

SCIENTIFIC COLLABORATION OF ADVANCED/DEVELOPING
COUNTRIES IN BIOLOGICAL SCIENCES:
THE CASE OF THE MARACA RAIN FOREST PROJECT⁽¹⁾

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ABSTRACT

The research reported here makes the assumption that collaboration projects on biological diversity in rain forest involving advanced and developing countries are necessary. However, they have to be evaluated so that lessons can be learned and benefits explicit. In line with the above, the paper looks at one specific collaboration project - the Maracá Rain Forest Project - which was carried out jointly by the Royal Geographical Society of UK and the Amazônia National Research Institute (INPA) of Brazil. It was conducted in site during 18 months, involving up to 50 British scientists and aimed at making an ecological survey of the Maracá Island in the Brazilian Amazon. A heated debate in Brazil about problems of giving access to foreign scientists of the Amazonian natural resources was raised. The paper, which is mainly methodological in its objective, presents an analysis of this project - from its negotiation phase to its final results - and provides subsidies for the design of future international collaboration initiatives in the region.

COLABORAÇÃO CIENTÍFICA DE PAÍSES AVANÇADOS
E EM DESENVOLVIMENTO NAS CIÊNCIAS BIOLÓGICAS:
O CASO DO PROJETO MARACÁ

RESUMO

Este artigo analisa um projeto específico de colaboração científica internacional na Amazônia: o Projeto Maracá. Parte-se da premissa de que ainda que tais projetos colaborativos sejam fundamentais para o conhecimento e a utilização dos recursos genéticos da região, eles precisam ser avaliados. Com base nisto, propõe-se uma metodologia de avaliação de projetos colaborativos que é, então, aplicada no referido Projeto Maracá. Este projeto, que se desenvolveu durante 18 meses, envolveu a Royal Geographical Society do Reino Unido e o Instituto Nacional de

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Pesquisa da Amazônia (INPA). Ele foi motivo de controvérsias durante sua aprovação e implementação e serve como foco privilegiado para um estudo deste tipo. Espera-se que a metodologia desenvolvida e os resultados de sua aplicação possam servir de subsídios importantes na tomada de decisão política.

INTRODUCTION

Latin America and the Caribbean region represent a crucial area of the globe from the point of view of biological exploration and biogeographical research. This derives from three factors: (a) the biological diversity crisis is heavily concentrated in tropical regions, where the overwhelming proportion of biological species are unknown to science; (b) an estimate of 90 per cent or more of all New World species are to be found in Latin America; and (c) there is potential and irretrievable loss between now and the end of the century of unknown species of plants and animals necessary not only to future advances in the life sciences but also to conservation measures for sustainable development in general (Christensen, 1987).

From this perspective, advanced/developing countries scientific cooperation in the biological sciences has been considered by many to represent an area in which all scientists and all nations have a major stake. It is agreed that there must be a quantum leap in scientific and collaborative activity in this field so that all nations will benefit from the increased knowledge deriving from studies of tropical biology and scientifically based conservation of biological diversity (Adler, 1985).

Scientists, government officials and even the lay people in the developing countries are well aware of the necessity to concentrate efforts - both financial and scientific - in order to enhance the knowledge of the biological aspects of the tropical forests. Evidence of this is the fact that Latin American countries have a strong tradition in biological research: considering, for example, general biology - which comprises botany, zoology, ecology and genetics - it has been shown that Latin American research activity in this subfield is 20 percent above the world average (Frame, 1977; Ailes et al., 1988). This fact notwithstanding, general biology represents a relatively small component of the overall Latin America research effort (around 3.6 percent, while the world average is 3.0 percent) and, more serious, when this participation is translated into actual number of publications in the mainstream literature, it becomes evident that Latin American output in the subfield is very small.

The case of Brazil is noteworthy: while this country entails the largest area of the Amazon Forest and is known to have a strong tradition in the biological sciences, Brazilian scientific activity in the subfield of general biology is below the world norm, that is, around 2.8 percent (Ailes et al., 1988). This is so despite the fact that the country has established scientific institutions - namely, the National Institute for Amazonian Research (INPA) and the Goeldi Museum - aimed specifically at studying the Amazon Forest, with strong emphasis in general biology research.

