HOUSE OF COMMONS SESSION 1990–91

ENVIRONMENT COMMITTEE

Second Report

VISIT BY THE COMMITTEE TO BRAZIL

Report with Appendices,
together with the
Proceedings of the Committee
relating to the Report

Ordered by The House of Commons *to be printed*
28 *November* 1990

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£11·90 net

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The Environment Committee is appointed under SO No. 130 to examine the expenditure, administration and policy of the Department of the Environment and associated public bodies.

The Committee consists of 11 Members. It has a quorum of three. Unless the House otherwise order, all Members nominated to the Committee continue to be members of it for the remainder of the Parliament.

The Committee has power:

(a) to send for persons, papers and records, to sit notwithstanding any adjournment of the House, to adjourn from place to place, and to report from time to time;

(b) to appoint specialist advisers either to supply information which is not readily available or to elucidate matters of complexity within the Committee's order of reference;

(c) to communicate to any other such committee its evidence and any other documents relating to matters of common interest; and

(d) to meet concurrently with any other such committee for the purposes of deliberating, taking evidence, or considering draft reports.

The membership of the Committee since its appointment on 2 December 1987 has been as follows:

Sir Hugh Rossi (Chairman)

Mr Henry Bellingham
Mr Paul Boateng
(discharged 19.12.89)
Mr John Cummings
Mr Richard Holt
Mr George Howarth
(appointed 19.12.89,
discharged 16.5.90)
Dr Kim Howells
(appointed 16.5.90)
Mr Andrew Hunter
Mr Robert B. Jones
Mr Terry Lewis
(appointed 26.10.90)
Mr Keith Mans
Mr Tom Pendry
Mr Peter L. Pike
(discharged 26.10.90)
Mr Robin Squire

The cost of printing and publishing this Report is estimated by HMSO at £7,175·00.

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SECOND REPORT

VISIT BY THE COMMITTEE TO BRAZIL

The Environment Committee has agreed to the following Report:

Introduction

1. As part of our inquiry into the climatological and environmental effects of the destruction of the rainforests, we had the opportunity to visit Brazil to see for ourselves something of the work which is being undertaken there, both by Brazilian and British scientists, on measures to preserve the rainforests and to discuss the problem with senior Ministers. At the outset we should express our thanks to all those who gave up time to show us something of their work, and in particular to Dr Lutzenberger, Secretary for the Environment, and Professor Goldemberg, Secretary for Science and Technology, for talking with us so frankly. A note of our discussions is appended to this Report.[1]

2. We shall be publishing, in due course, a more general appraisal of the effects of rainforest destruction; however, we hope that a short Report on the situation in Brazil might be of interest to the House. Although we were told by witnesses who appeared before us in Westminster that the situation in Brazil is by no means typical of the problems facing rainforests world-wide,[2] we judged that it was an appropriate destination for three reasons: Brazil contains by far the largest single area of rainforest within its borders,[3] it has a sophisticated scientific community of its own with considerable expertise in the area of rainforest ecology, management and conservation, and relations between Her Majesty's Government and the Government of Brazil are very cordial, as indicated by the Memorandum of Understanding on environmental co-operation agreed by the two Governments in 1989.

3. In view of the limited budget for our visit, we were only able to visit four centres in Brazil—São Paulo, Brasília, Belém and Manaus—a schedule which involved about 4,000 miles of internal air travel in the space of five days. While this itinerary enabled us to talk with a wide range of government officials and representatives of non-governmental organisations, and to visit the rainforest itself, we would clearly have been able to produce a fuller report given more time for discussions.

The scale of the problem

4. Deforestation in Amazônia is by no means a modern phenomenon: large tracts of forest in the State of Pará and Maranhão were destroyed in the nineteenth century during the construction of the railways. These areas of "historic" deforestation are now covered, in the main, by secondary forest. The existence of these areas of secondary forestation has given rise to some confusion as to the extent of the rate of "modern" deforestation.[4]

5. It is important to note that once primary forest is lost, it is replaced by a secondary forest which is relatively poor in the range of species which it contains. Any recuperation of the primary forest itself would be a very long-term process which would only be achieved perhaps over many hundreds of years—if indeed it ever occurred.

6. We were told by the Brazilian National Institute for Space Research [INPE] that the World Bank's figure for deforestation of 600,000 km^2 (over 230,000 square miles) was based on the erroneous assumption that the total area of *Amazônia Legal*—5,000,000 km^2 (almost 2,000,000 square miles)—had originally been covered in rainforest when this had never, in fact, been the case. On the World Bank's analysis, large areas of natural non-forest vegetation were regarded as having been deforested. The correct figure for the total area of the rainforest was 3,500,000 km^2 (1,350,000 square miles, or about one-fifth of the total land area of South America); and it is this figure which INPE uses as a baseline for its remote-sensing work.[5]

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[1] Appendix 1

[2] QQ 33, 86 [*not printed*].

[3] 27·5 per cent—"*Deforestation Rates in Tropical Forests and their Climatic Implications*", Myers N. Friends of the Earth, London 1989, p. 14.

[4] Appendix 1, paras. 11, 12, 14.

[5] Appendix 1, para. 14.

COMPARISON OF EUROPE AND AMAZONIA LEGAL

7. INPE's estimate of the total deforestation as between the individual States of Amazônia was as follows:

Deforestation in Legal Amazônia[1]

States and territories	*Total area km²*	*Area deforested to 1989 inclusive*	
		km²	*(miles²)*
Acre	153,698	10,000	(3,860)
Amapá	142,359	850	(320)
Amazonas	1,567,954	20,000	(7,700)
Maranhão	260,233*	27,000	(10,400)
Mato Grosso	802,403*	80,000	(30,900)
Pará	1,246,833	115,000	(44,400)
Rondônia	238,379*	32,000	(12,350)
Roraima	225,017*	4,000	(1,550)
Tocantins	269,911*	23,000	(8,850)
		311,850	(120,300)

8. A considerable degree of confusion has been caused by inadequate data; and the uncertainties are being resolved as more sophisticated methods of measurement become available. The current annual figure for deforestation of 50,000 km² (almost 20,000 square miles) quoted by Dr Norman Myers in his study for Friends of the Earth[2] was, we were told, based on an alarming preliminary figure of 80,000 km² (over 30,000 square miles) for 1988 produced by INPE itself.[3] The staff at INPE told us that this preliminary figure had been based on remote-sensing data from the NOAA weather satellite which had subsequently proved inaccurate as a result of inadequacies in the system employed. The infra-red sensors had proved far too sensitive; areas with surface temperatures as low as 47°C were recorded as fires, while the actual occurrence of a single small fire would saturate pixels for up to one square kilometre, giving a misleading impression of a large area of burning forest. INPE's estimates from other data had showed that deforestation in 1988 was at about the expected rate.[4]

9. INPE is now using images from LANDSAT—which provide much higher resolution—as a basis for its remote-sensing work, and produced a new Atlas of Amazônia in 1988 to provide a baseline for an accurate study of deforestation using better methodology.[5] The 1989 figures which were made public just before our visit indicate that the annual rate of destruction is 24,000 km² (over 9,000 square miles). Comparison with the 1988 figures appears to suggest that the rate of destruction has levelled off; but it will be possible to see whether this is maintained only when the 1990 figures become available. For the moment, the exact annual rate of destruction remains a matter of uncertainty and debate, not least because of the practical difficulties in carrying out surveys on the ground in order to confirm the accuracy of remote-sensing data. Since our return from Brazil, INPE, in collaboration with the National Institute for Research in Amazônia [INPA], has produced more detailed figures which we annex to this Report.

10. **From the information made available to us, it appears that deforestation in Amazonia may not be as great as was previously thought; however, an annual loss of over 9,000 square miles of rainforest—an area roughly 20 per cent bigger than Wales—is in itself extremely serious.**

[1]Legal Amazônia consists of the States listed above; those marked with an asterisk contain large areas of non-forest vegetation, principally savannas (called *cerrado* in Brazil).

[2]*Op cit* Table 1.

[3]We were subsequently told by Friends of the Earth that Dr Myers had himself revised the original INPE figure downwards, on the grounds that it was suspiciously high.

[4]Appendix 1, para. 14.

[5]Appendix 1, para 12.

The policy of the Brazilian Government

11. As mentioned above,[1] we were privileged to have discussions with Dr Lutzenberger, the Secretary for the Environment,[2] and Professor Goldemberg, the Secretary for Science and Technology.[3] Both Ministers welcomed the interest and assistance of the United Kingdom Government in tackling the problems of Amazônia; and we were left in no doubt about the seriousness with which they regard the question of deforestation. They attributed deforestation to various factors.

12. One major factor has been **the previous tax regime.** Professor Goldemberg told us that the peak of the destruction, in 1988, had been caused by a proposal for land-reform from the previous Government; the intention was that unexploited land should be returned from private ownership to the State. The immediate result of this was that landowners in Amazônia who had not previously worked their land began to burn patches of forest in order to demonstrate that they were using it. The previous Government also provided tax concessions which encouraged exploitation, such as ranching. The administration of President Collor has repudiated this policy, and we were subsequently told by Mrs Chalker, Minister for Overseas Development, that the ODA believed that the ending of incentives for cattle-ranching was already beginning to have an impact on the rate of destruction.[4]

13. Another major cause has been **poor agricultural practice.** As an example, Dr Lutzenberger pointed to the damaging consequences of deep ploughing; land which has been deep-ploughed is rapidly eroded by heavy tropical rains. Most of the agriculture in Amazônia is carried on by small farmers who rapidly exhausted the fertility of the soil and therefore cut down more virgin forest each year in order to survive. Dr Lutzenberger saw the encouragement of organic methods and crop-rotation as being important in educating small farmers in the sustainable productive use of their land.[5] He also had harsh words for the effects of the Common Agricultural Policy [CAP] on Brazilian agriculture, claiming that the enormous market which the CAP had created for animal feedstuffs had distorted the policies of previous Brazilian Governments; farmers had been encouraged to grow soya beans and oil-palms as large-scale cash crops. The result of this was, he suggested, twofold: resources had been diverted away from producing food for domestic consumption, and the forest of Rio Grande do Sul had been destroyed to provide agricultural land.[6]

14. A further problem is that of the **illegal gold-miners,** or *garimpeiros*—penniless migrants who have flooded into Amazônia to escape the high unemployment by extracting gold, using low-technology methods which pollute the rivers with mercury.[7] The Museu Emilio Goeldi [MEG] in Belém estimates that, including the dependants of the miners themselves, some 2·5 million people had migrated to Amazônia. The Brazilian Government has attempted to deter illegal gold-mining by blowing up unauthorised airstrips. We were told by Dr Lutzenberger that this approach had proved ineffective because the miners repaired them very quickly; and that the Government was now trying to control the supply of diesel oil which the *garimpeiros* needed to operate their pumps. However, it was reported after our return that the Government had instituted a new crackdown on the illegal airstrips in the State of Roraima, where the miners had rebuilt airstrips destroyed in May.[8] The situation was described to us as akin to that which existed in North America during the gold rushes 150 years ago, when law and order in the "Wild West" was unenforceable or non-existent. The similarity extends to the pressures placed on the indigenous Indian population.

