



UNITED NATIONS
UNIVERSITY

UNU-IAS

Institute for the Advanced Study
of Sustainability

Sustainability Science in a Global Landscape

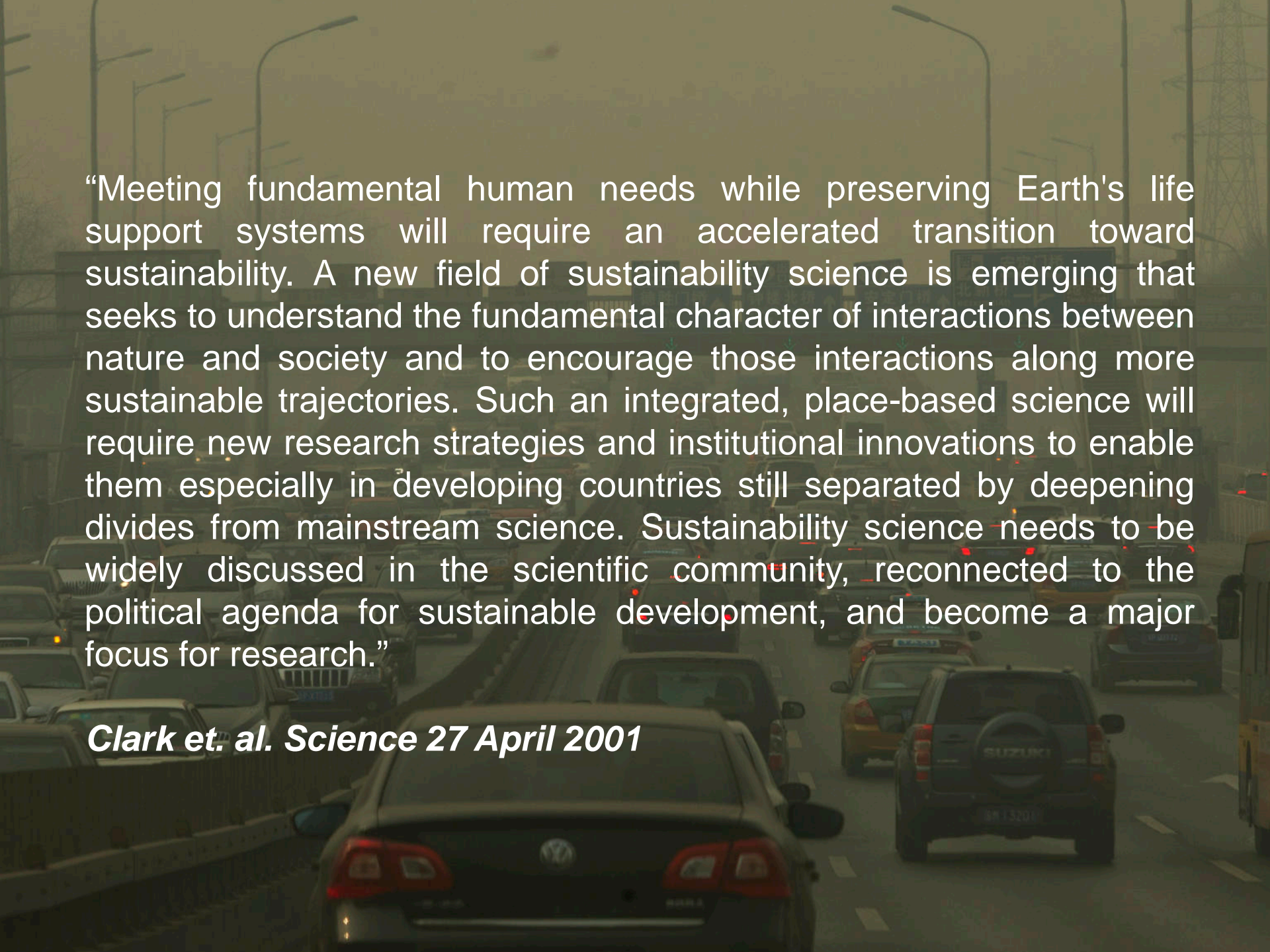
Seminar co-organized by
United Nations University, Institute for the Advanced Study of Sustainability (UNU-IAS) and
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**Dignity / People / Prosperity
Planet / Justice / Partnership**



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December 14, 2015, Tokyo



“Meeting fundamental human needs while preserving Earth's life support systems will require an accelerated transition toward sustainability. A new field of sustainability science is emerging that seeks to understand the fundamental character of interactions between nature and society and to encourage those interactions along more sustainable trajectories. Such an integrated, place-based science will require new research strategies and institutional innovations to enable them especially in developing countries still separated by deepening divides from mainstream science. Sustainability science needs to be widely discussed in the scientific community, reconnected to the political agenda for sustainable development, and become a major focus for research.”

Clark et. al. Science 27 April 2001

Mapping the 17 SDGs on 6 essential elements



Figure I.1 — The six Essential Elements. The figure is reproduced based on Figure 1 in the United Nations' report "The Road to Dignity by 2030: Ending Poverty, Transforming All Lives and Protecting the Planet".

Critical Dimensions of Sustainability Science

- **Research Output and Citation Impact**
- **Research Collaboration**
- **Interdisciplinary Research**

Scopus – the world's largest abstract & citation database

Over **55M** records from **21,912** serial titles and **42,000** books (July 2014)
22M pre 1996 records | 33.0M post 1995 records

- Content from > 5,000 publishers
- “Articles in Press” from > 3,750 titles
- Titles from 105 different countries in all geographical regions
- 40 “local” languages covered
- More than 3,500 Gold Open Access journals Indexed



How can we “data-mine” the science publication landscape

The screenshot shows a Scopus search result for the article "Strategic sustainable development - Selection, design and synergies of applied tools". The page includes a navigation bar with "Search", "Alerts", and "My list". A search bar shows "1 of 125" results. The article title is "Strategic sustainable development - Selection, design and synergies of applied tools" (Article) by Robèrt, K.-H., Schmidt-Bleek, B., Aloisi De Larderet, J., Basile, G., Jansen, J.L., Kuehr, R., Price Thomas, P., Suzuki, M., Hawken, P., and Wackernagel, M. The authors' affiliations are listed with superscript letters (a-j). On the right, a "Cited by 263 documents" section lists related works such as "Quantifying the relationship of resilience and eco-efficiency in complex adaptive energy systems" and "Sustainable Energy Application: Fuel Cells. Fuel Cells." Below this, a "Related documents" section highlights "Tools and concepts for sustainable development, how do they relate to a general framework for".

