

Quelles opportunités pour les sciences de l'environnement d'intégrer le concept de durabilité ?

?

Olivier Dangles



Directeur Délégué Adjoint à la Science à l'IRD
En charge de la Science de la Durabilité

Chercheur écologue, Centre d'Écologie Fonctionnelle et Évolutive



Holden Thorp

*Readers who don't think Science and its publishing peers should write about politics often tell us to “**stick** to science.” We are sticking to science, but more importantly, we're **sticking up** for science.*



La science pour le “vrai” ou pour le “bien”?

tions—and the reality—of the world today. “Sustainability” was appropriated, almost overnight, by many scientists, engineers, policy makers, development experts, members of the press, and even the public, and applied to a wide variety of economic, environmental, and societal problems, because it filled a conceptual vacuum. It encompassed a complex problem or set of problems that had previously seemed diffuse, and suggested a topography of value toward which new knowledge could migrate. These may be the qualities necessary to displace the endless frontier as the ruling myth and metaphor of science and technology policy, and inspire the pursuit of a greater convergence between progress in the laboratory and progress in the complex world of human beings.

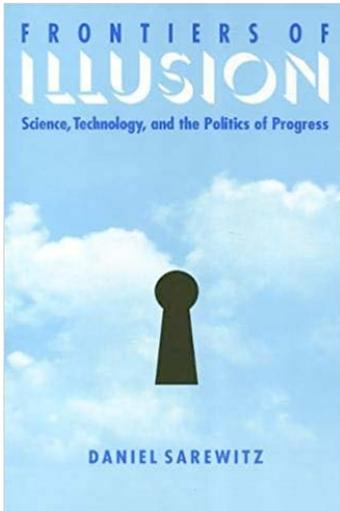


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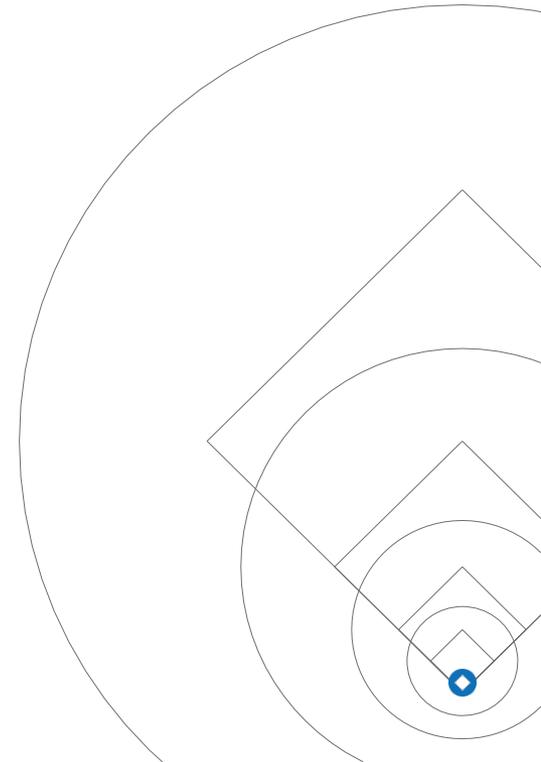
Entering the Century of the Environment: A New Social Contract for Science

Jane Lubchenco

As the magnitude of human impacts on the ecological systems of the planet becomes apparent, there is increased realization of the intimate connections between these systems and human health, the economy, social justice, and national security. The concept of what constitutes “the environment” is changing rapidly. Urgent and unprecedented environmental and social changes challenge scientists to define a new social contract. This contract represents a commitment on the part of all scientists to devote their energies and talents to the most pressing problems of the day, in proportion to their importance, in exchange for public funding. The new and unmet needs of society include more comprehensive information, understanding, and technologies for society to move toward a more sustainable biosphere—one which is ecologically sound, economically feasible, and socially just. New fundamental research, faster and more effective transmission of new and existing knowledge to policy- and decision-makers, and better communication of this knowledge to the public will all be required to meet this challenge.



Contexte international de la science de la durabilité



Premier réflexe: l'ODD washing



Olivier Dangles

Scientific Researcher at IRD

3w

Beware of ODD Washing ! Les ODDs ne doivent pas être des indicateurs de plus pour faire de nouveaux classements... On a plutôt besoin d'analyses qualitatives et réflexives autour des 169 cibles...

La contribution de l'INRAE et de Wageningen aux ODDs - sélection

➤ 5^{ème} rang mondial pour l'ODD 2 – Faim « zéro »
➤ 7^{ème} rang mondial pour les ODD 12, 13 et 15
en nombre de publications sur 2010-2019

Le FCWI, Field-Weighted Citation Impact, normalise les différences de comportement de citation selon les disciplines, l'année et le type de publication.
Normalisation : moyenne mondiale = 1



Objectifs de développement durable	Publications dans le monde 2010-2019	Publications INRAE 2010-2019	Pourcent	Rang mondial (inclure publications sur 10 000 institutions)	Proportion de collaboration internationale	Field weighted citation impact	Objectifs de développement durable	Publications dans le monde 2010-2019	Publications Wageningen 2010-2019	Pourcent	Rang mondial (inclure publications sur 10 000 institutions)	Proportion de collaboration internationale	Field weighted citation impact
2 Faim « zéro »	154 268	2 233	1,4%	5	57,3%	1,85	2 Faim « zéro »	154 268	2 263	1,5%	4	73,1%	2,53
3 Bonne santé et bien-être	6 143 882	10 170	0,2%	>120	40,3%	1,92	3 Bonne santé et bien-être	6 143 882	4 957	0,1%	>100	61,2%	2,42
6 Eau propre et assainissement	76 149	606	0,8%	14	95,8%	1,79	6 Eau propre et assainissement	76 149	622	0,8%	13	80,8%	2,51
12 Production responsable et consommation responsable	136 761	830	0,6%	7	51,2%	1,83	12 Production responsable et consommation responsable	136 761	780	0,6%	9	64,1%	2,40
13 Action pour le climat	305 672	3 570	1,2%	7	66,6%	2,21	13 Action pour le climat	305 672	3 086	0,9%	18	75,8%	2,17
15 Vie aquatique	192 282	2 709	1,4%	7	61,8%	2,08	15 Vie aquatique	192 282	2 237	1,2%	9	76,1%	1,85

Source : Schola données extraites le 28 juillet 2020



Olivier Dangles

Scientific Researcher at IRD

3w

Et en parlant des défis, les voici pour rappel...



Contexte international

Ethique du partenariat au Sud



Rôle de la science



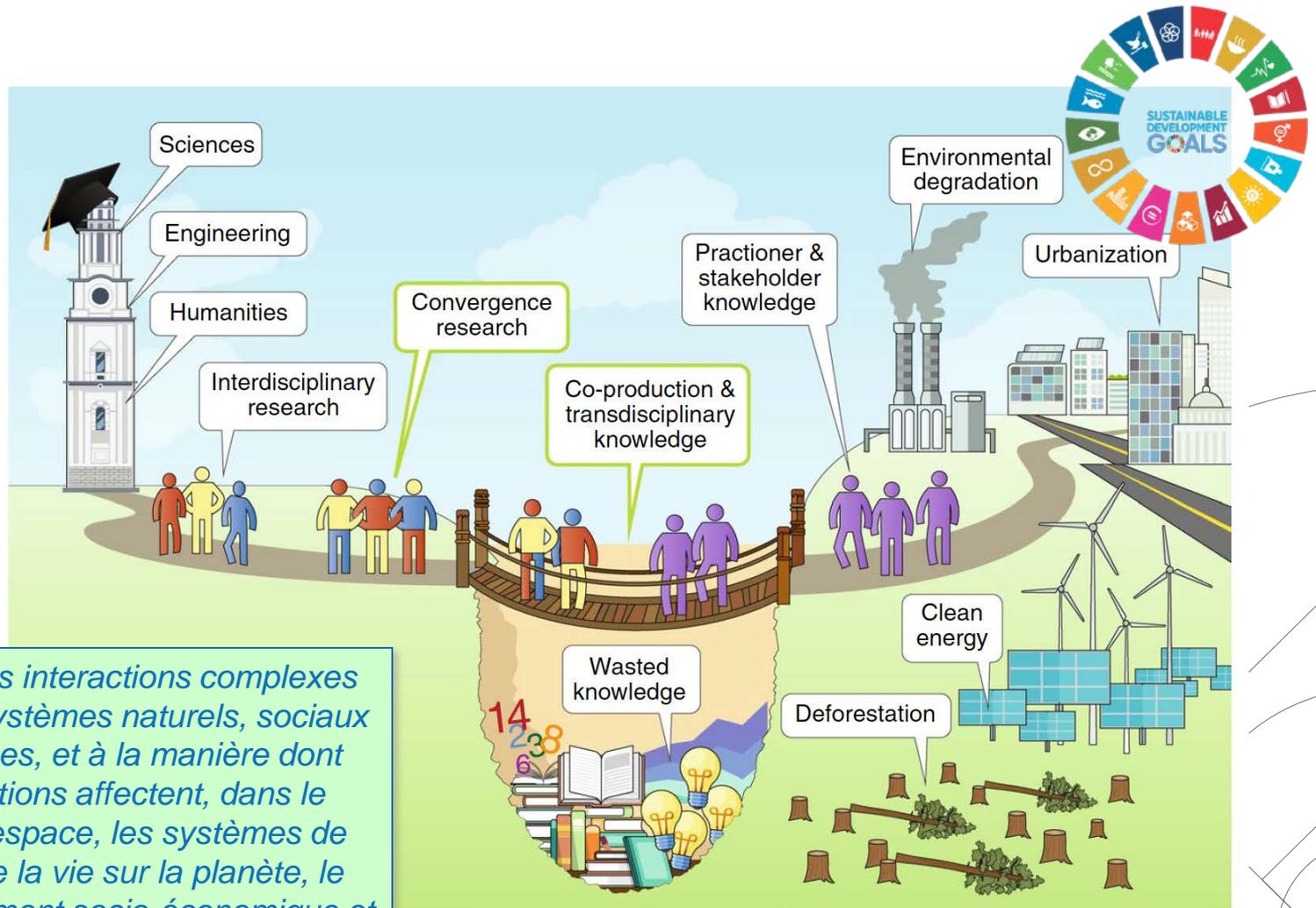
Contrat social

1. Qu'est-ce que la science de la durabilité?

2. Quels défis pour l'avenir?



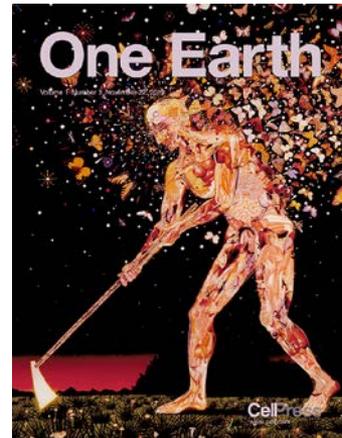
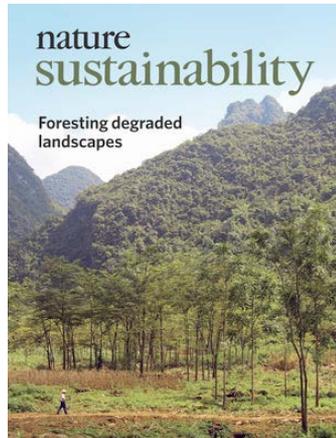
Science de la durabilité: le socio-écosystème