15. We were told that **logging** was not such a serious threat as formerly. The staff at MEG told us that itinerant loggers would still sell a whole tree for the price of one meal, and that their methods were extremely damaging; however, in their view, the problem was now under control because of the decline in demand.[9]

[1]Para. 1.
[2]Appendix 1, paras 31–40.
[3]Appendix 1, paras 16–19.
[4]Q 244 [*not printed*].
[5]Appendix 1, paras 34–5.
[6]Appendix 1, para. 37.
[7]Appendix 1, paras 61–66.
[8]*The Times*, 7 August 1990, p. 9.
[9]Appendix 1, paras 60–61.

16. The last, and in some ways the most intractable, problem is that of **size and enforcement.** Dr Lutzenberger told us that it was difficult for the enforcement authority, IBAMA,[1] to control and co-ordinate activities in such a huge land area.[2] Staff at the MEG confirmed that while the Government undoubtedly had the political will to enforce the law it lacked the means to do so; they suggested that the only possible solution to the enforcement problem would be to send in the Army, but felt that after 20 years of military rule it was not politically possible to show dependence upon them.[3] Dr Lutzenberger's strategy is to involve State and municipal governments through shared responsibility agreements which channel funds for environmental protection through the States and municipalities; the Government is also involving non-governmental organisations [NGOs] in the policing process.[4]

17. Mrs Chalker suggested that experience in the forest reserves of Ghana might provide a suitable model for Brazil; there, the local people are given a stake in the restoration of an area and are therefore anxious to play a part themselves in protecting it from degradation.[5] This is very much in accordance with suggestions which were made to us in informal conversations with representatives of the rubber-tappers, Brazil-nut collectors, and the indigenous peoples.

18. **We were impressed by the obvious commitment of Dr Lutzenberger and Professor Goldemberg—and, indeed, of President Collor himself—to environmental protection. The Brazilian Government clearly regards the preservation of the remaining rainforest with the utmost seriousness; it is also concerned about the conservation of the *cerrado* (savanna woodland) and other natural types of vegetation.**

19. **Much of the problem, however, comes down to lack of resources, not only for policing the rainforest but, more fundamentally, for the economic development which would provide jobs outside Amazônia for those who, otherwise, take to illegal gold-mining or subsistence farming.** The desperation of the *garimpeiros* presents a serious enforcement problem for the Government; as one of the staff of the MEG put it:

> "They don't come for fun. The aim of the gold-miner is to become rich—or die".[6]

The British Government's response

20. In July 1989 Mr Chris Patten, then Minister for Overseas Development, visited Brazil and signed a bilateral Memorandum of Understanding on environmental co-operation—the only such bilateral agreement to which Brazil is a party. Following that visit, the Overseas Development Administration [ODA] and its Brazilian counterparts have been identifying a series of specific environmental projects which will be funded under the Memorandum:

> "The initial emphasis has been on a major programme of Applied Research and Demonstration, both to provide the information needed urgently for environmental conservation and for the sustainable development of the rich natural resources of the forest. Within this, the focus is on three major areas: assistance for the sustainable management of the Amazon rain forests, research into and conservation of the genetic resources of the Amazon forests, and help for the urban environment".[7]

21. Of the projects under preparation, only one—the Institute of Hydrology Climate Research Project, which will involve a five-year study of the impact of deforestation on climate, at a cost of £2·46 million—had been formally approved prior to our visit; and we were present at the formal signing by HM Chargé d'Affaires and the Secretary-General of the Brazilian Ministry of External Affairs. This project is now under way; and two further projects—the Caxiuana Research Station, to be established by the Goeldi Museum, and the provision of training and consultancy assistance, managed by the British Council, to three institutions in Recife involved in environmental control—were signed during the recent visit to Brazil by Mrs Chalker. The Museu Goeldi stressed the need

[1]Brazilian Institute for the Environment and Renewable Resources.

[2]Myers *(op cit* p. 14) points out that until late 1988 there were only 140 forest guards in the State of Rondônia, or less than one to every 1,300 km^2 of forest. IBAMA's most recent figures indicate that there were a total of 101 Forest Protection Agents and Forest Protection Inspectors in the State.

[3]Appendix 1, para 60.

[4]Appendix 1, para 33.

[5]Q 215 *not printed.*

[6]Appendix 1, para 62.

[7]Appendix 2.

for aid in the form of equipment and trained personnel, rather than merely money. Subsequent to her visit, Mrs Chalker told the House on 12 November that a further project on aromatic plants had been agreed and that the ODA expected shortly to approve a further four projects worth an additional £4 million.[1]

22. Various persons and organisations with whom we had discussions criticised the slowness with which projects were being put in place under the Memorandum of Understanding. Professor Goldemberg himself, while expressing great satisfaction with the scientific content of the projects proposed under its auspices, told us that the pace of implementation was by no means as rapid as he would have wished; funding from the ODA was routed through the Ministry of External Affairs, and he suggested that the setting up of projects might be expedited if grants were channelled direct to recipient institutions.[2] The Secretary-General of the Ministry of External Affairs made it clear that it was normal practice for his Ministry to act on behalf of the Brazilian Government in relation to bilateral aid agreements, and pointed out that our own lead Department was the ODA within the Foreign and Commonwealth Office, rather than the Department of the Environment.

23. We did not fully understand why, once the Agreement had been concluded through the diplomatic channels of the two countries, implementation could not be left to the Department directly responsible for its actual implementation, thus avoiding unnecessary duplication and delays. Mrs Chalker attributed some of the problems to the fact that the Governors in certain of the Brazilian States—some of whom had been elected on an "anti-environment ticket"—were not fully in sympathy with the philosophy of President Collor's Government, and that it was necessary for the Federal Government to proceed by explanation and persuasion.[3]

24. **We share the concerns which were expressed to us in Brazil about the slowness in implementing projects under the Memorandum of Understanding. Setting up a research programme can be a lengthy process in itself; we hope that the necessary enabling agreements will be put in place as soon as possible and that the agreements recently signed by the Minister of Overseas Development are a sign that the pace is quickening. In this connexion we note with approval the appointment by the ODA of a First Secretary (Forestry Adviser) to assist the British Council and the British Embassy in the co-ordination of the proposed forestry programme;[4] and we hope that the establishment of this post will assist the Brazilian Government in streamlining its own internal administration in regard to these matters.**

Conclusion

25. **Our overall impression from our visit was one of deep concern, both in Government and among NGOs, at the continuing deforestation. The rate of deforestation, while less rapid than previously feared, still represents a major environmental disaster; and while the new Brazilian Government of President Collor is firmly committed to environmental protection, it faces a Herculean task in policing such a vast area. While there is a considerable degree of expertise and sophistication among the Brazilian scientific community, the United Kingdom–Brazilian Memorandum of Understanding is regarded as extremely important in advancing research on the rain forest. We hope that it does not founder through excessive internal administrative and regional difficulties which we have identified.**

[1] HC Deb (1990-91) c328.
[2] Appendix 1, para 16.
[3] QQ 215–6 *not printed*
[4] Appendix 2.

ANNEX

Deforested Area in Brazilian Legal Amazônia[1] from Comprehensive Landsat MSS and TM Surveys

DEFORESTED AREA IN SQUARE KILOMETRES (SQ MILES)

State	*area of state (sq km)*	*Jan 1978*	*Apr 1988*	*Aug 1989*	*Total % deforested to Aug 1989*
Acre	153,698	2,464	7,292	8,836 (3,412)	5·7%
Amapá	142,359	167	781	1,016 (392)	0·7%
Amazonas	1,567,954	1,725	18,565	21,584 (8,334)	1·4%
Maranhão	260,233	6,076	24,451	30,840 (11,907)	11·9%
(In addition to "old" deforestation: 57,824 sq km (22,325 sq miles))					
Mato Grosso	802,403	20,005	71,414	79,594 (30,731)	9·9%
Pará	1,246,833	16,525	88,535	99,786 (38,527)	8·0%
(In addition to "old" deforestation: 39,819 sq km (15,374 sq miles))					
Rondônia	238,379	4,242	29,678	31,476 (12,152)	13·2%
Roraima	225,017	132	2,745	3,621 (1,398)	1·6%
Tocantins	269,911	3,166	20,959	22,327 (8,620)	8·3%
Legal Amazônia	4,906,784	54,502	264,421	299,079 (115,474)	6·1%
(In addition to "old" deforestation: 97,643 sq km (37,700 sq miles))					

[1] *Source*: Fearnside, Tebaldi and Meira Filho: "*Deforestation Rate in Brazilian Amazonia*" INPE/INPA, August 1990.

APPENDIX I

Note by the Clerk of the Committee and the Specialist Adviser

VISIT OF THE ENVIRONMENT COMMITTEE TO BRAZIL, 1–8 JULY 1990

Attendance

Sir Hugh Rossi (Chairman)
Mr Richard Holt
Dr Kim Howells
Mr Andrew Hunter
Mr Robert B Jones
Mr Keith Mans
Mr Tom Pendry
Mr Peter L Pike
Mr Frank Cranmer (Clerk)
Dr James Ratter (Specialist Adviser)

Itinerary

Monday 2 July—São Paulo:

Briefing by HM Chargé d'Affaires
Briefing by ICI Brazil
Visit to INPE [National Institute for Space Research]

Tuesday 3 July—Brasília:

Meeting with Professor Goldemberg, Secretary for Science and Technology
Meeting with Secretary-General Azambuja, Ministry of External Affairs
Visit to FUNATURA

Wednesday 4 July—Visit to IBAMA [Brazilian Institute for the Environment and Renewable Resources]

Meeting with Dr Lutzenberger, Secretary for the Environment
Meeting with Senator Jarbas Passarinho
Presentation by Aracruz

Thursday 5 July—Belem:

Visit to SUDAM [Amazonian Development Superintendency]
Visit to Museu Emilio Goeldi
Visit to CPATU [Research Centre for Agriculture in the Humid Tropics]
Visit to IDESP [Economic and Social Development Institute of Pará]

Friday 6 July—Manaus:

Visit to INPA [National Institute for Research on Amazônia]
Visit to the Duque Forest Reserve
River trip

Presentation from ICI Brazil

1. ICI's Brazilian operation has been established for 60 years. Its turnover is currently $0·5 billion, and it employs about 5,000 people in locations stretching from the north to the south of the country, with the principal concentration in São Paulo. Its major areas of operation are in the production of leather-finishing chemicals, explosives,[1] colours and fine chemicals, and agrochemicals for use as fertilisers and for crop protection and pest control.