Citation information

Authors and affiliations

Cited by 263 documents

Quantifying the relationship of resilience and eco-efficiency in complex adaptive energy systems
Korhonen, J., Snäkin, J.-P.
(2015) Ecological Economics

Sustainable Energy Application: Fuel Cells. Fuel Cells.
Bashir, S., Liu, J.
(2015) Advanced Nanomaterials and Their Applications in Renewable Energy

Mapping the scientific research on life cycle assessment: a bibliometric analysis
Hou, Q., Mao, G., Zhao, L.
(2015) International Journal of Life Cycle Assessment

View all 263 citing documents

Inform me when this document is cited in Scopus:
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Related documents

Tools and concepts for sustainable development, how do they relate to a general framework for

Abstract

View references (47)

How to define what type of publications goings into a theme?

THEME DIGNITY

The publications need to satisfy the following conditions:

1. Contain at least one of the keywords or combinations of keywords in abstract, title or keywords:

agricultural development

(agricultural production AND sustainab*)

child labor

child mortality

children's health

development aid

distributional effect

(educational attainment AND sustainab*)

endowment

(food AND aid)

(food policy AND sustainab*)

food price

(food security AND sustainab*)

(hunger AND sustainab*)

income growth

income inequality

income shock

land ownership

land reform

land right

land tenure

malnutrition

poverty alleviation

poverty determinant

poverty line

poverty reduction

(reform program* AND sustainab*)

(rural development AND sustainab*)

rural finance

rural poverty

(safety net AND sustainab*)

small farmer

smallholder

2. Belong to one of the following Scopus subject areas:

social sciences, economics, econometrics & finance, business, management & accounting, multidisciplinary, and does not belong to medicine.

THEME PEOPLE

The publications need to satisfy at least one of the following two conditions:

1. Satisfy a, b and c below:

- a. Contain at least one of the keywords or combinations of keywords in abstract, title or keywords:

AIDS	intersex	tobacco use
cancer	lesbian	traffic accident
cardiovascular disease	malaria	transgender
child mortality	maternal mortality	tropical disease
chronic respiratory disease	mental health	tuberculosis
diabetes	neonatal mortality	unplanned pregnancy
drug abuse	planned abortion	vaccine
health finance	post natal depression	(victim AND crime)
health risk	premature mortality	violence
hepatitis	reproductive health	water-borne disease
HIV Infection	sexually transmitted disease	
household accident	spontaneous abortion	

- b. Contain at least one of the following keywords in abstract, title or keywords: development, sustainab*, millennium, goal, target, indicator.

- c. Belong to at least one of the Scopus subject areas: obstetrics and gynaecology, health policy, endocrinology, diabetes & metabolism, cardiology & cardiovascular medicine, psychiatry & mental health, public health, environmental & occupational health, infectious diseases,

What are the common keywords for the themes?

Dignity

farmer research community
 strategy inequality agriculture
 production system resources
 child land income people
 development effect group
 population poverty data area economy
 practice impact growth
 economics food model health
 evidence analysis process income inequality
 international program government reduction
 survey poverty alleviation

People

gender identity residence characteristics
 treatment outcome development young adult mice
 evaluation studies adolescent time pharmaceutical preparations
 mental health women middle aged HIV infections
 infection risk factors male adult cardiovascular diseases
 incidence diagnosis mortality data area economy
 logistic models patients female health vaccines
 disease risk life methods prevalence cells sex
 comprehension animals aged therapeutics HIV infections
 interviews research population behavior
 questionnaires neoplasms delivery of health care
 cross-sectional studies data collection proteins

Prosperity

global warming urban area air development pollution
 air pollution region energy efficiency transportation standards
 applications economics sustainability
 vehicles efficiency humans technology data cities wastes
 sustainable development
 public policy models research carbon construction
 growth (materials) industry production air quality
 environment costs industry pollutant methods
 planning emission water management
 energy utilization time reduction design energy atmospheric pollution
 greenhouse gases control materials solutions

Planet

design greenhouse gases
 modeling environment water information measurements
 ecosystem data region growth carbon dioxide
 applications humans plant climate change
 materials forest carbon soil industry
 technology climate production
 ocean management time model research energy record
 air simulation emission temperature
 economics costs surfaces summer methodology
 global warming thermal expansion

Justice

humans future
 united states of america politics offense values
 strategy development effect system behavior
 individual war law research power risk control
 action impact group violence concept
 discourse perspective analysis democracy theory security
 experience problem practice justice society evidence
 population woman citizen conflict data process economics
 institution international people government education program
 terrorism influence exertion community

Partnership

industry stakeholder
 health knowledge project government public policy
 international technology development conservation of natural resources
 residence characteristics strategy capacity building resource
 data water approach environment
 sustainability analysis impact system
 values capacity planning international cooperation
 corporate social responsibility management
 model sustainable economics process
 research humans practice
 sustainable development
 participatory approach
 societies and institutions

RESEARCH OUTPUT AND CITATION IMPACT

SUSTAINABILITY SCIENCE IS A FIELD WITH A HIGH GROWTH RATE IN RESEARCH OUTPUT

7.6%

Double the Scopus average growth rate (2009-13)

