

2. TARGETING NEW GROWTH AREAS

2.2. Environmental sciences

Research in environmental sciences can help achieve a wide range of environmental objectives, from mitigating climate change to controlling air and water pollution, to enhancing biodiversity. Core scientific articles identify the most influential contributions to research. Citations to core articles in environmental sciences provide a measure of research activity in this field.

Environmental sciences include three main research areas: climate change, air and chemical pollutants, and biodiversity. The average annual growth rate in citations to core articles in climate change (20.0%) and biodiversity (18.5%) exceeds the rate for the total number of citations to all scientific articles (15.8%) between 2002 and 2007. However, citations to core articles in air and chemical pollutants grew more slowly (14%). These trends show the increasing influence of research in climate change and biodiversity in recent years.

Research activities show a clear orientation towards environmental sciences in a minority of OECD countries. Seven report a share of citations above the world average in air and chemical pollutants, ten in climate change, and eleven in biodiversity.

The United States has the largest relative share in air and chemical pollutants and in climate change, while Denmark has the largest relative share in biodiversity. The United Kingdom ranks second in climate change and biodiversity and Sweden in air and chemical pollution. Switzerland is third in all three areas.

In China, Italy, Japan and Spain the share of citations to environmental sciences is below the world average in all areas.

Environmental research

Clusters of articles with similar research subjects were identified via co-citation analysis. Co-citation is a form of citation in which a set of articles is simultaneously cited by other articles. A total of 64 958 highly cited articles, i.e. the top 1% of cited articles in the database from 2001 to 2006, were clustered on the basis of co-citation relationship. The co-citation analysis identifies three areas of environmental science in which there has been active research in recent years: climate change, air and chemical pollutants, and biodiversity.

Research on climate change consists, for example, of research on the global carbon cycle, the North Atlantic Oscillation and the paleoclimate. The impact of increasing greenhouse gases on global climate is extensively studied.

Research on air and chemical pollutants appears to be another important domain. It models generation and diffusion processes of aerosols and air pollutants and studies their impact on climate. It also covers aquatic pollution by toxic chemical compounds and environmental pollution caused by persistent organic pollutants.

Biodiversity is defined as the diversity of living organisms from all sources, including, among others, terrestrial, marine and other aquatic ecosystems and their ecological systems. This includes diversity within species, between species and among ecosystems.

Source

OECD calculations, based on Scopus Custom Data, Elsevier, July 2009.

Going further

Igami, M. and A. Saka (2007), "Capturing the Evolving Nature of Science, the Development of New Scientific Indicators and the Mapping of Science", *OECD Science, Technology and Industry Working Papers 2007/1*, OECD, Paris, www.oecd.org/sti/working-papers.

Figure notes

The average annual growth rate of the number of citations to core articles is based on the year of publication of citing articles.

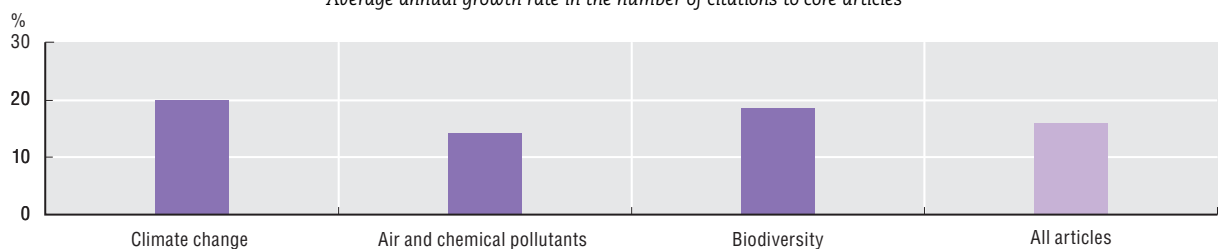
Calculation of a country's share is based on the address of the institution to which the authors belong, and fractional counts.

Only countries with a share of core articles over 1% are included.

A country's relative share in core articles is calculated by dividing the country's share in core articles by the country's share in all articles in all scientific fields.

