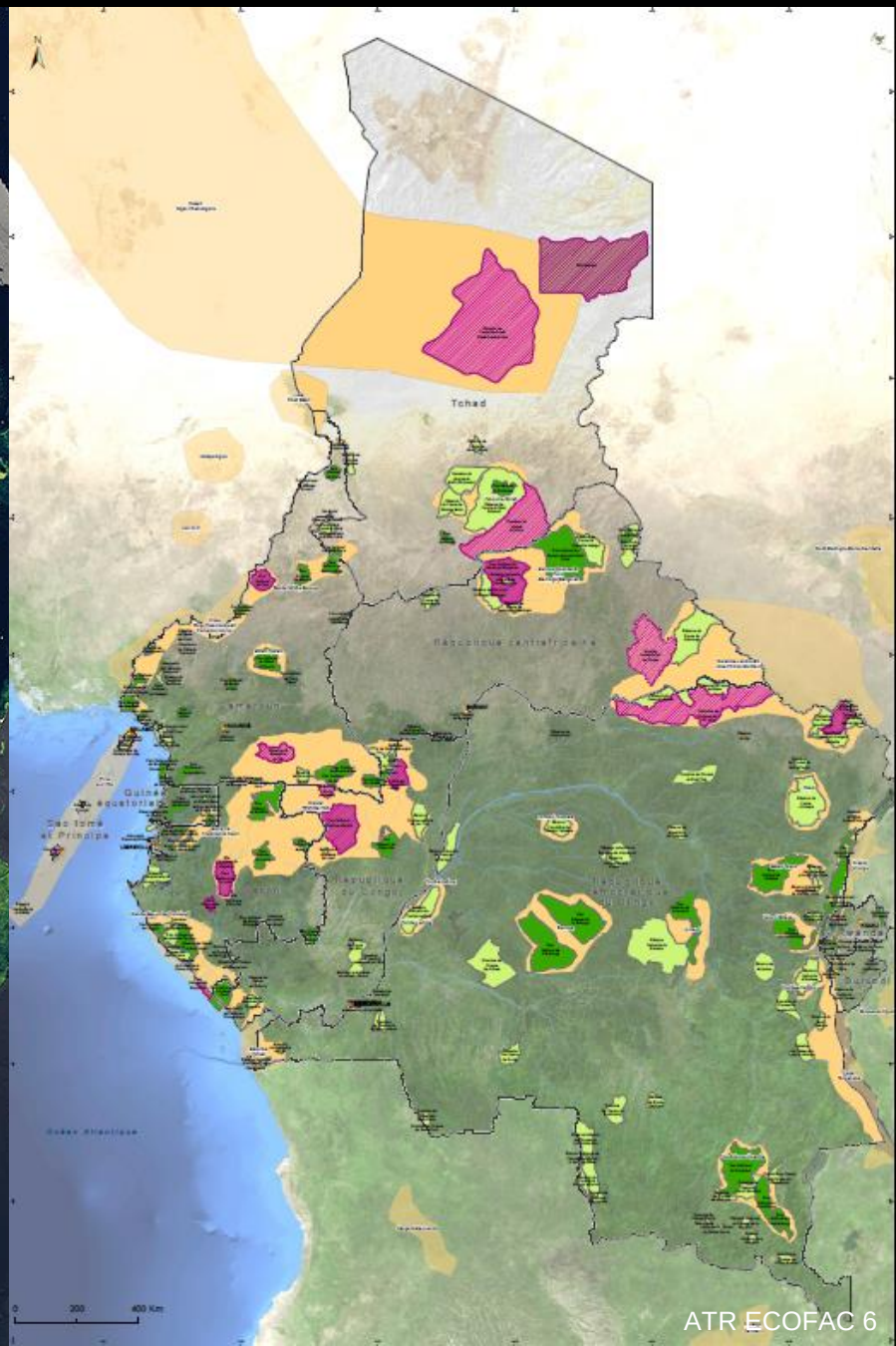
Central Africa

10 countries

Protected areas

~ 960 000 km²

~ 2 x  's protected areas



Research in protected areas

Research is supposed to help in decision-making (‘*science-policy interface*’)

However:

- The sharing of results is insufficient, as well as the dialogue among scientists, field managers and policy makers
- Research in protected areas is rarely connected with the priorities of managers

