

# Productivity of Fisheries Laboratories in Lesser Developed Countries

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The measurement of scientific productivity in fisheries laboratories is an area fraught with difficulties since the structure and function of these laboratories differ between countries. Some laboratories, particularly those attached to or affiliated with universities enjoy the comparative luxury of being able to undertake scientific research on fisheries related matters without the need to address day to day management problems. At the other extreme, some Government fisheries laboratories spend a significant proportion of their time involved in practical management issues with research work either being directed to answer specific, localized problems or in some cases, neglected completely.

In addition to the management advice function, which is shared with fisheries laboratories in developed countries, laboratories in lesser developed countries (LDCs) face additional problems. Foremost among these are a shortage of skilled researchers and technicians, lack of financial support, difficulties of access to new technology and, perhaps most important, lack of opportunity for dialogue with other fisheries researchers.

As a first, albeit very preliminary attempt to gather information on the extent to which these factors affect productivity in fisheries science in LDCs, we surveyed annual reports of laboratories involved in fisheries science, including aquaculture, in both developed and lesser developed countries. Only western developed countries were included because of difficulties of access to financial and staffing data for non-western countries. From these reports (which mostly covered 1982-1983) we extracted information for each laboratory on:

- Total number of active research staff excluding technicians.
- Number of publications accepted for publication in refereed scientific journals or presented as part

of the proceedings of an international conference within the last 12 months. Technical reports, whether refereed or not, were excluded.

- The operating budget for the laboratory including aid funds and salaries but excluding major research ship running costs.

In addition, letters were sent to a number of institutions requesting this information, all of which kindly provided the relevant information. Information was collected on a total of 28 fisheries laboratories in 22 countries.

As a crude measure of scientific productivity, we used the number of scientific publications produced per researcher per year. This measure can be criticized on several accounts including the fact

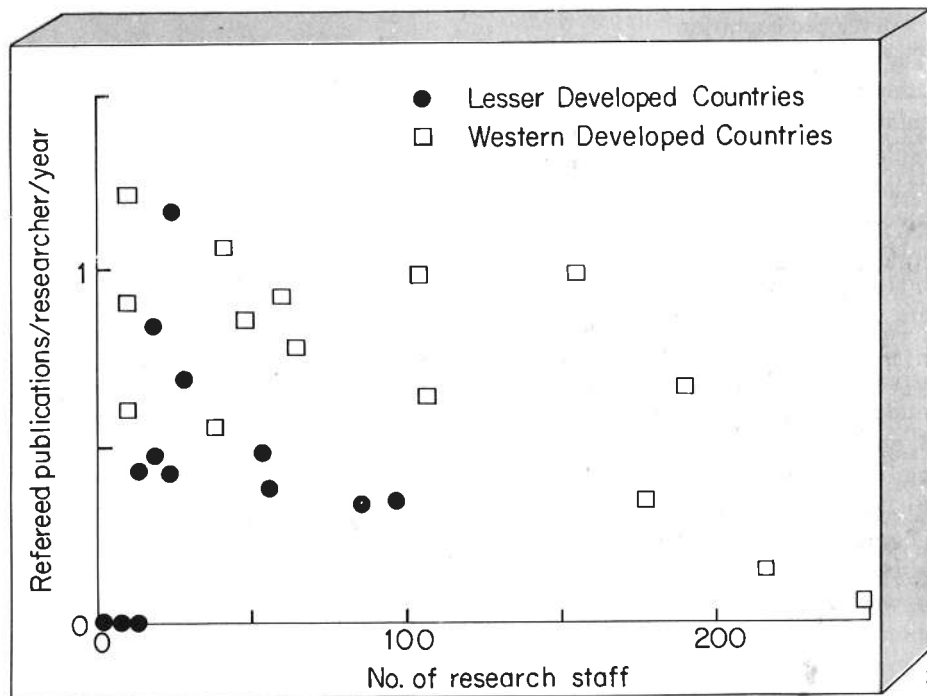
that it does not take into account quality of publications, although by only including refereed journals, this quality aspect was partly resolved. Since one of our principal interests was the extent to which the results of scientific research are made available to the scientific community through the medium of scientific journals, we consider that this measure of productivity is legitimate.

## Results

For the 13 laboratories in LDCs which were surveyed, the average number of publications per researcher per year was 0.49 which was remarkably close to that for the 15 surveyed laboratories in western developed countries of 0.53. By this measure, therefore, the average fisheries laboratory in the LDCs was as productive as those in western developed countries.

The relationship between size of the laboratory (as measured by the number of research staff) and productivity is shown in the graph. Several interesting points emerge:

- In both LDCs and western developed countries, there is a marked





decline in productivity with the size of the laboratory; the decline appears at a smaller institute size in LDCs than in western developed countries.

- Within the range of about 15-50 researchers, there is little difference in the productivity of laboratories in LDCs and western developed countries.
- There appears to be a general trend of larger laboratories being less productive.
- Very small laboratories in LDCs (less than about 15 research staff) have virtually zero productivity unlike such laboratories in western developed countries. This implies that the concept of a 'critical mass' of researchers is of greater importance in LDCs than in western developed countries.

The decline in productivity with increasing numbers of staff may stem from a number of factors, such as increased administrative functions in large institutions, a tendency to publish in "in house" technical series with limited outside circulation and a concentration by large laboratories on contract research work where results are usually confidential and are seldom published. From our experience, it is considered that the last mentioned factor is particularly important and it results in research findings being unavailable to other researchers.

In an attempt to further quantify the economic efficiency of fisheries research laboratories in various countries, we calculated the cost of each publication by dividing the total operating

budget of each laboratory by the number of publications. This figure was then weighted by the average Gross Domestic Product (GDP) per capita for 1983 for each country in order to take into account the difference in salary and benefit scales between countries.

The mean unweighted cost per publication in LDCs averaged \$152,909 with a range of \$55,000 to \$241,300, compared with \$241,606 (range \$26,500-\$1,968,900) in western developed countries. When these figures were weighted according to the GNP/capita for each country, the cost per publication in LDCs rose to 6.3 times that of developed countries. This extraordinary difference is primarily a result of the large differences in GDP/capita between LDCs



and developed countries which, while reflecting the overall situation, are probably not so pronounced in scientific fields. This is particularly the case in those LDCs which employ expatriate staff who are paid more in accordance with developed countries' salary scales than with those of the LDC in which they are working.

Despite the large range in unweighted costs per publication in both LDCs and developed countries, there was a good degree of consistency within regions as summarized in the table.

Unweighted cost per publication for fisheries/aquaculture laboratories in various regions.

| Region                   | Cost/publication US\$ |
|--------------------------|-----------------------|
| North America            | 138,823               |
| Europe                   | 553,811*              |
| Middle East/North Africa | 199,000               |
| South America            | 153,524               |
| Asia                     | 121,977               |
| Oceania                  | 66,214                |

\*This figure is probably an overestimate and results from both a small sample size and the inclusion of a large, costly laboratory.

### Need for Better Dissemination

Although complete information on the publication medium was not available for all laboratories, there was a distinct trend in all cases for publication in local or regional journals. It is apparent to us that the regional nature of publications into which many LDC fisheries laboratories publish makes the dissemination of research results from these laboratories difficult. Both the laboratories and the established scientific journals in developed countries share the blame in this—the laboratories for not actively seeking wider publication of their results and the journals—even the so-called 'core' journals of fisheries science—for often being parochial and for being reluctant to accept papers from outside their immediate regional interests. We believe a more international outlook in publication of research in fisheries would be beneficial to all fisheries scientists.