

THE NORTHERN TERRITORY OF AUSTRALIA

Copy No.

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CABINET DECISION

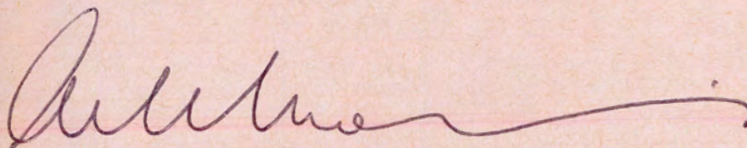
No.....6319.....

Submission No.: 5429

Title: NORTHERN TERRITORY/CSIRO COLLABORATIVE AGREEMENT
ON REGIONAL CLIMATE CHANGE RESEARCH

Cabinet approved -

- (a) the agreement between the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Conservation Commission of the Northern Territory for the provision of State of the Art scientific advice on the Regional Impact of the Greenhouse Effect;
- (b) in principle, the funding of the above Agreement over a period of four years at an approximate cost of \$380,000 (subject to annual adjustment); and
- (c) funding without substitution of \$80,000 for the 1989-90 financial year to implement the first stage of the NT/CSIRO program.



A. G. MORRIS
Secretary to Cabinet.

19 December 1989

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5429

FOR CABINET

SUBMISSION No:

Title:	NORTHERN TERRITORY/CSIRO COLLABORATIVE AGREEMENT ON REGIONAL CLIMATE CHANGE RESEARCH.
Minister	CHIEF MINISTER
Purpose:	TO SEEK CABINET APPROVAL FOR THE PROPOSED COLLABORATIVE AGREEMENT AND THE ASSOCIATED FUNDING.
Relation to existing policy:	THE PROPOSAL IS CONSISTENT WITH THE NORTHERN TERRITORY RESPONSE TO THE GREENHOUSE EFFECT ANNOUNCED BY THE CHIEF MINISTER IN THE LEGISLATIVE ASSEMBLY ON 29 AUGUST 1989.
Timing/ legislative priority:	IMMEDIATE - TO ENABLE THE COMMENCEMENT OF THE RESEARCH PROGRAM IN THE 1989/90 FINANCIAL YEAR.
Announcement of decision, tabling, etc:	AS APPROPRIATE.
Action required before announcement:	NIL
Staffing implications, numbers and costs, etc:	N/A
Total cost:	\$80,000 IN 1989/90; A FURTHER \$100,000PA FOR THE 1990/91, 1991/92 AND 1992/93 FINANCIAL YEARS

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Department/Authority..NORTHERN..TERRITORY..TREASURY.....

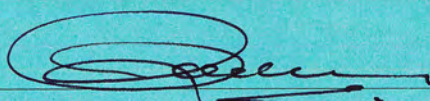
COMMENT ON CABINET SUBMISSION No.

TITLE: NORTHERN TERRITORY/CSIRO COLLABORATIVE
..... AGREEMENT ON REGIONAL CLIMATE CHANGE RESEARCH
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COMMENTS:

Given previously stated strong Government support for this programme, sufficient funding for Territory participation will need to be provided.

In current and prospective budgetary circumstances every effort must be made to obtain funds from proposed Commonwealth allocation. Alternatively, if sufficient assistance is not forthcoming from this source, funding by substitution should be considered.



SIGNED: J E GARDNER
ACTING UNDER TREASURER

DESIGNATION:
18 December 1989

DATE: **CONFIDENTIAL**

CONFIDENTIALDepartment ~~XXXXXX~~ OF THE CHIEF MINISTER

COMMENT ON CABINET SUBMISSION No.

TITLE: NORTHERN TERRITORY/CSIRO COLLABORATIVE AGREEMENT ON
REGIONAL CLIMATE CHANGE RESEARCH**COMMENTS:**

The Submission generally addresses an acceptance that the "Greenhouse Effect" will effect significant climatic change in the Northern Territory.

There are signs, however, that more cautious approach to this issue is emerging. The frequent use of words such as "likely" and "probable" support this view.

The critical issues for this submission to address are:

- (1) whether, and to what extent the proposed NT/CSIRO Collaborative Agreement should be supported;
- (2) the adequacy of the agreement in reflecting the Northern Territory's interests (as against CSIRO interests).