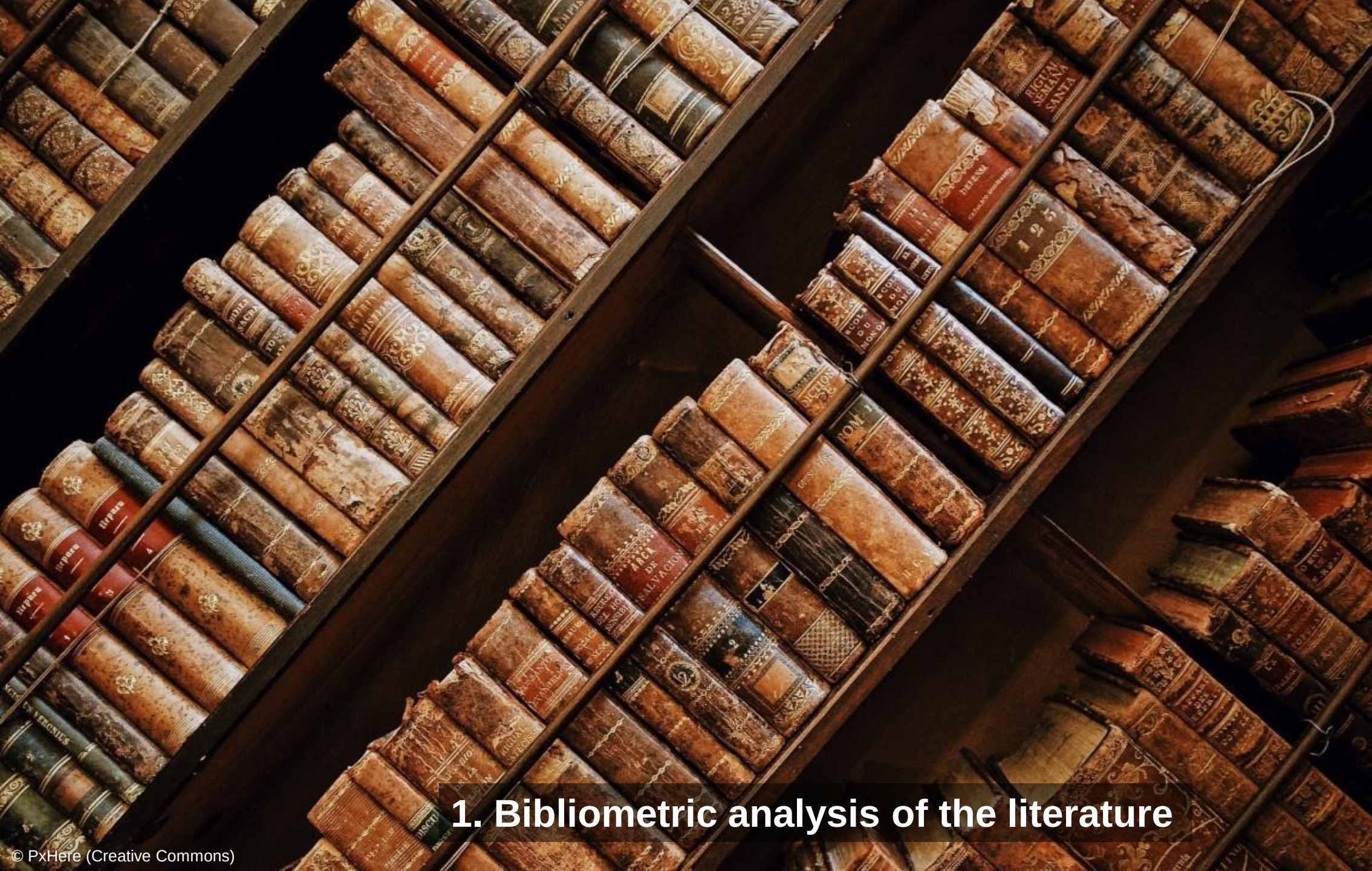
Objectives

1. Characterize the research effort in the protected areas of the 10 central African countries
   ➔ **Bibliometric analysis of the literature** (1st planned paper)

2. Capitalize on managers' experiences with their practical use of research
   ➔ **Interviews** (2nd planned paper)

3. Make **recommendations** that aim to:
   i. Define priority research topics for protected areas
   ii. Improve the conditions for funding, producing and disseminating research to enable its efficient use

➔ '***Finalized research****':* meeting an initial management objective, within a timeframe compatible with decision-making



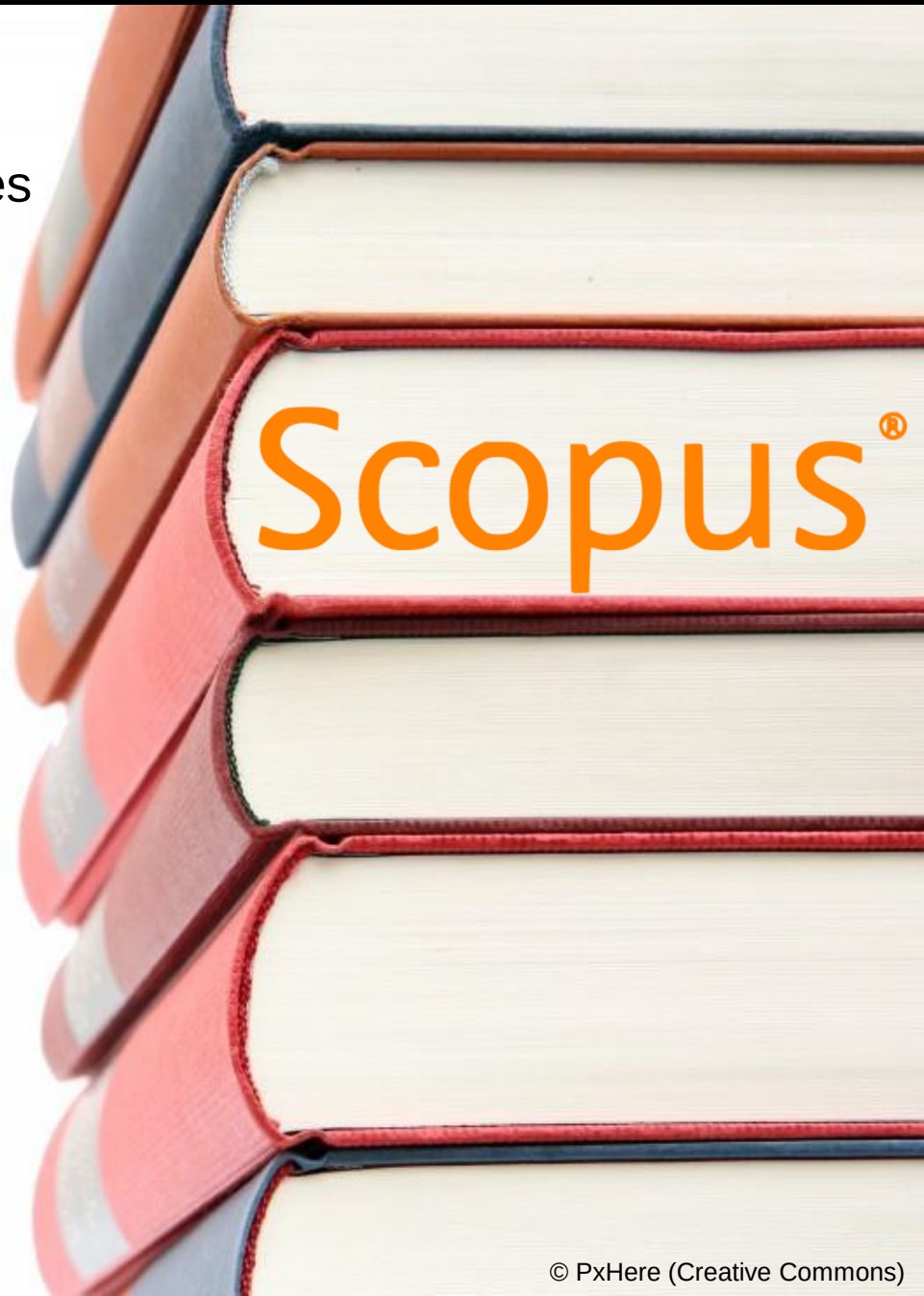
1. Bibliometric analysis of the literature

Bibliometric analysis of the scientific literature

- Inventory of scientific articles published in international journals (Scopus)
- All protected areas of the 10 central African countries
- Period 2011-2020 (Aichi Targets)

For each publication, identification of:

- **Country(ies) studied**
- **Protected area(s) studied**
- **Research subject(s)**
- **Metadata:**
  - Authors
  - Title
  - Year of publication
  - Journal
  - Download link
  - Author affiliations
  - Abstract
  - Keywords
  - Funding sources
  - Language of the document
  - Type of article
  - Accessibility (open access or not)

