2.9 The Problems of Giving and Receiving Development Aid: Where Does Science Fit In?

Ingemar Wadsö* and John M Pratt†
University of Lund, Sweden*
University of Surrey, Guildford, UK†

Every country's development depends ultimately on the availability of skilled manpower in fields such as engineering, technology and medicine; the production and 'development' of such skilled manpower depends, in turn, on the existence of a healthy infra-structure of the pure sciences. In all developed countries it is taken for granted that science teaching and scientific research are essential factors for progress; the same should apply to developing countries.

It is clearly desirable for a developing country to be able to call on its own skilled nationals (whether trained at home or abroad) rather than rely on foreigners on short-term contacts and at a slightly later stage, perhaps in association with other countries of the region, to build up training facilities coupled with a healthy high-calibre science base. Their presence could help to reduce the problem of the brain drain; their absence could weaken the country's future chances of self-sustaining development.

There is, however, reason to fear that many developing countries, especially in Africa, may be denied the chance of building up an adequate science base either because of a belief that world-class science is simply too expensive a luxury for many parts of the developing world or because the claims of science do not have sufficient political appeal in competition with other claims on limited funds.

The aim of this paper is to consider some of the needs and problems of science in the Third World in the light of current patterns of international aid. One of the basic problems is that, while science requires long-term support for 'institution-building', politics and finance both dislike long-term commitment of funds.

The Science Base

High-calibre scientists can be trained and employed and high-class research carried on either in institutes of higher education (as is most common in Western countries) or in separate research institutes (as in most Eastern European countries); we here assume the former. High-class universities could provide a science-based service with the capacity to:

1. Contribute to identifying needs and opportunities and to selecting, modifying and developing relevant technologies.

2. Provide a fast and effective channel of information and communication with the international community of scientists for keeping their country abreast of the latest trends and developments.

3. Conduct teaching at a high level and carry out research of a quality which would make the researchers acceptable as peers by the international science leaders. Clearly the first of these depends on the second, and the second on the third.

The basic sciences differ in their methodology, needs and costs and in their relevance to national activities; such differences would have to be reflected in any national science policy. As a very sweeping generalisation, one could say that: physics is relatively more closely associated with the military as well as with certain sectors of industry; chemistry with industry (in particular the upgrading of raw materials which must form the basis of wealth-generation in many developing countries) and, via analytical chemistry, with environmental matters; and biology with agriculture, forestry and fisheries. In addition to the more direct and obvious funds for research and training, all three sciences will share common needs such as:

1. Supporting technical services (instruments, workshops) and information services (libraries, journals, data-bases).

2. Appropriate and effective lateral links with other national bodies more directly concerned with the setting of national objectives, the translation of R into D, technology transfer, etc: this requirement is even more important in developing, than in developed, countries.

3. Funds to facilitate contact (via conferences, visits) with colleagues on the international scene.

Donors and Recipients of Aid

Statistics concerning the major donors and recipients of official development assistance (ODA) in 1987/88 are given in Tables 1-4 (data taken from refs. 1 and 2. Most such aid (85% in 1988) is provided by the OECD (Organisation for Economic Cooperation and Development) countries (3). As expected (see Table 1), the largest industrial countries operate most of the largest ODA programmes; Japan overtook the USA as the largest single contributor in 1989. Their contributions, when judged as a percentage of GNP (see Table 2), are not as impressive as those of smaller countries such as The Netherlands and the Scandinavian countries.

Saudi Arabia is in a class by itself; its aid programme, directed mainly towards other Arab countries, has probably changed considerably since the Gulf War. Aid from the industrialised socialist countries of Eastern Europe (mainly the USSR) has decreased drastically as a result of their recent political and economic changes, and some are now considered developing countries. Aid from the USSR has been directed mainly to other socialist countries, particularly Cuba.

Table 1. The Largest Donors of ODA* in 1987/1988

Country	Amount (10^9 US$)	% of Total Aid
1. USA	9.4	18.3
2. Japan	7.7	15.0
3. France	4.5	8.9
4. FRG	4.5	8.7
5. USSR	4.2	8.2
6. Italy	2.8	5.5
7. Saudi Arabia	2.4	4.7
8. The Netherlands	2.1	4.1
9. Great Britain	2.1	4.0
10. Canada	2.0	3.9

* Official Development Assistance. Data from ref. 1.

Table 2. Countries Ranked According to ODA as Percentage of GNP in 1987/88

Country	% of GNP	Amount (10^9 US$)
1. Saudi Arabia	3.27	2.4
2. Norway	1.10	0.9
3. The Netherlands	0.98	2.1
4. Denmark	0.88	0.8
5. Sweden	0.88	1.4
6. Kuwait	0.83	0.2
7. Finland	0.55	0.5
8. France	0.51	4.5
9. Canada	0.48	0.2
10. Belgium	0.44	0.6

Data from ref. 1.

Table 3. The Largest Recipients of ODA in 1987

Country	Inhabitants (millions)	Total Amount (10^9 US$)	Amount Per Person (US$)
1. India	810	1.9	2
2. Egypt	50	1.8	35
3. Bangladesh	110	1.6	15
4. China	1070	1.4	1
5. Israel	4	1.3	286
6. Indonesia	170	1.2	7
7. Sudan	23	0.9	39
8. Tanzania	24	0.9	37
9. Pakistan	102	0.9	8
10. Syria	11	0.7	62

Data from ref. 2.