Thus, given that the major proportion of the Amazon Forest is located in Brazil and that the country clearly has not been able to respond to the needs of biological investigation in this region, and also considering that averting the biological diversity crisis is seen as a responsibility of all nations, it is not surprising that scientists, particularly of the advanced countries, have focused their interest in carrying out investigations in such part of Brazil. At least a proportion of such interest (certainly not as much as would be desirable) has manifested itself in the form of collaborative research programmes involving "foreign" scientists and segments of the Brazilian scientific community.

So it is that a number of collaboration projects involving different advanced countries - UK, USA, the Netherlands, France, Germany, Japan and others - have been carried out, or are currently under development, or are being thought of or negotiated with the Brazilian government in order to investigate the different biological aspects of the Amazon region. There is, however, an interesting feature of such collaboration effort from the Brazilian perspective: on the one hand, there is a broad agreement to the extent that the country lacks expertise and number of scientists to study all the aspects needing investigation in the Amazon region, what makes the collaboration with foreign scientists not only desirable, but essential. On the other hand, a considerable proportion of local scientists, and other segments of the Brazilian population, are very reluctant to open the frontiers of the Amazon for foreign scientific exploration.

The reasons for such reluctance are many but may be summarized under two categories: 1) "economic imperialism": the biological resources of the Amazon have an impressive potential for economic application and there are fears that foreign research activities in the region would revert in economic benefit to the advanced countries (because they are scientifically, technologically and financially better qualified to explore such resources) to the expense of Brazil. This argument involves the discussion of questions

such as the access to international germplasm banks, conservation of germplasm, property rights of natural and “engineered” germplasm, access to natural germplasm in exchange for new technologies, and so on (Adler, 1985); 2) “scientific imperialism”: the survey, classification and study of biological diversity and the understanding of biological systems in the Amazon can contribute substantially to the advancement of the biological sciences worldwide. It is argued that foreign scientists are only, or mainly, interested in benefit from access to such biological resources in order to further their own careers and scientific interests, and have very little concern for developing the biological sciences within Brazil, or for training local young scientists (unless when such scientists pay for the high fees charged by advanced country universities), or for helping in institution-building. There is also a belief that foreign scientists may introduce concepts, methods and techniques of research developed in their countries to the study of the Amazon, which may not be the most appropriate approach to investigate the region.

It is clear from the above that advanced/developing countries scientific collaboration in general, and in the biological aspects of the Amazon, in particular, involves not only scientific and technical aspects, but also political ones (Dickson, 1988). Collaboration projects must be thought of and designed with great care, negotiated with scientists and other segments of society and, most importantly, be evaluated so that lessons can be learned for future initiatives, and benefits (or the lack of them) can be identified. Most collaboration projects in the Brazilian Amazon share a common problem: they have not been subject to any kind of evaluation, so that what is said about them are impressionistic views painted by political and ideological colours.

While it is easy to say that scientific collaboration projects must be evaluated, carrying out the evaluation is a difficult thing to do, since there is no agreed methodology to perform such task. It is generally perceived that international research collaborations enhance the national prestige of scientists in scientifically peripheral countries and expand training opportunities. They are perceived to improve foreign relations. There are, however, few measures - either quantitative or qualitative - of any of these benefits, although most policy experts do not dispute them. Without accurate measures, however, we can not really test the equations used to demonstrate that the presumed benefits outweigh potential losses in every circumstance.

In view of what was said above, this paper reports the methodology and the preliminary conclusions of a research which aimed at studying, analyzing and evaluating one specific collaboration effort in the Amazon region involving Brazil and the UK - the Maracá Rain Forest Project. Conclusions are considered to be preliminary for two reasons: firstly because Brazilian participant scientists and government officials involved in the project have not yet been interviewed for the reasons which will be explained later; and secondly because the full presentation and interpretation of the findings is not seen as the main focus of this paper, which intends to be methodological. In other words, the paper outlines both the conceptual basis of this research design, and the methods adopted for implementing it in the evaluation of the Maracá Rain Forest Project. It concludes by arguing for the potential value of the approach to both public policy and to an enhanced understanding of a controversial theme: access to foreign scientists of the resources located in the Amazon region.

A BRIEF HISTORY OF THE MARACÁ RAIN FOREST PROJECT

The Royal Geographical Society (RGS) in London was the coordinator of a major scientific expedition to the fluvial Island of Maracá, three degrees North of the Equator, in the region of Roraima, Brazilian Amazon. Up to 50 British scientists from universities and botanical gardens, and the British Museum took part. The project was carried out in site for the period of 18 months, in 1986 and 1987 and aimed primarily to survey the flora, fauna, soils and other aspects of the Maracá island. This fact notwithstanding, the project also looked at other four research fields: forest regeneration, land development, soils and hydrology, and medical entomology.