Trends in citations to core articles in selected environmental sciences, 2002-07

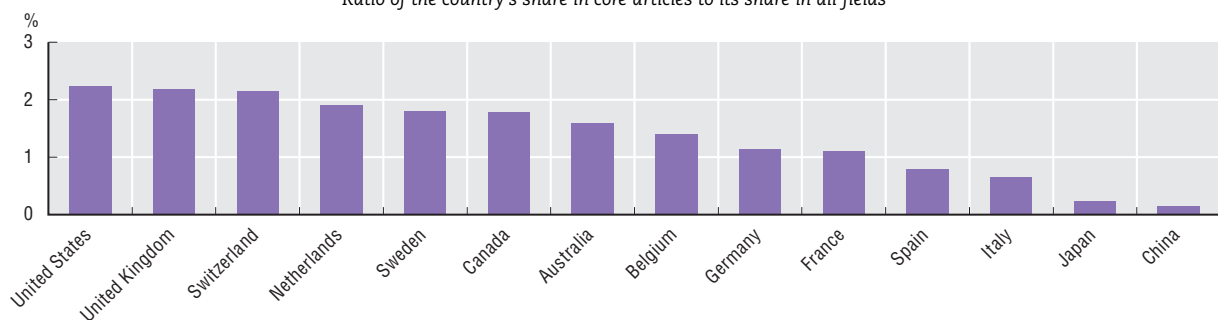
Average annual growth rate in the number of citations to core articles



StatLink <http://dx.doi.org/10.1787/742784242476>

Countries' relative share in core articles in climate change, 2001-06

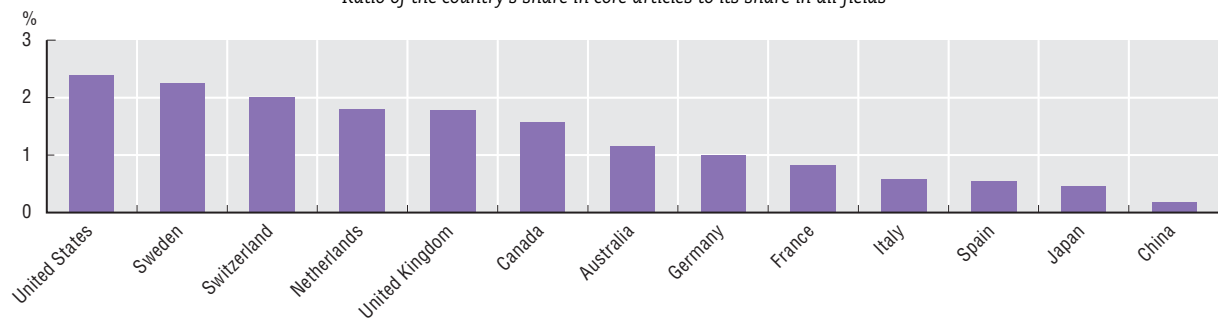
Ratio of the country's share in core articles to its share in all fields



StatLink <http://dx.doi.org/10.1787/742808880801>

Countries' relative share in core articles in air and chemical pollutants, 2001-06

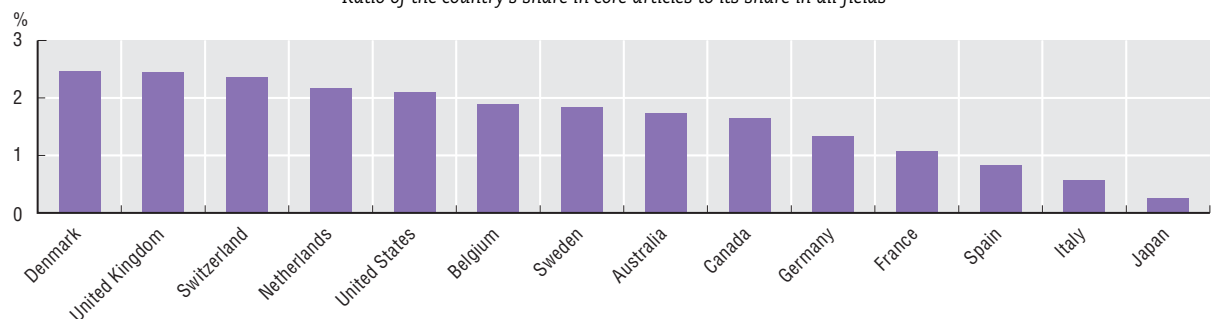
Ratio of the country's share in core articles to its share in all fields



StatLink <http://dx.doi.org/10.1787/742848400728>

Countries' relative share in core articles in biodiversity, 2001-06

Ratio of the country's share in core articles to its share in all fields



StatLink <http://dx.doi.org/10.1787/742887658225>



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