The basic reasoning for supporting the CSIRO study is that the Territory needs empirical data to make its own assessment of likely effects and to propose an appropriate course of action.

While this Department supports in principle the agreement with CSIRO, the submission does not focus sufficiently on whether the agreement satisfactorily addresses NT needs, e.g. is there more general research work included in the study, funded by the Territory that could reasonably be expected to be funded by the Commonwealth Government? There is no indication of the relative size of the Territory contribution as compared to the States and the Commonwealth in the total research project.

The roles of Territory scientists and agencies in the proposed agreement are not well defined but it appears that the funds will be largely expended outside the Territory.

B Chambers

SIGNED: B CHAMBERS

DESIGNATION: A/DEPUTY SECRETARY

DATE: 15th Dec 1989**CONFIDENTIAL**

Department/Authority: LAW

COMMENT ON CABINET SUBMISSION No.

TITLE: . .NORTHERN TERRITORY/CSIRO COLLABORATIVE

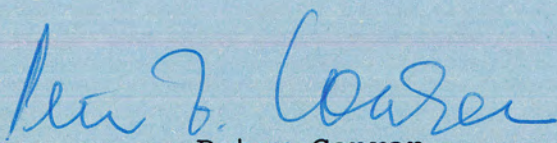
 . .AGREEMENT ON REGIONAL CLIMATE CHANGE

 . .RESEARCH

COMMENTS:

The effect of clause 2.3 of the proposed agreement is that reports prepared by CSIRO but partly paid for by the Territory, belong to the CSIRO and the CCNT could not distribute these reports to third parties without the consent of CSIRO. The sub-clause is unacceptable and should be struck out.

Apart from this problem there would appear to be no legal or constitutional barriers to the proposal.



SIGNED: Peter Conran

DESIGNATION: Secretary, Department of Law

DATE: 14 December 1989

Handwritten note: 12/12/89

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Department/Authority..... POWER AND WATER AUTHORITY.....


COMMENT ON CABINET SUBMISSION No.

TITLE: NORTHERN TERRITORY/CSIRO COLLABORATIVE AGREEMENT ON REGIONAL
..... CLIMATE CHANGE RESEARCH
.....

COMMENTS:

The Authority has no objection to the Submission.

SIGNED:

DESIGNATION:  CHAIRMAN

DATE: 15 December 1989

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Department/Authority Department of Mines and Energy.....

COMMENT ON CABINET SUBMISSION No.

TITLE: Northern Territory/CSIRO Collaborative
..... Agreement on Regional Climate Change Research.....

COMMENTS:

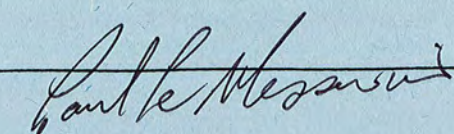
While there is a need to assess what the implications of climate change are for the Northern Territory, a considerable amount of research is required to improve understanding and reduce uncertainties about global and regional climatic change.

At this stage, CSIRO's regional climate change studies are based on scenarios and sensitivity analyses. Such analyses will need to be refined from time to time as better information from global models becomes available.

As it is not possible to predict with accuracy and confidence climatic changes, the usefulness of CSIRO's regional assessment for long-term planning purposes is limited.

In view of the current tight budgetary limits, the Northern Territory could defer its participation in the proposed research program.

SIGNED:



DESIGNATION: SECRETARY

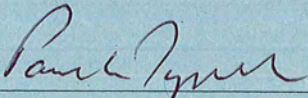
Department/Authority.....LANDS AND HOUSING.....

COMMENT ON CABINET SUBMISSION No.

TITLE:NORTHERN TERRITORY/CSIRO COLLABORATIVE AGREEMENT ON REGIONAL
.....CLIMATE CHANGE RESEARCH.....

COMMENTS:

Supported.



SIGNED: PAUL TYRRELL

DESIGNATION: SECRETARY

DATE: 15/12/89

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Department/Authority..... Department of Health and Community Services.....

COMMENT ON CABINET SUBMISSION No.

TITLE: NORTHERN TERRITORY/CSIRO COLLABORATIVE AGREEMENT ON.....
..... REGIONAL CLIMATE CHANGE RESEARCH.....
.....

COMMENTS:

This Department agrees with the submission.

SIGNED:

W. Cho

DESIGNATION:

CHO

DATE:

15/12/85

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Department/Authority..... PRIMARY INDUSTRY AND FISHERIES.....

