

The ASU logo is mounted on a tall, light-colored stone pillar. The logo consists of the letters 'ASU' in a bold, sans-serif font, with a stylized sunburst or fan shape behind the letter 'S'. The pillar is set against a clear blue sky.

ASU

Actionable and engaged science to conserve biodiversity

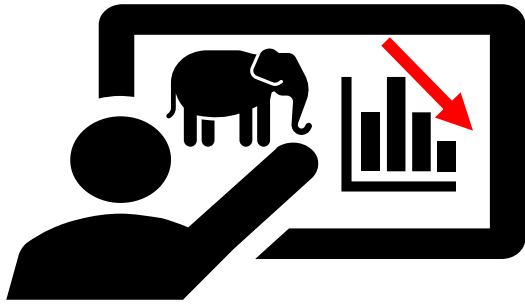
Simon Lhoest, Candice Carr Kelman, Chris J. Barton, Jessica Beaudette, Leah Gerber

ULiège Open Science Day 2024
Liège, November 7, 2024

A large, dark grey stone monument stands in the foreground. It has a rectangular base and a taller, narrower section on top. The words 'ARIZONA STATE UNIVERSITY' are engraved in large, white, capital letters on the front face of the base. The monument is surrounded by green grass and some small plants.

ARIZONA
STATE
UNIVERSITY

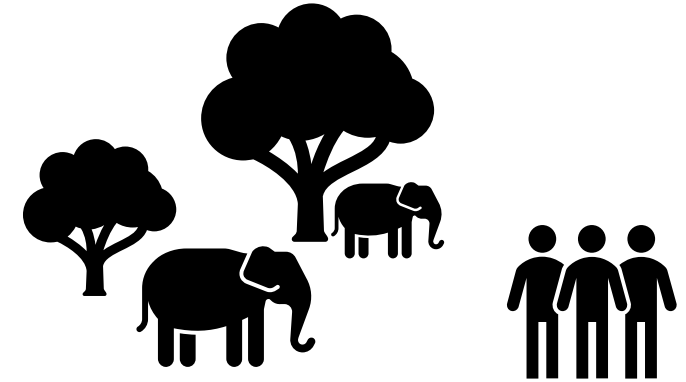
Scientists



'Basic' science

Use-inspired research

Conservation practitioners



Ideal
co-production of
knowledge

Understudied models of demand-driven science

Science communication

Boundary spanning

Supply-side dynamics

Demand-side dynamics

How can we produce more actionable conservation science?
How can universities encourage actionable science?

Why isn't conservation science as actionable as we want it to be?

Loading-dock problem

Assumptions:

- Science is inherently useful
- People want to act in informed ways
- Non-scientists care about the same things scientists do
- The role of knowledge producer is distinct from the role of knowledge user



Why isn't conservation science as actionable as we want it to be?

Loading-dock problem

Consequences



The research may not be read



The research may not be helpful



Damages relationship between researchers & practitioners



Why isn't conservation science as actionable as we want it to be?

Loading-dock problem

- **Whose responsibility** is the pick-up?
- Can conservation practitioners **access** the literature on the dock?
- What does it **cost** them to access it?
- How would they know **where to look** for it?
- Is the published literature in an **appropriate format to be used** by practitioners?



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Conservation Biology 

CONTRIBUTED PAPERS

Five approaches to producing actionable science in conservation

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Interviews with 71 conservation scientists who participated in one of three fellowship programs focused on becoming agents of change:


- Leopold Fellows
- Pew Fellows
- Wilberforce Fellows



General questions + specific questions about actionable science:

- **What do you do** to make your research more actionable?
- **What would you do differently** to make your research more actionable?
- Have you had **training / mentorship / experiences** that enhance your capacity to produce actionable science?
- What does your **institution / organization do to help you** produce actionable science?
- What are some **barriers from your institution/organization** to producing actionable science?
- Do you **work with others** to make your research more actionable?