2. New projects are subject to Environmental Impact Assessment studies, while existing operations are the subject of environmental plans, with specific targets for improvements. The local dye plant, for example, is now operating up to the best international standards. ICI felt that its agrochemicals operation was environmentally-acceptable, but was undertaking a lot of educational work with users on the health and safety aspects of its products.

[1] ICI told us that its explosives were sold to bona fide customers and that it was unaware of any illegal use of its products.

3. ICI Brazil does not have any significant waste-disposal problem. Waste minimisation is pursued aggressively, and residues are disposed to landfill, with or without prior chemical treatment; moreover, ICI's local operations did not produce any of the really difficult wastes, such as cyanide. The São Paulo State Environmental Protection Board [CETESB] obliges companies within the State to operate at least to European standards and pursues a vigorous policy of heavy fines for defaulters. In ICI's view, São Paulo State in no respect resembles a Third World nation where companies are allowed to pursue environmentally-damaging operations—though it was suggested that CETESB was a model of good practice within Brazil and that standards were less strict in the north-east.

4. The total petrochemical sector in Brazil has an annual turnover of about $20 billion. About 25 per cent is controlled by multinationals and 5 per cent by small firms which probably operate to lower environmental standards. The rest is State-owned and will be privatised in due course, with the exception of the first-stage manufacture (cracking) operations. The current view of the Brazilian Government is that the holdings of overseas companies should not exceed 30 per cent.

The forthcoming symposium

5. ICI and the Overseas Development Administration [ODA] co-operate in respect of agriculture and the agrochemical sector, and ICI has carried out research on various aspects of the rainforests, such as investigation of the soil structure of the rainforest in Indonesia. In view of the impetus given to work in this area by the Bilateral Agreement, ODA had therefore approached ICI and suggested its involvement in a symposium on the regeneration of deforested areas which will address, in particular, the scope for

(i) recuperation of deforested areas, and

(ii) other productive uses.

The Brazilian Institute for the Environment and Renewable Resources [IBAMA] and Dr Lutzenberger have both supported this initiative, and have proposed two particular areas for study—each the size of the United Kingdom—one in the State of Rondônia and the other in the State of Amazonas.

6. ICI regards the most important factors in rainforest destruction as poverty (which drives the need for land) and lack of education (resulting in agricultural practices which rapidly exhaust the fertility of the land, once cleared). Five per cent of Brazil is currently under cultivation. Potentially, 45 per cent of the country is cultivable and there is enormous potential for increasing agricultural production using non-destructive techniques, particularly at a time when world food-stocks are declining; for example, soyabeans and coffee can be grown successfully on poor quality scrubland.

7. It is hoped that the symposium will produce positive proposals and concrete action. There is lots of sponsorship money available if good projects are put forward for funding—without increasing spending either by ICI or ODA.

National Institute for Space Research [INPE]

8. INPE employs about 1,600 people, of whom 950 are graduates, 350 with higher degrees. Its annual budget is currently $100 million—approximately double the figure for 1985. The initial research brief of INPE was work on astrophysics and atmospheric phenomena using probes and meteorological balloons. INPE is also responsible for the Brazilian Antarctic Research Station. The Institute has extended this work into the areas of meteorological forecasting; in particular, it conducts research into oceanography with particular reference to water temperatures and the influence of Antarctic currents.

9. The most important area of the Institute's work on rainforests is in the area of remote sensing. Through its receiving-station at Cuiabá, in the State of Mato Grosso, it receives pictures from LANDSAT which are updated every 16 days. Adaptations have also been made to enable the receiving-station to process transmissions from the French SPOT satellite. INPE also uses a Bandeirante aircraft for survey work. Remote sensing is seen as a low-cost alternative to other methods of data-collection making it possible to map water resources, soil types and vegetation.

10. INPE is responsible for the National Satellite Programme, under which it is planned to build four satellites; two for the collection of environmental data from 200 ground transmission points located mainly in Amazônia and the north east and a further two for remote sensing. INPE operates the only satellite simulation laboratory in the southern hemisphere. The first two satellites are being developed in Brazil itself, though they have not yet been launched. Brazil has signed a co-operation agreement on satellite technology with China, and is also involved in NASA's "Mission to Planet Earth" project in respect of long-term monitoring of the Amazon region. INPE is working with Australia, Belgium, Canada, France, India, Japan and the United Kingdom as well as with China.

Remote sensing

11. INPE regards remote sensing as an irreplaceable tool for monitoring the environment, since it provides a simple technique for detecting land-use changes over huge areas; and the Institute maintains a network of regional offices for the dissemination of remote-sensing data. The power of resolution of the LANDSAT system has been improved, so that it will now resolve pixels of 30 × 30 metres, as against 60 × 80 metres three years ago. This higher resolution enables INPE to distinguish areas of deforestation much more precisely than before, and to differentiate between "historic" deforestation areas which are now mainly covered by old secondary forest (as in the States of Pará and Maranhão, where forest was destroyed in the nineteenth century as railways were constructed) and recent forest loss. Remote sensing has also revealed the location of illegal landing-strips, secondary tracks from main roads which open up areas of forest to further exploitation, and patterns of settlement in Rondônia.

12. INPE produced a new Atlas of Amazônia in 1988, based on the higher resolution LANDSAT images, in order to provide a baseline for more accurate study of deforestation using better methodology. Because there were insufficient cloud-free images, evidence was also used from other sources. The 1989 figures which were made public in late June, indicate that the total level of deforestation is 395,000 km^2, of which 93,000 km^2 is "historic" deforestation not all of which has regrown. INPE therefore estimates modern deforestation at 302,000 km^2 out of a total forest area of 3,500,000 km^2, and that the current annual rate of destruction is about 23,000 km^2. Comparison between the 1988 and 1989 figures seems to indicate that the rate of deforestation has levelled off; but it will be possible to establish the trend only when the 1990 figures become available.

13. The breakdown for deforestation as between the individual States of Amazônia is as follows:

Deforestation in Legal Amazônia

States and territories	*Total area km^2*	*Area deforested to 1989 inclusive km^2*
Acre	153,698	10,000
Amapá	142,359	850
Amazonas	1,567,954	20,000
Maranhão	260,233*	27,000
Mato Grosso	802,403*	80,000
Pará	1,246,833	115,000
Rondônia	238,379*	32,000
Roraima	225,017*	4,000
Tocantins	269,911*	23,000
		311,850[1]

Legal Amazônia consists of the States listed above; those marked with an asterisk contain large areas of non-forest vegetation (principally savannas—called *cerrado* in Brazil). The forested area of Brazilian Amazônia was approximately 3,500,000 km^2. The figures above do not include the 93,000 km^2 of "historic" deforestation in the States of Pará and Maranhão. Total deforestation in *Amazônia Legal*, including "historic" deforestation, is about 12 per cent.

[1]The difference of approximately 10,000 km^2 between this figure and that given in paragraph 12 above is probably accounted for by the accidental inclusion of some "historic" deforestation here.

14. INPE explained that the exaggerated World Bank figure of 600,000 km² for deforestation of *Amazônia Legal* was based on the supposition that the total area of 5,000,000 km² had originally been forested, whereas the true figure was 3,500,000 km²; large areas of natural non-forest vegetation were therefore considered as having been deforested. The alarming preliminary figure of 80,000 km² of deforestation given by INPE for 1988 was an unfortunate mistake arising from INPE's attempt to use information from the NOAA weather satellite to estimate deforestation. The infra-red sensors had proved far too sensitive and areas with surface temperatures down to 47°C were recorded as fires, while the actual occurrence of a single small fire would saturate pixels for up to 1 km², giving the impression of a large area of burning forest. In fact, estimates from other data showed that deforestation in 1988 was at about the expected rate.

15. INPE estimates Brazil's contribution to global CO_2 emissions as 5·1 per cent of the total—of which 3·6 per cent is produced by forest burning and 1·5 per cent from other sources, principally alcohol motor fuel. The contribution from electricity generation is relatively low because of Brazil's reliance on hydro-electricity.

Meeting with Professor Goldemberg, Secretary for Science and Technology

16. The Office of Science and Technology is part of the Presidential Office, rather than a Ministry. It is responsible for scholarships and grants, research, and Government laboratories; but it also has responsibility for policy in certain areas, such as intellectual property and information technology. As in the United Kingdom, responsibility for scientific research is divided; for example, the Ministries of Agriculture and Health are responsible for research within their own policy areas. Professor Goldemberg told us that he was very pleased with the Bilateral Agreement with the United Kingdom from a scientific point a view, but that the pace of implementation was not as fast as he would have wished. Funding from the ODA was routed through the Ministry of Foreign Affairs, and he suggested that matters might be expedited if grants were channelled direct to recipient institutions.

Deforestation

17. Relatively little is known about deforestation, and there is therefore great uncertainty about the contribution of rainforest destruction to CO_2 emissions. If the overall contribution of deforestation is small, then it would be necessary for the developed countries, as major contributors, to take the lead in reducing emissions; if, on the other hand, deforestation is a major factor in the global rise in CO_2 levels, then the tropical countries will have to act. The United States Government is very anxious to have Brazil sign a treaty on deforestation; the Brazilian Ministry of External Affairs, on the other hand, wants to see limits on CO_2 emissions by the major industrial countries. The debate can only be resolved by accurate information on the rate of deforestation, and it is therefore important for INPE to produce accurate estimates of the extent and annual rate of destruction—though it must be remembered that INPE's data relates only to Brazil, and other work will be required to establish accurate data for rainforests elsewhere. It is also necessary for the remote-sensing work of INPE to be complemented by fieldwork (including much ground-truthing) undertaken by the National Institute for Research on Amazônia [INPA]; and it is INPA that is likely to be the main beneficiary of ODA technical assistance.