« Etude des interactions complexes entre les systèmes naturels, sociaux et techniques, et à la manière dont ces interactions affectent, dans le temps et l'espace, les systèmes de maintien de la vie sur la planète, le développement socio-économique et le bien-être humain. »

Irwin et al. (2018) Nature Sustainability

Science de la durabilité: des revues scientifiques, des colloques, des financements



Comprendre, co-construire, transformer



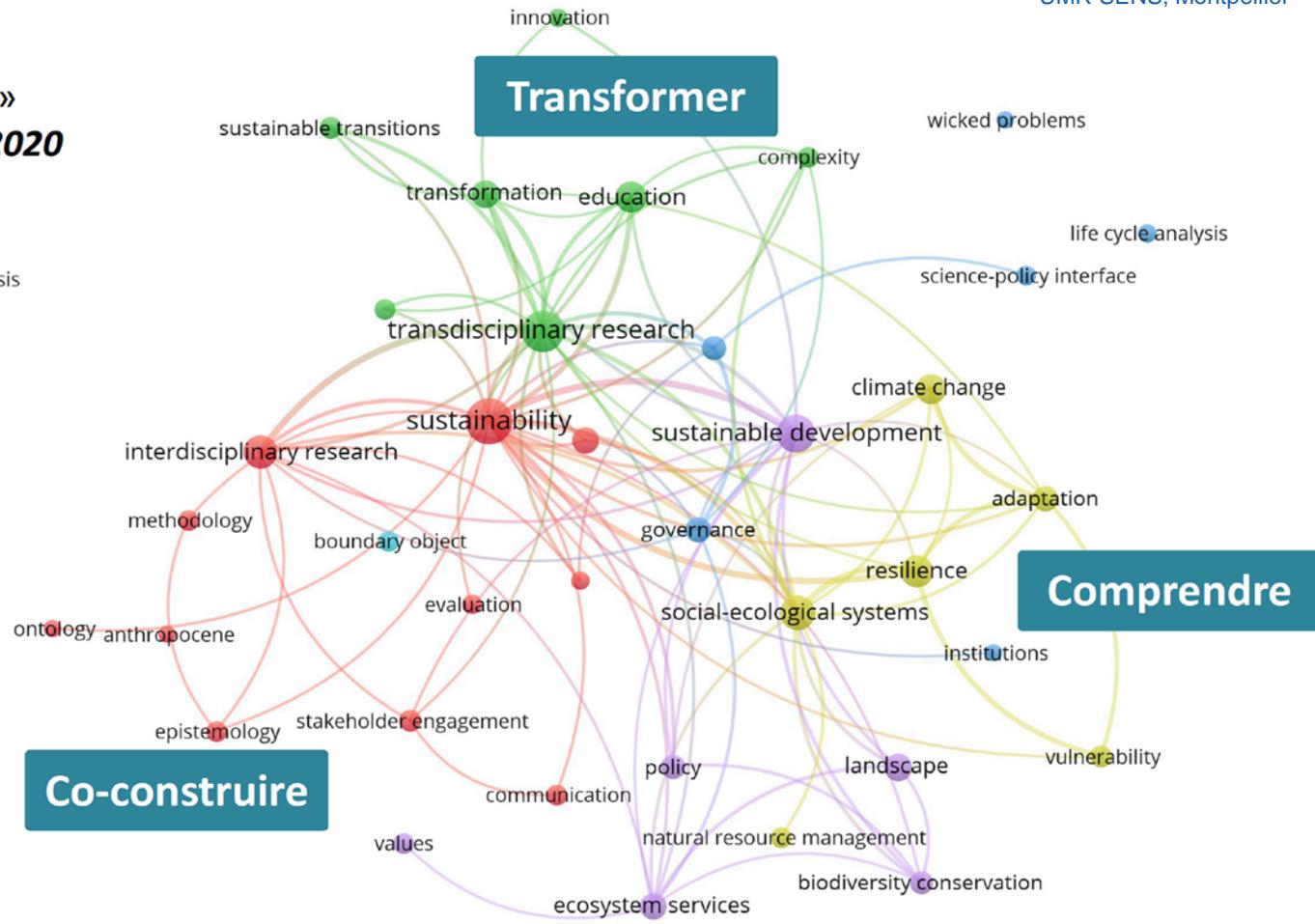
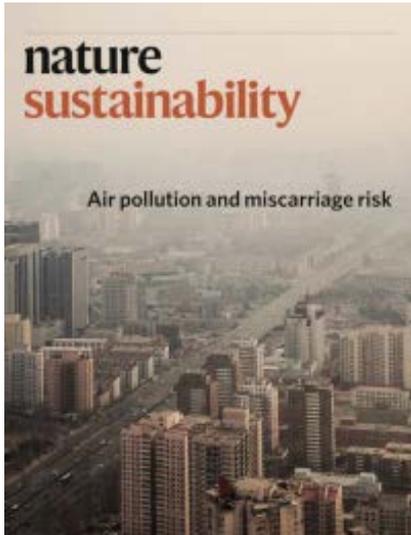
Julien Blanco, IRD,
UMR SENS, Montpellier

WoS

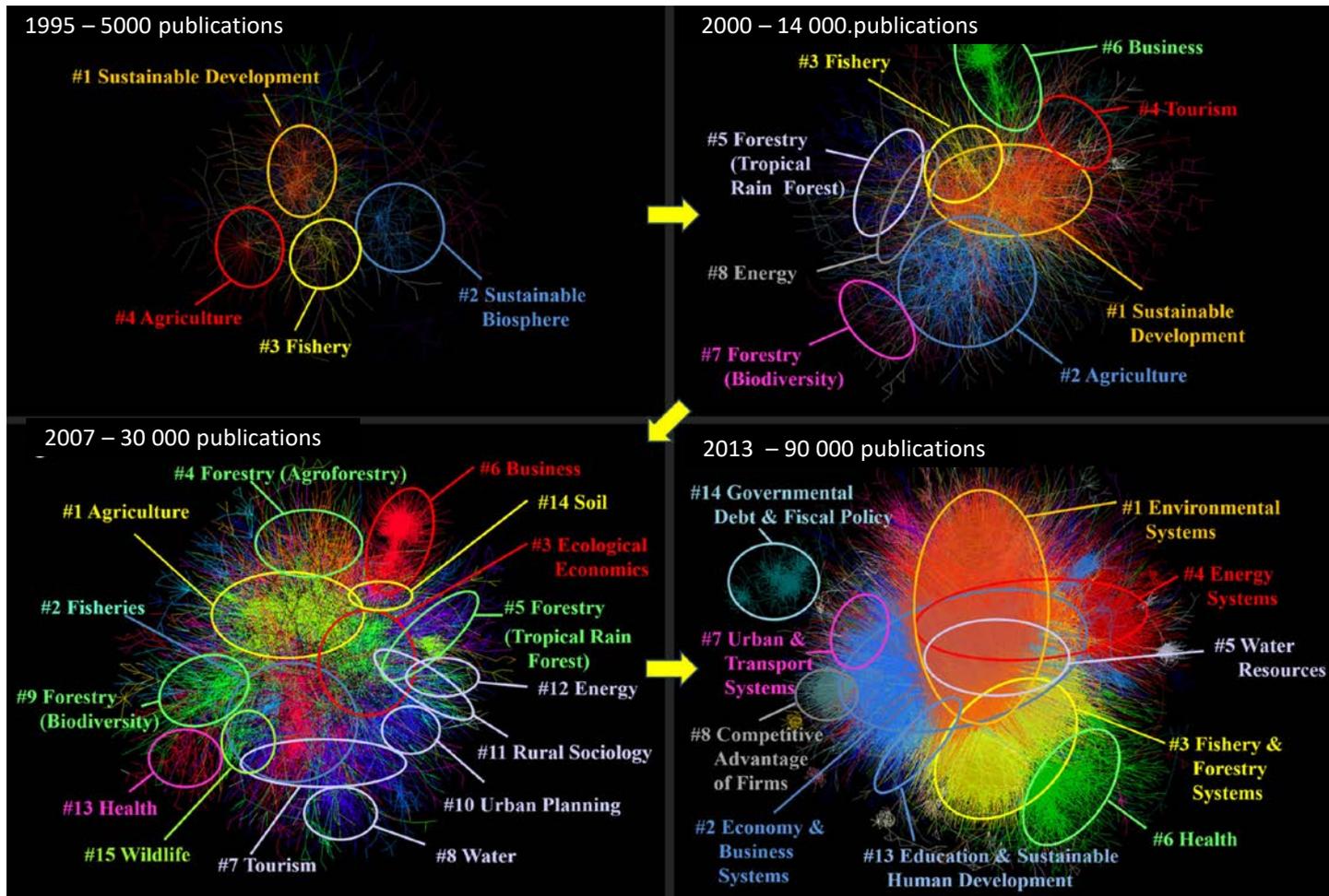
TS = « sustainability science* »

1 129 références entre 2001 et 2020

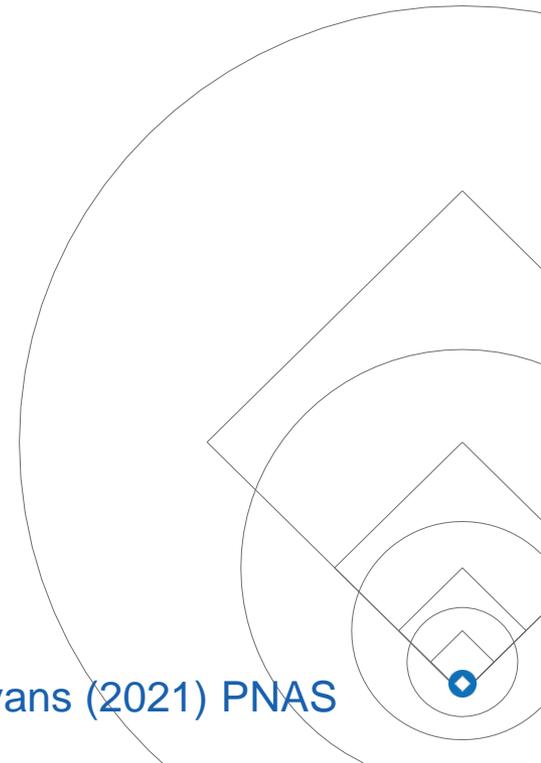
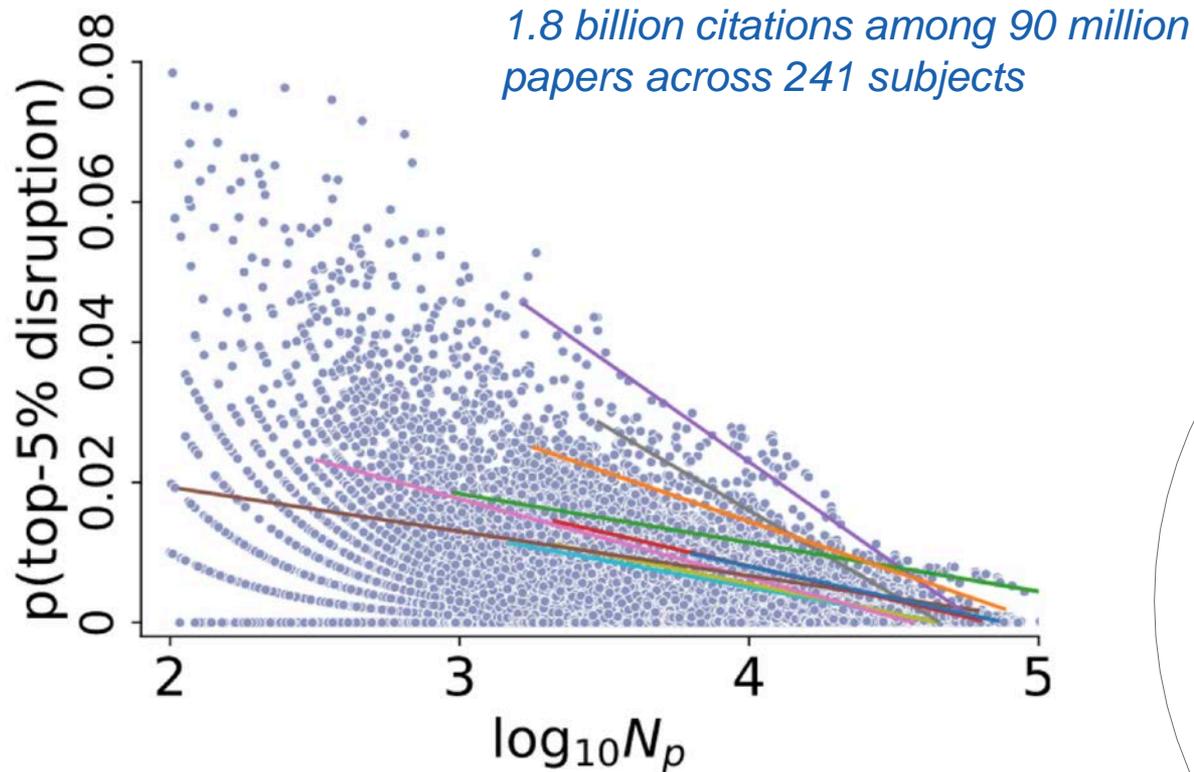
network analysis