COMMENT ON CABINET SUBMISSION No.

TITLE: NT/CSIRO COLLABORATIVE AGREEMENT ON REGIONAL CLIMATE
..... CHANGE RESEARCH
.....

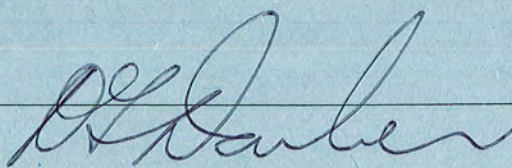
COMMENTS:

DPIF strongly supports the submission and the need for comprehensive studies into likely consequences of the "Greenhouse Effect" on the NT.

DPIF however draws attention to two important omissions:

1. There is no indication to Cabinet of the extent, nature and costs of complementary programs being undertaken or proposed by NT Agencies.
2. Although the provision for annual review of the NT/CSIRO agreement is referred to in the body of the submission (para 18) it is not included in either the recommendations or the draft agreement with CSIRO DAR.

DPIF recommends that Cabinet approves in principle the submission and the draft agreement subject to satisfactory inclusion of the above omissions.

SIGNED: 

DESIGNATION: SECRETARY

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RECOMMENDATIONS

1. It is recommended that Cabinet approve:
 - a) the agreement between the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Conservation Commission of the Northern Territory for the provision of State of the Art Scientific advice on the Regional Impact of the Greenhouse Effect; (Attachment A)
 - b) approve in principle the funding of the above Agreement over a period of four years at an approximate cost of \$380,000 (subject to annual adjustment); and
 - c) approve funding without substitution of \$80,000 for the 1989-90 financial year to implement the first stage of the NT/CSIRO program.

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BACKGROUND

1. CSIRO climate change research programs in Australia involve two areas of study. In collaboration with the Bureau of Meteorology a core research program has been formulated for the main purpose of developing climate models so that higher predictive resolution can be obtained for the Australian region.

2. To complement this core study a Regional Impact Program is being implemented to utilise climate model predictions, historical data, paleological data, and current trends with a view to addressing the specific concerns of regional climate changes and impacts on the States and Territories. (see Attachment B Climate Change Research).

3. It is proposed that the CSIRO Division of Atmospheric Research will investigate regional climate changes in conjunction with Northern Territory agencies, to provide access to adequate basic climate research data for the Northern Territory so that the most significant likely changes in weather patterns can be identified in this region.

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4. The Northern Territory Government has already recognised that preventive action may help to reverse the trend of the Greenhouse Effect. Strategies related to emission controls, energy conservation and the review of energy alternatives are currently being considered and implemented.

5. Adaptive measures however depend on an understanding of the probable long term effects of climate change which will emerge from participation in the CSIRO climate studies.

6. To date all States have commenced or finalised negotiations with CSIRO to set up regional study programs. The Victorian study has been operational for almost 12 months and has already highlighted serious implications with respect to the agricultural sector.

7. For example, following the examination of the effect on the frequency of occurrence of extreme temperatures, and 'on runs' of extreme warm or cold days, assumptions have indicated most stone fruits would no longer be viable in the Goulburn Valley and grape growing will be seriously at risk in the Mildura area. Responses include alternative crops or research into the selection or breeding of low-chill varieties.

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8. The specific tasks to be undertaken by the CSIRO in collaboration with Northern Territory agencies are listed in Attachment C.

CONSIDERATION OF THE ISSUES

9. World-wide concern about the Greenhouse Effect has heightened following the Villach Conference in October 1985, the Toronto Conference in June 1988 and The Hague Conference in November 1989.
10. It is now generally agreed that there is conclusive evidence to support the Greenhouse theory and that a progressive global warming can be expected as a result of increasing concentrations of gases which retain heat in the atmosphere. Although some slowing down with the reduction of Greenhouse gas emissions may be possible, the effect is still expected to cause the greatest and most rapid climate change in human history. As a result many important economic and social decisions made today on long term projects no longer can be based on the assumption that past climate experience, without modification, is a reliable guide to the effects of future climatic conditions.

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11. By the year 2030, dramatic climate change is likely to have a considerable impact on a wide variety of sectors including agriculture, manufacturing, construction, public works and services and on coastal communities.