The Royal Geographical Society was allegedly invited by the Brazilian Environmental Secretary (the head of the former SEMA, now IBAMA) at that time to make such an ecological survey of the island and was offered the infrastructure available in the site to host the British scientists. This invitation apparently launched the project and motivated the RGS to search for sponsors to fund the project and scientists to carry it out.

On the Brazilian side, however, things seem to have been much more complicated. The Brazilian Environmental Secretary was changed before the project was fully negotiated; the National Institute for Amazonian Research (INPA), which was to collaborate with RGS was apparently reluctant to welcome the British; the National Council for Scientific and Technological Research (CNPq), which had to approve any foreign scientific expedition to

Brazil, argued against opening the resources of Maracá to the British team; the Brazilian scientific community through the Brazilian Society for the Advancement of Science (SBPC) positioned itself against the project; the media was clearly divided. The arguments against the initiative of the RGS pointed out that much of the proposed research would duplicate Brazilian work already being carried out in the same area, and that if INPA itself were given proper funding, it would be able to conduct all the project's proposed work. Also, and perhaps more importantly, it was generally believed to be wrong to allow the removal of so many unique collections of plants and animals from the island to a foreign country.

Despite the objections of the local scientific community, research council and press, diplomatic pressures seem to have been stronger and the British expedition was given the go-ahead. The Brazilian side, however, succeeded in negotiating a number of conditions to be followed by the British: foreign scientists could enter the research site exclusively through the airport in Manaus, after having obtained a work visa issued by the Brazilian consulate in London and with previous consent of INPA; all five research fields selected for the project would necessarily involve the participation of Brazilian scientists both in the conduct and in the decisions concerning the research; it was strictly forbidden that living material from the island would leave the country; all material collected was to be INPA's property and could eventually, at INPA's discretion (after being herbarized or fixed) be taken to the UK for the purpose of classification provided that a duplicate sample would be deposited in INPA; Brazilian government would nominate one person from the Ministry of Science and Technology to monitor the project on site and to report systematically its development.

After 18 months in the island the British team - in collaboration with Brazilian scientists, mostly from INPA, who were eventually convinced to participate in the project - gathered considerable amount of information in the five research fronts pursued. Such information was processed and gave rise to a series of research findings which have already been presented in two scientific meetings - one in Roraima State and one in London. Besides presentation and discussion of research findings such meetings had the objective of discussing policy publication of research results.

The summary presented before touches a number of very interesting aspects which need to be investigated in depth to assess the validity and legitimacy of international scientific collaborations. Having this in mind, a conceptual and methodological approach was designed in order to evaluate

the Maracá Rain Forest Project hoping that it would be of general value to other initiatives.

CONCEPTUALIZATION AND METHODOLOGY

The basic assumption underlying this study is that the evaluation of a collaborative scientific effort must look at the whole process - from its negotiation phase to the final results - trying to identify the role played by as well as the potential and real benefits which accrued to each part. This methodological procedure derives from the obvious recognition that collaboration among knowledge producers represents essentially a pragmatic attitude. Sharing resources and coordinating activities seem economical; it avoids “wasteful” duplication. Particularly to the developing countries, collaborative research projects may hold the promise of practicality and prudence, while to the advanced countries, collaboration in biological sciences means access specific resources which are only available in developing countries.

The concept of an “ideal” research collaboration includes such characteristics as: (1) equally divided tasks; (2) common sources of support (or shared assets) and shared equipment; (3) pooled intellectual effort; and (4) shared input naturally implies shared output - from co-authored publications and reports to co-ownership of patents and copyrights and hence equally divided royalties. As consequence of (4), both parties (RGS and INPA) should be able to equally share the credit and professional reward for the work done.

Having defined what should “ideally” be expected from scientific collaboration initiatives, the methodology proposed here and applied to the evaluation of the Maracá Rain forest Project looks at different aspects of the project in an attempt to find out the extent to which it held the four characteristics listed above and deemed “ideal”. Also, because political factors are recognized as playing an important role, particularly at the negotiation phase of the project, the methodology takes this issue into consideration. Finally, it is important to bear in mind that the main outcome expected from the application of this methodology is that it can be useful to inform policy decisions; consequently, policy recommendations are an essential component of the methodology.