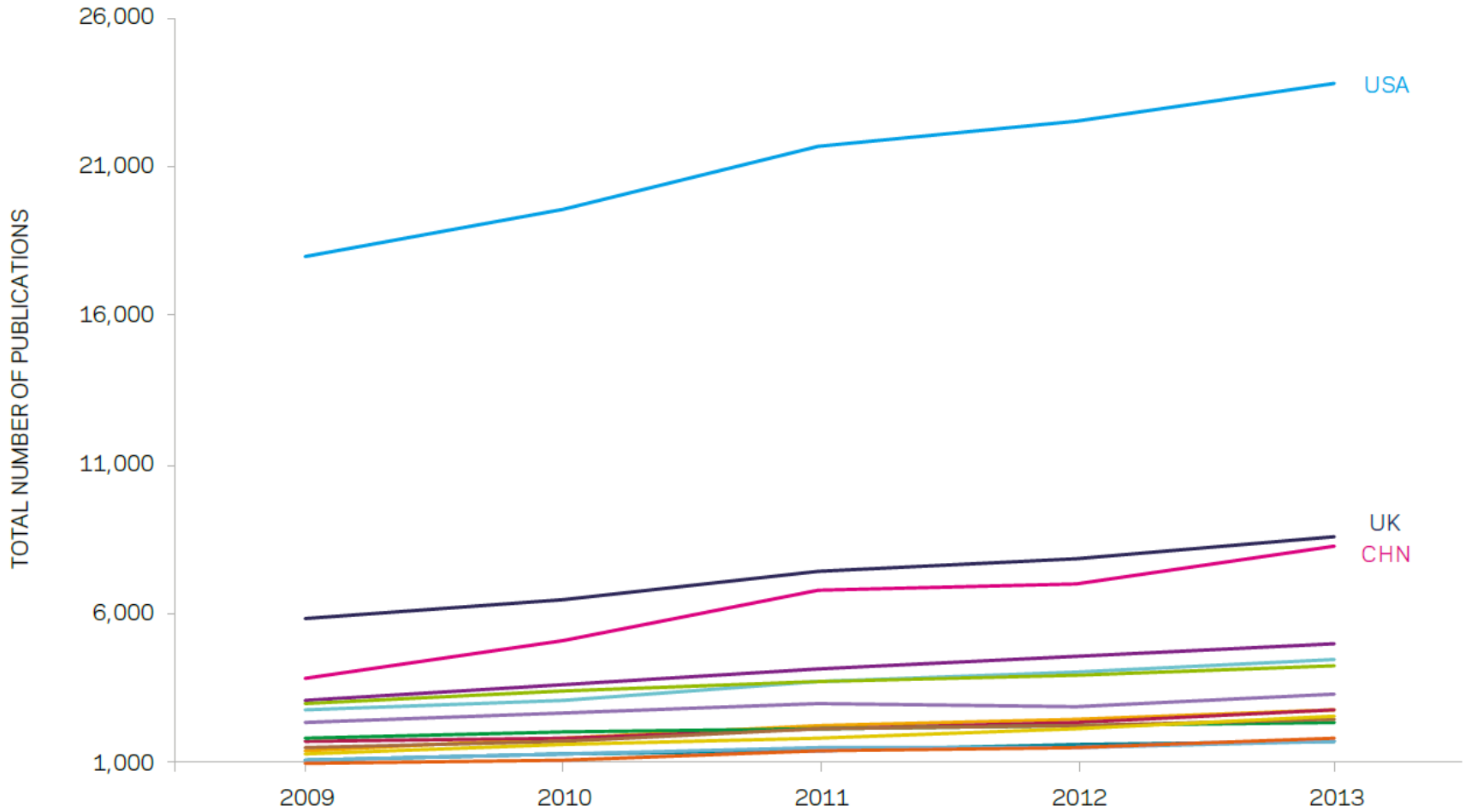


Figure 1.1 — Total number of publications; per country for top 15 most prolific countries in sustainability science; for sustainability science; per year for the period 2009-2013.

a. Top 15 most prolific countries

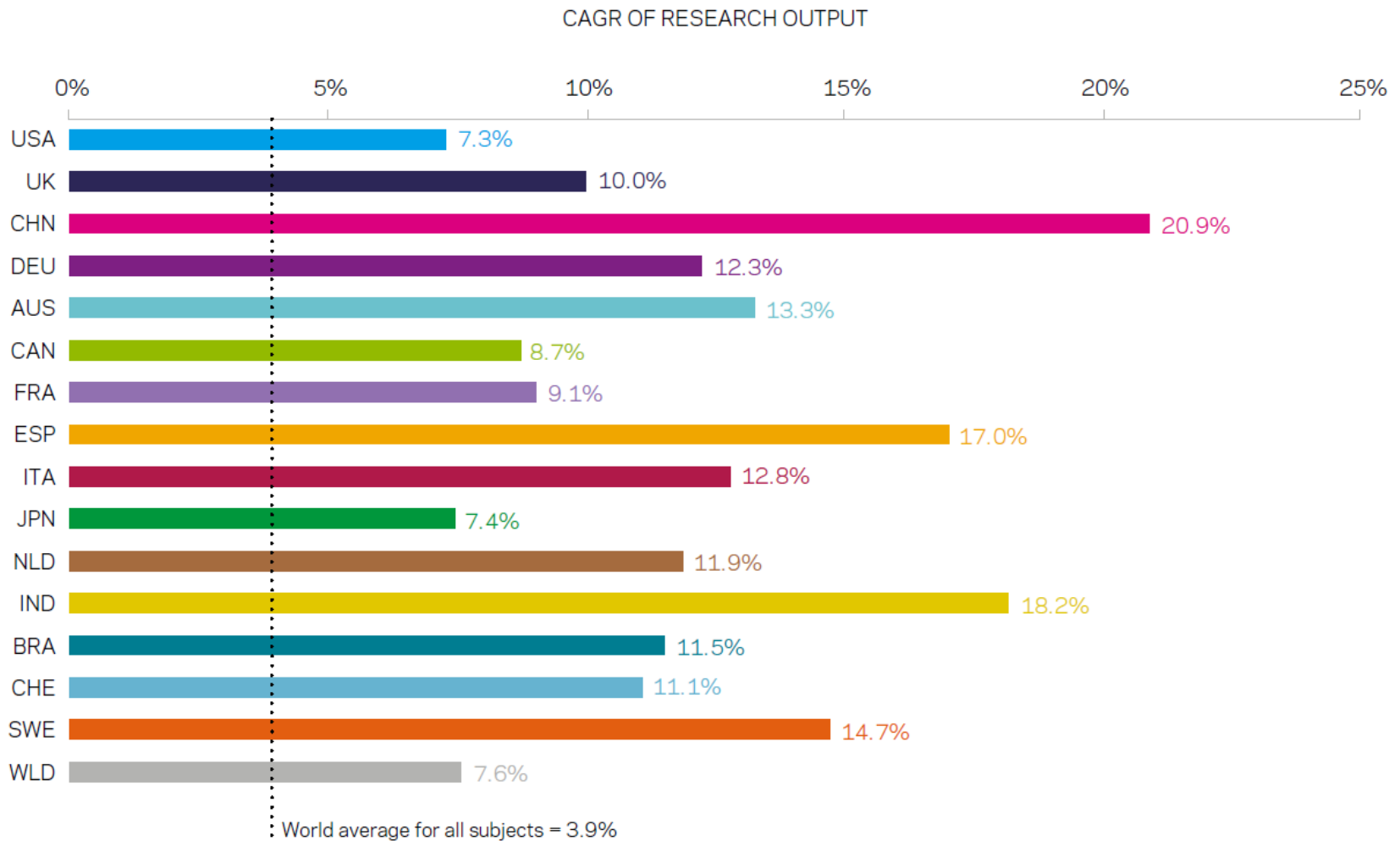


Figure 1.2 — CAGR of publications in sustainability science; per country for the top 15 most prolific countries in sustainability science; for the period 2009-2013.