16 activities of action-oriented scientists:

1. Focus on real-world impacts 
2. Science communication to the public, policymakers, and other scientists 
3. Building agency / capacity / knowledge 
4. Focus on user needs 
5. Networking & building relationships 
6. Boundary-spanning 
7. Creating long-standing partnerships with managers 
8. Collaborative interdisciplinary / transdisciplinary research 
9. Involving intended users in design of research & research questions 
10. Involvement in management / policy / action forums 
11. Strategic planning 
12. Deep listening / understanding 
13. Early engagement of stakeholders / end users of science 
14. Co-production of research questions, process, and results of value to both science and policy
15. Face-to-face interaction 
16. Open access / open-source data or findings 



	Real-world impact	Building capacity	Science communication	Boundary spanning	Partnerships	Collaborative research	Action forum	Co-production	Use-inspired research	Networking	Involving users in design	Early engagement	Strategic Planning	Deep listening	Face-to-face	Open access
Real-world impact	1															
Building capacity	0.32	1														
Science communication	0.09	0.09	1													
Boundary spanning	0.36	0.4	-0.1	1												
Partnerships	0.28	0.29	-0.02	0.53	1											
Collaborative research	0.26	0.12	0.04	0.32	0.1	1										
Action forum	0.24	0.23	0.18	0.15	0.15	0.08	1									
Co-production	0.26	0.27	-0.08	0.51	0.52	0.31	0.23	1								
Use-inspired research	0.43	0.49	0.04	0.56	0.35	0.31	0.03	0.49	1							
Networking	0.52	0.49	0.04	0.44	0.41	0.25	-0.03	0.37	0.57	1						
Involving users in design	0.33	0.3	-0.06	0.62	0.49	0.37	0.13	0.72	0.63	0.51	1					
Early engagement	0.28	0.24	-0.21	0.63	0.47	0.28	0.03	0.59	0.54	0.48	0.68	1				
Strategic Planning	0.24	0.3	-0.06	0.39	0.44	0.2	0.13	0.48	0.45	0.27	0.48	0.62	1			
Deep listening	0.31	0.28	-0.17	0.63	0.5	0.25	0.01	0.39	0.47	0.53	0.54	0.73	0.48	1		
Face-to-face	0.17	-0.13	-0.14	0.16	0.17	0.2	-0.08	0.1	0.25	0.1	0.15	0.14	0.15	0.25	1	
Open access	-0.24	-0.11	0.15	-0.1	-0.28	0.08	0.02	-0.16	-0.07	-0.25	-0.07	-0.19	-0.07	-0.22	-0.17	1

Co-occurrence matrix

- ➔ Some activities are strongly correlated
- ➔ Most correlations are **positive**, some are **negative**

5 levels of engagement in actionable science

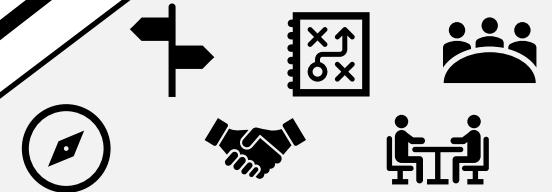
5) The Pluralists

Knowledge coproduction for – and by – both knowledge users (practitioners) and knowledge producers (researchers), transparency and early engagement of stakeholders
(**multidirectional information flow**)



4) The Collaborators

Engage in long-term, boundary-spanning knowledge partnerships, focus on real-world impacts and capacity-building



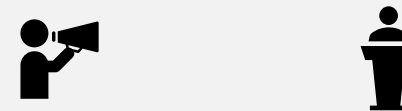
3) The Networkers

Use-inspired and stakeholder-engaged research, targeting specific user groups
(**two-way information flow**)