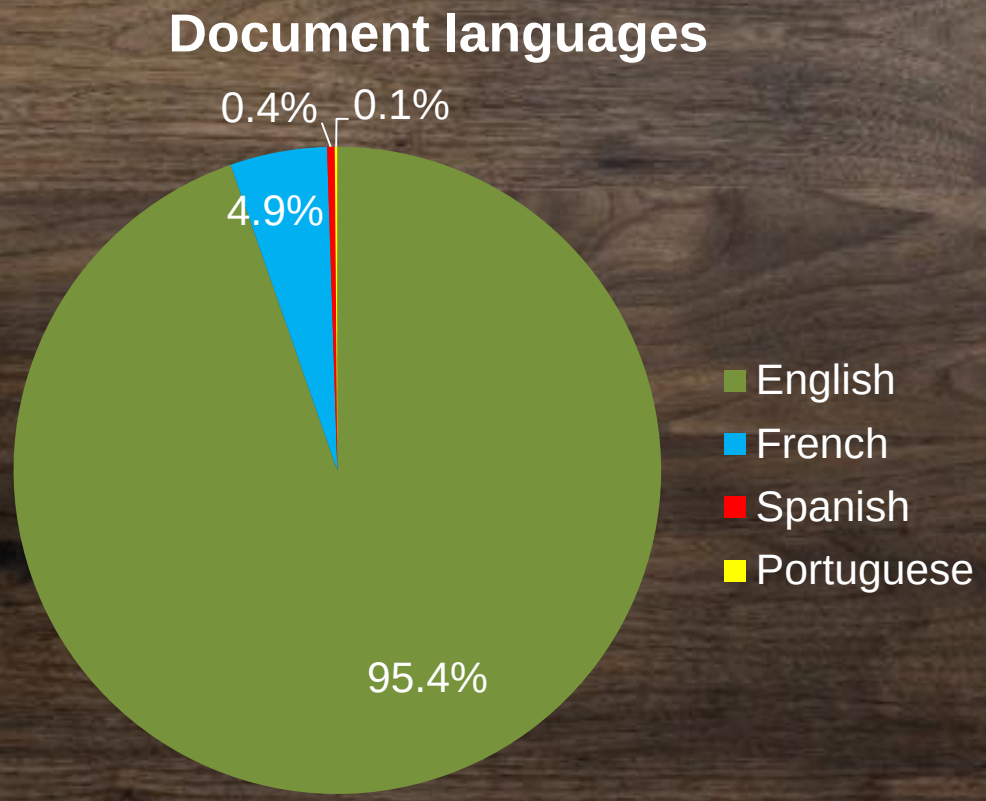


Online database

- Access link to the database: Tinyurl.com/protectedareascentralafrica
- 1140 scientific articles analyzed ➔ List of 779 relevant articles selected

Sub-selections by:
- Authors
- Countries
- Protected areas
- Topics

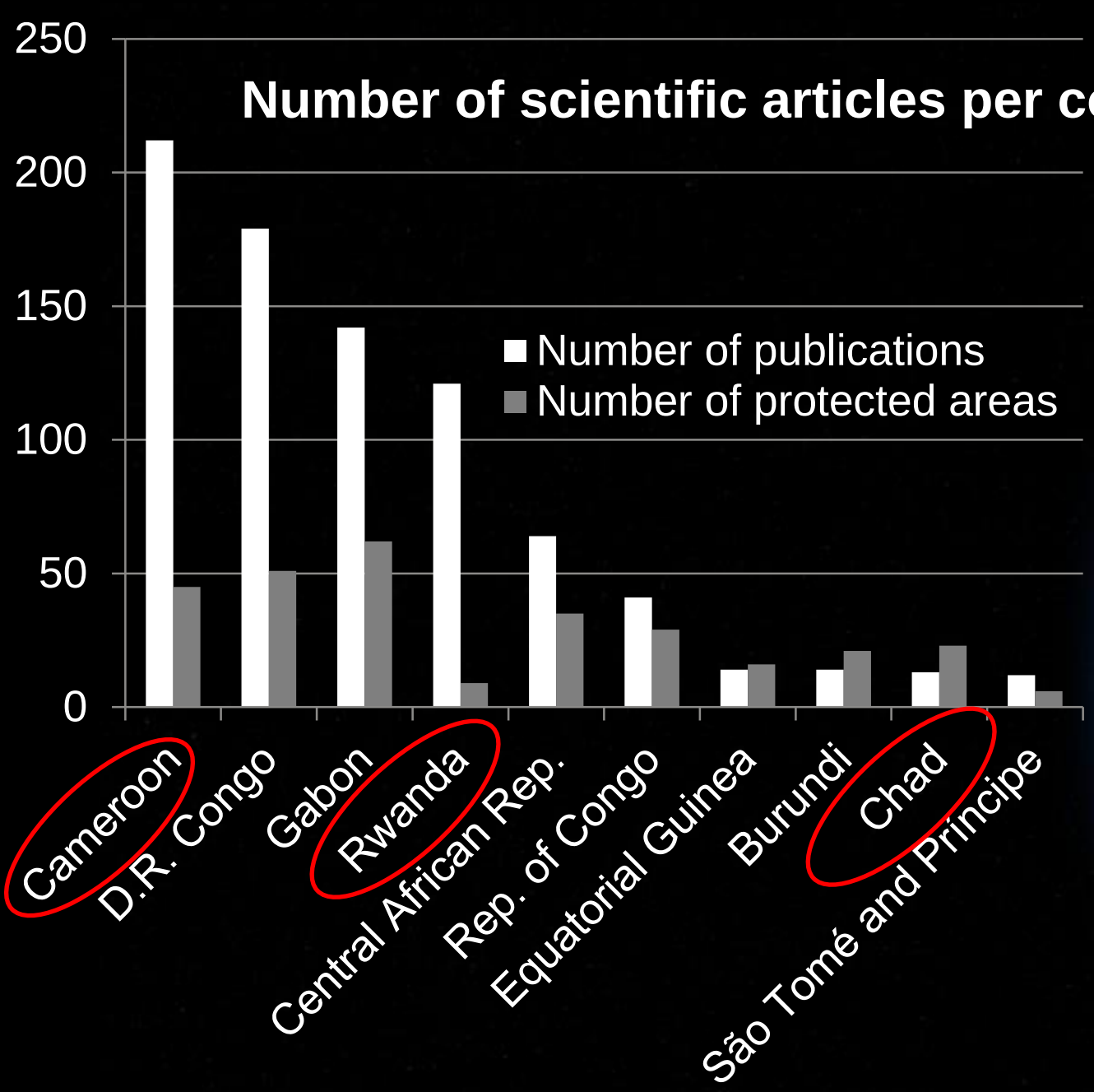
Languages, access and affiliations



Only **37%** of articles are published in open access

For only **29%** of the publications, the first author has an affiliation in central Africa