OPTIONS

12. The options are:

- (a) to participate in the CSIRO Regional Climate Study Program and provide funding for the NT/CSIRO Regional Climate Change Impact Study of the Greenhouse Effect;
or

- (b) not to participate in the CSIRO Regional Climate Study Program.

13. The preferred alternative is option (a). It is considered essential that the Northern Territory Government participates in the Regional Climate Change Impact Program in order to obtain a data base on which appropriate planning decisions can be based.

14. Research data will provide the foundation to assess the likely environmental, economic and social consequences of weather changes and enable the Territory to adopt

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preventive and adaptive responses to the effects of Greenhouse induced climate change. The Advisory Committee on the Greenhouse Effect (ACGE) recommends that the Northern Territory enter the Agreement with CSIRO to undertake the proposed regional climate study.

15. Option (b) will effectively isolate the Northern Territory from vital climatic information required to formulate responses to impacts of climate change. Further, the Territory will not have the opportunity of influencing the direction of this research in terms of Northern Territory requirements.

PUBLIC IMPACT

16. Participation in the regional study will be welcomed by most of the public. The public has already been alerted to the CSIRO Program following a media release in July 1989 and the Statement on the Environment by the Chief Minister in the Legislative Assembly on 29 August 1989.

FINANCIAL CONSIDERATION

17. The cost estimate is \$380,000 over a four year period, made up of \$80,000 in 1989-90 and approximately

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\$100,000 per annum for a further three years. (A budgetary breakdown is attached at Attachment D)

18. The program will be subject to annual review in the light of progress and a reassessment of Northern Territory requirements.

REGULATORY IMPACT

19. Nil.

EMPLOYMENT AND INDUSTRIAL RELATIONS

20. Nil.

COMMONWEALTH, STATE AND LOCAL GOVERNMENT RELATIONS

21. Continuing liaison between the Commonwealth and State Governments will be required throughout the Greenhouse study.

CO-ORDINATION AND CONSULTATION

22. The program will be co-ordinated by CSIRO in consultation with the Conservation Commission.

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23. This submission has been circulated to the Department of the Chief Minister, N.T. Treasury, the Department of Law, Department of Primary Industry and Fisheries, The Power and Water Authority, Department of Lands and Housing, Department of Mines and Energy, Department of Health and Community Services and the Conservation Commission of the Northern Territory.

LEGISLATION

24. Nil

PUBLICITY

25. If approved, an initial press release and publication of progress reports on the program would be appropriate.

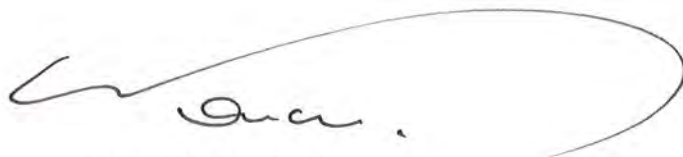
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TIMING

26. The Agreement should be signed and commissioned as soon as possible. Funds should be made available by January 1990 so that research activity can commence in the 1989-90 financial year.

A handwritten signature in black ink, appearing to read "Marshall Perron", with a large, sweeping flourish that loops back under the name.

MARSHALL PERRON

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Agreement

between the

Commonwealth Scientific and Industrial Research Organisation

and the

Conservation Commission of the Northern Territory

**for the provision of State of the Art scientific advice
on the Regional Impact of the Greenhouse Effect**

CSIRO Division of Atmospheric Research
Private Bag No. 1,
Mordialloc, Vic. 3195.

Agreement between
Commonwealth Scientific and Industrial Research Organisation
and the
Conservation Commission of the Northern Territory
for the provision of State of the Art scientific advice
on the Regional Impact of the Greenhouse Effect

Background

In October 1985 a conference in Villach, Austria, sponsored jointly by UNEP, WMO and ICSU, concluded that "As a result of the increasing concentrations of greenhouse gases, it is now believed that in the first half of the next century a rise of global mean temperature could occur which is greater than any in man's history." It went on to say that "Governments and regional inter-governmental organisations should take into account the results of this assessment (Villach 1985) in their policies on social and economic development, environmental programmes, and control of emissions of radiatively active gases".