Table 4. Recipients Ranked According to ODA Per Person in 1987

Country	Inhabitants (millions)	Amount Per Person (US$)
1. Israel	4	286
2. Jordan	4	157
3. Bostwana	1	136
4. Somalia	6	102
5. Mauritania	2	96
6. Senegal	7	92
7. Costa Rica	3	87
8. Papua New Guinea	4	87
9. El Salvador	5	86
10. Gabon	1	77

Data from ref. 2.

The major recipients according to both total sum involved and the sum per inhabitant are listed in Tables 3 and 4. Although both India and China receive large amounts of aid, the sums are equivalent to only $1-2 per person per annum. The small country of Israel, on the other hand, has the highest amount of aid per person; it can hardly be considered a developing country and owes it position in the league table to its special relationship with the USA.

The developing countries form a very heterogeneous group and their needs (eg. in the scientific field) can be very different. China and India, whose populations represent nearly half the developing world, are poor countries but have very important natural resources in the form of large numbers of highly educated people, not least in science and technology. From this point of view it is even questionable whether India should be considered a developing country. The same applies to some countries in Eastern Europe and others such as Argentina where political mismanagement has allowed the economy to deteriorate. These countries need help and cooperation to preserve their relatively high scientific and technological level. Their problems are entirely different from those of most developing countries in , eg. Africa, which have never achieved such a standard and where several of the few aspiring universities such as Makerere in Uganda and Legon in Ghana have been virtually brought to their knees by the political and economic state of those countries.

The Problems of Science

It is obvious (and perfectly understandable) that ODA is given by donors and passed on by the recipient governments for a mixture of political, military and commercial, as well as humanitarian, reasons. Political and military considerations naturally tend to be most noticeable in the case of donors who claim to have global responsibilities (or ambitions), while the recipient governments must give some consideration to the political pros and cons of favouring supporters, buying off pressure groups, etc. Commercial considerations underlie the frequent earmarking of aid for capital-intensive schemes which require the provision of equipment and/or expertise from the donor country or for schemes which may serve to open up future export markets.

In addition, politicians in both developed and developing countries prefer to put their money into programmes which produce political dividends, quantifiable financial returns or highly visible prestige constructions in a relatively short space of time; they dislike programmes which require commitments to recurrent expenditure over lengthy periods before results can be expected.

Building up a healthy science base not only requires a long-term commitment of expenditure but, in addition, its eventual dividend is not easily quantifiable; furthermore, scientists are all too frequently associated with those centres of anti-government dissent called universities.

Although there appears to be increasing pressure to devote more aid to longer-term 'institution-building' and 'social expenditure', it will be politically far easier to support institution-building in the applied than in the pure sciences and to support social expenditure on primary education than on university science departments. Anyone who wishes to press the case for supporting the basic sciences must expect an uphill struggle against practicalities, prejudices and perceptions, but forewarned is forearmed.

Doing Science - and doing it properly - will certainly be expensive, but several comments should be made, eg.

1. Not doing science may be even more expensive, in terms of the lower capacity to manage technological change and the likely higher level of the brain drain.

2. There is no need for every (eg. African) country to 'go it alone'; there is, in fact, every reason to build up regional 'centres of excellence' to share the costs - every reason except the difficulty of getting agreement between national governments.

(As loyal chemists we should perhaps also add in parentheses (3). Research in physics can be very expensive, due to the demands of Big Science (eg. particle physics, astronomy); by contrast, research in chemistry is relatively cheap).

Conclusions

There, are however, some encouraging signs. In its report on 'Sub-Saharan Africa; from Crisis to Sustainable Growth' (4), the World bank says that "If Africa is not to be further marginalised, (it) must improve its science and technology training and aim at the highest standards for at least a minimum core of specialists (which implies long-term commitments), and forge new partnerships with qualified firms and research institutes in the developed countries". We would suggest there is an equally strong case for forging much stronger links than at present with universities in the developed world, encouraging them to become directly involved in both teaching and research. They have the expertise and many of their staff probably feel some moral obligation to help the developing countries. Programmes could be arranged where developing and developed universities are connected in pairs (or even in larger associations), initially in a mother-daughter but later in a sister-sister relationship, over a lengthy period (say 15-20 years).

We would strongly urge the donor agencies to earmark some aid for a deliberate longer-term 'science injection policy' aimed at: building up the basic sciences (physics, chemistry, biology, together with mathematics); developing regional centres of excellence; ensuring strong lateral links to other bodies involved with national policies and with development, production and wealth-generation in general; and involving universities (as well as firms and research institutes) in the developed world more closely than at present. We would also urge scientists to consider whether and how shorter-term support could best be used to promote the overall longer-term aim of institution-building for the basic sciences.

References

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The Authors

Ingemar Wadsö is Professor in Thermodynamics at the University of Lund, has been closely associated with IUPAC since 1967 and a member of the IUPAC Bureau since 1985, has taught and examined at the University of San Agustin, Arequipa, Peru and given a lecture course at the Panjab University, Chandigarh, India. John Pratt has been Professor of Chemistry and the Head of the Department at the University of Surrey since 1985 after periods at the University of Oxford, with ICI and as Professor of Inorganic Chemistry in Johannesburg, gaining first-hand experience of much of East and Southern Africa; has an interest in national and international factors currently affecting chemistry.

Professor I Wadsö
Chemical Centre
University of Lund
P O Box 124
S-221 00 Lund
Sweden

Tel: + (46) 46-108175
Fax: + (46) 46-104533

Professor J M Pratt
Department of Chemistry
University of Surrey
Guildford
Surrey
GU2 5XH

Tel: + (44) 483-509164 (direct)
Fax: + (44) 483-300803 (University)