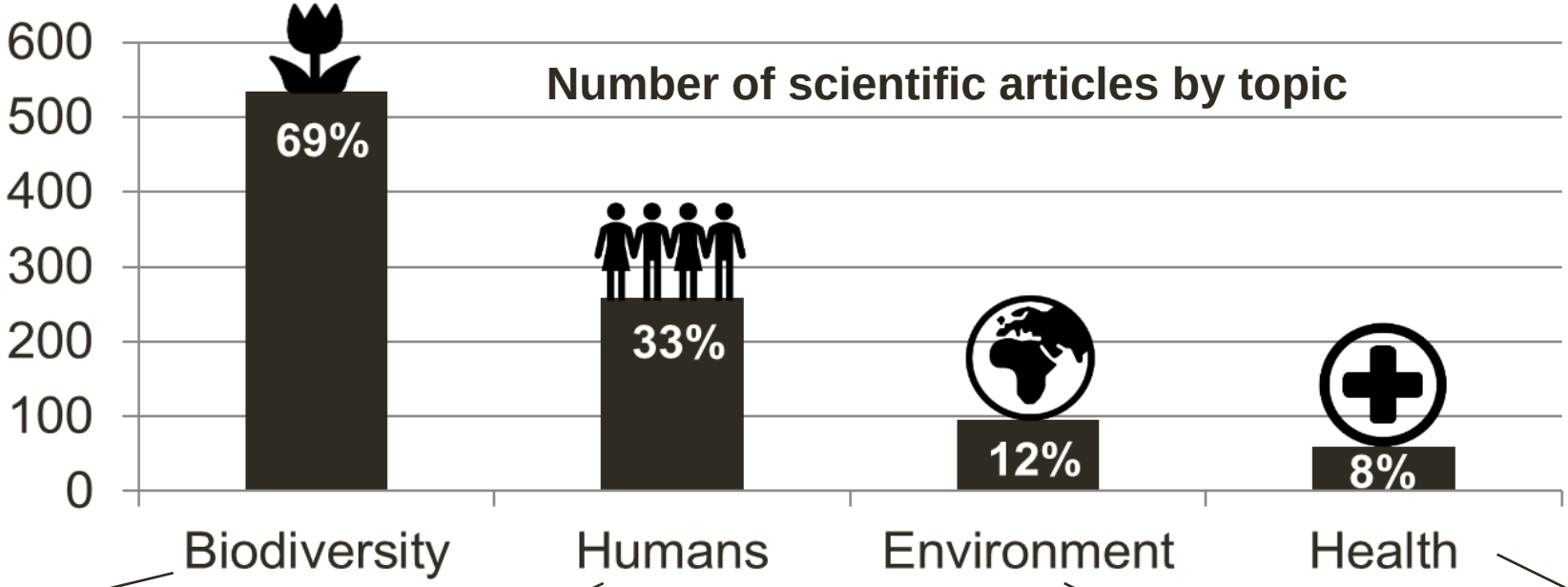
Spatial distribution of scientific articles



Most studied protected areas:

1. Volcanoes NP (Rwanda)
2. Korup NP (Cameroon)
3. Virunga NP (DRC)
4. Dzanga-Sangha (CAR)
5. Dja Faunal Reserve (Cameroon)
6. Lopé NP (Gabon)
7. …

Distribution of publications by topics



Animals
Plants
Inventories
Biology / Ecology
Genetics
Taxonomy
...

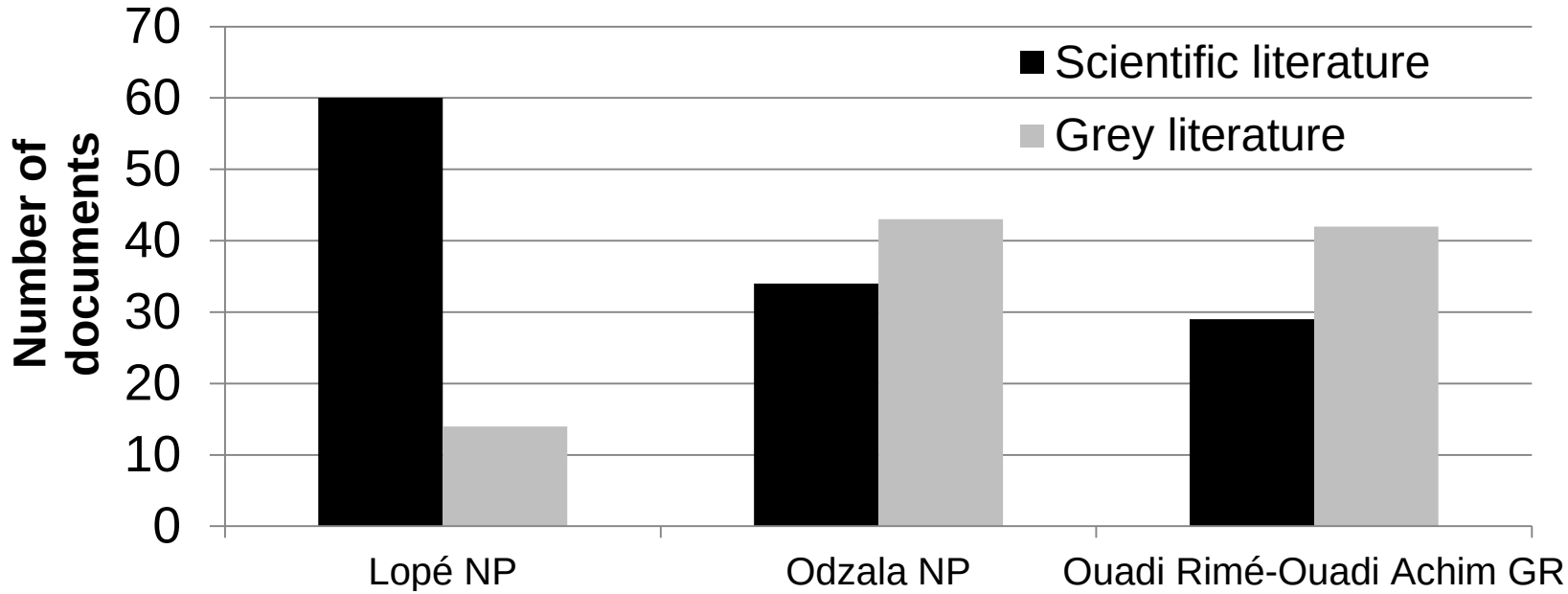
Periphery management
Perceptions / Behaviors
Conservation activities
Income-generating activities
Governance / Policy
Hunting / Poaching
Anthropology
Agriculture
NTFPs
Conflicts
...