18. Professor Goldemberg estimates that Brazil contributes about 5 per cent of global CO_2 emissions, of which four-fifths comes from deforestation. He acknowledged that the Government had to stop the destruction, and is under great pressure on the issue. The peak of destruction in 1988 had been caused by a land-reform proposal, that unexploited land should be returned from private ownership to the State; this had caused a frenzy of activity among settlers and massive burning. Deforestation had been largely driven by political rather than economic considerations; for example, various subsidies such as tax concessions had encouraged exploitation of Amazônia. Policy has now changed, and subsidies have been ended. There is still, however, a difference of view between the Federal Government and some of the States in the North, which see conservation as a brake on their economic development. At least the Brazilian Government has prevented destruction from growing exponentially, and it is levelling off in the States of Rondônia and Pará (though the situation is not so good in some other States).

19. The Government wants to see a Treaty which will limit the emissions of CO_2 worldwide and hopes that such a Treaty or Protocol will be ready by 1992. It is pleased with the outcome of the Montreal Review Conference and hopes that this augurs well for talks on limiting CO_2 emissions.

particularly as regards the prospect of technology transfer. The attitude of the United States—that certainty as to the existence of global warming and its likely development is a necessary precondition to any concerted international action to limit emissions of greenhouse gases—is not seen as helpful. A reduction of CO_2 emissions, in particular, is regarded as desirable both for its environmental consequences and as an energy-saving measure.

FUNATURA

20. There are four large environmental Foundations in Brazil, of which FUNATURA is one. There are also ten smaller Foundations[1] and about 200 local associations with environmental aims. FUNATURA supports projects in Amazônia, but is also concerned with the *cerrado*. This tropical savanna woodland covers nearly one-quarter of Brazil. Only 1 per cent is protected by law; and FUNATURA regards the *cerrado* as the second most threatened Brazilian vegetation type (the first being the Atlantic rainforest)—and one about which the international community is largely unconcerned. FUNATURA currently supports 38 projects, of which it cited three as examples of the range of its work.

21. The **Grande Sertão Veredas Federal Park** has been established in the *cerrado* in an area near to the transition to the arid cactus/thorn scrub vegetation (*caatinga*) of north-east Brazil. FUNATURA is attempting to raise funds to buy and support the Park (which is 84,000 hectares in area) and to fund adequate fencing and a warden service. The Foundation is also looking at the genetic potential of indigenous species, which include endangered species such as marsh and pampas deer and the giant anteater. Brazil has strong wildlife protection laws, giving absolute protection for all species except gamebirds in the south of the country.

22. FUNATURA is also trying to create a **Wildlife Sanctuary Network** by buying land to donate to the Government which the Foundation will then manage on its behalf. It is currently working on 30 separate projects suggested by landowners, and four sanctuaries have been created, one of which consists of 500 ha beside Brasília Zoo. Some landowners can afford to donate sites without the need for any financial return; however, one of the objects of the initiative is to demonstrate to landowners that creating a wildlife sanctuary can create profits for the donor from eco-tourism. The establishment of sanctuaries will also enable educational work to be undertaken.

23. **Alternatives to deforestation** are also being promoted through workshops for decision-makers in local areas on topics such as rubber, fisheries and logging. FUNATURA sees the major issue not as to whether alternative methods of exploiting the rain forests are necessary, but rather how to implement them. Workshops are planned for Porto Velho, Belém and Brasília in 1990; FUNATURA hopes to begin a joint project on logging with the International Timber Trade Organisation [ITTO].

24. FUNATURA regards the policies of the new Government as being on the right lines in many respects. 6·8 per cent of Amazônia is currently a conservation area; the problem is seen not so much as a lack of political will as force of economic circumstances—a product of land tenure, economic crisis and external debt. Immigrants are destroying Amazônia because they need work in order to survive; FUNATURA estimates that there are 1,200,000 *garimpeiros*[2] and their dependants in Amazônia. Nevertheless, FUNATURA feels that the Government has got to stop immigration into the Amazon region; FUNATURA's preference would be for agrarian reform and subsidies for the economy of north-east Brazil (where the majority of the immigrants come from). The Government should also encourage rational economic exploitation of the area through activities such as fisheries and silviculture; cattle-ranching in the deep forest is not economically viable.

25. In 1989 FUNATURA managed about $2 million, of which about half came from the Government, 30 per cent from organisations abroad (such as WWF), 5 per cent from membership, and 5 per cent from donations. Since the implementation of the Collor Plan, no Government money has been available and its funds in the bank have been temporarily confiscated; FUNATURA's staff has therefore been reduced from 25, with two consultants, to 11, with 14 consultants. The Foundation is starting again with new projects funded by the ITTO, World Bank and World Resources Institute [WRI]. Pay accounts for about 10 per cent of costs.

[1]Of which some are very specific; for example, there is a Foundation solely concerned with the marine turtle.

[2]Miners of gold and precious stones, often operating illegally.

Brazilian Institute for the Environment and Renewable Resources (IBAMA)

26. IBAMA is the Government Institute charged with overall control of environmental issues, especially supervision and inspection of forests and endangered species. The new Institute was established in January 1989 from four existing organisations: the Institutes of Forestry, of Fisheries, and of Rubber, and the Special Secretariat for the Environment. Under President Collor's reorganisation, rather than a Ministry, environmental issues are the responsibility of a Secretary, Dr Lutzenberger, who reports directly to the President. IBAMA is headed by the National Council for the Environment—which includes representatives from the Federal and State Governments and from non-governmental organisations; it reports to the Secretary and constitutes his executive agency on environmental matters. It employs about 6,000 administrative and technical staff. IBAMA also has links with the State environmental regulation organisations, such as CETESB, through regional offices in each State. There are five Directorates: Administration, Research, Ecosystems, Natural Resources, and Enforcement and Environmental Quality.

27. The **Directorate of Research** is establishing a national system of environmental research and education. There are four centres linked to the Directorate: fisheries, remote sensing, the laboratory for forest products and national technical information. For 1990, projects will be broadened to include more intensive technical assistance for forestry, the zoning of regions according to potential for forestry, and greater use of remote sensing for resource management. The Directorate is also developing technology for environmental management, and research into the socio-economic aspects of environmental management. Another section of the Directorate deals with environmental education. It is mounting a high-priority programme of both formal and informal education.

28. The main task of the **Directorate of Ecosystems** is conservation. The Directorate operates through two Departments: Conservation, and Wildlife. The main tasks of the Conservation Department are to administer existing conservation units and to establish new ones; they vary in size and type according to their purpose. The Wildlife Department is responsible for managing wildlife, monitoring and promoting the survival of endangered species (for which it compiles the register), co-ordinating the Brazilian response to the CITES programme and controlling and advising zoos. It currently has in hand important programmes in relation to Amazon turtles and manatees, as well as bird-banding and studies of marine turtles and whales. The role of NGOs in relation to wildlife is integrated into the projects which they propose. The Directorate has a total staff of about 600, of whom some 500 are in the field, and administers about 20 million hectares of conservation units.

29. The **Directorate of Natural Resources** operates through three Departments: Forestry Resources, Fisheries and Agriculture, and Trading and Transformation of Natural Products—the last of which is concerned mainly with trading and standardisation of products. The Directorate attempts to integrate the use of natural resources with their management, and is very influential in the formulation of environmental protection policy. An important aim is to make the production sector of the economy aware of the importance of environmental issues. The Directorate administers 15 million hectares of National Forests (in addition to the 20 million hectares of Conservation Units administered by the Directorate of Ecosystems) and is carrying out research on sustainable development. Two million hectares are being established as extractive reserves in which local people will be able to extract rubber, medicinal herbs and the like, with government assistance. It is planned to establish a further 20 million hectares of extractive reserves; the intention is that exploitation should be by local communities and that outsiders should be excluded.

30. The **Directorate of Enforcement and Environmental Quality** operates through three Departments—Fiscalisation (ie inspection and enforcement), Environmental Quality, and Licensing—as the enforcement and regulatory arm of IBAMA.

Meeting with Dr José Lutzenberger, Secretary for the Environment

31. Dr Lutzenberger expressed himself as very happy with the attitude of the United Kingdom towards environmental protection in Amazônia and with the activities of the ODA in Brazil.

32. The first priority for environmental protection was the problem of Amazônia, where the damage being caused was largely irreversible. However, there were other problems which were also of great importance but which received little international attention: the savanna,[1] which has a much richer flora than that of Africa and 30 per cent of which has already been destroyed, the wetlands *(pantanal)*, and the araucaria forest, little of which has survived. The overall aim had to be *protection of the remaining wilderness;* loss of wilderness areas was almost as irreversible as loss of species, and in any case, the loss of unique ecosystems led to species loss; Amazônia had large numbers of unique ecosystems which were irreplaceable.

33. A major problem was one of size; it was difficult for IBAMA to control and co-ordinate activities in such a huge land area. Dr Lutzenberger's strategy was to involve State and municipal governments through agreements which shared responsibility with them and which channelled funds for environmental protection to the States and municipalities. The Government also worked closely with the non-governmental organisations, and involved them in policing. In talks with producers, officials from IBAMA were always accompanied by officials from the local State government and representatives of NGOs. An example of Government action where such co-operation would be necessary was the new Regulations on chainsaws; in future, chainsaws were to be subjected to the same kind of regulatory system as firearms, with licensing and registration of sales.

34. Agricultural practice was another major problem. "Agribusiness" had taken the wrong path. Brazilian farmers could not continue to use with impunity chemical fertilisers and practices which degraded the soil; deep ploughing, for example, was perfectly acceptable in temperate areas, but the effect of heavy tropical rains on areas which had been subjected to deep ploughing was immediate soil erosion. Reliance on chemical pesticides was based on a misconception; it was treating the symptom rather than the disease. Pests were indicators of incorrect agricultural practice; even biological control was based on the same incorrect premise. Pests were not a problem on healthy plants, and their presence indicated an imbalance in the supply of nutrients through over-or under-feeding. The key was good soil-structure and adequate fertility. The overall aim had to be to convert Brazilian agriculture to self-sustaining systems and reduce the emphasis on production of cash crops for export.

35. Most of the agriculture in Amazônia was carried out by small farmers and by big cattle ranchers. Most of the cleared areas had already been abandoned and small farmers had to cut down more forest each year in order to survive. Once the land had been burned off it would provide only two or three crops before becoming exhausted. Small farmers had to be educated about organic methods and crop-rotation; for example, the same piece of ground could only be used for growing two crops of manioc, while other crops derived from trees, such as breadfruit, palm-fruit and papaya were much more productive over long periods of time. Traditionally, the Government had only been interested in cash crops, to the extent that the marketing authorities had discouraged the planting of mixed stands of, for example, coffee, cocoa and rubber. The Government was now promoting mixed farming rather than monoculture—but changing attitudes was a huge task.