The Villach Conference was followed in June 1988 by a major international conference in Toronto, sponsored by the Canadian government, on The Changing Atmosphere: Implications for Global Security. The Toronto Conference statement began:

Humanity is conducting an unintended, uncontrolled, globally pervasive experiment whose ultimate consequences could be second only to global nuclear war. ... Far-reaching impacts will be caused by global warming and sea-level rise, which are becoming increasingly evident as a result of continued growth in atmospheric concentrations of carbon dioxide and other greenhouse gases. ... The best predictions available indicate severe economic and social dislocation for present and future generations, which will worsen international tensions and increase risk of conflicts among and within nations. It is imperative to act now.

In line with this scientifically based concern, CSIRO and the Commission for the Future in 1987 launched The Greenhouse Project: Planning for Climate Change, with the Greenhouse 87 conference. In preparation for this conference CSIRO DAR issued a "Climate Scenario", or possible future climate for Australia in the year 2030, and asked various authorities to prepare papers on what impact such a scenario would have on their particular area of responsibility, whether it be water resources, coastal management, agriculture or regional planning (to name some of the topics). Proceedings of the conference, since published in book form, make clear that the local impacts will in many cases be of serious proportions.

It should be stressed, however, that Greenhouse 87 was based on a climate scenario which was necessarily highly generalised and rather uncertain. Overall warming and sea-level rise will undoubtedly occur, although the exact rate of change is still uncertain, and regional variations are at present ill-defined. Moreover, changes in rainfall at the regional level are very uncertain. These uncertainties are partly due to possible future variations in greenhouse gas emissions, but also due to simplification of the real physical processes in the models and poor spatial resolution in the global-scale climate models presently being used to study the problem.

It is clear that models at the present resolution are not capable of telling us what climatic changes are likely to occur on a detailed regional scale, in particular river catchments, for example. Also the models are not capable of satisfactorily resolving tropical cyclones. There is thus a clear need for future research to obtain more detailed and reliable predictions of future climatic changes. This research will be concerned with developing and running suitable climate models that are capable of simulating regional change in Australia but it must be supplemented by other studies, e.g. using data from the real atmosphere to develop associations between large-scale features and regional climate that may enable inferences to be made about scales of phenomena that are not explicitly resolved in the models.

It is also important in the Australian context to look especially carefully at the role of the oceans, which dominate our hemisphere, and in particular at what might be the behaviour of the El Nino-Southern Oscillation (ENSO) phenomenon, which plays a vitally important role in determining the climate of much of northern and eastern Australia. It is unlikely that northern hemisphere research groups will do this for us, and in any case they will not relate their conclusions to our regional climate.

Present Research on the Greenhouse Effect in Australia

The CSIRO Division of Atmospheric Research (DAR), with the cooperation of the Bureau of Meteorology Research Centre (BMRC), has a climate modelling capability which can be rapidly expanded and updated to produce results at the forefront of world efforts in this area. The 9-level spectral model developed jointly by the Bureau of Meteorology and CSIRO over the last decade, and now employed as a research tool in both organisations, was used as the basis of one of the leading U.S. models (that at the National Center for Atmospheric Research in Colorado). At BMRC the model is being further developed for studies of medium-range forecasting, and at DAR it has already been used for several dynamical and climate studies and in studies of the climatic effects of an elevated smoke layer from a nuclear war. DAR is currently expanding its team of climate modellers who are modifying various aspects of this model to improve its performance over Australia.

As part of this effort, DAR staff are currently "nesting" a small-scale ("Mesoscale") numerical model within the coarse-resolution 9-level global model, which will enable the climate over Australia to be described at a horizontal resolution of 50-100 km.

In addition there is at DAR another global climate model with only 4 levels, but which currently has some more realistic physics including variable cloudiness, sea ice, and more realistic soil hydrology. It can be run more economically than the 9-level model, especially with diurnal variations, and has somewhat better horizontal resolution than the Oregon State University model. Coupling of this model to an oceanic model is underway.

With the support of the federal Department of Arts, Sport, the Environment, Tourism and Territories (DASETT), DAR and BMRC, in cooperation with the New Zealand Meteorological Service, is developing a core program of research which is funded by the Australian and New Zealand governments.

There is also within CSIRO a broad program of research which includes oceanic aspects of the problem, and impacts on agriculture, water resources, etc.

Finally, there was a decision in principle by the Australian Environment Council (AEC) at its meeting in July 1988 to:

"ask CSIRO, the Department of Arts, Sport, the Environment, Tourism and Territories (DASETT) and the States to prepare a program of research on the regional estimates of climate change and ask Standing Committee to prepare a funding proposal to enable this research to be undertaken expeditiously".