Land use / Land cover
Geology / Pedology
Climate
Carbon
...

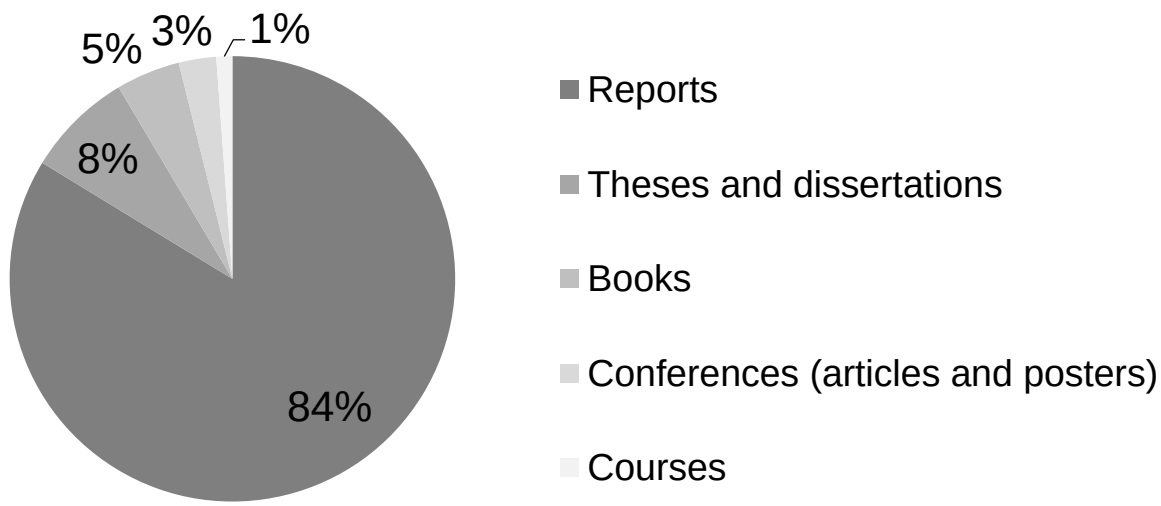
Animal health
Human health

➔ **Research topics VS priority management challenges?**
➔ **Fundamental VS applied / '*finalized*' research?**

Scientific literature VS Grey literature



Grey literature

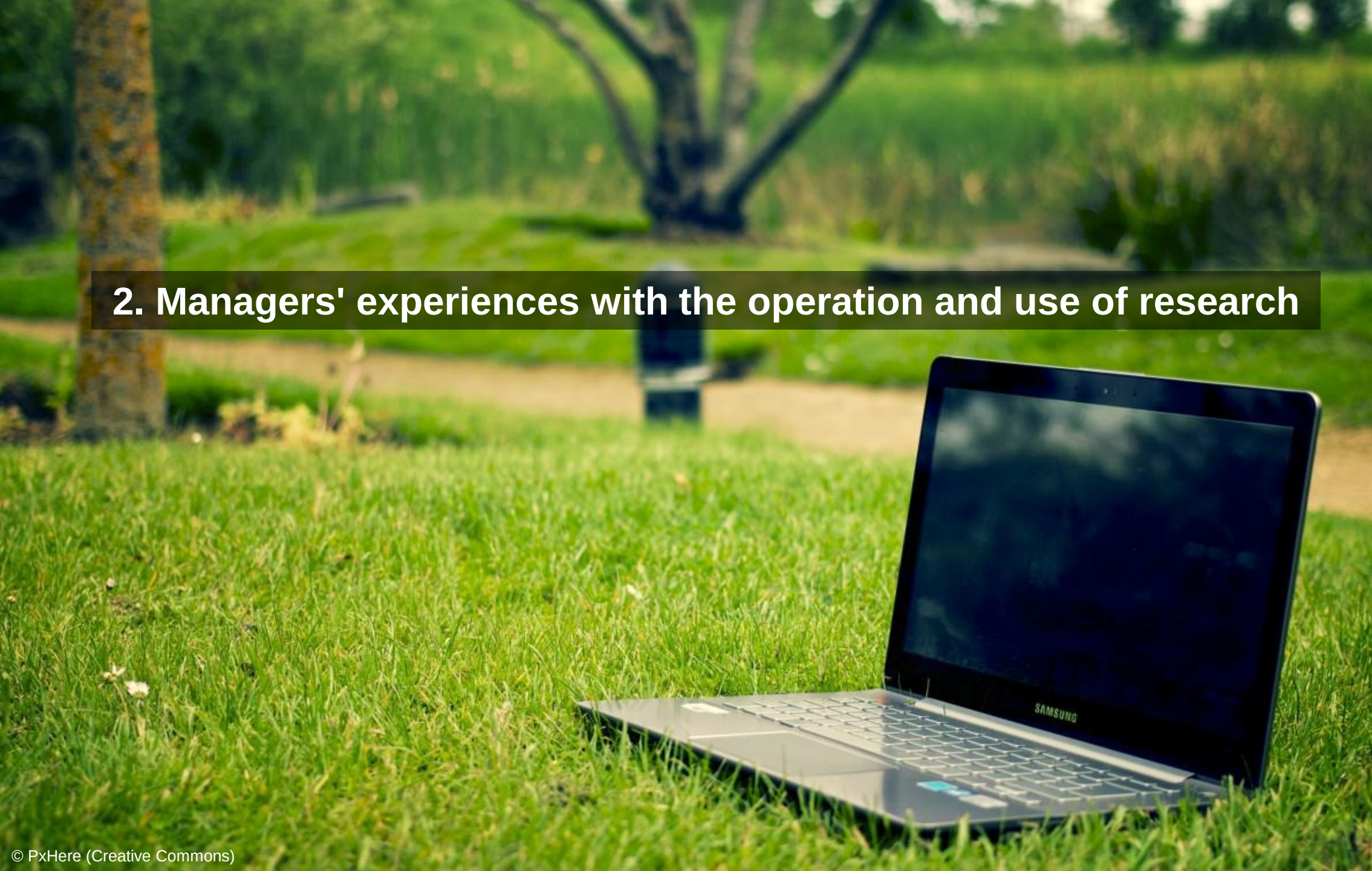


➔ More applied topics (human, environment, ...) in the grey literature

Conclusions

- Important differences among the 10 countries and among protected areas
- Only 1/3 of publications are accessible to managers
  ➔ Ensuring open access + appropriate format of research recommendations
- Only 1/3 of authors are based in central Africa & few publications per protected area, per country and per year
  ➔ Give priority to the financing of national theses, with North-South collaborations
- Large majority of publications in English, but managers largely French-speaking
  ➔ For each scientific publication, associate an abstract in French