For the sources of information, the general assumption is that it must necessarily involve both parties of the project. In the particular case of the Maracá Project this means the British and the Brazilian scientific teams and

project negotiators and managers. Information collection consists in reading and analysing written documents, scientific papers, reports and in interviewing participants - both scientists and non-scientists - in the UK and in Brazil. All documentation concerning the project was collected in both sides: in the Maracá Office at the Royal Geographical Society in the UK and in the former Brazilian Ministry of Science and Technology in Brasilia. In addition, 16 British scientists who participated in the project were subject to face-to-face semi-structured interviews as well as the head of the RGS who was the coordinator of the project (this was done during the author's post-doctoral training at the University of Edinburgh, partly funded by the Economic and Social Research Council of the UK). Although all documentation concerning the Brazilian side had already been collected - including the research-in-progress reports prepared by the appointee of the Ministry of Science and Technology - neither the Brazilian scientists nor the government officials involved in the project have been interviewed yet due to lack of funds to undergo the necessary travel (a research grant application for this task has already been submitted to Brazilian agencies and is under processing).

Having conceptualized and described the methodology, let us now look at the preliminary conclusions emanating from its application to the case of the Maracá Rain Forest Project.

QUESTIONS ASKED AND PRELIMINARY CONCLUSIONS

The application of the methodology designed to this evaluation exercise will be presented by taking each one of the four "ideal" characteristics listed above, as well as the negotiation phase and policy recommendations in turn. Preliminary and tentative conclusions are outlined in the end of this section.

Negotiation Phase: Looked at questions such as: Was the Brazilian scientific community and Research Council against the project? Why? What was the role played by the Environmental Secretary in the process? Was there actually a role played by diplomatic pressures? How legitimate and valid are the arguments attributed by the press to the local scientific community? Why the project was given the go-ahead? What were the conditions imposed by the Brazilian government to give permission for the project and were they actually observed by the British and monitored by the Brazilians? What was the interest and motivation of Royal Geographical Society to launch and carry out this project?

Equally Divided Tasks: What was the process of decision-making concerning selection of research lines and research methodology? Who made the important decisions in each research front pursued? How were managerial and administrative decisions taken and what the role of each party in the process? Which institutions were involved in the project from each side? How these institutions got involved in the project and what were the criteria they used to select participant scientists? How communication was maintained among participant scientists and between these and the managerial unit and government officials?

Common Source of Support and Shared Facilities: Which were the main funding organizations and sponsors for each party? Who was responsible for supplying and keeping food, fuel, scientific equipment and specimens?

Pooled Intellectual Effort: What was the qualification of the British and the Brazilian scientists involved in the project? What was the level of preparedness of the scientists regarding technical problems of the Amazon forest? Were they experienced in Amazonian problems or were they new to the field? What was the level of awareness of the scientists regarding the potentialities of the Amazon forest in relation, for example, to ethnobotany and biotechnology? Were young scientists from both sides involved?

Shared Output and Recognition: What was the main output of the project in terms of: scientific publications; enhancing scientific knowledge about rain forest environment; economic returns (tangible and potential); possibilities of obtaining future research grants; training of young scientists; development and improvement of equipments; enrichment of plants, animals and microorganisms collections? What kind of material left Brazil? Is this material useful for subsequent research? What forms of dissemination of research were agreed between the parties? What was the proportion of Brazilian/British co-authored papers in relation to the total scientific output?

Policy Implications: What did and did not work out well in this project? What were the determinants of the problematic and of the successful aspects of this project? What lessons can be learned? How the results of the evaluation can be used to inform policy decisions?

The information collected and analysed so far allows answers to most of the above questions and clarify the circumstances in which the project was negotiated and implemented. It also provides grounds for a number of preliminary and tentative conclusions. Generally speaking it may be said that the Maracá rain forest project is far from fulfilling the characteristics of an “ideal” collaboration project.

To begin with, there are strong indications that diplomatic pressures were actually decisive in allowing the Royal Geographical Society to undertake the expedition which was seen by the Brazilians as a practice “which does not fit anymore with the current level of the Brazilian scientific development”. The Brazilian Minister of Science and Technology understands, together with the Brazilian scientific community represented by the president of CNPq and the president of SBPC, that the country needs actual collaborative research efforts, under the coordination of Brazil (document signed up by the Minister of Science and Technology, 1986). From the British side, the project was said to be motivated by “the imperative that rain forest should be better understood” (Royal Geographical Society, Maracá Rain Forest Project, 1985). It is clear that whatever legitimate the scientific motives of the British may have been, they are a very weak basis for establishing international scientific cooperation.