36. An immediate problem was to discourage the *garimpeiros*. Blowing up the illegal airstrips had not worked; either they were repaired or new ones were constructed. The Government was trying a new approach: to control the supply of diesel oil which the illegal miners needed to operate their pumps. Diesel was currently sent by road to Boa Vista and transshipped by private aircraft. It was proposed that the carriage of diesel fuel by air should by subject to regulation; but there were legal difficulties with this approach, and several Ministries would have to work together with the problems.

37. One of the main contributory factors in deforestation was the effect of the EC Common Agricultural Policy [CAP], which had created an enormous market for animal feedstuffs. Previous Governments had promoted soyabeans in Brazil and oil-palm in Africa and Asia as a large-scale cash crop, and one of the results had been to destroy the forest in Rio Grande do Sul and to cause the migration of large numbers of small farmers. The soybean crop had gone to feed cattle in the EC, rather than hungry Brazilians. The CAP also had an unfortunate effect in Europe itself, with the creation of surpluses. This demonstrated the fact that ecological problems could not be considered in isolation from one another.

[1]Known in Brazil as *cerrado*.

38. Dr Lutzenberger suggested that extrapolations on the greenhouse effect did not take sufficient account of rainforest destruction which, in his view, would have a major impact on climate change. Of the rain which fell on the forest, 25 per cent never reached the ground at all and evaporated from the canopy, while 50 per cent was recycled through transpiration. The water was recycled in this way six or seven times during its passage on the prevailing wind to the Andes; the process of continuous condensation and evapotranspiration involved massive amounts of energy.

39. In Dr Lutzenberger's view, both the global and local effects of rain forest destruction would be dramatic. He doubted the accuracy of linear extrapolations of climatic change, since complex systems did not behave in a linear way. He foresaw the possibility of "flip-over", in which the linear progression was suddenly interrupted by a major change. He cited as examples of this the shift in the *El Niño* current and the hole which developed in the ozone layer over the Antarctic, and asked what would happen if the destruction of Amazônia led to the end of the huge warm northern airflow originating there or even to a change in the course of the Gulf Stream.

40. In summary, the problems of Amazônia were not ones of plans and projects, but of political will and solutions which were adapted in scale to the nature of the difficulties—both small and large—which people faced. While recognising the difficulties ahead, the present Government was strongly committed to providing a solution to the deforestation; its predecessor, on the other hand, had been aware of the problems but had done nothing.

Meeting with Senator Passarinho[1]

41. Senator Passarinho is one of the Senators for the State of Pará, where major deforestation has taken place. He said that the total figure for forest destruction up to 1988 in *Amazônia Legal* was 7 per cent, while it had been only 1 per cent in 1971. Much of this deforestation had been brought about by immigration into southern Pará and Rondônia. Fortunately, Dr Philip Fearnside's projections—made in 1980—of a situation where Rondônia would already be completely deforested and Pará would reach total deforestation in 1991 had not proved accurate; but the situation was nevertheless very serious. He spoke briefly about the Great Carajas Project, involving total investment of $US18 million to exploit not only the vast iron-ore reserves in the south of Para, but all its mineral resources. Only pig-iron was being produced there for export to Japan, although Brazil is the world's sixth-largest steel-producer.

42. The *garimpeiros* were a much greater threat to Amazônia even than the burning of the forest, which had been reduced in scale. The landscape was being degraded by illegal goldmining and the rivers were being polluted by the mercury used to extract the gold.

43. Senator Passarinho advocated sustainable exploitation. There was a new conception of environmental problems—and understanding that the environment was not something limited by national sovereignty but which belonged to the world as a whole. He regarded some of Dr Lutzenberger's positions (for example, on restriction of hydro-electric schemes) as too extreme, and felt that the exploitation of natural resources was necessary but that it had to be carried out in a way which would not damage the environment.

44. Federal law on environmental protection took precedence over State law. Policing was difficult, and depended on Federal law. For example, the policy of destroying illegal airstrips in Amazônia had been unsuccessful; as existing airstrips were destroyed, new ones were opened. Although the numbers of *garimpeiros* had declined in some areas (for example, from about 40,000 to about 5,000 in the lands of the Yanomani) they still presented a major problem. A more realistic approach to illegal goldmining might have more productive results. For example, research was being carried out in the University of Pará into better extraction methods for gold, so that the mercury was not evaporated during the extraction process to contaminate the environment. The *garimpeiros* used low-technology extraction techniques which were highly-polluting.

45. In Brazil there was an old saying about Amazônia: "A land without people for a people without land". There was a need for *controlled* settlement and exploitation. The Trans-Amazonian Highway had been an attempt to promote planned development, but it had failed because spontaneous immigration had been much greater than controlled settlement. Recent projects administered through SUDAM and SUDENE[2] were concentrated on "poles of development".

[1]Senator Passarinho was appointed to the Government subsequent to our visit.

[2]The Development Agencies for Amazônia and the North East.

Presentation by Aracruz

46. Aracruz is part of Souza Cruz, a Brazilian subsidiary of BAT Industries plc which manufactures woodpulp for paper-making. Eighty per cent of production is exported.

47. The raw material for the production of woodpulp is eucalyptus growing on land in the State of Espirito Santo which was originally deforested for the production of charcoal and subsequently suffered considerable erosion. The eucalyptus trees were grown from seeds collected in Australia to provide an appropriate strain for the acid soil (pH 4.7—pH 5.4), and the stock has been further improved by selection and grafting. The trees are coppiced on an eight-year cycle and regrow from the stumps.

48. Forty-seven million seedlings and rooted cuttings have been produced, partly for the plantations and partly for distribution to farmers in order to provide a renewable source of fuelwood. Tissue culture is also used as an alternative technology. Native species are planted in stands between the eucalyptus. Inventory studies of natural forest have been carried out in order to establish the correct mix of species for replanting; seeds are collected from natural reserves. Biological control methods are used against pests (eg fungal control against leaf-cutter ants). Aracruz carries out consultancy work in other countries—for example, China—on the production of biomass for fuel.

Amazonian Development Superintendency [SUDAM]

49. SUDAM is the development agency for *Amazônia Legal*, currently employing 480 staff.[1]

50. Continental Amazônia covers an area of 7,855,000 km^2; it is a distinct region with well-defined physical characteristics—humid to super-humid climate, high uniform temperature, and a short dry season. Forty-five per cent of Continental Amazônia (3,600,000 km^2) is situated within the borders of Brazil; *Amazônia Legal* consists of this area together with some additional areas added for reasons of planning. The additional areas are distinctive both physically and botanically, consisting largely of *cerrado*. A map of the area's vegetation reveals a band of seasonal semi-humid forest along the margins of the rain forest, between the rain forest and the *cerrado*.

51. The majority of immigrants settle along the southern margin of the Amazonian Basin; the pattern of habitation is clearly shown by remote-sensing data. SUDAM agrees with INPE's figures for rainforest destruction: about 7 per cent, including the "historic" destruction in Pará and Maranhão. But SUDAM suggests that the precise extent of the rain forest and of the degree of destruction are difficult to calculate, since the rain forest and the semi-humid forest run into a band of forest/*cerrado* transitional vegetation.

52. SUDAM's principal project is to identify and prioritise zones for study, looking at the geology, soils, and ecological factors. The studies are preparatory to land-zoning, and are a combination of desk-studies and fieldwork. A soil map has already been produced, showing 12 categories of soil, with variable potential. Detailed vegetation and climate maps have also been produced and the Agency is at present working to produce a geological map. In addition, as a final stage, a summary map containing all the information will be produced. All the maps are accompanied by detailed reports. Mixed teams of the Agency's own employees and staff from the Brazilian Institute of Geography and Statistics [IGBE] collaborate in this work. The reports of *Projeto Radam*, the giant project which mapped Brazil using sideways-looking radar, provide an indispensable basis for the present projects of the Agency.

53. SUDAM prepares its budget for approval by Brasília; and funding has been reduced since the implementation of the Collor Plan. The Superintendency would welcome technical assistance on hydrogeology.

Museu Emilio Goeldi [MEG]

54. The Director, Dr Guilherme de la Penha, told us that the MEG was involved in three projects with the ODA: the study of the ecosystem of Combu (a *varzea*[2] island near Belem), the Caxiuana National Forest and a project on essential oils and other phytochemicals available from native plants.

[1] A decline from 800 employed before implementation of the Collor Plan.

[2] *Varzea* is periodically-flooded forest

55. The Combu Island project is principally concerned with the Açaí palm, an economically-important plant in Amazônia. The MEG is looking at ways of improving management, but is also carrying out basic anthropological and ecological research. The latter will concentrate particularly on tidal flooded forest.

56. The Caxiuana Project involves 33,000 hectares of protected National Forest which contains 17 ecosystems—almost all the important ecosystems within this National Forest. The research will cover both important groups of ecosystems—flooded and dry. The area contains about 30 families who have come into the area in recent years to practise subsistence agriculture; they are *caboclos*[1] rather than Indians. It is intended to involve them in the project. Because of its inaccessibility, the area does not have any problems of invasion by outsiders. The research station will require £1 million to establish, and work on its construction will continue over two years.

57. **Research on Amazônia** is now beginning to be co-ordinated; and a committee has been established to further this. While many of the SUDAM projects are aimed at development, the Agency has financed some small scientific projects. The MEG is now exchanging results with SUDAM and INPA but this process is inhibited by lack of facilities. The various computer systems are not compatible and the cost of the necessary links is too high for Brazil to fund at the moment; it is hoped to achieve compatibility over the next five years. The MEG provides support for SUDAM on request, but in the past has rarely been consulted about projects.

58. Bureaucratic delays are being tackled, but there are still serious problems. The MEG calculates that it had lost 60 per cent of foreign funds as a result of currency conversion at officially-imposed rates and the fact that the *Banco do Brasil* charges a 10 per cent handling charge. The MEG would prefer direct funding wherever possible, but hopes that procedures will be streamlined under the new Government. The new research station is at the planning stage, and while the capital expenditure required Government sanction, the MEG is hoping to obtain equipment for the new station directly from the British Council, which will administer the ODA funds and which has already been very helpful in providing assistance to get the project under way before the formal Agreement is signed.

59. The Ecology Department is supported by the Jesse Smith Noyes Foundation and is conducting a study of comparative ethno-ecology in Eastern Amazônia, looking principally at the use made by Indians of botanical resources. A comparative survey is being undertaken of the flora and fauna available to three Indian tribes on the border of the State of Maranhão. The area of the survey is in the last remaining high forest, an Indian reserve of one million hectares; it is threatened by *garimpeiros*, logging and cattle-ranching, and will be gone in five years if the present rate of destruction continues. The project could serve as a model for the utilisation of resources in other parts of Amazônia.