L'interdisciplinarité pour une approche en systèmes complexes en réponse aux « *wiked problems* »

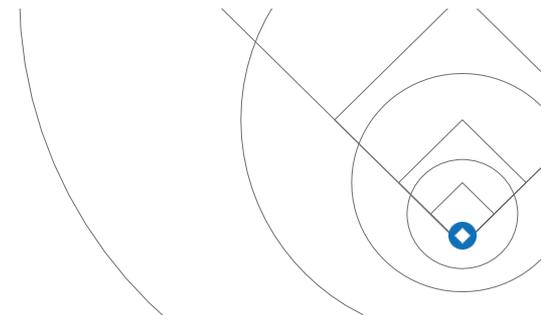
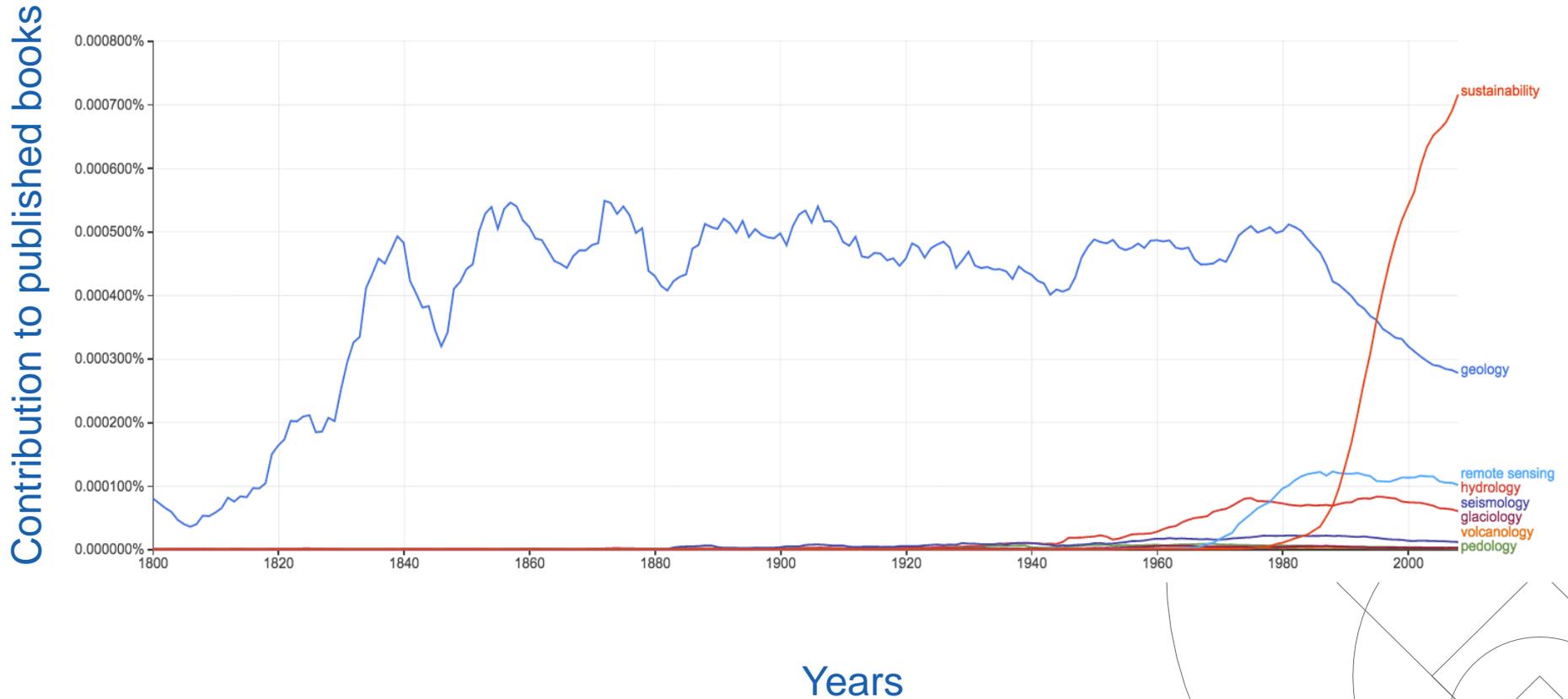


Could we be missing fertile new paradigms because we are locked into overworked areas of study?



Ne pas manquer le défi de la durabilité

Google Books Ngram Viewer





ASU Arizona State University

Earth science for sustainability

Peter Schlosser and Stephanie Pfirman

Human activities increasingly lead to climate change, overuse of water, hazards and the destruction of biodiversity — to name just a few. Earth scientists need to take on the challenge of serving society on these issues, in close collaboration with engineering, social sciences and the humanities.

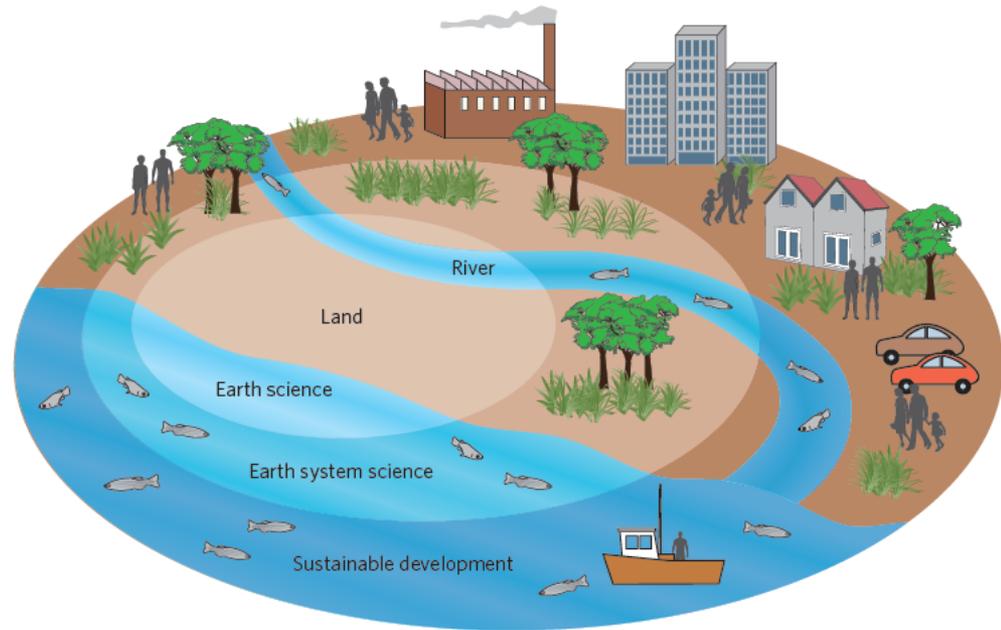
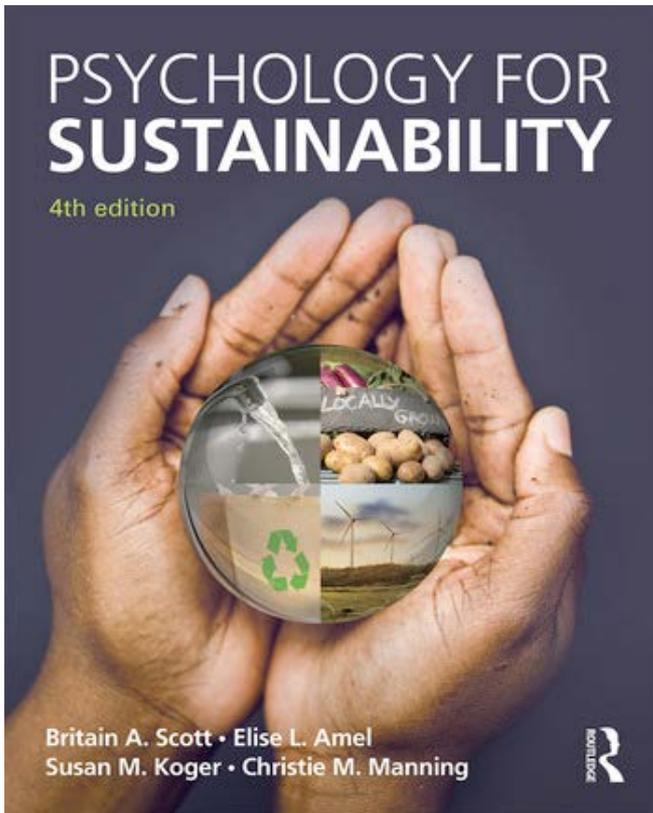


Figure 1 | Towards sustainable development. The Earth sciences (central oval) have progressed towards Earth system science, which includes interactions of the physical components of Earth with the human domain to inform decisions on