2. Managers' experiences with the operation and use of research



Methods

3 interview types with protected area managers:

1. Online questionnaire
2. Focus group
3. Individual interviews

Questions related to:

1. Research actors
2. Research questions
3. Use of research results in management
4. Access to research

➔ 73 respondents, representing 42 protected areas

More than 70% of protected areas:

- Welcome (inter)national students and researchers
- Have signed formal collaboration agreements with privileged partners for research

Supervision team in the field, infrastructure, logistical means, security support, etc.

Protected area's managers ⇄ **Students & researchers**

Restitution and valorization of research results + scientific support to achieve management objectives

(2/4) Research questions

Only 20% of protected areas have **defined their priority research questions**

Highest priority research questions are related to:

1. **Animal biodiversity**
2. **Human aspects**
3. **Fight against illegal activities**
4. **Vegetal biodiversity**

61% report that there are **"dormant data"** that are not used by anyone

70% are involved in the design of research protocols and

49% in writing scientific publications…

BUT 82% would like to be better involved in the design of research protocols and scientific publications

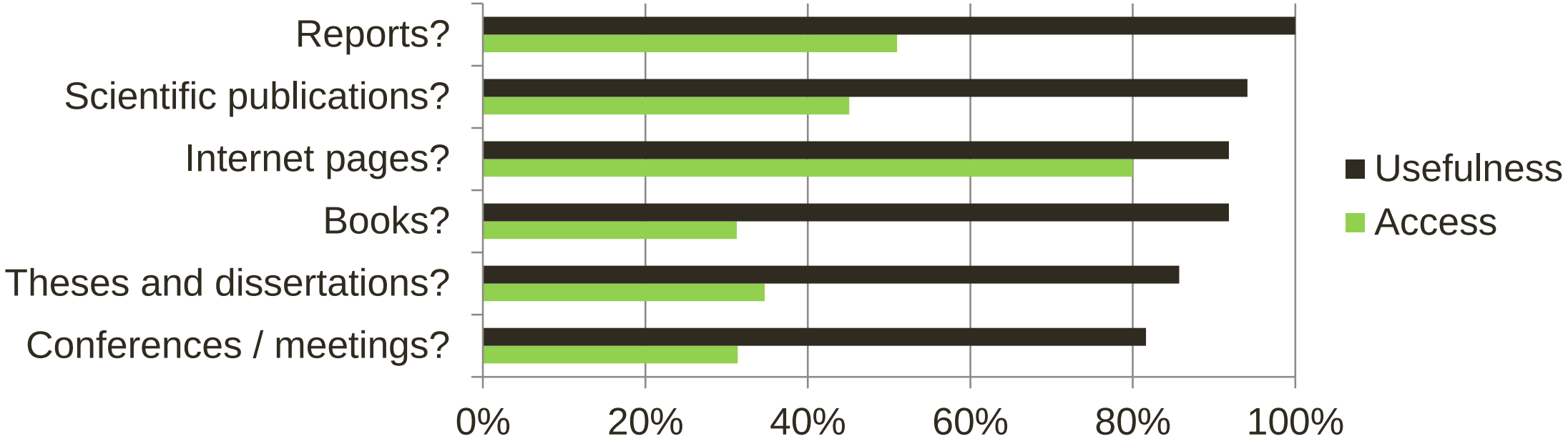
(3/4) Use of research results in management

Biomonitoring results are directly used by **90%** of protected area managers...

... while **only 45%** consider that **scientific research is produced quickly enough** to respond to management issues.

The main use of scientific research by managers consists in using tools developed by researchers, such as applications, GIS, databases…

Are these types of documents useful and accessible for your work:

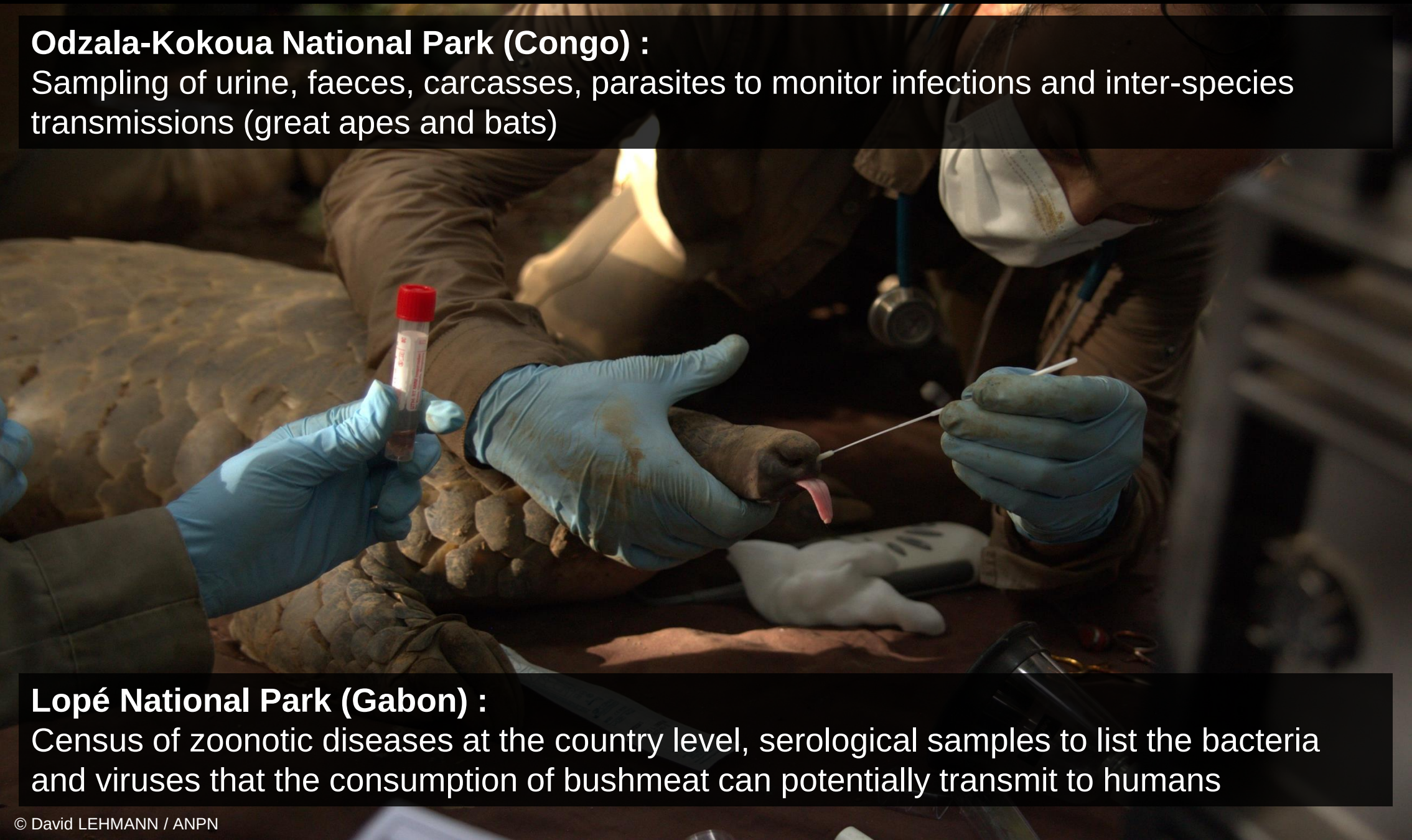


73% of managers generally have access to the **results** of research conducted in their PA

61% **raw data**

Examples of applications: disease prevention

Odzala-Kokoua National Park (Congo) :
Sampling of urine, faeces, carcasses, parasites to monitor infections and inter-species transmissions (great apes and bats)



Lopé National Park (Gabon) :
Census of zoonotic diseases at the country level, serological samples to list the bacteria and viruses that the consumption of bushmeat can potentially transmit to humans

Examples of applications: animal reintroductions

Scimitar-horned oryx in the Ouadi Rimé-Ouadi Achim Game Reserve (Chad) :

- Species classified as "extinct in the wild" since 2000 by the IUCN
- Reintroduction of 144 animals in 2016 ➔ today 382 individuals

- Logistics, breeding, monitoring and scientific research (progress assessment, threat detection and management information)
- Monitoring: demography (population size, survival, reproductive success), space and habitat use
- Responses to threats: epidemics, bush fires, poaching
- Adaptation of release protocols and veterinary prophylaxis

Examples of applications: tourism

Little used in Central Africa, but can finance conservation + socio-economic benefits with income-generating activities for local communities + development of basic / applied research projects

Lopé National Park (Gabon) :
Vision tourism for emblematic species, thanks to the GPS tracking of animals
➔ Mandrill excursion: 250€
➔ Pangolin excursion: 280€

Obô Natural Parks (São Tomé and Príncipe) and other countries (South Africa, Kenya, Uganda, Namibia):
EARTHWATCH model of science tourism
➔ Amateur "research tourists" pay thousands of dollars to participate in scientific field studies without having to manage the paperwork

WILDLIFE & ECOSYSTEMS

Moderate

Conserving Endangered Rhinos in South Africa

Rhino populations are in crisis due to the high value of rhino horn combined with widespread poaching.

Africa : Northwest Province, South Africa, Africa
Lead Scientist: Dawn Scott, Ph.D.
Duration: 12 days (avg. $300 a day)

Starting at **$3,595**

Expedition Details

View Dates & Join

WILDLIFE & ECOSYSTEMS

Easy

Elephants and Sustainable Agriculture in Kenya

Help local farmers to conserve elephants and their habitat in southeast Kenya by implementing sustainable agriculture practices

Africa : Kasigau Corridor, Kenya (between Tsavo East and West National Parks), Kenya, Africa
Lead Scientist: Bruce A. Schulte, Ph.D.
Duration: 12+ days (avg. $250 a day)

Starting at **$2,995**

Expedition Details

View Dates & Join

WILDLIFE & ECOSYSTEMS

Very Active

Investigating Threats to Chimps in Uganda

Explore interactions between people and chimpanzees and other primates in the rainforest of Uganda to improve human–primate rel

Africa : Budongo Forest Reserve, Uganda
Lead Scientist: Fred Babweteera, Ph.D.
Duration: 12 days (avg. $254 a day)