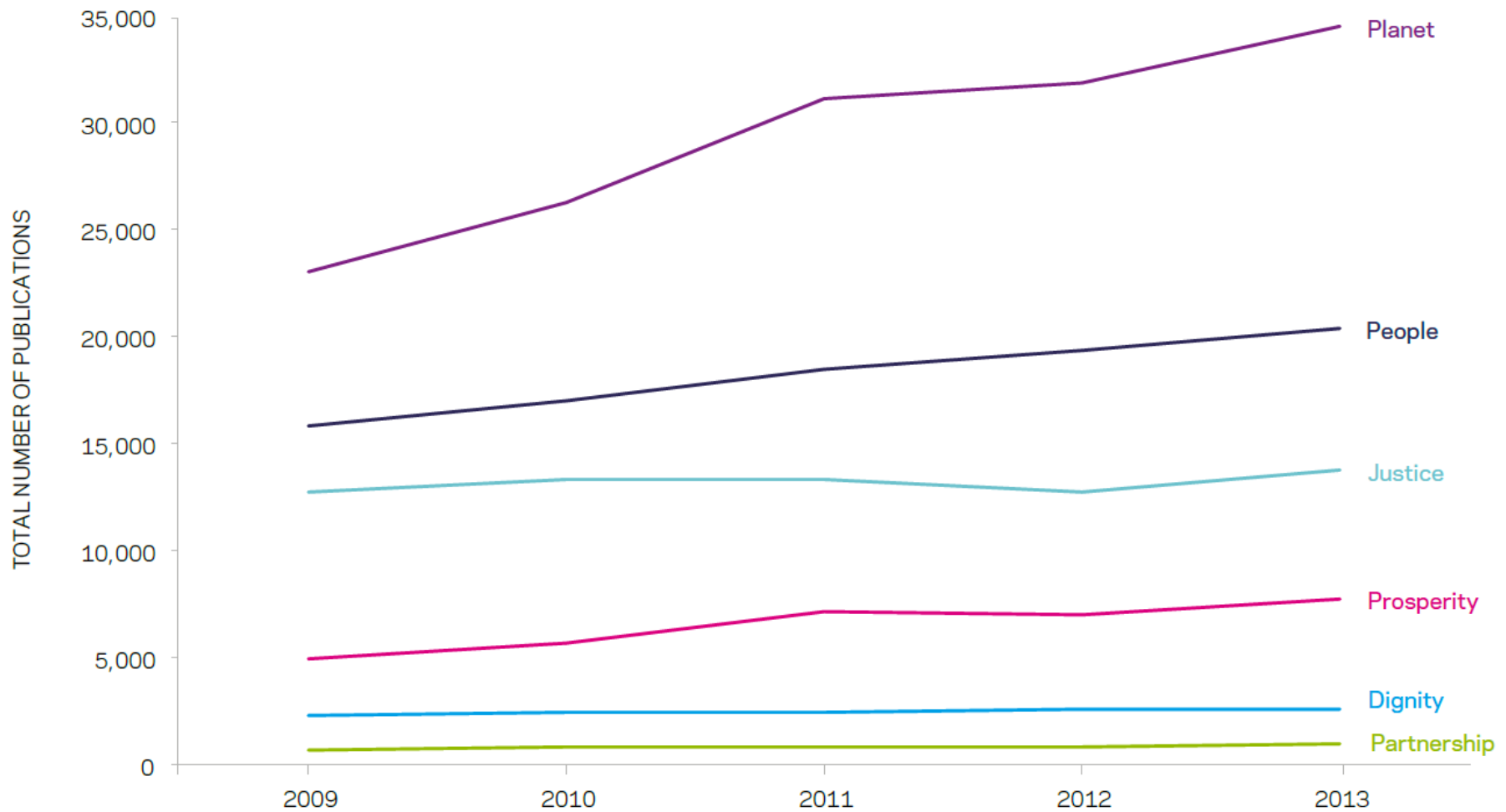


Figure 1.3 — Total number of publications; for the world; per theme for sustainability science; per year for the period 2009-2013.

RESEARCH OUTPUT IN SUSTAINABILITY SCIENCE ATTRACTS

30%

**MORE CITATIONS THAN AN AVERAGE
RESEARCH PAPER**

RESEARCH COLLABORATION

RESEARCH IN SUSTAINABILITY SCIENCE IS HIGHLY COLLABORATIVE

EXAMPLE:

US proportion of international collaboration in
its research output

26.5% (2009) to **32.9%** (2013)

HOWEVER:

Collaboration between high-income and low-
income nations remains low

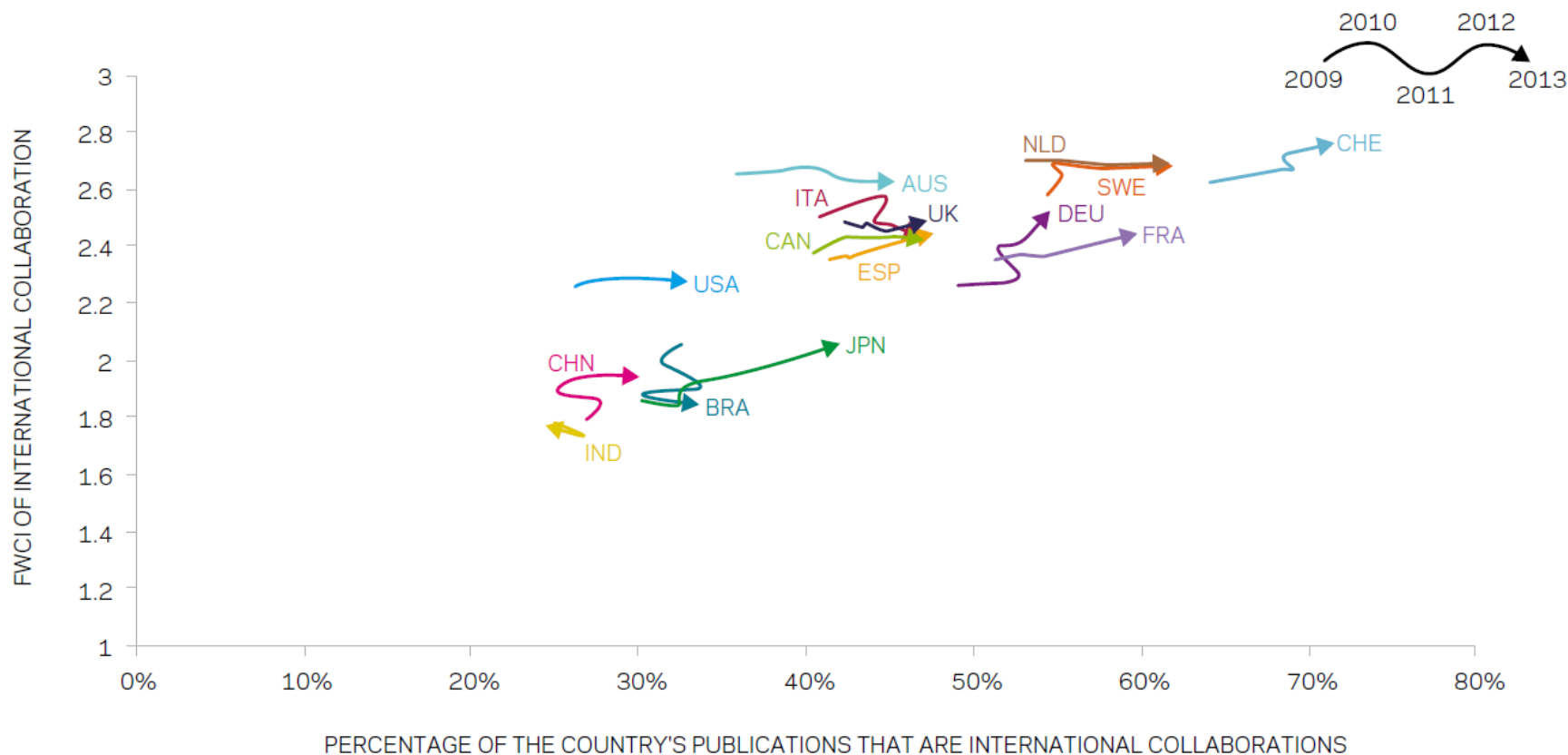


Figure 2.1 — Share of internationally collaborative publications out of the country's total publications and FWCI of international collaboration; per country for the top 15 most prolific countries in sustainability science; for sustainability science; per year for the period 2009-2013.

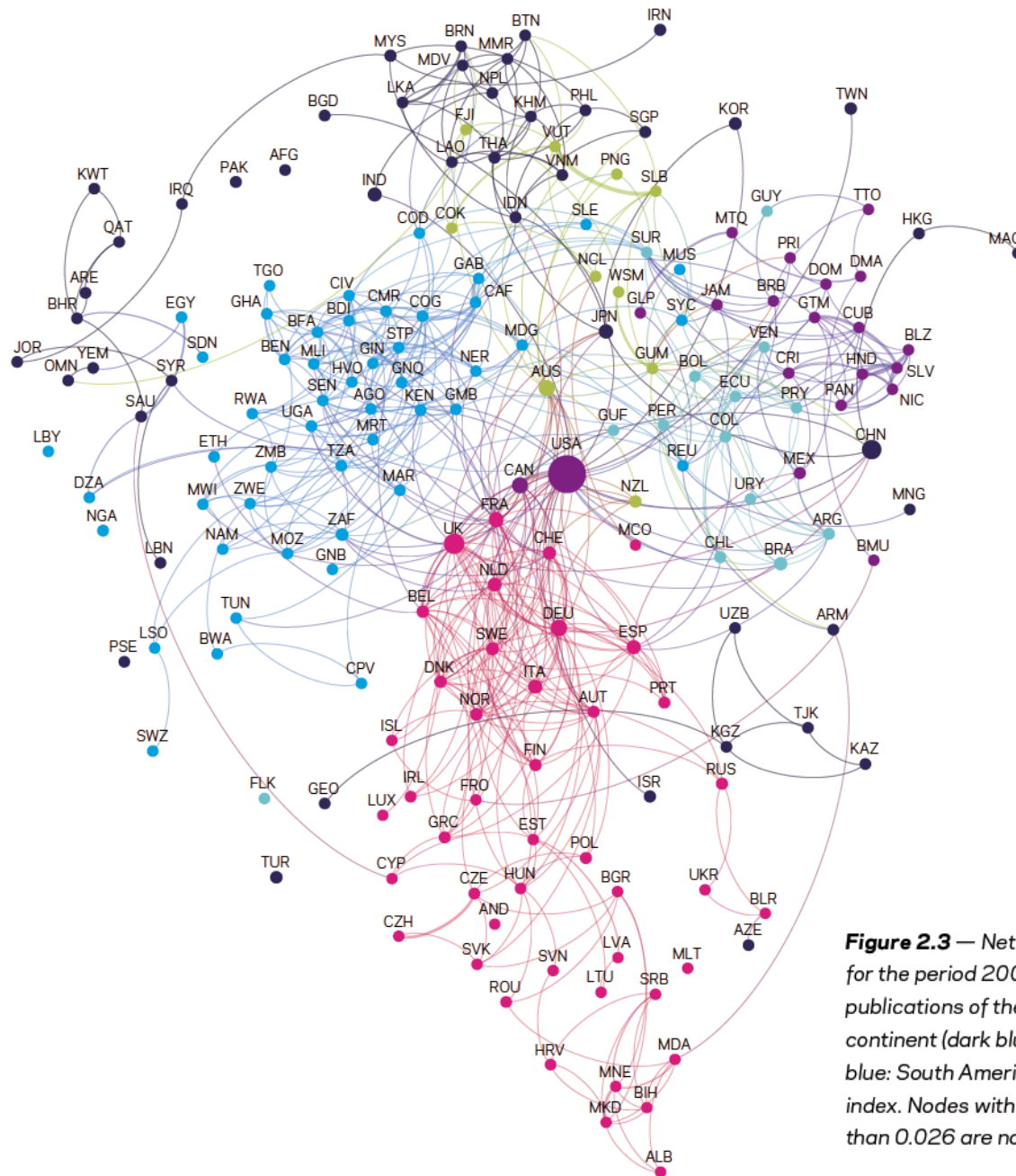


Figure 2.3 — Network map of countries; for the world; for sustainability science; for the period 2009-2013. The size of the nodes denotes the number of the publications of the country. The color of the nodes and edges denotes the continent (dark blue: Asia, blue: Africa, pink: Europe, purple: North America, green blue: South America, green: Oceania). The length of the edges denotes Salton's index. Nodes with less than 10 connections and edges with a Salton's index less than 0.026 are not shown. Force Atlas 2 algorithm is used for the layout.