Science de la durabilité et grands défis

EBOLA

Immunologie

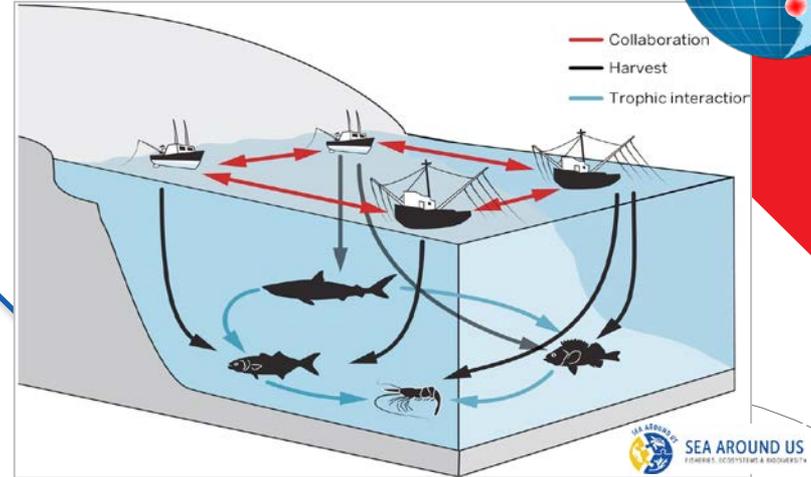


The Lancet, 2017, Delaporte

Science, 2011, Cuny
Nature Comm., 2014, Bertrand

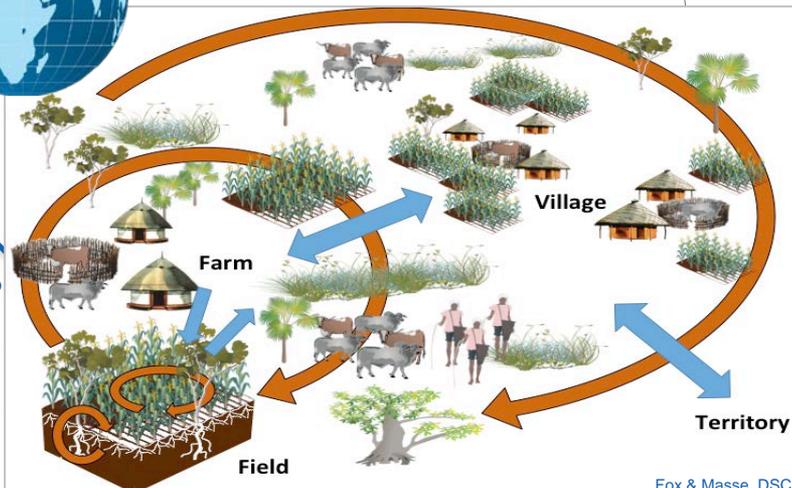
INTERDISCIPLINARITÉ (coopération)

PÊCHERIES



APPROCHE SYSTÉMIQUE (complexité)

AGRICULTURE DURABLE

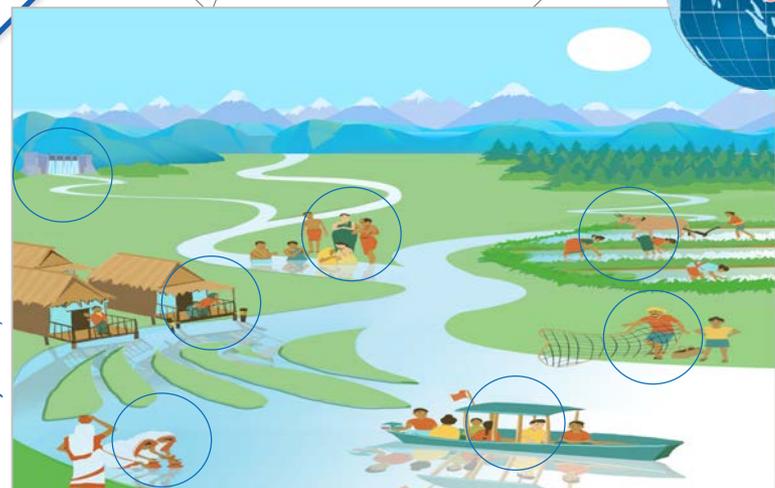


Science, 2019, Verdier
PNAS, 2014, Dangles

Fox & Masse, DSCATT

ÉCHELLES LOCALES/GLOBALES (option-contexte)

GESTION DE L'EAU



Science, 2018, Molle

Institut de Recherche
pour le Développement
FRANCE

RECHERCHE MULTI-ACTEURS, PARTICIPATIVE

Conflicts entre ODDs

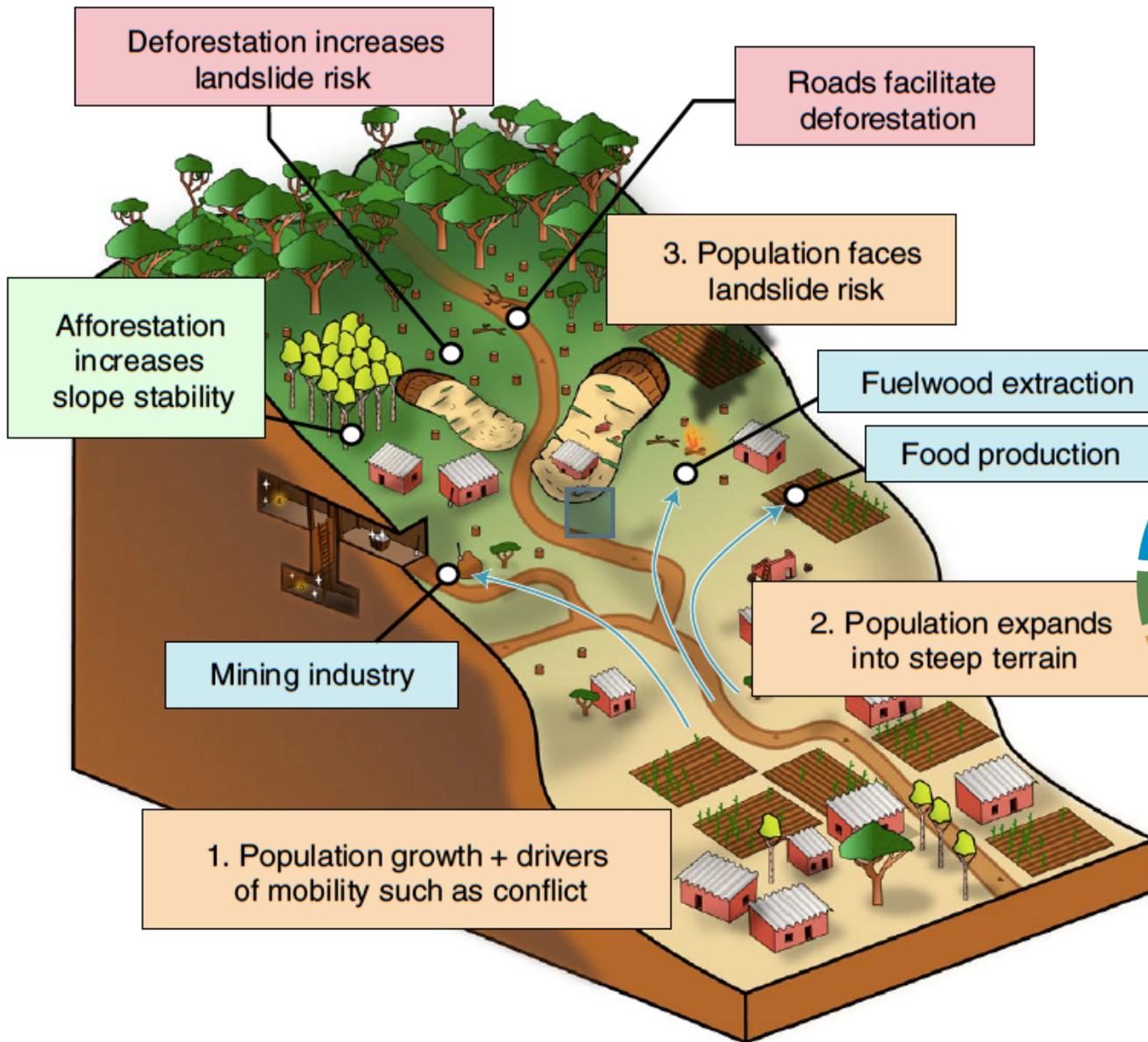
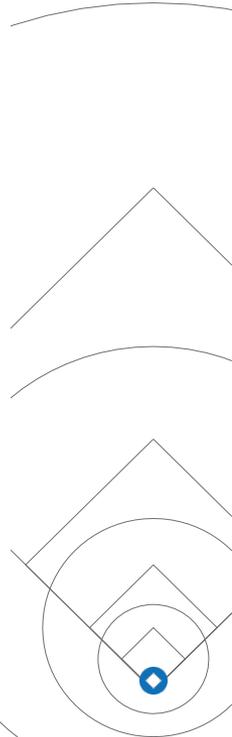
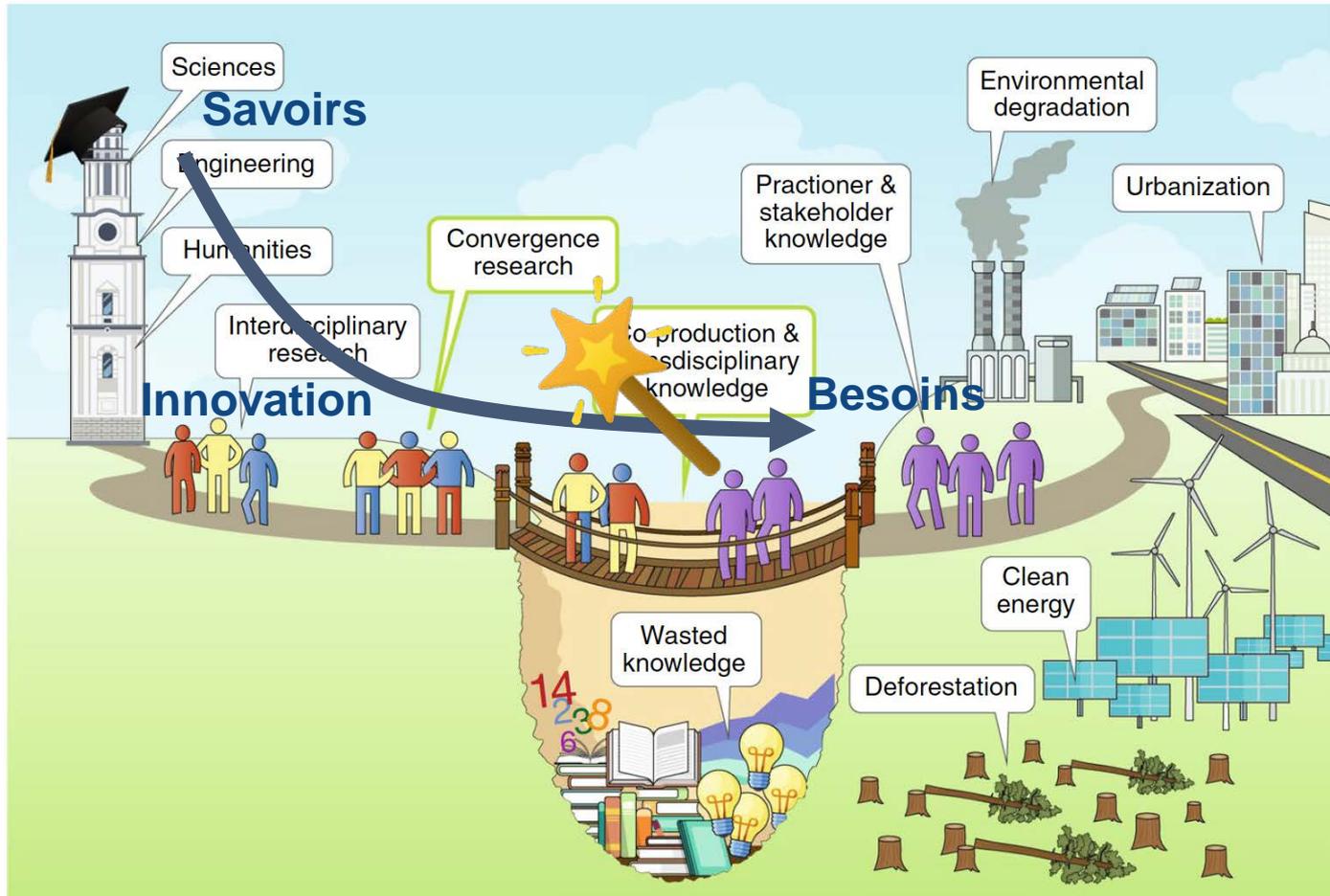