60. The MEG identified various **priorities for the protection of Amazônia.** Squatters, ranchers and *garimpeiros* are contravening the Constitution; while the Government has the political will to enforce the law, it lacks the means to do so. Incentives for forest clearance had been abolished.[2] However, there are only about 25 forest guards in Amazônia, and it is not possible to use the local police. Adequate enforcement almost requires a military operation with helicopters. It might be possible to solve the problem by sending in the Army, but this is not a politically-realistic option after 20 years of military rule.

61. In the opinion of the MEG, the problem of Amazônia lies not in enforcement, but in the economic situation of Brazil. There is high unemployment and massive foreign debt. People come to Amazônia in order to have a chance of survival. As one of the staff explained,

"They don't come for fun. The aim of the gold-miner is to become rich—or die".

The *garimpeiros* are armed in order to protect themselves and if necessary, will kill Indians or *caboclos*. The only solution is to offer them work; some of them arrived in Amazônia to work on the big projects and stayed on when the projects were completed. Loggers still sell a whole tree for the price of one meal; they make very little money and their logging practices are not sustainable. Even the gold-miners make relatively little—and drug-dealers are now buying Amazonian gold as a means of laundering illegal funds. The solution has therefore to be socio-economic; at present, immigrants are dying from mercury-poisoning, malaria and indigenous viruses.

[1]People of mixed Indian descent.

[2]Under the old tax regime, one of the major culprits of deforestation was Volkswagen.

62. Logging is now under control as demand has declined. The main danger to Amazônia comes from illegal gold-mining. 2·5 million people are involved, using low-technology methods of extraction which damage the environment and the health of the miners, some of whom have in their bodies mercury levels which are 100 times the maximum allowed by health guidelines. The method of extraction used is not even economic, if any value is placed on the hours of labour expended. The Government tries to control the sale of mercury, but mercury smuggling has become big business.

63. In the short term there is increasing pressure on Amazônia. The rainy season acts as a buffer, because it is difficult to travel during the rains. It is not clear whether destruction will be as bad in 1991 as in 1990; the pressure will start again in March 1991.

Research Centre for Agriculture in the Humid Tropics [CPATU]

64. CPATU, founded in 1939, is the oldest research centre in Amazônia, with 480 staff in the whole region, 130 of whom are research-workers. CPATU's main objective is to study and develop agriculture and cattle breeding in the humid tropic; it studies the natural and economic resources of Amazônia, development of forest products, and indigenous forest management. The Centre has a herbarium with 160,000 specimens and has strong links with Kew. The Centre has conducted a soil survey and produced a soil fertility map. Climate mapping is also undertaken.

65. The Centre is also conducting research on the cultivation of the most important crops: r.. .ber, black and white pepper (which was the biggest export as recently as 1981), coffee, annatto (a vegetable dye), and *guaraná* (a mild stimulant which is the main ingredient of a popular soft drink). The Centre has also carried out research on the Brazil-nut tree, producing by selective breeding smaller trees which are easier to harvest and which produce their first crop after two seasons instead of after 15.

66. Research is also being carried out on the recuperation of degraded pasture and on the suitability of the Indian water-buffalo for Amazônia; 57 per cent of the national herd is situated in the Amazon, and their milk is used to produce yoghurt and cheese. Fisheries are very important in Amazônia and CPATU is investigating methods of combining fisheries with the raising of water-buffalo. Other alternatives under investigation include jute, hill rice, rice on wet paddies, and garden crops, 90 per cent of which are at present imported from the south rather than grown locally. The Centre is also looking at mixed culture, such as rice with maize or manioc with maize.

67. CPATU sees the **reasons for deforestation** as a combination of increasing population (Brazil's population has increased by 57 million since 1970), the agrarian structure, the patterns of agricultural production both inside and outside Amazônia, and the increase in urbanisation.

68. Various schemes for agricultural production had been put forward. One possibility would be for 70 per cent to be left as forest, with 10 per cent devoted to agriculture, 15 per cent to stock-rearing, and 5 per cent to the cities. Alternatively, 58 per cent might be used for forest extraction, 22 per cent kept under conservation, and the remaining 20 per cent used for crops, cattle-rearing and cities.

69. The industrialised and stock-raising areas are expanding. Examples of industrialisation are the Carajas project and the exploitation of petroleum gas in western Amazônia. In CPATU's opinion this expansion will inevitably continue as the population of *Amazônia Legal* increases by three million each year. An alternative conservation strategy would be to make better use of the 33,000,000 hectares which have already been deforested, by introducing more intensive methods of agricultural production; this will in turn require techniques for high-volume production. For example, in 1986, 2,400,000 hectares were under irrigation in Brazil, as against almost 45,000,000 in both India and China. CPATU feels that the emphasis placed on extractive use of the forest by organisations such as Friends of the Earth and Bodyshop is unrealistic; extractive methods could support the existing forest population, but could not sustain the increasing immigration into Amazônia. In conclusion, the ODA is principally interested in *forests* and has targeted its technical assistance towards various aspects of forestry; but CPATU feels that the way to save the forests is to encourage agricultural projects which divert pressures away from them—particularly those directed at making the enormous areas which are already deforested and abandoned agriculturally productive once more.

Economic and Social Development Institute of Pará [IDESP]

70. IDESP has been in existence for 24 years; it originally prepared the spending Estimates for the State of Pará, as well as carrying out economic, social and statistical research. In 1975 its budgeting function was removed and it became a research organisation. It is divided into various Departments. The **Department of State Statistics** prepares various economic indices, such as the Retail Price Index, the Employment Index and the Commercial Index, maintains the State's databank of general economic information, and produces the Annual Digest of Statistics. The **Department of Socio-economic Research** undertakes particular studies on the effects of Federal projects in Pará and evaluations of commercial and industrial statistics which are communicated in brief reviews, for example, on the situation of Indian lands in the State. The statistical work is for general information rather than solely for Government; for example, IDESP's evaluations of the Carajas project were taken up by those wishing to take legal action over the Project.[1]

71. The **Department of Natural Resources** carries out research and mapping. It has produced maps of each municipality in the State, using radar remote-sensing and has used satellite remote-sensing to map deforestation. The Department has produced a map of the location of Brazil-nut trees, using remote-sensing data from INPE and SUDAM combined with it own fieldwork. According to the latest figures, 44·6 per cent of Brazil-nut trees in the State have been lost.

72. Detailed mapping of deforestation in the State is not yet available for all areas. IDESP is carrying out a project on the zoning and ecology of Pará which will combine information from all available maps in order to produce detailed coverage of the ecology of the State. This is being supported by detailed fieldwork in 56 areas chosen as a representative of the ecology of the State as a whole. There are no "empty" areas in Pará; all of the remaining forest is inhabited by rubber-tappers, Brazil-nut collectors and Indians.

National Institute for Research on Amazônia [INPA]

73. INPA was set up in 1954 in response to a United Nations project for an international institute for Amazônia. Its main objective is research on the flora and fauna of the Amazon region, together with work on socio-economic issues and population.

74. There is considerable pressure to develop farming and mining in Amazônia. In the last thirty years the population has increased by 15 million, principally as a result of immigration. The development of the Trans-Amazonian Highway had been planned to facilitate the transfer of population from the arid north-east. The Government of the day gave land along the Highway to migrants. INPA's view at the time was that the project had not been planned with due consideration to soil management; agriculture is difficult in the tropics because of problems with pest and fungus control, and tropical plantations therefore require adequate investment and the application of the proper technology if they are to succeed. The North-South Highway, BR 364, was built with support from the World Bank to facilitate trade with Venezuela; the Bank is now under pressure from NGOs for supporting the project. It has brought similar problems: poor farming practice which breaks the phosphate/nitrogen cycle, and erosion by the action of the heavy tropical rains which both wash away the soil and leach out the nutrients.

75. It is now known that the forest maintains its own nutrients in a self-sustaining system with a balanced hydrological cycle. The average precipitation is 2,400 mm per year. Nearly 70 per cent of the rain falling on the forest is recirculated by evapotranspiration: 25 per cent never reaches the ground and is evaporated direct from the canopy, while at least one half of that which reaches the forest floor is returned to the atmosphere by transpiration. Total evapotranspiration for the Brazilian part of Amazônia is estimated at about 4×10^{12} m^3 per year. The air currents provide a crucial system for transporting energy from the equatorial belt to the temperate regions. The Amazon also accounts for 20 per cent of the freshwater flowing into the world's oceans. The new Government is seriously concerned about the problem of rain forest destruction; INPA has been warning of the dangers for the last 25 years—the only difference now is that the figures have been refined.

[1]The cases are still pending.

76. The social pressures on the Amazon region are immense, and originate outside the region. One way to solve the agrarian reform problem would be to use land in *Amazônia Legal*. Some planners in the south look to Amazônia as a solution; in INPA's view, immigration will merely transfer problems from the south and the north east to the north. There is also international pressure for greater timber exports as the tropical forests in Africa and Asia are depleted but this is not the major cause of deforestation: the principal pressures are from cattle-ranching, charcoal-burning and mining. Dr Salati, the Director of INPA, has suggested that, given the experience of irrigation programmes, it would be more cost-effective to transfer water to the arid north east—where the soils are good—rather than to transfer people from the north east to Amazônia.

77. INPA is currently preparing a strategy document—to be published shortly—which it is hoped will provide a scientific base for the sustainable development of Amazônia. INPA clearly regard this as extremely important, and 30 people are working on it. The document is aimed at the Government and Congress rather than the scientific community, in the hope that the direction of policy can thereby be changed. A similar document was prepared ten years ago, but it had little impact; the present strategy, however, is being prepared in response from a direct request from President Collor and Professor Goldemberg. It is hoped that the new Constitution will create a climate in which Congress will be more ready to bring pressure to bear on the Government.

78. One possible approach would be more extensive irrigation schemes. Seventy-five per cent of the north east is crystalline rock and exploitation of the groundwater is therefore too expensive. There are several irrigation programmes but they are small in scale. Water transferred from the Amazon would have to be piped for between 700 and 1,000 km; such a major project would require great political determination. Another possibility would be to increase agricultural productivity in south and central Brazil. For example, the average production of field-beans is currently 600 kg/ha, though the technology exists to produce 3·4 tonnes/ha. Similar increases are possible for other crops such as rice and cassava; to achieve such increases, a change in the attitude of the Ministry of Agriculture is required, together with technology transfer. Any plan for the sustainable development of Amazônia has to take account of the indigenous population, especially the Indians and the *caboclos*, most of whom are rubber-tappers and Brazil-nut collectors. Means have to be found to prevent the invasion of Indian reserves.