This agreement is to facilitate the Northern Territory component of this AEC decision.

Northern Territory Interest

The Northern Territory Government has decided to allocate resources to the CSIRO to enable a start to be made on a program of research on the regional estimates of climate change, with special reference to the Northern Territory.

The Northern Territory Government has designated the Conservation Commission of the Northern Territory (CCNT) as its lead agency in this matter, and representatives of the Division of Atmospheric Research and the CCNT have met and it is agreed as follows:

1. Specific Tasks to be performed by DAR

- 1.1 Intercompare the available overseas global model simulations of the change in climate to be expected in the Australian region from an effective doubling of carbon dioxide, and thus to develop an interim climate scenario. A preliminary report is to be ready by the end of July 1990, to be revised as later results become available.
- 1.2 Simulate likely climatic changes for the Northern Territory ranging from the wet-dry tropics in the North to the desert of the Centre statistically, based in part on the results of 1.1 above. Preliminary report by end of July 1990.
- 1.3 Coordinate a critical review and report on sea level rise and coastal impacts, with special reference to the Northern Territory. Preliminary report by the end of December 1990 with periodic updating thereafter.
- 1.4 To review the impacts of climate change on tropical cyclone intensity, frequency, and location. By end of December 1992.
- 1.5 Provide suitable scenarios to use in modelling impacts on fire regimes. By end of December 1992.
- 1.6 Critically review and report on ENSO behaviour under warmer-earth conditions. Preliminary report during 1990, with periodic updates as new information becomes available.
- 1.7 Examine key synoptic mechanisms for rainfall in catchments, and relate these to greenhouse scenarios. By December 1991.
- 1.8 Examine the realism of the existing (or "control") climate for both the 4-level model, and the 9-level model with and without the nested model covering Australia at higher resolution. This to be done as soon as possible within 1990.
- 1.9 Use the 4-level model, with its existing coarse horizontal resolution, for a preliminary study of the effect on Australia of an equivalent doubling of carbon dioxide. As soon as possible, by December 1990.
- 1.10 Use the 9-level model with nesting for a finer resolution (50-100 km) study of the regional effects of an effective doubling of carbon dioxide, with prescribed sea surface temperatures (SST). To be done during 1991.

- 1.11 Use the 9-level model for various sensitivity studies, and in particular to examine the effects of various SST scenarios, especially those associated with ENSO. To be done during 1991-92.
- 1.12 Further develop and improve the 9-level model to obtain more reliable predictions of the regional climatic changes. Representations of various physical processes can be improved in the model, including variable cloud cover, interactive oceans, ocean circulations, improved soil hydrology, and interactions with vegetation. Higher spatial resolution should also be possible. These improvements should continue through 1991-1993.
- 1.13 Consultation through the CSIRO scientist responsible for the coordination of the Northern Territory research program will continue throughout the project regarding specific model products needed, and for the interfacing of climate predictions with impact models as appropriate.
It is envisaged that personnel involved in the project will, on a needs basis, visit the Northern Territory at approximately six-monthly intervals to enable this consultation to occur.
- 1.14 CSIRO where appropriate will involve Northern Territory scientists and expertise in the carrying out of the tasks.
- 1.15 Provide recommendations identifying priorities for future research programs by N.T. agencies including the identification of field data needed to complement the N.T. regional study.

2. Intellectual Property

- 2.1 CSIRO shall retain ownership of the intellectual property (including without limitation the computer software programmes to be used to produce the models for simulation referred to in this Agreement, inventions, copyright materials, designs and technical expertise and knowhow) it shall bring to bear in the carrying out of the tasks and goals set out in Clause 1 of this Agreement.
- 2.2 Any additions to or improvements of CSIRO's intellectual property as defined above created or coming into existence in the carrying out of the said tasks and goals shall belong exclusively to CSIRO.
- 2.3 All intellectual property in the reports, summaries and other materials to be produced by CSIRO as required under this Agreement shall belong entirely to CSIRO. However CSIRO agrees that any data, knowhow or other material provided by the Northern Territory Government or its departments, instrumentalities or agents shall remain the property of the Northern Territory.
- 2.4 The parties agree that all reports summaries information or other material produced by CSIRO or the CCNT pursuant to this Agreement shall not be published or distributed to third parties unless it is accompanied by a disclaimer in the following terms:

Important Disclaimer

This report relates to the modelling of climate scenarios. Models involve simplification of the real physical processes that are not fully understood. Accordingly, no responsibility will be accepted by CSIRO or the CCNT for the accuracy of forecasts or predictions made in this report or for any person's interpretations deductions conclusions or actions in reliance on this report.