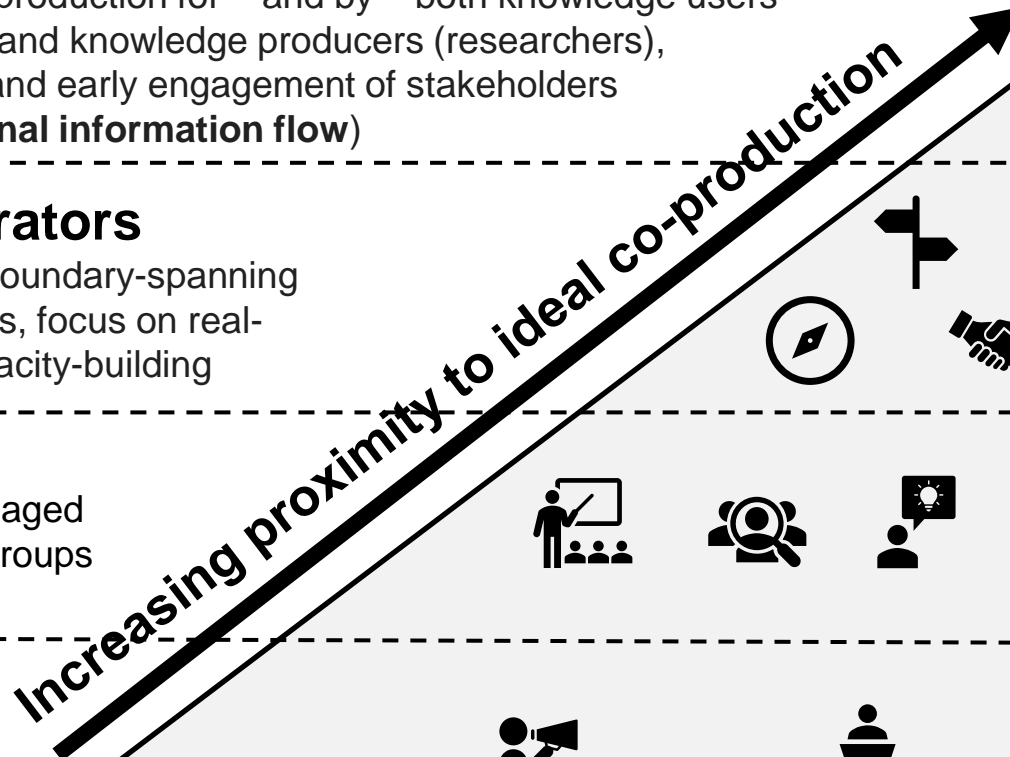
2) The Educators

Science communication in an appropriate format for different stakeholders
(**one-way information flow**)



1) The Disclosers

Open access only



Which actionable science type are you?

The Pluralist

The Collaborator

The Networker

The Educator

The Discloser



How could universities consider new metrics for conservation impact?

➔ Analysis based on quotes from our 71 interviews

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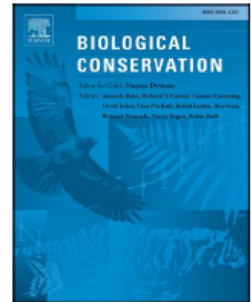


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Policy analysis

The impact factor of engaged research: Metrics for conservation outcomes

Simon Lhoest^{a,b,c,*}, Candice Carr Kelman^{b,d}, Chris J. Barton^{b,e}, Jessica A. Beaudette^{b,f}, Leah R. Gerber^{b,c}

Conservation impact?



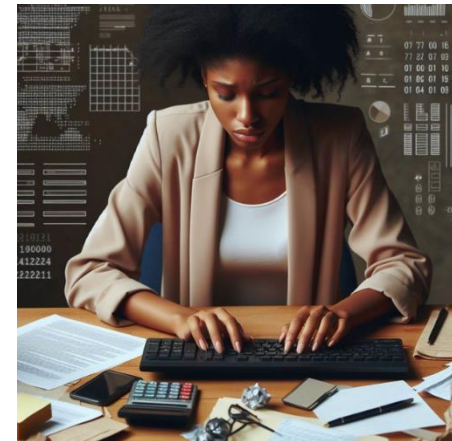
Conservation has always been a **mission-oriented discipline**

Conservation scientists usually **want to make an impact on real-world conservation outcomes**

... But what does it really mean to make an impact? ...