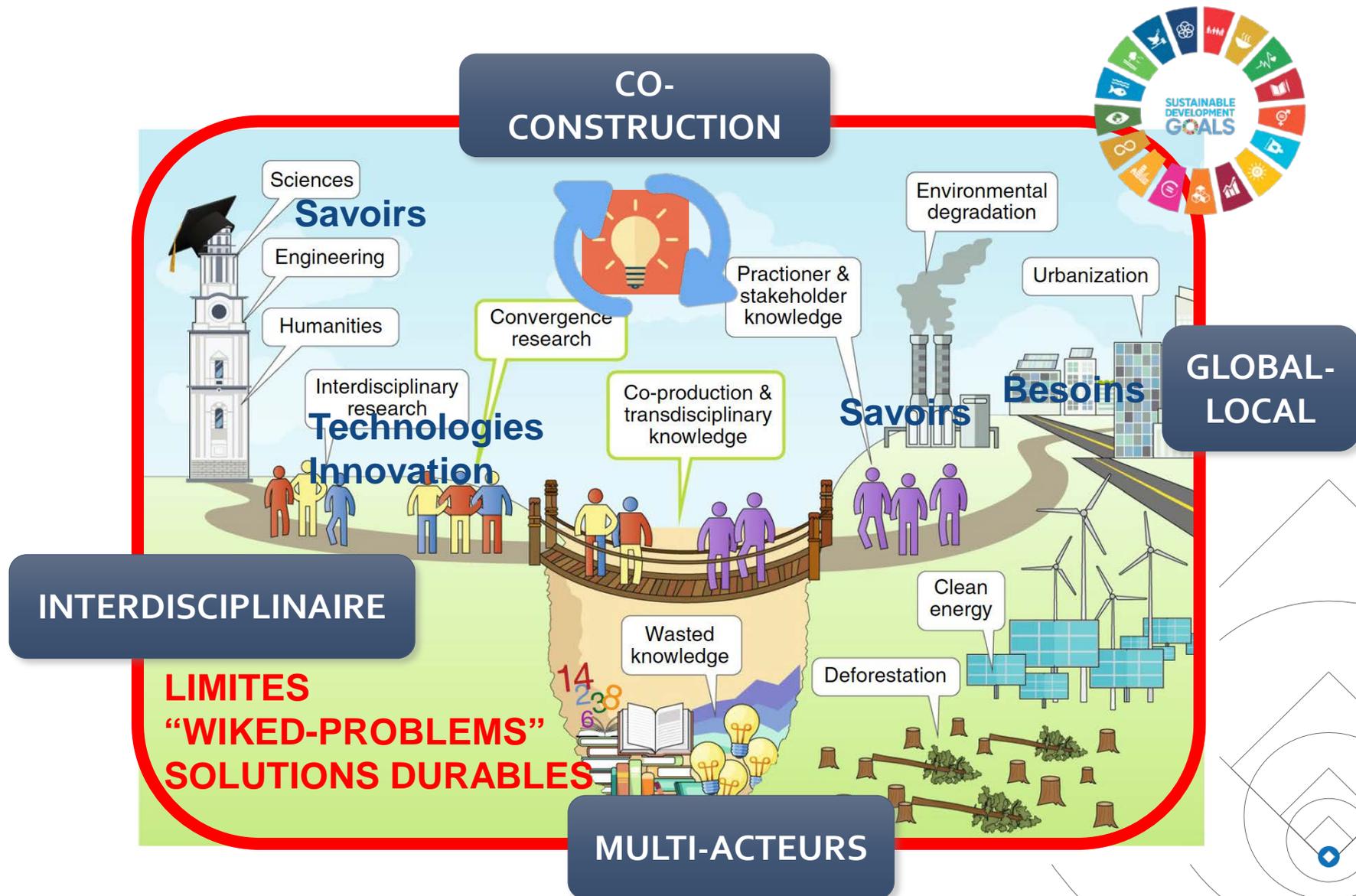
Fig. 6 | Conceptual overview of the key processes affecting shallow landslide risk in the Kivu Rift. The orange boxes represent the trajectory

Qu'est-ce qui change vraiment?