79. INPA estimates that there are about 200,000 *garimpeiros* in Amazônia, each supporting about 10 people dependent on their activities, and suspects that the global figure of 2,000,000 is rising. In 1989, 60 tonnes of mercury were dumped in the River Madeira alone; illegal disposal damages both the forest and the rivers. The import of mercury, which comes mainly from Germany and the US, is impossible to control; the licensing system is unenforceable. The technology for extracting gold without using mercury exists, but it is very expensive and requires training. The solution would be to move from individual exploitation to extraction by properly-equipped companies—but attempts to introduce this have been thwarted by the *garimpeiros*.

80. Charcoal production is the second biggest problem after ranching. Charcoal-burning on a large scale began with the extraction of iron ore from Carajas, where there is enough ore to last for 500 years at the current rate of extraction. The Carajas Project was developed in conjunction with the Japanese Government and the World Bank, and involved the construction of a railway to Sao Luis, on the coast in Maranhão. The current price of iron ore is $14 per tonne as opposed to $110–120 per tonne for pig-iron. The result of the price-differential is that four companies are each producing 60,000 tonnes of pig-iron each year, using almost the same weight of charcoal in the process. The long-term programme envisages annual production of 1,200,000 tonnes of pig-iron. INPA has proposed that the Government should impose a levy $6 per tonne of pig-iron, to be returned to forest management and replanting, using fast-growing species such as eucalyptus.

APPENDIX II

Memorandum by the Overseas Development Administration

(A) UNITED KINGDOM ENVIRONMENT PROGRAMME

BACKGROUND

Following Mr Patten's visit to Brazil last July and his signature of the Memorandum of Understanding on environmental co-operation (copy at Annex 1), we have been working up with the Brazilians a series of specific environmental projects. The initial emphasis has been on a major programme of Applied Research and Demonstration, both to provide the information needed urgently for environmental conservation and for the sustainable development of the rich natural resources of the forest. Within this, the focus is on three major areas: assistance for the sustainable management of the Amazon rainforests; research into and conservation of the genetic resources of the Amazon forest; and help for the urban environment. A glossary of key Brazilian institutions is at Annex 2.

2. The list at Annex 3 outlines the projects under preparation and their current status. So far only one project—a £2·5 million research project into the effects of deforestation on climate, involving the Institute of Hydrology, originally approved by ABC in February—has been formally approved. Some of the delay stems from the change in Brazilian Government in March. Another major cause of delay has been the Brazilian aid co-ordination agency (ABC) which is under considerable pressure from donor interest. ABC has no professional advisers on its staff and needs to hire consultants to advise on the technical aspects of projects. This causes delay as administrators initially try to assess complicated proposals.

3. In addition, ABC has used our programme as an opportunity to standardise the Brazilian format for proposals requiring external support. This required some of the proposals originally submitted by institutes for ODA support to be reformatted and resubmitted to ABC. The list of projects at Annex 4 indicates those that we believe ABC now expect to approve within the next few weeks, and we are still hoping that many of the remainder will also be under way this year.

4. We have agreed to provide a First Secretary (Forestry Adviser) in the Embassy from early September to assist the British Council and British Embassy in the co-ordination of the proposed forestry programme, and to help establish strong and continuing professional links with the relevant Brazilian Ministries and institutions. Gordon Armstrong will be seconded from the Natural Resources Institute (NRI) on technical co-operation terms to fill the post.

5. We understand (but await formal confirmation) that Dr Lutzenberger has approved the proposal for a Joint Conference on Conservation of the Rainforest, an ODA initiative with ICI which we have in mind for 29 October–1 November. The subject would be the potential for the improved and sustainable use, mainly for agricultural purposes, of already deforested and degraded lands around the margins of the rainforest as a means of relieving the pressure on the rainforest itself and discouraging further encroachments.

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June 1990

ANNEX 1

MEMORANDUM OF UNDERSTANDING BETWEEN THE MINISTRY OF EXTERNAL RELATIONS OF THE FEDERATIVE REPUBLIC OF BRAZIL THROUGH THE BRAZILIAN AGENCY OF CO-OPERATION AND THE OVERSEAS DEVELOPMENT ADMINISTRATION OF THE GOVERNMENT OF THE UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND

The Ministry of External Relations of the Federative Republic of Brazil through the Brazilian Agency of Co-operation and the Overseas Development Administration of the Government of Great Britain and Northern Ireland

Considering the particular interests of their respective countries in protecting and promoting the quality of the environment and of human life in their national and global plans,

Considering the special attention which the Governments of Brazil and the United Kingdom give to environmental problems arising from the expansion of urban populations, the increase of industrial activities, the inappropriate or indiscriminate exploitation of natural resources and insufficient protection of the environment,

Recognising the mutual benefit which the intensification of bilateral co-operation in the area of the environment would bestow on the two countries,

Having in mind the importance of environmental questions in the formulation and implementation of policies of economic and social development in the two countries,

Taking account of the relevance of the rational use of natural resources in a way which ensures that they are a benefit as much to future generations as to the present,

Recognising that the promotion of sustained development is a common objective of the two countries and reiterating their adherence to the principle that the concept of sustainable development cannot imply interference in matters concerning the sovereignty of each country, nor constitute a pretext for the imposition of new conditions for the financing of development,

Considering the terms of the Agreement on Technical Co-operation made between the two Governments on 18 January 1968 (hereinafter referred to as "The 1968 Agreement"),

Have reached the following understandings:

Section I—General Objectives

The participants intend, according to the laws and regulations in their respective countries, to co-operate in finding rational and adequate solutions to their environmental problems, by means of exchange of information, technology transfer, activities which strengthen institutions and promotion of joint projects defined as priorities through diplomatic means and agreement between the participants.

Section II—Programme of Co-operation

The participants will decide on specific projects and programmes of co-operation for the supply of specialists and services, as well as equipment as necessary, in the fields of management of the natural resources, environmental management, the solutions of urban and industrial environmental problems, control of marine pollution, forestry management, conservation of genetic resources, evaluation of environmental impact; this co-operation may include aspects of environmental legislation and economics, as well as studies on the functioning of terrestial eco-systems, such as hydrological and climatological research.

Section III—Activities of Co-operation

The participants have decided to promote their co-operation activities under the following headings:

1. Exchange of experts, scientists, specialists and delegations of technical, scientific and technological character;
2. Exchange of technical, scientific and technological information;
3. Transfer of appropriate technology;
4. Joint organisation of seminars, symposiums, courses of short and medium length and academic interchange;
5. The joint monitoring and studying of environmental themes;
6. Interchange and supply of equipment and samples, products, data, instruments and spare parts necessary for the efficient conduct of projects and programmes of co-operation jointly decided on.

Other forms of co-operation which are deemed desirable may be negotiated under an Annex to the present Memorandum.

Section IV—Participants

The participants will identify as those participating in the projects of co-operation, scientists, experts and technicians linked to government agencies, academic institutions and other entities, which both participants decide to propose.

Section V—Finance

It is expressly understood that the running costs of the development and implementation of the co-operation projects in the context of this Memorandum will be strictly in conformity with the 1968 Agreement.

Section VI—Implementation of the Projects

The implementation of the projects of co-operation decided on within the sphere of the present Memorandum will be subject to the norms applied to technical, scientific and technological co-operation current in each country.

Section VII—Validity, duration, amendments and deletions

1. The present Memorandum of Understanding will come into operation on the date of its signature and will continue to have effect indefinitely.
2. It will be possible to amend the present Memorandum at any time with amendments decided on by the participants in writing.
3. The participants will be able at any time unilaterally to revoke the present Memorandum. The revocation will have immediate effect, without prejudice to the projects and programmes already started and not completed during the period in which the Memorandum was in operation.

The foregoing record represents the understandings reached between the Ministry of External Relations of the Federative Republic of Brazil through the Brazilian Agency of Co-operation and the Overseas Development Administration of the Government of the United Kingdom of Great Britain and Northern Ireland upon the matters referred to therein.

In the Portuguese and English languages both texts being of equal validity.

Signed in duplicate at Brasilia on 5 July 1989.

Representing the Ministry of External Relations of the Federative Republic of Brazil/Brazilian Agency of Co-operation

Roberto de Abreu Sodré

Representing the Overseas Development Administration of the Government of the United Kingdom of Great Britain and Northern Ireland

Christopher Patten

ANNEX 2

GLOSSARY OF KEY BRAZILIAN ORGANISATIONS

ABC	Brazilian Agency for International Co-operation, within Foreign Ministry (Itamaraty)
CENARGEN	Centro Nacional de Recursos Geneticos (part of EMBRAPA) (National Centre for Genetic Research)
CPATU	Centro de Pesquisa Agropecuario de Tropico Umido (Centre for Agricultural Research in the Humid Tropics—part of EMBRAPA)
EMBRAPA	Empresa Brasiliera de Pesquisa Agropecuaria (Federal Agricultural Research Organisation)
FUNAI	Federal Indian Agency
IBAMA	Instituto Brasileiro do Meio Ambiente (Brazilian Environment and Natural Resources Institute)
IDESP	Instituto de Desenvolvimento Economico e Social do Para (Para State Economic and Social Development Institute)
INPA	Instituto Nacional de Pesquisas da Amazonia (National Research Institute for Amazonia)
INPE	Instituto de Pesquisas Espaciais (Space Research Institute)
SEMA	Environment Secretariat

ANNEX 3

BRAZIL ENVIRONMENT PROGRAMME

1. PROJECTS APPROVED

Institute of Hydrology Climate Research Project in states of Amazonas, Para and either Rondonia or Acre. A study of the impact of deforestation on climate. Project now approved formally by new Brazilian Government. The first field mission is scheduled to commence September 1990. Cost £2·46 million over five years.

2. PROJECTS UNDER CONSIDERATION

(a) **Tropical Rain Forests**

(i) *Tapajos Forest Management Project, Para State*, with IBAMA (Federal Environment and Natural Resources Institute) as Project Manager—establishment of infrastructure and initiation of sustained forest management, production and harvesting system. Support in principle agreed, to be channelled through ITTO, but awaits clarification of project details. Brazilians reconsidering scope of assistance required.

(ii) *INPA Forest Research Project, Manaus, Amazonas State*—with University of Stirling as Project Manager, and INPA (National Research Institute for Amazônia)—research on the distribution and dynamics of biomass and minerals in tropical forest. Project proposal being considered by ABC and approval reported to be imminent. ODA have agreed to a project planning meeting for key United Kingdom participants (five or six) with Brazilian counterparts in Brazil in July.