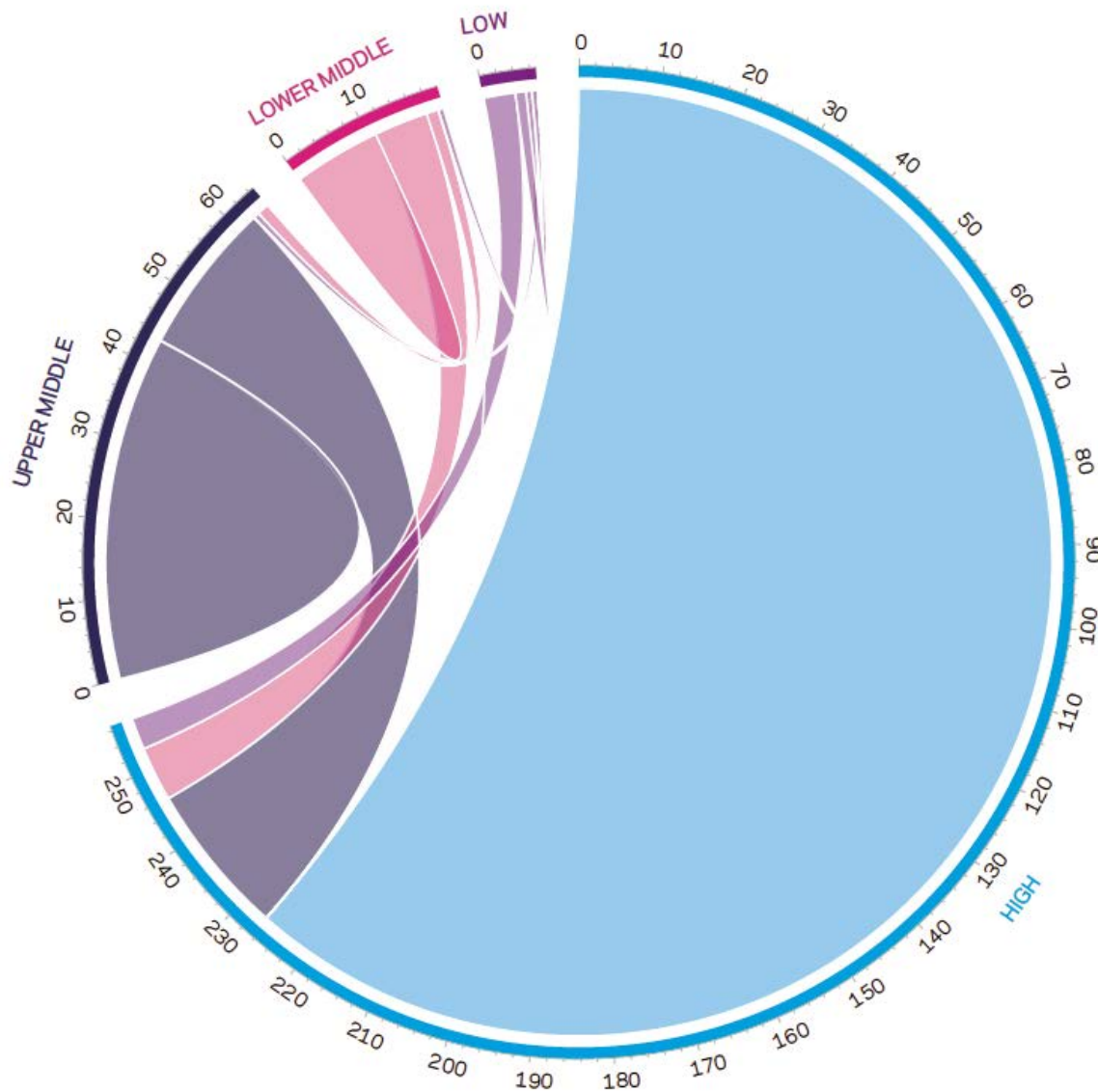
Disparities in Contributions to Sustainability Science

HIGH-INCOME COUNTRIES

76% (254 629) of all publications in sustainability science (2009-13)

LOW-INCOME COUNTRIES

2% of all publications in sustainability science (2009-13)



LOW-INCOME COUNTRIES

Publications: 5,597
2% of all publications in sustainability science

Collaborative publications
 With high-income countries: 3,992 (71.3%)
 With upper-middle-income countries: 752 (13.4%)
 With lower-middle-income countries: 707 (12.6%)

UPPER-MIDDLE-INCOME COUNTRIES

Publications: 63,069
19% of all publications in sustainability science

Collaborative publications
 With high-income countries: 19,250 (30.5%)
 With lower-middle-income countries: 1,498 (2.4%)
 With low-income countries: 752 (1.2%)

LOWER-MIDDLE-INCOME COUNTRIES

Publications: 18,360
6% of all publications in sustainability science

Collaborative publications
 With high-income countries: 6,833 (37.2%)
 With upper-middle-income countries: 1,498 (8.2%)
 With low-income countries: 707 (3.9%)

HIGH-INCOME COUNTRIES

Publications: 254,629
76% of all publications in sustainability science

Collaborative publications
 With upper-middle-income countries: 19,250 (7.6%)
 With lower-middle-income countries: 6,833 (2.7%)
 With low-income countries: 3,992 (1.6%)

Figure 2.5 — The number of collaborative publications across income classes; for the world; for sustainability science; for the period 2009-2013. The numbers in the bracket are the share of collaborative publications out of all publications of the countries in the income class.