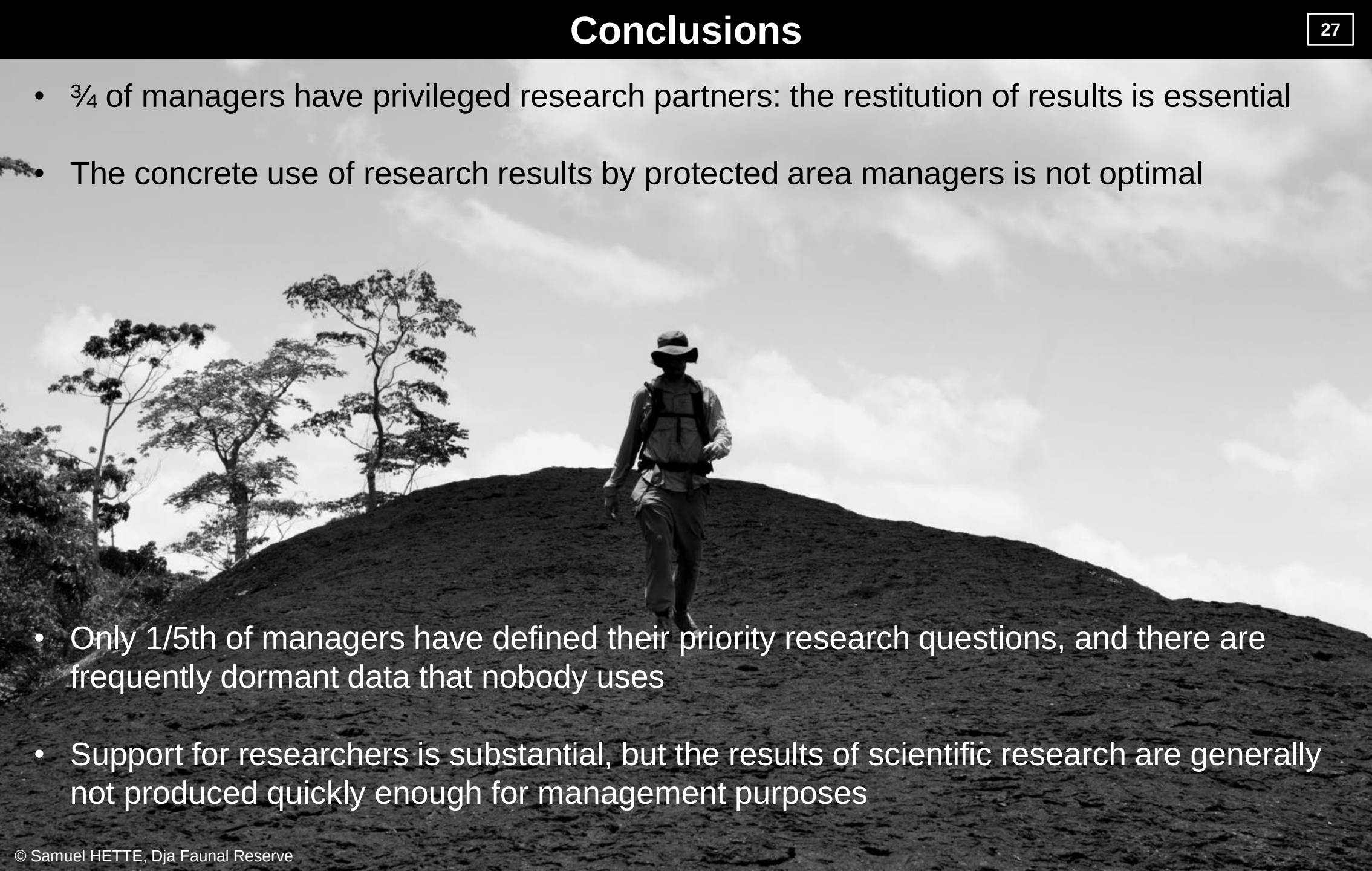
Starting at **$3,050**

Expedition Details

View Dates & Join

Conclusions

- ¾ of managers have privileged research partners: the restitution of results is essential
- The concrete use of research results by protected area managers is not optimal



- Only 1/5th of managers have defined their priority research questions, and there are frequently dormant data that nobody uses
- Support for researchers is substantial, but the results of scientific research are generally not produced quickly enough for management purposes

Conclusions

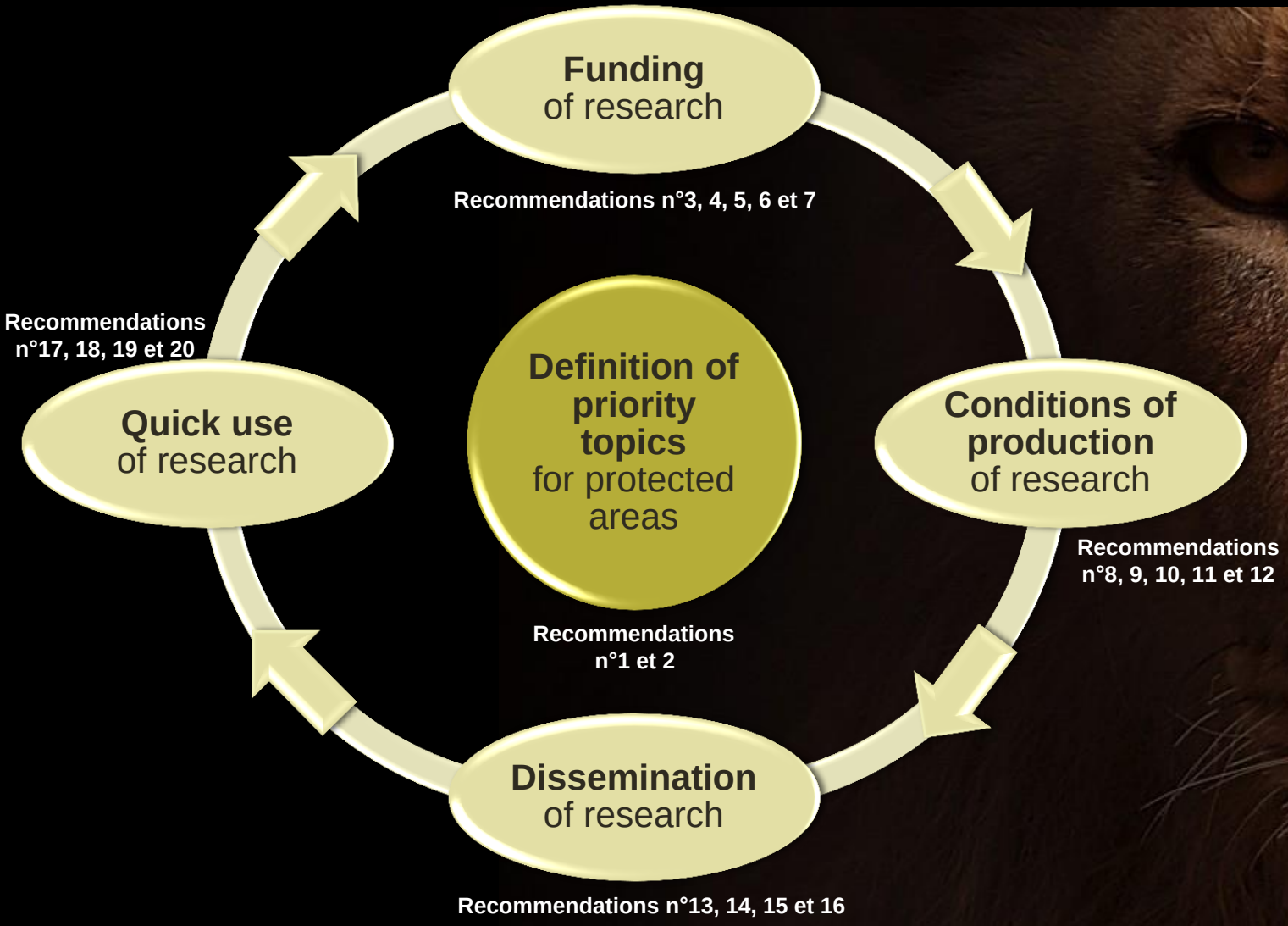
How to translate research results into operational recommendations?

How can managers and researchers be better mobilized to focus research efforts on priority management issues?

How to reconcile the different time frames between scientists and managers?

20 recommendations...

… to protected area managers, central African States, research and training institutions, donors, and civil society



➔ See our complete report: https://orbi.uliege.be/handle/2268/261099


Research is directly useful for conservation,
but only when it is strategically aligned with protected area management issues.
Thank you for your attention!
simlho@hotmail.com / slhoest@asu.edu
LIÈGE université
Gembloux
Agro-Bio Tech
JOINT CONSERVATION LAB
ASU
Arizona State
University
© Simon LHOEST, Garamba National Park