... Does publishing as many papers as possible in high-impact journals make the impact needed? ...

Universities usually reward researchers based on **publishing metrics** such as the **number of articles** they publish, the **citations** of their papers or their ***h-index***, resulting in **‘publish or perish’** pressures, leading scientists to prioritize publishing over other outcomes



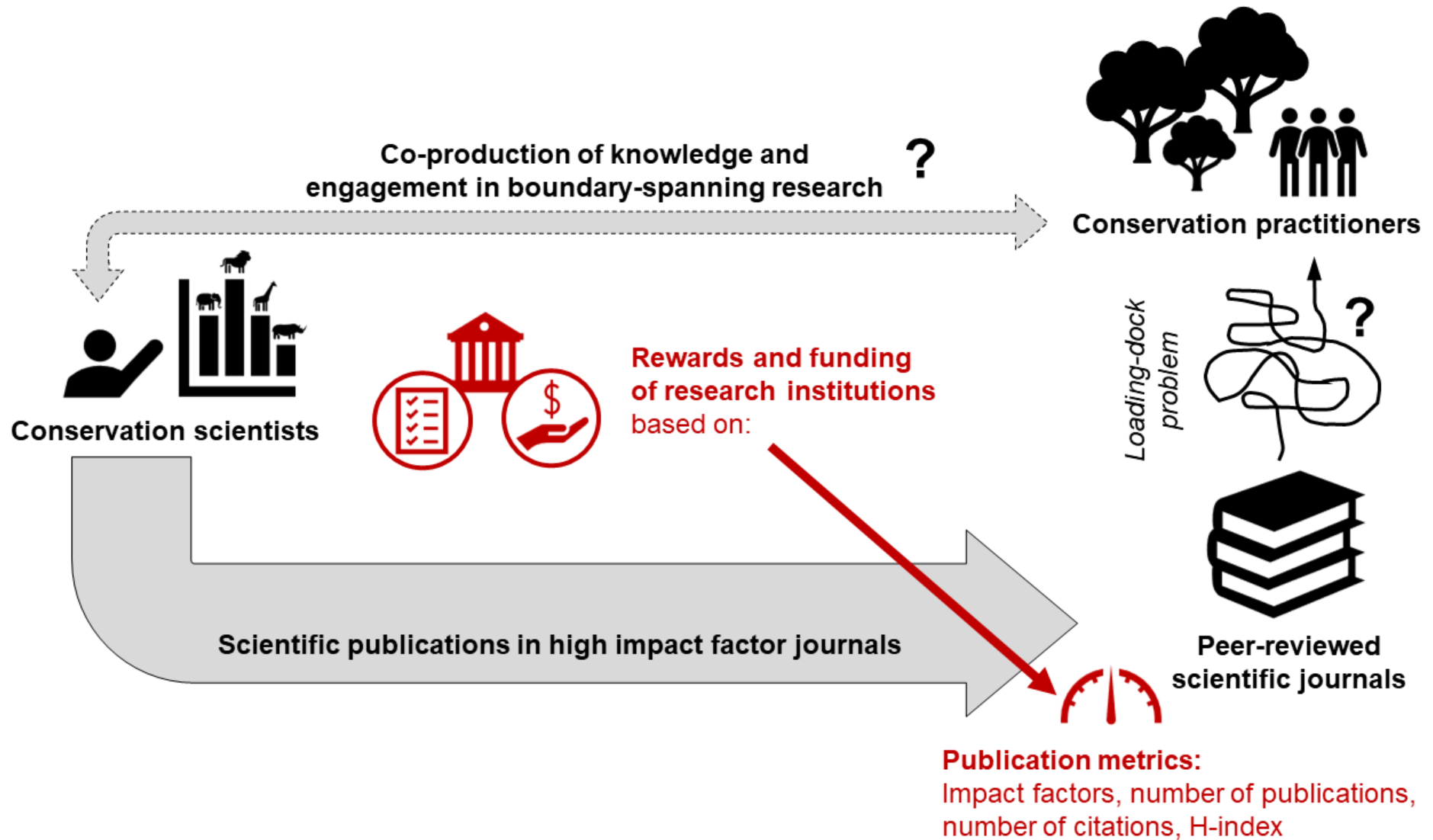


Fig. 1. Current problematic situation for research production, evaluation, and funding. The primary consideration of individual research metrics (journal impact factors, number of publications, number of citations, H-index) for the evaluation and funding of scientists by research institutions does not incentivize researchers to engage in boundary-spanning work. The width of gray arrows represents the research effort dedicated to publishing articles in peer-reviewed scientific journals (bottom arrow) and engaging in co-production of knowledge and boundary-spanning work (top arrow).

Structural barriers to engaged scholarship at universities

1. **Engagement is rarely recognized or rewarded** (e.g. products coproduced for partner organizations do not “count” as academic products toward tenure and promotion)
2. Only a **small minority of scholars find time to engage** with non-academic stakeholders in boundary-spanning work
3. It is **unreasonable** to expect most academics to engage in this work **without additional incentives**

Engaged research?

- Historically, natural sciences have sought **objectivity** by separating themselves from societal influences and concerns of decision-makers
- However, this mode of knowledge production **does not often result in actionable science to advance the public good**
- **Engaged scholarship** = practice of collaboratively including the various perspectives and competencies of academics and practitioners to coproduce knowledge to solve our complex and pressing conservation problems



Engaged research?

- **Coproduction** involves knowledge users and producers collaborating at every stage of a project's development
- Knowledge produced collaboratively with practitioners has a **much greater likelihood of having real impact on policy and practice**
- This can be **difficult and time-consuming**: scientists often lack the institutional support necessary to manage these complex processes
- **New institutional models for engaged scholarship are needed** to better connect scientists with practitioners