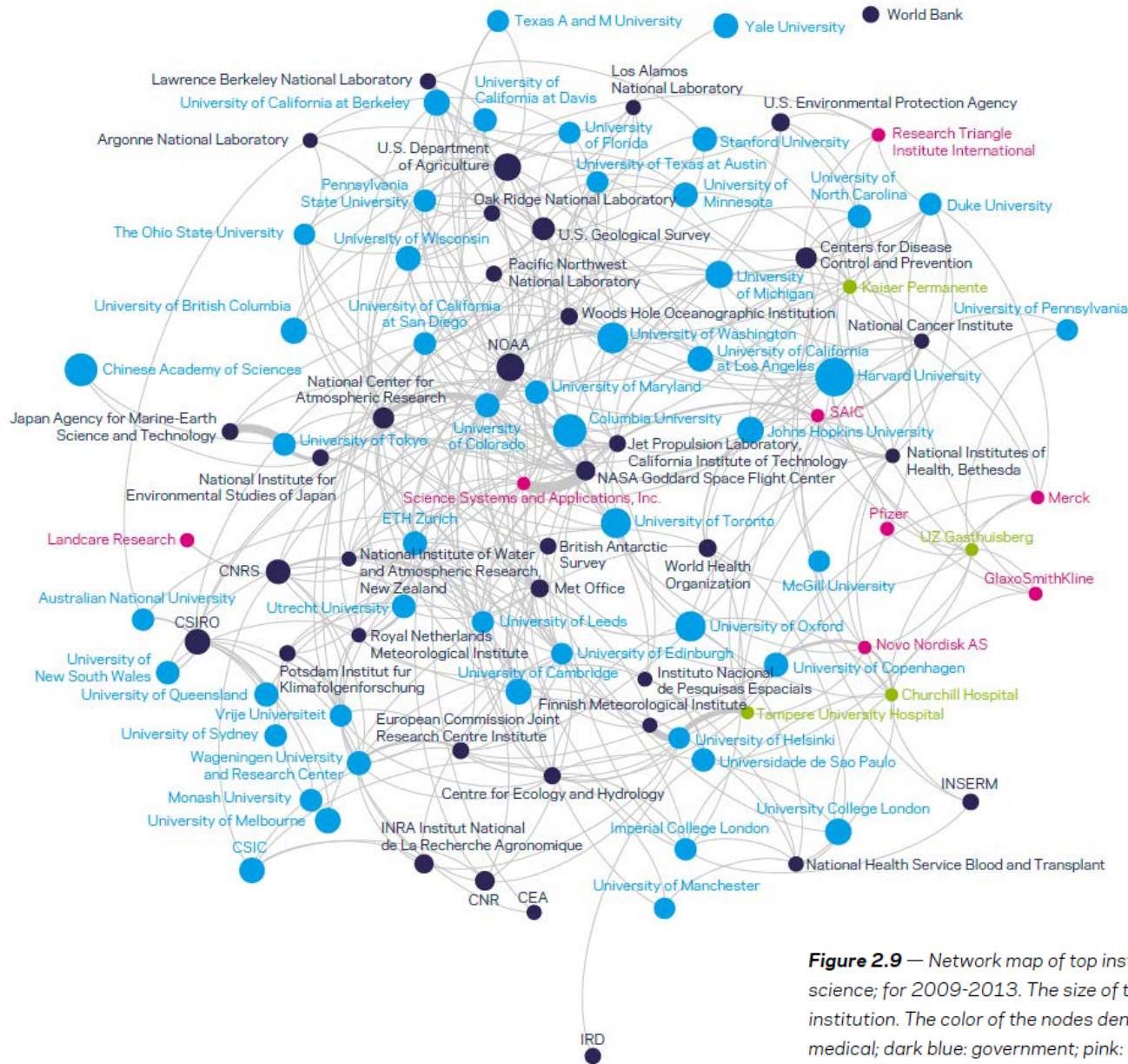


Figure 2.9 — Network map of top institutions in each sector; for the world; for sustainability science; for 2009-2013. The size of the nodes denotes the number of the publications of the institution. The color of the nodes denotes the sector of the institution (blue: academic; green: medical; dark blue: government; pink: corporate). The length of the edges denotes Salton's index. Nodes with less than 39 connections and edges with a Salton's index less than 0.025 are not shown. Force Atlas 2 algorithm is used for the layout.