(iii) *Duque Forest Reserve Project, nr Manaus, Amazonas State* with Royal Botanic Gardens, Kew as Project Manager and INPA (National Research Institute for Amazônia)—botanical collections, taxonomic studies and the production of a guide to flora and fauna of Duque Forest. ABC approval reported to be imminent. ODA project memorandum and framework under preparation by RBG, Kew.

(iv) *Caxiuana Biological Reserve Project, Para State* with Museu Goeldi as Project Manager—establishment of biological reserve in Caxiuana State Forest. Project proposal being considered by ABC with approval reported to be imminent.

(v) *Floodplain Management Project, nr Belem, Para State* with Museu Goeldi as Project Manager—biological studies of the ecology, natural regeneration and flora of flooded forest, economic studies of farm forest production systems and extension programme. Project proposal being considered by ABC and approval reported to be imminent.

(vi) *Aromatic Plant Development Project, nr Belem, Para State* with NRI as Project Manager, [illegible] Museu Goeldi and FCAP (Faculty of Agricultural Science in the State of Para)—[illegible] and trials of plant species with potential for commercial development. NRI have just [illegible] to ODA draft United Kingdom project framework and memorandum. ABC considering Brazilian project proposals and approval expected shortly.

(vii) *Tocantins Rural Development Project, Para State*, IDESP will be Project Manager (Institute for Socio-Economic Development of Para State)—implementation of forestry, and components of, rural development programme, including agro-forestry trials and extension. ABC considering project proposal and approval expected very soon.

(viii) *Para State Forest Conservation Project, Para State* with Oxford Forestry Institute as Project Manager, and IDESP (Institute for Socio-Economic Development of Para State)—definition of state conservation areas and objectives, resource surveys, preparation of reserve management plans and initiating operations. ODA Environmental Programme Co-ordinator spending one week with IDESP in June to discuss/prepare project proposal.

(ix) *Medical Assistance for Yanomami Indians*—ODA has offered to fund 50 per cent of a Yanomami health programme proposed by CCPY (Campaign for the Creation of a Yanomami Park, a Brazilian NGO). ODA assistance could be routed through Oxfam.

(x) *Upper Jurua Extractive Reserve Project, Acre State*—a five-year management project for Brazil's first extractive reserve (506,186 hectares) designated in January 1990, involving support for the National Rubber-Tappers Council and the Forest People's Alliance (FPA). Project proposal seeking ODA contribution (other donors are also likely to contribute) to be submitted by FPA in next few months. Brazilian Government clearance for our support will be necessary.

(b) **Urban**

(i) *Recife Environmental Control Project, Pernambuco State*, with British Council as Project Manager—training and consultancies to enhance capability of three environmental control institutions in Recife: Pernambuco State Pollution Control Agency (CPRH), Federal University of Pernambuco (UEPE), and Pernambuco State Technical Institute (ITEP). Project apparently approved by ABC and formal request expected very soon.

(ii) *São Paulo State Pollution Control Agency Project* with British Council as Project Manager, and São Paulo State Environmental and Sanitation Agency (CETESB)—training and consultancies to enhance CETESB's environmental control capabilities. Brazilian project proposal just submitted to ABC for approval.

(iii) *São Paulo State Water and Sewerage Project* with United Kingdom water authority (to be identified) as Project Manager, and São Paulo State Water Supply and Sewage Company (SABESP)—provision of training and consultants to increase sewage and sludge disposal capabilities. Brazilian project proposal will be submitted to ABC in early July.

We hope to agree all these projects during 1990/91. One or two may start in the third quarter of 1990, others will follow as Brazil agrees project details.

3. PROJECTS PROPOSED IN OUTLINE (FURTHER STUDY AND PREPARATION REQUIRED)

(i) *Caxiuana National Forest Management Project, nr Belem, Para State*, with Oxford Forestry Institute as Project Manager, and Federal Environment and Natural Resources Institute (IBAMA)—introduction of management: basic surveys, infrastructure, silvicultural trials and preparation of management plan. IBAMA to discuss project content with potential Brazilian collaborators.

(ii) *CENARGEN Genetic Resources Project*, with Royal Botanic Gardens, Kew as Project Managers, and CENARGEN (National Centre for Genetic Research, part of Federal Agricultural Research Organisation (EMBRAPA), Brasília,—conservation and development of Amazonian plant genetic resources. Two scientists from CENARGEN to visit RBG, Kew for three months in mid 1990 to discuss/prepare project proposal.

(iii) *CPATU Rain Forest Silviculture Research Project, nr Belem, Para State* with Oxford Forestry Institute as Project Manager, and Centre for Agricultural Research in the Humid Tropics (CPATU)—silvicultural treatment trials, studies of forest regeneration and biology in Tapajos and Jari forests. Project proposal to be prepared by CPATU. Possible OFI visit late 1990.

(iv) *Varzea Forest Conservation Project, nr Belem, Para State*, with Cambridge University as Project Manager and Museu Goeldi—establishment of research programme in biology and conservation of flooded forest in Upper Amazônia. Project proposal being redesigned.

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ANNEX 4

PROJECTS WHERE ABC APPROVAL EXPECTED SHORTLY

1. INPA Forest Research Project (University of Stirling and INPA)—Project 2(ii) in Annex 2.
2. Duque Forest Reserve (Royal Botanic Gardens, Kew and INPA)—2(iii).
3. Caxiuana Biological Reserve (Museu Goeldi)—2(iv).
4. Floodplain Management Project (Museu Goeldi)—2(v).
5. Aromatic Plant Development Project (NRI, Museu Goeldi and FCAP)—2(vi).
6. Tocantins Rural Development Programme (IDESP)—2(vii).

(B) REGULAR (NON ENVIRONMENTAL) AID PROGRAMME TO BRAZIL

1. Our regular bilateral aid programme to Brazil amounts to some £1 million a year, all technical co-operation. Half is devoted to training in the United Kingdom (about 34 new scholarships each year). There is also a large FCO scholarships programme (£1 million a year).

2. The remainder of the aid programme finances tcos*, consultants and equipment in a number of projects in the renewable natural resources sector, and in urban pollution and English language training. In Porto Alegre in the south two veterinary tcos are assisting with a tick-borne diseases project, and two further veterinarians with a sheep diseases project. A tco from our Natural Resources Institute is working on research and development in vegetable oil technology in São Paulo. In the poor north east, a further tco is helping to develop artisanal fisheries in Maranhão state, and consultants are involved in low cost sanitation and urban pollution projects around Recife. We are also supporting a small English for Specific Purposes Project in São Paulo as a continuation of our project assistance to the English Language Teaching departments of certain Brazilian universities and technical colleges since 1981. (More detail at Annex 1).

3. The British Council rather than the Embassy undertakes the local support and liaison function for the aid programme in Brazil.

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ANNEX 1

BRAZIL: REGULAR AID PROGRAMME

1. The major technical co-operation activities are:

(i) *TC Training Programme:* Priority areas for training, agreed with the Brazilian Government, are: project related training including the environment, agriculture, education, energy, planning (social, regional and industrial), public and community health, transport and water resources.

(ii) *Artisanal Fisheries:* A long-term tco, Richard Stride, is assisting in the development of artisanal fisheries in Maranhao State, North East Brazil. He commenced work in October 1986 and will continue until late 1990. We are considering an extension to December 1991.

(iii) *Tick-borne diseases:* A long-term tco, David Radley, appointed in 1986, is working on the epidemiology of tick borne diseases in cattle in Porto Alegre, in the State of Rio Grande de Sul. He is assisted by a second tco laboratory scientist, Freddie Cheong). Laboratory equipment has also been provided.

(iv) *Sheep Disease Investigation Project:* Two tcos (Andrew Coe, sheep disease specialist, and Roger Hancock, sheep pathologist) are establishing laboratory facilities for disease diagnosis, also at Porto Alegre. We have also provided laboratory equipment and a vehicle.

(v) *English for Specific Purposes:* This project is a follow up to our long running English Language Training project which was completed in 1989. It supports the development of ESP in Federal Universities and Technical schools through consultants, training and some minor equipment. British Council are Project Manager.

(vi) *Vegetable Oil Technology:* A tco, Jim Broadbent from NRI, is advising the Brazilians on vegetable oil technology. A modest amount of equipment, and specialist short term visits has also been provided. We are considering a request for a one year extension.

(vii) *Capabaribe River Pollution:* We are about to appoint United Kingdom consultants, Binnies, who are advising the Brazilian authorities on the control of pollution in the Capabaribe river at Recife, North-East Brazil. This is an extension of an earlier project.

*Technical Co-operation Officer

(viii) *Low Cost Sanitation:* Short visits are being undertaken by a sanitary engineer (Sandy Cairncross of The London School of Hygiene and Tropical Medicine, the Project Manager), a health education adviser and a small business adviser (both to be identified to advise on methods of low cost sanitation in Olinda, near Recife.

2. *Voluntary Agencies:* There are twelve United Nations Association International Service Volunteers in Brazil, in the health sector (90 per cent ODA funded). OXFAM have 19 small projects, jointly financed by ODA under the Joint Funding Scheme. There are further JFS projects run by CAFOD (8), Christian Aid (12), Health Unlimited (1) and SCIAF (1).

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PROCEEDINGS OF THE COMMITTEE RELATING TO THE REPORT

WEDNESDAY 27 JUNE 1990

Members present:

Mr Henry Bellingham
Mr Richard Holt
Dr Kim Howells
Mr Andrew Hunter
Mr Robert B Jones
Mr Tom Pendry
Mr Peter L Pike

In the absence of the Chairman, Mr Robert B Jones was called to the Chair.

The Committee deliberated.

Mr Richard Holt declared an interest as a Consultant to the British Furniture Manufacturers Association in relation to the Committee's inquiry into the Climatological and Environmental Effects of the Destruction of the Tropical Rainforests.

WEDNESDAY 28 NOVEMBER 1990

Members present:

Sir Hugh Rossi, in the Chair.

Mr Henry Bellingham
Mr John Cummings
Mr Andrew Hunter
Mr Robert B Jones
Mr Keith Mans

The Committee deliberated.

Draft Report (Visit by the Committee to Brazil), proposed by the Chairman, brought up and read.

Ordered, That the Chairman's draft Report be read a second time, paragraph by paragraph.

Paragraphs 1 to 25 read and agreed to.

Appendices read and agreed to.

Resolved, That the Report be the Second Report of the Committee to the House.

Ordered, That the Chairman do make the Report to the House.

Ordered, That the provisions of Standing Order No. 116 (Select Committees (reports)) be applied to the Report.

Printed in the UK by HMSO
Dd 0102060 C8 12/90 1475/2 3204040 19542