Despite the efforts and actions undertook by the Brazilian government in order to transform the original “British scientific expedition” into a Brazil/UK collaboration project, this was not successfully accomplished. There are a number of indications of this fact:

1. The British in various occasions did not follow the conditions imposed by the Brazilian government, which were part of the negotiation: British scientists often entered the area of the project through Venezuela without previous permission or even notice of INPA (this was a common complaint in the reports written by the appointee of the Ministry of Science and Technology and was confirmed during interviews with British scientists); not only herbarized and fixed specimens, but also samples of soils and live microorganisms were taken to Britain (soil samples, for example, were being analysed at the University of Bristol during my visit to that institution).

2. All the important decisions related to research and logistics were taken by the British. The five research fronts - ecological survey, forest regeneration, soils and hydrology, medical entomology and land development - were decided by the RGS on the basis of the interests of the British scientists. Brazilian scientists tried to incorporate other lines of research and to exclude both medical entomology - understanding that this front should be exclusively Brazilian for a number of reasons - and land development - on the justification that it was not of interest to Brazil. Once more the Brazilian scientists did not succeed in their intents and the British carried out their original project.

3. Facilities were apparently equally shared but with funding things were very different. The British had a great number of sponsors - including British banks, pharmaceutical industries, the research councils, Mercedes Benz and charitable trusts. Brazilian scientists had to rely on government money through CNPq what made impossible the participation of many of them who were to be the national counterparts in some of the research fronts.

4. Contrary to what the RGS said it would be, many of the British scientists involved were neither highly qualified in their fields nor had previous experience in rain forest investigation. Similarly, on the Brazilian side, because of the resistance of the scientific community against the project, many of the most experienced people did not participate. Thus, it may be said that the project did not succeed in pooling intellectual effort neither in providing adequate training for young scientists.

5. A number of publications have been derived from the project. In 1989 a list provided by the Maracá Office at the RGS shows that 11 books had already been published, 10 of them authored exclusively by the British, only one co-authored by two British and one Brazilian scientist. Concerning scientific articles, it was decided that all papers should be published in "Acta Amazonica", the scientific journal edited by INPA, if necessary after publication elsewhere. The list provided by the RGS shows that 110 papers were produced: of these, only 18 were joint-authored by British and Brazilian scientists (13 to be sent to "Acta Amazonica" and 4 to international journals). It is interesting to note that of the 52 papers authored exclusively by Brazilians, 38 were meant for publication in "Acta Amazonica" and 14 in other Brazilian journals. The British alone produced 40 papers, of which 36 were sent to international journals and 4 to "Acta Amazonica". Thus, it seems that the project not only gave rise to a very small collaborative output but also reinforced the well-known pattern: developing country scientists publish at home, advanced country scientists publish in international journals. To this extent, the project apparently contributed very little to enhance the international visibility of Brazilian scientists. It did contribute, however, to augmenting the scientific recognition of the British scientists (at least in the UK) as indicated by the number of conferences and lectures - 17 - as well as broadcasts - 11 - they were invited to perform.

The preliminary conclusions delineated above show the difficulties of a developing country to negotiate and implement scientific collaboration

projects with and advanced one. The obstacles are derived from the “weaker” position of the developing country not only with respect to scientific qualification and insufficient research funds, but also from a political perspective. Of course this is not a justification for not establishing international collaboration efforts, much to the contrary: the collaboration of foreign scientists is essential to the scientific development of these countries. The argument is that it is up to the developing countries to get themselves internally organized concerning this issue by establishing a protocol of procedures and a blueprint for collaboration which attends their scientific and development objectives.

More important, however, for the objective of this paper, is the demonstration that international scientific collaborations projects must be subject to evaluation - they are not intrinsically beneficial, although they tend to be so perceived. The paper has also gone some way to providing a methodology for such evaluation. Very broadly, the application of this methodology has been able to identify the circumstances under which the project was negotiated and implemented as well as the determinants of its outcomes. Such findings provide arguably the most significant vindication of the research design. Hopefully, the rewards will be measured, not only in terms of a deeper understanding of advanced/developing countries scientific collaboration, but also more targeted and effective policies.

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