Interdisciplinary Research

Monodisciplinary: apple



Multidisciplinary: fruit salad



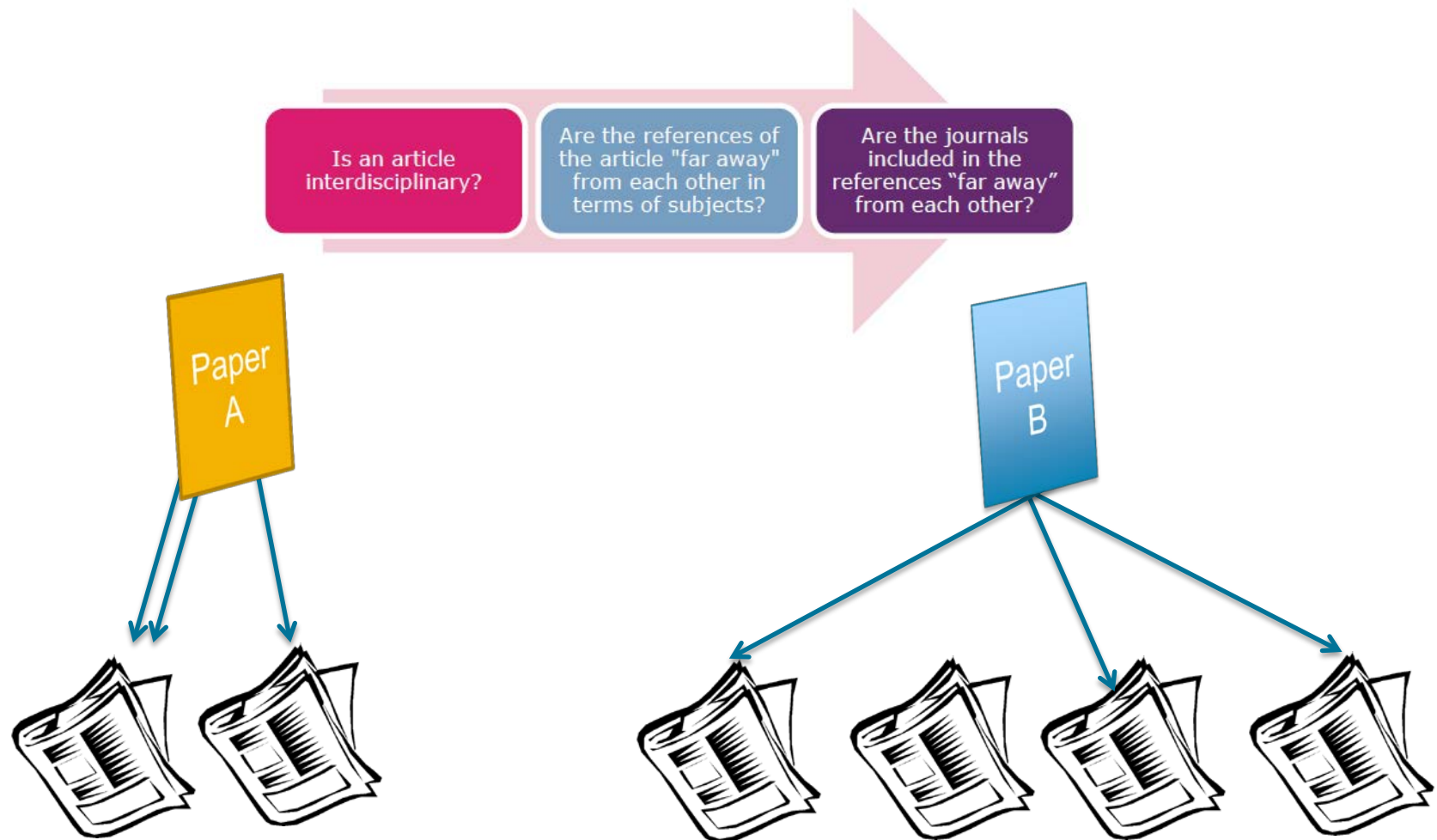
Interdisciplinary: smoothie



Transdisciplinary: multi-fruit ice cream

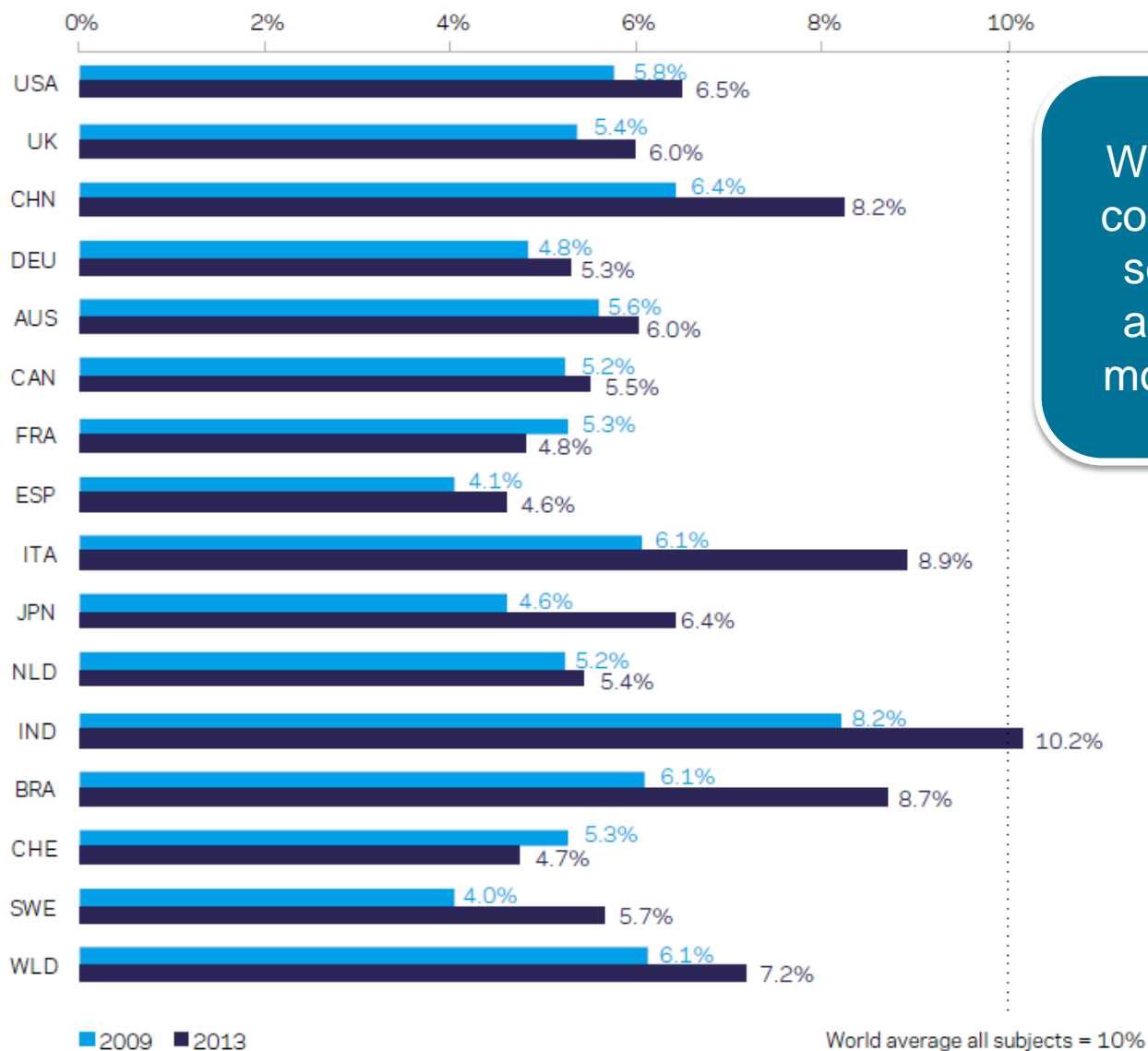


How can we define interdisciplinarity?



**SUSTAINABILITY SCIENCE IS
LESS INTERDISCIPLINARY THAN
THE WORLD AVERAGE**

PERCENTAGE OF THE COUNTRY'S PUBLICATIONS IN THE TOP 10% IDR



What is the share of a country's sustainability science publications among the top 10% most interdisciplinary?

Figure 3.1 — Share of the top 10% most IDR; per country for the top 15 most prolific countries in sustainability science; for sustainability science; 2009 and 2013.

Conclusions

- **Baseline**
- **Growth**
- **Disparities**
- **Strengths**
- **Gaps**
- **Dialogue**



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23 Nov 2015

Coralie Bos, Joe D'Angelo and Kay Tancock

How editors can contribute to sustainable development


 Sustainability Science
in a Global Landscape
Water • Food • Energy • Health • Cities • Environment
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When the UN established the Sustainable Development Goals at its headquarters in New York last month, it set the agenda for Sustainable Development for the next 15 years.

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**“There is a natural value chain of knowledge.
I think mapping how this range of activities
connect and could contribute to problem solving
within the SDG framework
would be extremely valuable.”**

Jeffrey Sachs
The Earth Institute

2015



Thank you!