3. Financial and Other Commitments by the Northern Territory

3.1 The Conservation Commission of the Northern Territory agrees to provide \$80,000 during 1989/90 and support of \$100,000 per annum (adjusted for CPI) in each of the three following financial years 1990-91 to 1992-93. Payments to CSIRO will be made half-yearly in advance and CSIRO will invoice the CCNT in June and December of each year.

The first half-yearly payment will be due within 30 days of the signing of this Agreement.

3.2 The funds are to be used for salaries, overheads and operating for staff in the Division of Atmospheric Research working on either the core program or applied aspects as set out in Clause 1. "Operating" includes expenditure under the general headings of travel, computing, equipment, maintenance, consumables, etc.

3.3 Notwithstanding Clause 3.1 additional funding may be provided as agreed to from time to time by the parties to the Agreement.

A financial statement covering receipts and expenditure as at 30 June each year under the broad headings of salary, travel, equipment and maintenance and overheads will be provided to the CCNT by 30 July each year.

4. Reporting of Progress

An annual scientific workshop or seminar will be held shortly after the end of each financial year, whereby the research priorities and program for the following year will be defined. A written summary of progress will follow this meeting.

More detailed written reports will be prepared and published as appropriate.

A final report is to be prepared by June 1994.

Signed for and on behalf of the

CONSERVATION COMMISSION OF THE NORTHERN TERRITORY

by: _____

Title: _____

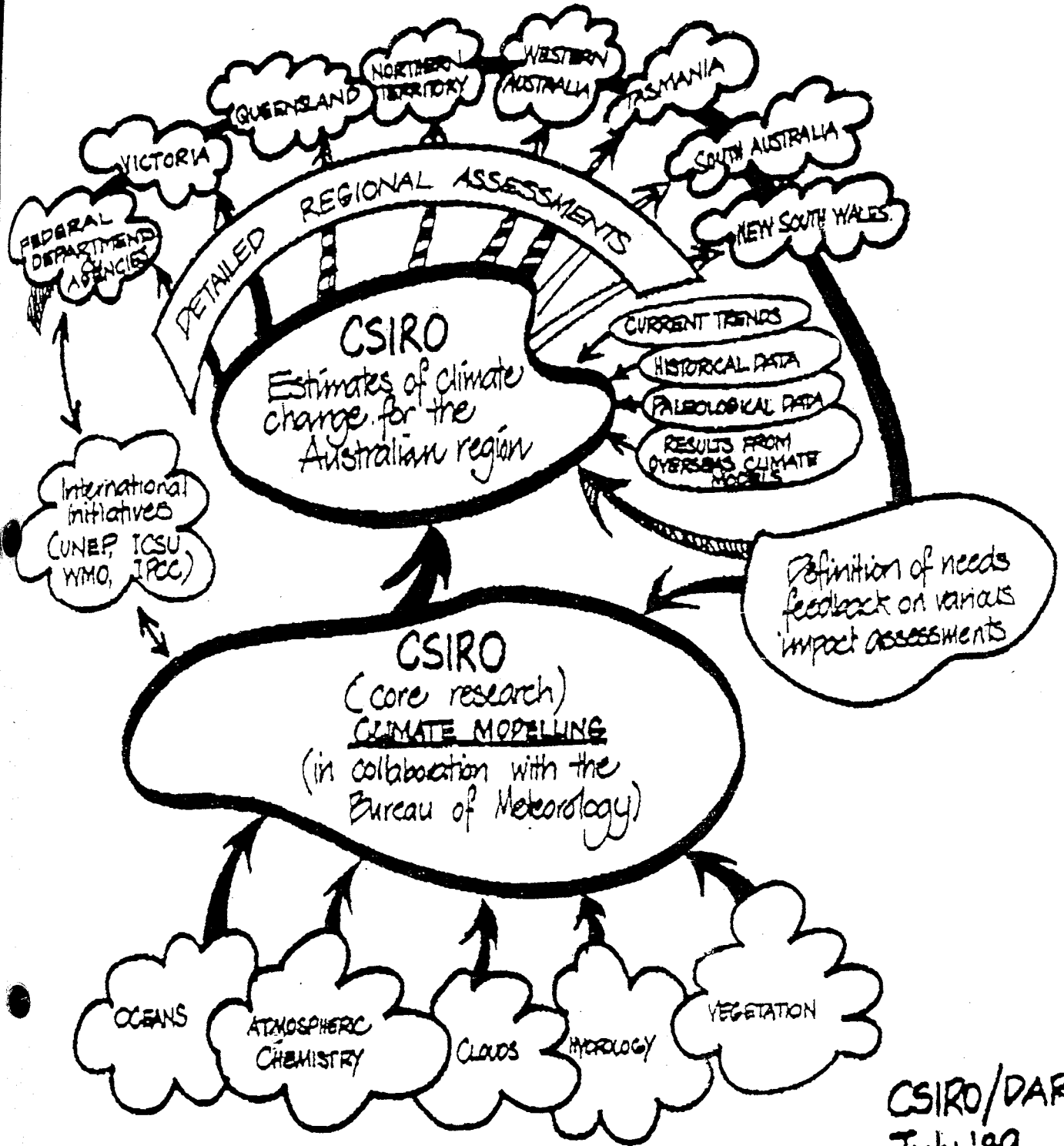
Signed for and on behalf of the

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION

by: _____

Title: _____

CLIMATE CHANGE RESEARCH



CSIRO/DAR
July '89

Attachment C

Specific tasks to be undertaken by the CSIRO in collaboration with Northern Territory.

A. Scenarios of regional climate change

Provide the best possible estimates of anticipated sea-level rise in the Northern Territory. Such estimates will enable other agencies to evaluate the coastal impact of such anticipated changes.

Provide a best assessment of the likely changes during the wet season with respect to rainfall amount, length of the wet season and the occurrence of breaks in the monsoon.