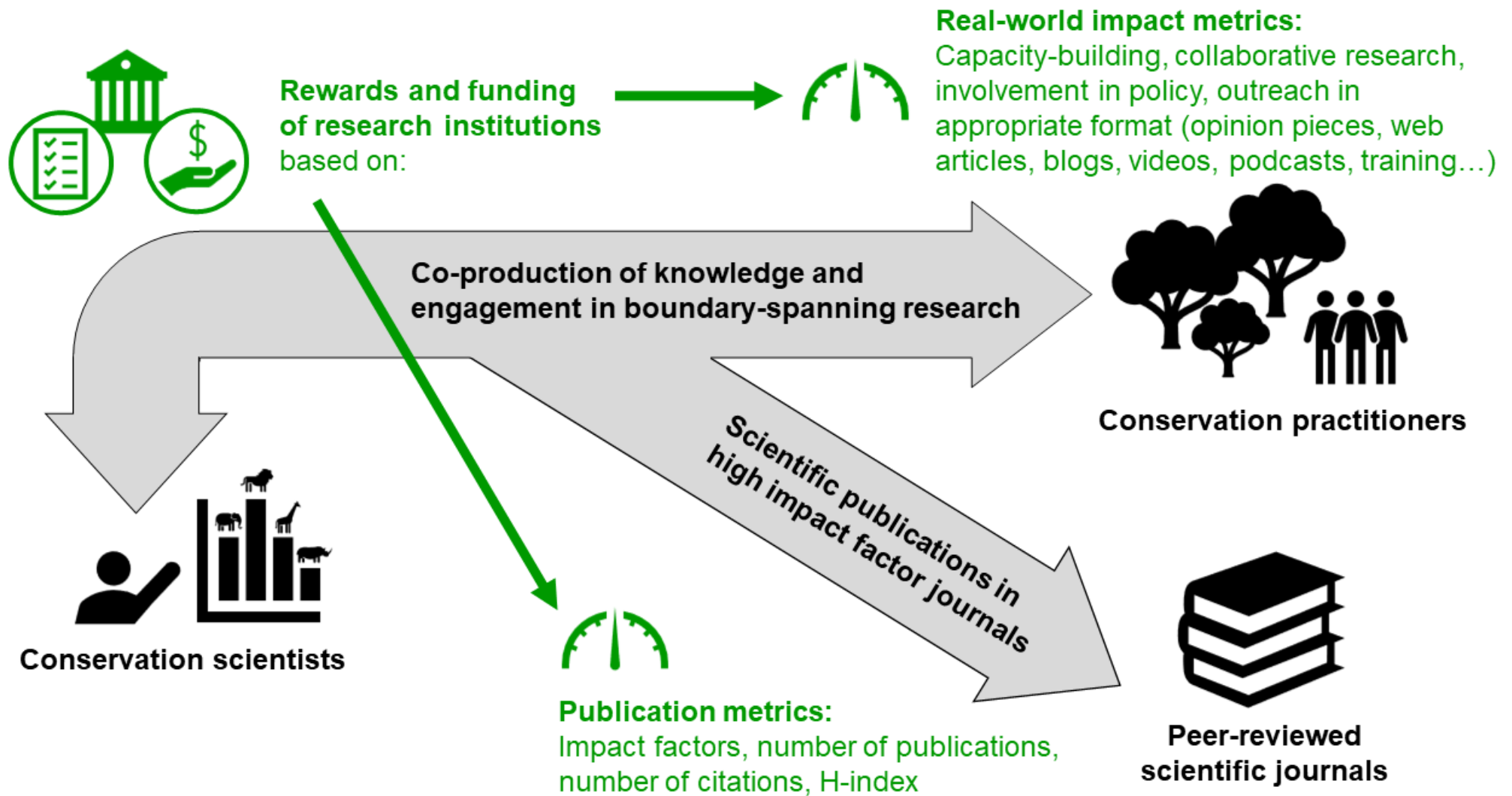


Fig. 2. Suggested framework for research production, evaluation, and funding of conservation scientists in academia. Beyond publication metrics, scientists' evaluation and funding criteria used by research institutions must also include the engagement in knowledge co-production and boundary-spanning research. The width of gray arrows represents the research effort dedicated to publishing articles in peer-reviewed scientific journals (bottom arrow) and engaging in co-production of knowledge and boundary-spanning work (top arrow).

We recommend that universities:

1. Actively **support faculty engagement in boundary-spanning** work, providing an interface between research and society
2. Meaningfully **reward faculty work** that makes a genuine **impact on efforts to solve real-world problems**, beyond academic publications
3. Use appropriate **metrics to recognize the value of impacts on society** and contributions to practical conservation outcomes

→ **YES**, Universities **CAN** reward actionable and engaged research

GUIDEBOOK FOR THE ENGAGED UNIVERSITY

Best practices for reforming systems of reward,
fostering engaged leadership, and promoting action-
oriented scholarship

BEYOND
THE ACADEMY

Participant Institutions



Beyond the Academy

Best practices recommendations

- 1. Use “**baskets of indicators**”:
Evaluation should include a suite of quantitative and qualitative measures
- 2. Adopt a “**narrative with numbers**” approach: Quantitative measurements should complement rather than replace qualitative data and stories
- 3. **Limit the use of journal impact factors**: they measure journal prestige rather than research impact or quality
- 4. Measure performance or merit against the **mission statement** of the research group, unit, or institution
- 5. Encourage researchers to develop **individual professional development plans** and use these plans as a basis for annual evaluation: Collectively develop and agree upon the suite of metrics that will be used to measure research impact
- 6. **Evaluate and update indicators** regularly

Take-home message

1. Let's publish **open access**
2. Let's share our work with the **audience that can use it directly**
3. Let's improve our **science communication**
4. Let's be **boundary-spanners**
5. Let's **coproduce** our work with the people who can use the work – from research question through communication of findings and recommendations





**Thank you
for your
attention!**

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