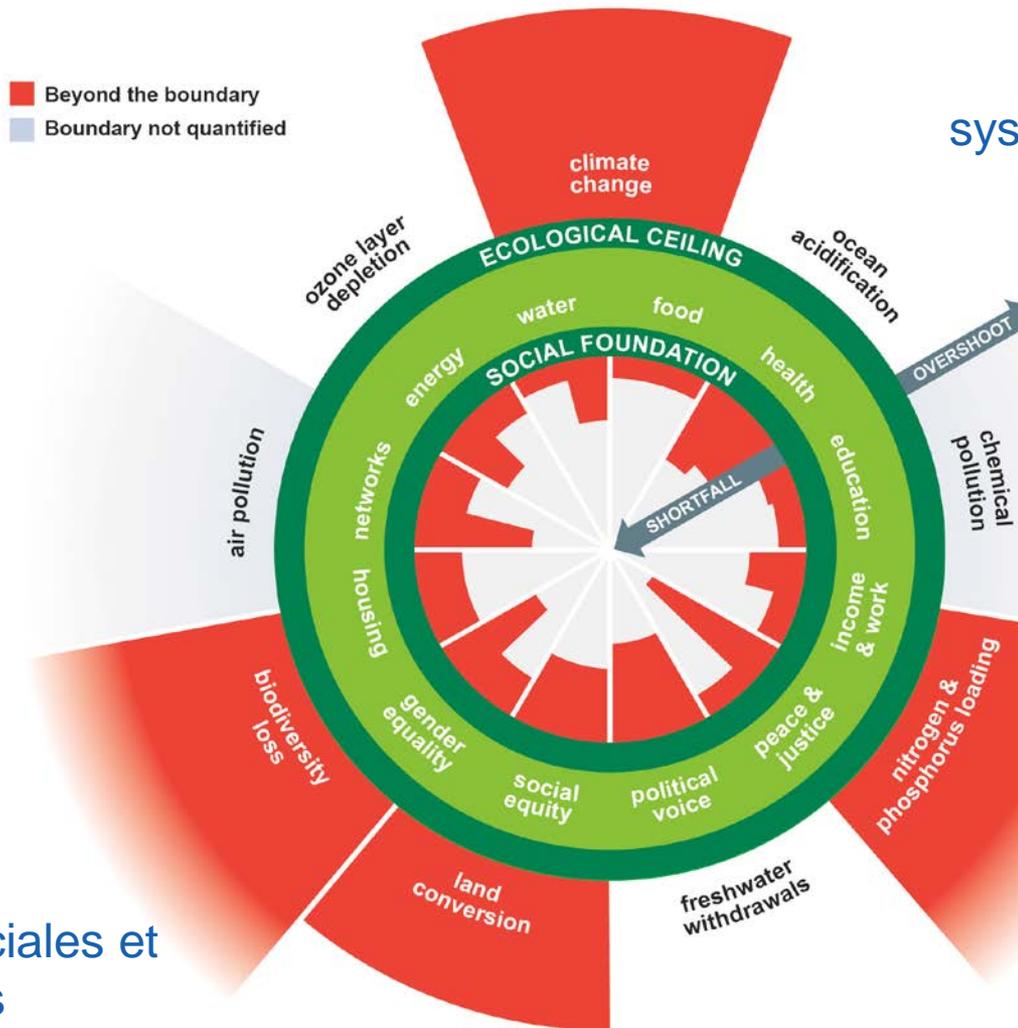
AVANT



La science de la durabilité: un nouveau paradigme

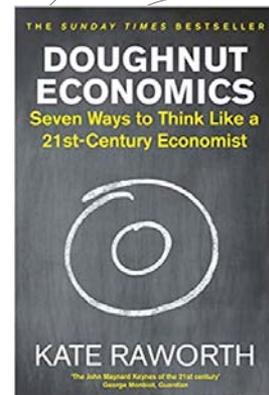


Un cadre pour relier les limites environnementales et les enjeux sociaux

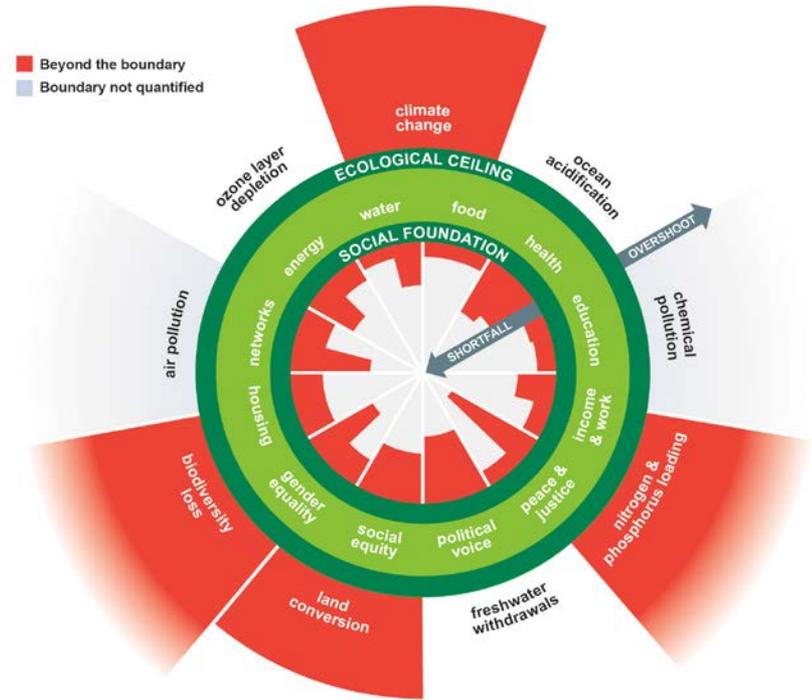


Connaissance systémique du système Terre

Dynamiques sociales et politiques

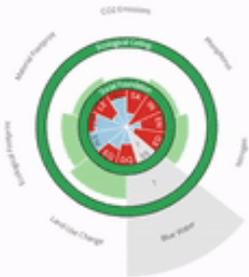


Un cadre pour relier les limites environnementales et les enjeux sociaux



The social shortfall and ecological overshoot of nations

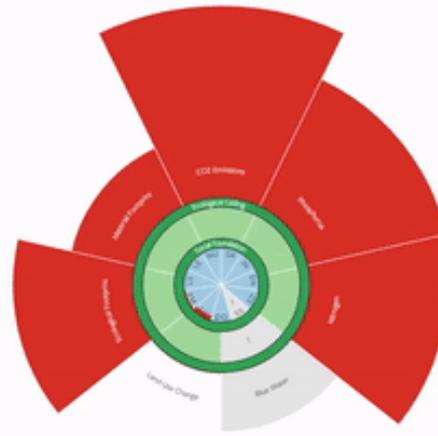
1992 2015



Nigeria

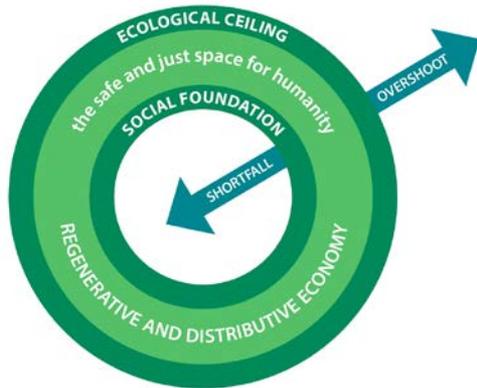


China

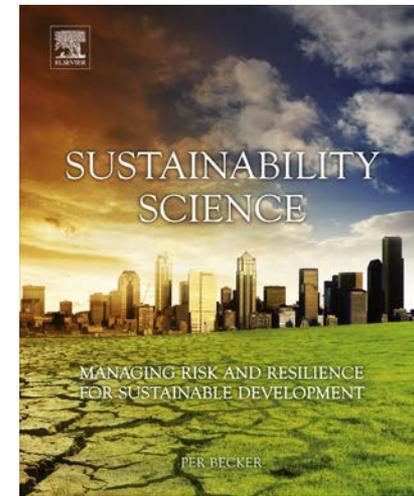
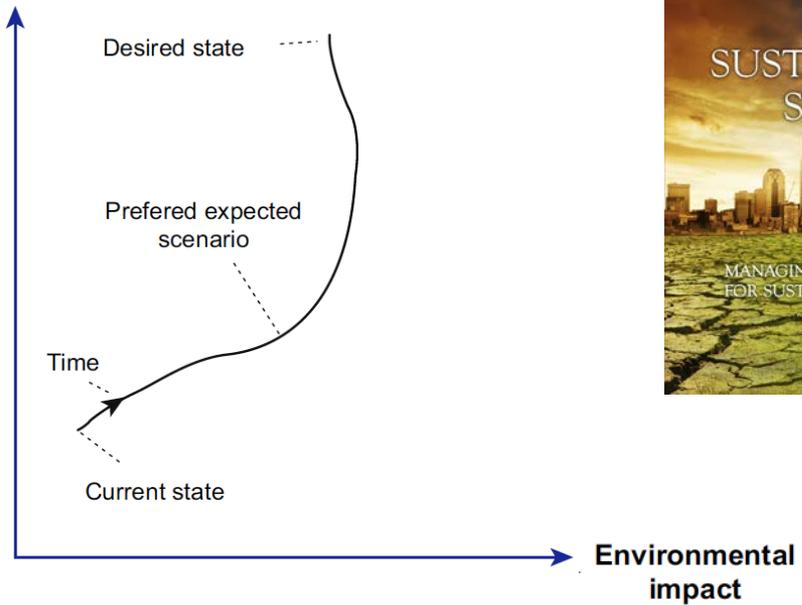


USA

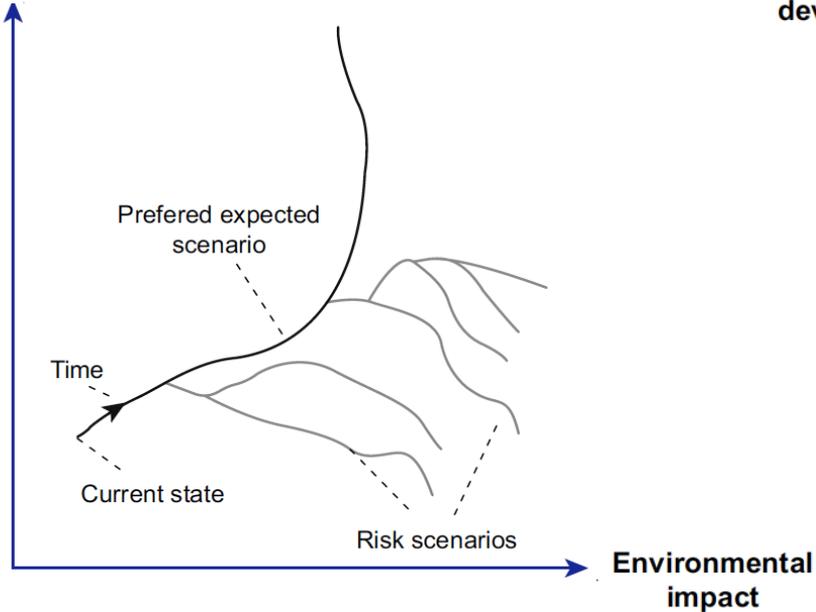
Les risques et la durabilité



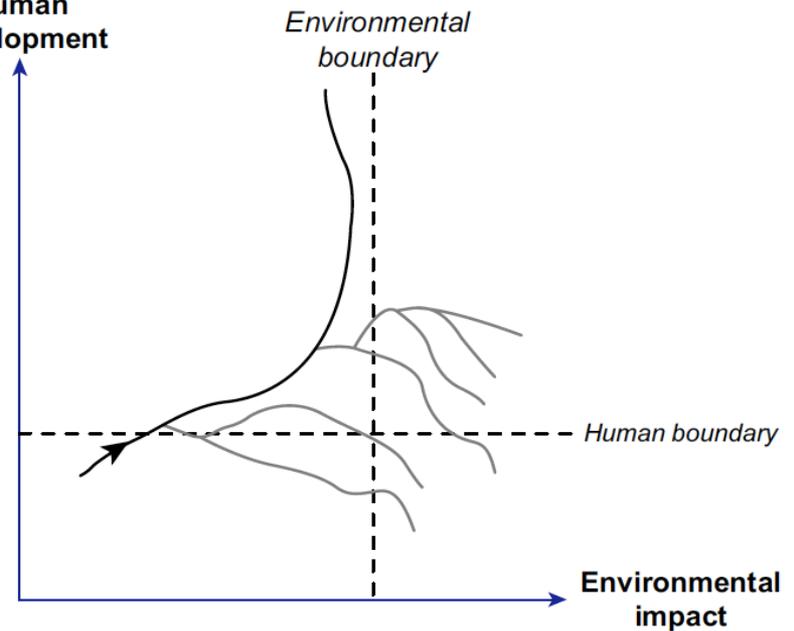
Human development



Human development



Human development

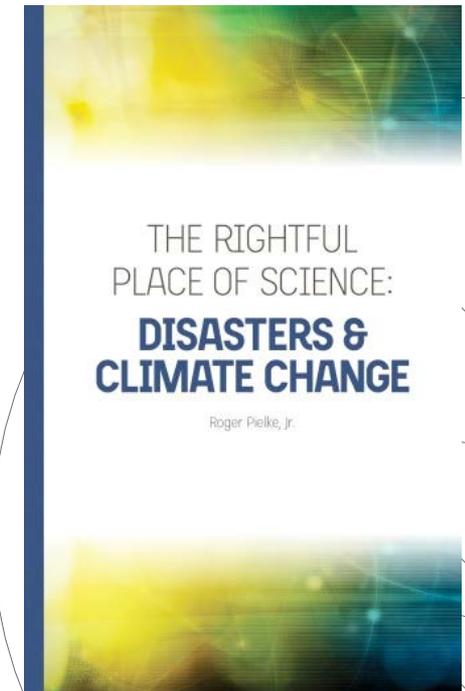


Evènements rares et durabilité



Julien Rebotier

- ◆ Observations, compréhension des processus, modélisation, évaluation des dégâts
- ◆ Ce que l'on sait déjà permet-il de mieux comprendre les dommages possibles, mieux prédire la réponse/résilience des sociétés (lien entre configuration sociale et vulnérabilité)?
- ◆ Aurait-on besoin de pratiques interdisciplinaires pour améliorer la prévention des désastres?
- ◆ Peut-on inclure ces connaissances dans l'établissement de scénarios, de chemins vers la durabilité (*sustainability pathways*), de transitions?

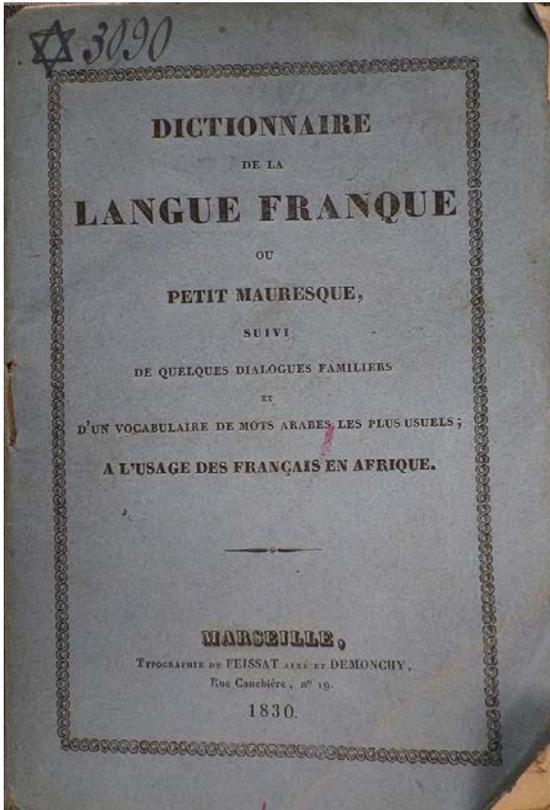


1. Qu'est-ce que la science de la durabilité?

2. Quels défis pour l'avenir?



Interdisciplinarité: se comprendre entre SHS et sciences de l'environnement



Se ti sabir,
Ti responder ;
Se non sabir,
Tazir, tazir.

The golden age of social science

PNAS Proceedings of the National Academy of Sciences of the United States of America

Anastasia Buyalskaya^{a,1}, Marcos Gallo^a, and Colin F. Camerer^{a,b}

Edited by Matthew O. Jackson, Stanford University, Stanford, CA, and approved November 23, 2020 (received for review May 14, 2020)

Interdisciplinarity needs a common trade language across disciplines, a “lingua franca.” In a useful lingua franca, all disciplines adopt the “best” language from whichever discipline has described an idea most effectively. In order for teams of researchers to effectively tackle the complex research questions of our time, they will need to work together to build a common vocabulary that enhances the efficiency of their trade and collaboration.

PNAS 2021 Vol. 118 No. 5 e2002923118

Natures Sciences Sociétés 13, 184-188 (2005)
© NSS-Dialogues, EDP Sciences 2005
DOI: 10.1051/nss:2005030

Natures
Sciences
Sociétés

Forum

Dossier Interdisciplinarité Canevas pour une réflexion sur une interdisciplinarité entre sciences de la nature et sciences sociales

Marcel Jollivet^a, Jean-Marie Legay^b

^a Sociologue, LADYSS, Université de Paris X, bât. K, 92001 Nanterre cedex, France

^b Biométricien, LBBE, Université Claude Bernard, Lyon 1, 43 boulevard du 11 novembre 1918, 69622 Villeurbanne cedex, France

Quelle intégration des disciplines?
Quel degré de pollinisation croisée?

Principles for knowledge co-production in sustainability research

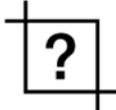
Albert V. Norström , Christopher Cvitanovic, [...] Henrik Österblom



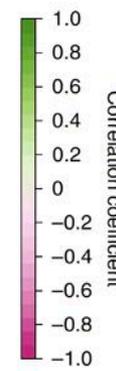
Fig. 1 | Principles for knowledge co-production in sustainability research should be context-based, pluralistic, goal-oriented and interactive.

