

India's declining ranking

SIR — Scientometric studies are useful in understanding the dynamics and performance of science, as well as for policy interventions. Several authors have attempted such quantitative analyses of Indian science¹, but none has analysed the long-term trends in Indian scientific output in relation to world trends.

Our analysis of authored publications in the journals covered by the *Science Citation Index (SCI)* between 1981 and 1995 shows that Indian share in world scientific output has declined by 32%, almost double the 17% decline estimated in *World Science Report*², on the basis of *SCI* data collected for 1982 and 1993. Even at 17%, no other country suffered such a massive decline, except the Commonwealth of Independent States. Consequently, India's world ranking has also declined from eighth position in 1980 to thirteenth in 1995.

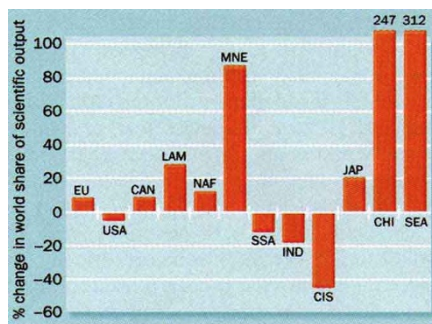
How did this happen? A comparison of the annual publication output of India and of the world reveals that Indian publications declined by about 15% between 1981 and 1984 and stagnated thereafter, whereas world output grew by about 22%. It can be argued that this decline is a reflection of the reduced coverage of Indian journals in *SCI*, which fell by two-thirds during the above period³. However, Indian journals accounted for only 35% of the total Indian output even when *SCI* coverage was at its best. Reduced coverage, therefore, accounts for only one-third of the overall decline in the Indian share in world output.

The decline cannot be fully explained by a publishing bias against developing countries either, as other such countries (especially in South-East Asia and China) improved their world share tremendously during the same period (see figure), and there is not enough evidence to suggest any specific anti-India bias. Nor is this decline due to a reduced preference for submission of Indian manuscripts in *SCI* journals (INSDOC survey; Pandale, personal communication). So Indian authors could be facing more rejections than before.

The relative citation rate of Indian research papers, expressed as a ratio of observed citations to expected citations⁴, has also been declining steadily, causing a steep fall in India's rank by citation impact, from 57 in 1985 to 81 in 1989 and probably further since then. This indicates that India is losing out in terms not only of quantity but also of quality. But the practice of judging quality by citations is contentious⁵.

It is therefore clear that the *SCI* data, in spite of their limitations, give a fairly reliable picture of India's declining position in world science. This calls for an in-depth analysis of science management in India. We point out a few possible factors here.

First, on the 'brain drain' of scientists from India to the West⁵, *SCI* rightly identi-



International trends in research publications. The percentage change in the share of different regions 1982-93, based on *World Science Report/SCI* data. (EU, European Union; USA, United States; CAN, Canada; LAM, Latin America; NAF, North Africa; MNE, Middle and Near East; SSA, Sub-Saharan Africa; IND, India; CIS, Commonwealth of Independent States; JAP, Japan; CHI, China; SEA, South-East Asia.)

fies Indian articles only by the address of the first author, and does not take account of Indian authors publishing from abroad. India receives no credit for its scientists' contributions from a foreign country, especially since it failed to retain and support them. Second, as to declining government funding for science in India⁵, although funding has increased in absolute terms, the rate of growth of expenditure on research and development at constant as well as current prices is on the decline⁶.

The 'ageing' of scientific institutions in India⁷ through decreasing recruitment also reduces publishing activity, as older scientists rarely work with their own hands in India. And as young scientists are a floating population of *ad hoc* workers hired for a pittance and fired at whim, they often fail to deliver tangible benefits, especially when there are more lucrative opportunities abroad.

Lack of motivation, a feudal work culture and absence of dynamic and inspiring leadership are equally important. But what is most striking is the total lack of long-term monitoring of Indian science publishing trends as an input to policy and planning.

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Limited consensus

SIR — John Maddox questions the validity of the 'consensus' sometimes associated with the conclusions of the Intergovernmental Panel on Climate Change (IPCC) (*Nature* **383**, 17; 1996). As he points out, the nature of the scientific process, which is built on debate, argument and disagreement as well as agreement, is not very compatible with the idea of consensus.

The nature of the consensus being pursued by the IPCC, however, is not the achievement of agreement about all of the science. Rather, it is a limited consensus delineating those parts of the science where scientists are in broad agreement and those parts where there remains a great deal of uncertainty and debate. It is this limited consensus — of paramount importance to those formulating policy — that the IPCC Summaries for Policymakers attempt to present as clearly as possible and without any particular political spin.

The very substantial and detailed assessments that form the bulk of the IPCC reports are aimed at providing just what Maddox is asking for, namely a continuing review of the peer-reviewed literature that carries weight in the research community, including an assessment of the uncertainties.

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Chain reaction

SIR — There are indications that some scientists have been infected with an agent of unknown nature and origin which leads them to think that there is such a thing as a human food chain¹. The same agent may be responsible for the belief that proteins can be cloned². Without editorial vigilance on your part, the effects of this agent may result in an epidemic of confusion and the further degeneration of our scientific language.

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Correction: Climate change

THERE is no connection between the people listed in Hugh W. Ellsaesser's letter about global warming (*Nature* **383**, 214; 1996) and the companies and institutes shown in parentheses after their names. The institutes should have been listed separately. We apologize for this error. — Editor, *Nature*. □