Derive estimates of changes in average and extreme temperatures for various Northern Territory regions.

Provide estimates of the probable effects of climate change on the intensity, frequency and location of tropical cyclones.

Develop further insights into the probable behaviour of the El Nino/Southern Oscillation (ENSO) phenomenon under changed climatic conditions.

B. Progressive refinement of regional scenarios

Using results from overseas global climate models as and when available.

Using historical and paleological climate records to gain insight into possible regional climate change.

Using the results which will become available over the next several years from the CSIRO/Bureau of Meteorology regional climate modelling research program.

C. Gauging the impact of regional climate change

In collaboration with Northern Territory agencies, carry out sensitivity studies using current climate data and climate change scenarios, to provide estimates of likely impact of climate change on a range of Northern Territory interest areas.

The latter to be decided in consultation with Northern Territory Authorities.

It is anticipated that Territory agencies such as the University of the Northern Territory will be sub-contracted to assist with these tasks.

ATTACHMENT D

THE BUDGET BREAKDOWN

The Budget breakdown as provided by CSIRO.

1989/90

Salary (basic)	(8 months)	\$ 23 000
Direct salary on cost		\$ 7 000
(super, leave, comp, etc)		
Therefore, total salary cost		\$ 30 000

ADD

Support services & overheads		\$ 17 000
(library/computing services/graphics/ scientific services/power/telephones etc		

ADD OPERATING

Travel (2 x 2 visits x 1 week)		\$ 10 000
Equipment (1 PC plus peripherals)		\$ 6 000
Computing charges		\$ 4 000
Software, data charges, subcontracting		\$ 8 000
Appointment costs (advertising, fares allowances etc.)		\$ 5 000

TOTAL

 \$ 80 000
1990/91

Salary	(basic)	\$ 40 000
Direct Salary on cost		\$ 13 000
Total salary cost		\$ 53 000

ADD

Support Services		*\$ 20 000
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ADD OPERATING COSTS

Travel (2 x 2 visits x 1 week)		\$ 10 000
Computing charges		\$ 8 000
Software data charges/sub contractor		\$ 9 000

 \$100 000
* Note:

To keep the cost within our budget constraints, CSIRO has discounted its normal overheads charges substantially and also will absorb some of the direct costs.