Knowledge co-production for sustainability should be context-

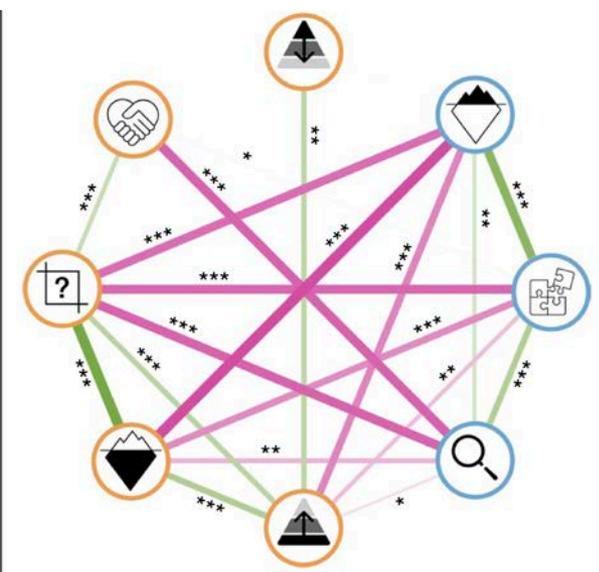
3. Comment aborder la co-construction?

Theme	Approach
Purpose Why do actors co-produce?	To solve problems 1 5 2 5 6 9 4 
	To reframe problems 0 3 3 3 8 5 10 
Power How is human agency conceptualized?	Shaping direct agency 3 2 8 4 5 6 4 
	Shaping systemic agency 1 2 3 4 10 6 6 
Politics How are power relations changed?	Influencing powerful actors 2 4 9 9 8 0 0 
	Empowering marginalized actors 1 8 3 5 11 3 1 
Pathways How are impacts catalysed?	By producing knowledge 2 4 4 4 6 6 6 
	By relating together 0 1 6 8 3 6 8 

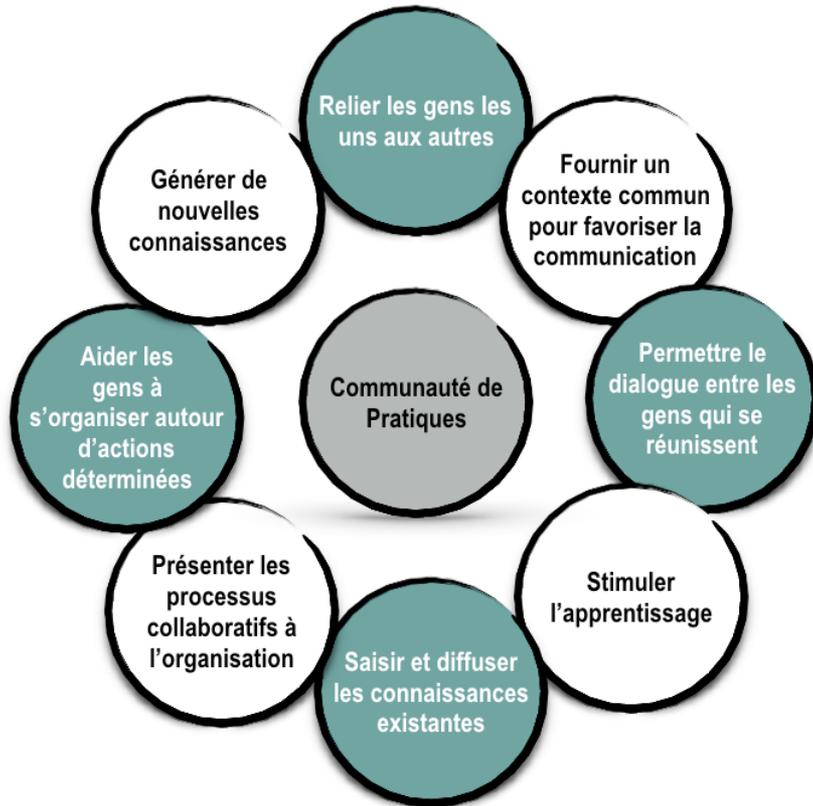
Dimension relations



*P<0.05
**P<0.01
***P<0.001



Les communautés de pratiques et de savoirs



Formation d'animateurs de communauté



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Triptyque à l'IRD: défis clés, conseillers, communautés



One Health



Littoral et mer



Sols et terre



Systèmes alimentaires durables



Biodiversité



Villes durables



Migrations



Changement climatique



Géoressources et durabilité



200

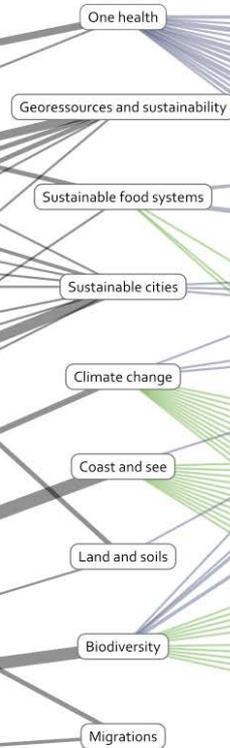
chercheurs,
ingénieurs,
acteurs de la
société civile
Par CoSav

Des défis transversaux (inégalités, eau, agro-écologie, risques)

Axes de recherche en amont

COMMUNAUTÉS DE SAVOIRS

CIBLES ODD



LABOS



Travail sur les CoSav



M. Mambrini



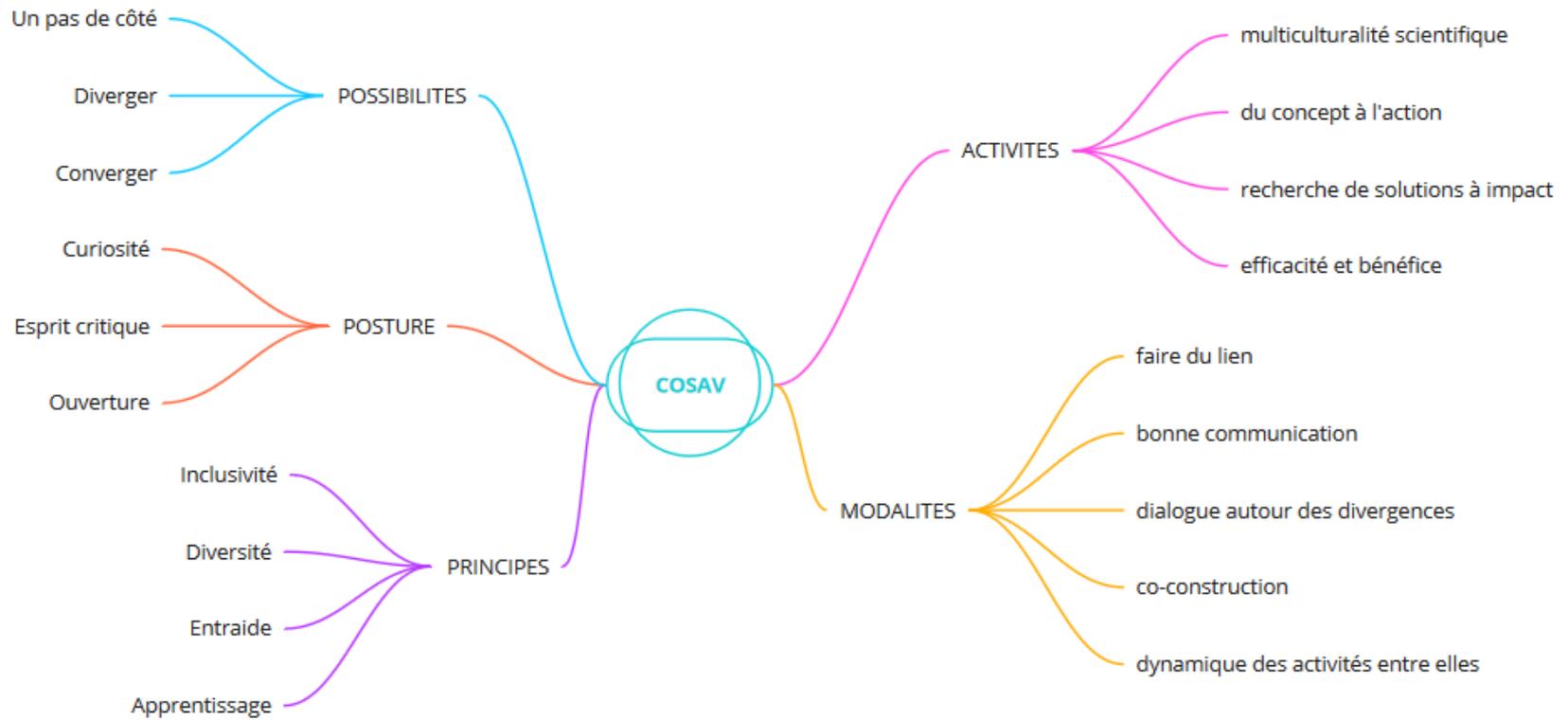
G. Mainguy



M. Ribals



L. Houdebine

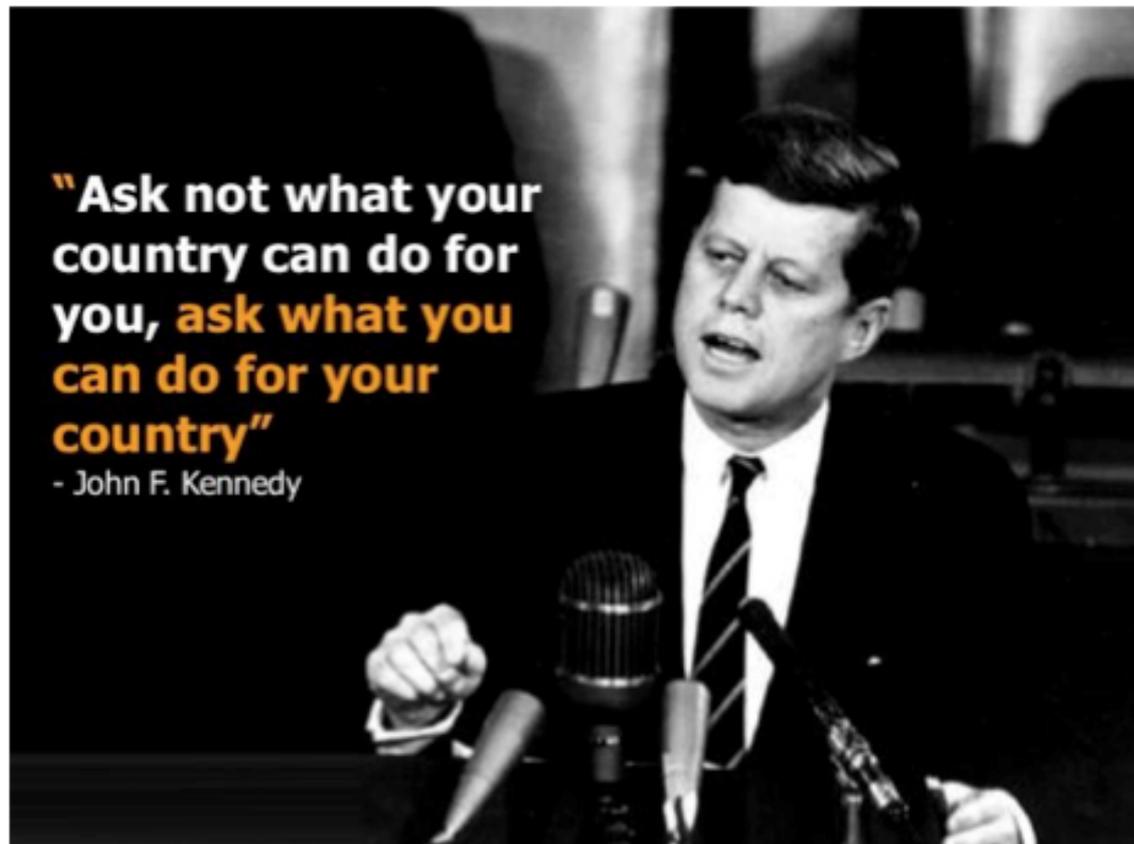


Changement de posture

La science de la durabilité



R. Devillers, IRD
UMR ESPACEDEV



Pas comment les financements de recherche peuvent faire avancer mon programme de recherche
...
mais comment mes compétences de chercheur peuvent aider à solutionner des problèmes sociétaux

Courtoisie de R. Devillers

Offrir ses compétences sur des terrains communs

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 - LBGTQ+
- Age Group
- Setting
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- Other At-Risk Population Group

The World Needs Students with Interdisciplinary Education

When students can understand and make connections across a diverse array of knowledge and skills, they embark on a path to more rewarding lives and employment opportunities. Higher education can and must do a better job of leading the way out of disciplinary silos. Bear & Skorton (2019) *Issues in Science & Technology*

SCIENCE ADVANCES | RESEARCH ARTICLE

SOCIAL SCIENCES

Flexible learning, rather than inveterate innovation or copying, drives cumulative knowledge gain

Elena Miu^{1,2*}, Ned Gulley³, Kevin N. Laland¹, Luke Rendell¹

Human technology is characterized by cumulative cultural knowledge gain, yet researchers have limited edge of the mix of copying and innovation that maximizes progress. Here, we analyze a unique large-scale originating from collaborative online programming competitions to investigate, in a setting of complexity, how individual differences in innovation, social-information use, and performance generalise to cumulative knowledge gain. We find that cumulative knowledge gain is primarily driven by pragmatists, willing to copy, explore, and take risks flexibly, rather than by pure innovators or habitual copiers. Our study also reveals the role for prestige in information transfer.

Forming the next generation of European interdisciplinary scientists

Ariel B. LINDNER^{a,b,1} and Francois TADDEI^{a,b,1}

^aINSERM U571 laboratory and ^bCentre de Reflexions Interdisciplinaires (CRI) – Paris Interdisciplinary College (PIC), Faculty of Medicine, Rene Descartes Paris V University

Abstract. The centrality of well-trained innovating doctorates to the future of the world's cultural and economical well-being cannot be underestimated. To meet with the challenge,



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Vers la fin des disciplines ? Réponse des présidents de l'ERC et de l'Allea à la conférence EUA 2021



Science durable et chercheur citoyen



Global soil science research collaboration in the 21st century: Time to end helicopter research

Budiman Minasny^{a,*}, Dian Fiantis^b, Budi Mulyanto^c, Yiyi Sulaeman^d, Wirastuti Widyatmanti^e



Out of Africa: The underrepresentation of African authors in high-impact geoscience literature

Michelle A. North^a, Warwick W. Hastie^{b,*}, Lauren Hoyer^b

^a School of Life Sciences, University of KwaZulu-Natal, Westville Campus, Private Bag X54001, Durban 4000, South Africa

^b Discipline of Geological Sciences, School of Agriculture, Earth and Environmental Sciences, University of KwaZulu-Natal, Westville Campus, Private Bag X54001, Durban 4000, South Africa



« 17.6. Renforcer l'accès à la science, à la technologie et à l'innovation et la coopération Nord-Sud et Sud-Sud ... et améliorer le partage des savoirs selon des modalités arrêtées d'un commun accord... »

La science engagée au Sud



nature
geoscience

ARTICLES

PUBLISHED ONLINE: 26 DECEMBER 2016 | DOI: 10.1038/NNGEO2864

Supercycle at the Ecuadorian subduction zone revealed after the 2016 Pedernales earthquake

J.-M. Nocquet^{1*}, P. Jarrin², M. Vallée³, P. A. Mothes², R. Grandin³, F. Rolandone^{1,4}, B. Delouis¹, H. Yepes², Y. Font¹, D. Fuentes², M. Régnier¹, A. Laurendeau², D. Cisneros⁵, S. Hernandez², A. Sladen¹, J.-C. Singaicho², H. Mora⁶, J. Gomez⁵, L. Montes⁵ and P. Charvis¹



Le chercheur citoyen/engagé



False news travels 6 times faster on Twitter than truthful news

Science Mar 9, 2018 9:51 AM EST



RESEARCH

SOCIAL SCIENCE

The spread of true and false news online

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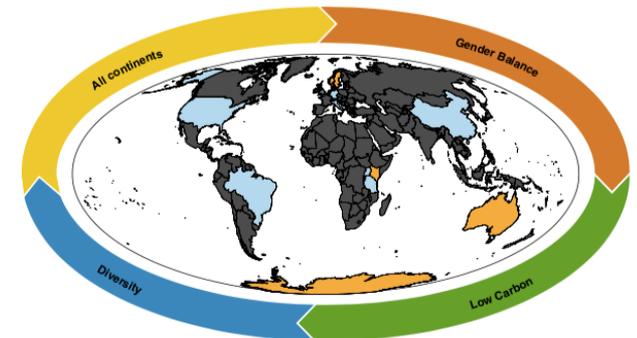
We investigated the differential diffusion of all of the verified true and false news stories distributed on Twitter from 2006 to 2017. The data comprise ~126,000 stories tweeted by ~3 million people more than 4.5 million times. We classified news as true or false using information from six independent fact-checking organizations that exhibited 95 to 98% agreement on the classifications. Falsehood diffused significantly farther, faster, deeper, and more broadly than the truth in all categories of information, and the effects were more pronounced for false political news than for false news about terrorism, natural disasters, science, urban legends, or financial information. We found that false news was more novel than true news, which suggests that people were more likely to share novel information. Whereas false stories inspired fear, disgust, and surprise in replies, true stories inspired anticipation, sadness, joy, and trust. Contrary to conventional wisdom, robots accelerated the spread of true and false news at the same rate, implying that false news spreads more than the truth because humans, not robots, are more likely to spread it.

A meeting framework for inclusive and sustainable science

The ABCD conference format (All continents, Balanced gender, low Carbon transport, Diverse backgrounds) mixes live-streamed and pre-recorded talks with in-person ones to reflect a diverse range of viewpoints and reduce the environmental footprint of meetings while also lowering barriers to inclusiveness.

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Conferences are, next to publications in scientific journals, the most commonly used format to present and disseminate recent advances in scientific research. Conferences are also important to synthesize knowledge, especially through sessions dedicated to a specific topic, to bring together different views and to explore solutions to shared problems. A wide range of diverse backgrounds of participants is often seen as a key element to facilitate novel insights, promote unconventional solutions and advance science. However, while there are hundreds of conferences and symposia within individual research fields, the examples of those achieving this seem to be relatively few. Scientific culture can also be inward facing with many symposia drawing on participants repetitively from a small



The excellence question



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Five months ago, when I stepped into my new role as the chief executive officer of the UK Research and Innovation (UKRI) organization, a question loomed large for me: What is excellence? After all, UKRI is the major public funder of science in the United Kingdom, spending billions of taxpayer money every year. To spend this money well, UKRI must support a portfolio of truly excellent work. So, what then is excellence?

Some years ago, I was contacted about a plan to establish a new research journal. I was asked, “Where do you submit your best work for publication?” To answer this, I had to define my best work. I ought to know how to do that, having served on the Board of Reviewing Editors for *Science*, which aims to publish the very best research across the sciences. In that role, I considered whether the work constituted a major advance and if it was of interest to a wide audience. In a similar vein, the European Research Council, which has had an extraordinary impact on research funding in Europe, uses “excellence” as the sole criterion for funding. Instructions for panel members who evaluate proposals define such excellence as ground-breaking and high-risk, high-gain.

There is no doubt that truly excellent and ground-breaking work is published in *Science* and funded by the European Research Council, but are those the only definitions of excellence?

It is worth remembering that the term “ground-breaking” comes from construction. There is often a ground-breaking ceremony, but then the building must be erected. This comes only after much preparation, from determining the ideal location to securing all the planning permissions. Likewise, for every ground-breaking discovery, a huge amount of work has paved the way, and follow-up work to solidify the evidence and demonstrate reproducibility and generality is essential. High-quality work of this sort is rarely recognized as excellent by the scientific enterprise but is excellent nonetheless, and without it, there would be no progress.

Even at the cutting edge, work that looks at things in a new or different way can be harder to recognize as valuable. It is less obviously ground-breaking in the short

term, not least because it might be wrong, but it is arguably more transformative in the long term. The systems in place for defining excellence are not sufficiently open-minded to alternative ways of looking at things.

And the desire for excellence as the only criterion for selection is often understood to mean research unrestricted by a requirement for utility—in other words, blue skies research for which applications are not immediately apparent. This contributes to the view that there is a compromise between excellence and applied research. Although there is a continuous need to emphasize the value of blue skies research, the implication that it is better than applied research is insidious.

In the United Kingdom, the question of what constitutes excellence in research is particularly pertinent with the announcement of a review of the Research Excellence Framework. This system allocates block grant funding to U.K. universities based on the excellence of their research, with assessment of a selected sample of research outputs as an important component. A high-quality portfolio should surely include a range of types of output, but universities are extremely conservative in their selection and typically focus on high-impact papers that their faculty has published, embedding a culture

of narrowly defined excellence.

It is time for assessment systems to support and value a robust portfolio of work of different sorts, and by association, a diverse range of people to do this work. Organizations such as UKRI, which supports research across sectors, have a major responsibility in this regard. UKRI was created by bringing together nine different research funders. Some argued that a “monolithic” funder would reduce diversity in funding. My view is quite the opposite. Organizations with a broad funding mandate must address the portfolio challenge by recognizing and supporting excellence in all its forms.

The world is wrestling with crises such as climate change and the coronavirus disease 2019 (COVID-19) pandemic. Let’s redefine excellence in ways that open up opportunities for projects and talent to break through the problems of today and tomorrow.

—Ottoline Leyser

“The systems in place for defining excellence are not sufficiently open-minded...”

« Les systèmes en place pour définir l'excellence ne sont pas suffisamment ouverts à d'autres façons de voir les choses. »

Chambardements dans l'évaluation des scientifiques

Le Monde Science et Médecine
Publié le 23 novembre 2021 à 12h00

🕒 Lecture 3 min.

Alors que le nombre de publications dans des revues scientifiques de renom était au cœur de l'appréciation des mérites des chercheurs, de nouveaux critères visent à mieux jauger leurs travaux.

Si ce n'est pas une révolution, c'est au moins un changement de paradigme pour des milliers de chercheurs. Petit à petit, les opérateurs et les financeurs de la recherche (organismes, universités, agences...) abandonnent l'un de leurs instruments favoris d'évaluation : les facteurs d'impact

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