

AGREEMENT

between

The Commonwealth of Australia

and

Northern Territory University

and

The Australian National University

and

The James Cook University of North Queensland

and

**The Executive Director of the Department of Conservation and Land Management
(Western Australia)**

and

Chief Executive Officer of the Department of Agriculture (Western Australia)

and

The State of Queensland

and

Northern Territory of Australia

and

The Director of National Parks and Wildlife

and

Commonwealth Scientific and Industrial Research Organisation

in relation to a research centre named

The

**Cooperative Research Centre for
the Sustainable Development of Tropical Savannas**

to be established under

THE COOPERATIVE RESEARCH CENTRES PROGRAM

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THIS AGREEMENT is made on the _____ day of _____ 1995
between

THE COMMONWEALTH OF AUSTRALIA, represented for the purposes of this agreement by the Department of Industry, Science and Technology (in this agreement called "the Commonwealth") of the one part; and

NORTHERN TERRITORY UNIVERSITY, a body established under the Northern Territory University Act 1988 as amended and having its principal office situate at Ellengowan Drive, Casuarina in the Northern Territory of Australia; and

THE AUSTRALIAN NATIONAL UNIVERSITY, a body corporate established by the Australian National University Act 1991; and

THE JAMES COOK UNIVERSITY OF NORTHERN QUEENSLAND, a body corporate established under the James Cook University of North Queensland Act (1970); and

THE EXECUTIVE DIRECTOR OF THE DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT, a body corporate under the Conservation and Land Management Act 1984 of Western Australia; and

CHIEF EXECUTIVE OFFICER OF THE DEPARTMENT OF AGRICULTURE, a body corporate under the provisions of the Agriculture Act 1988, having its office situate at 3 Baron-Hay Court, South Perth 6151, in the State of Western Australia; and

THE STATE OF QUEENSLAND acting through its Department of Lands and Department of Primary Industries; and

THE NORTHERN TERRITORY OF AUSTRALIA acting through its Conservation Commission, its Power and Water Authority, its Department of Primary Industry and Fisheries, its Department of Lands, Planning and Environment and its Department of Mines and Energy; and

THE DIRECTOR OF NATIONAL PARKS AND WILDLIFE, a corporation established under Section 33 of the National Parks and Wildlife Conservation Act 1975 (Commonwealth) which for the purposes of this Agreement is acting through the Australian Nature Conservation Agency; and

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION, a body corporate established by the Science and Industry Act 1949 (Commonwealth) which for the purposes of this Agreement is acting through its Division of Wildlife and Ecology in its Institute of Natural Resources and Environment and its Division of Tropical Crops and Pastures and its Division of Soils in its Institute of Plant Production and Processing.

(in this agreement collectively called "the Researcher") of the other part.

WHEREAS:

- A. The Commonwealth, by the provision of financial assistance under a program known as the Cooperative Research Centres Program, wishes to enhance scientific and technological capabilities and support scientific research in higher education institutions, CSIRO and other Commonwealth and State Government research organisations and in the private sector, and to encourage applications of science and technology in industry and other sectors such as health and the environment.
- B. The objectives of the Program are:
- to contribute to national objectives, including economic and social development, and the establishment of internationally competitive industry sectors through supporting long-term, high quality scientific and technological research;
 - to capture the benefits of research, and to strengthen the links between research and its commercial and other applications, by the active involvement of the users of research in the work and management of the Centres;
 - to promote cooperation in research, and through it a more efficient use of resources in the national research effort by building centres of research concentration and strengthening research networks; and
 - to promote the active involvement of researchers from outside the higher education system in educational activities, thus stimulating a broader experience in education and training, particularly in graduate programs and to offer graduate students opportunities to be involved in major cooperative, user oriented research programs.
- C. The persons collectively described above as the Researcher have entered into a joint venture agreement between themselves [and other persons] for the purpose of establishing a research centre to be known as the
- "Cooperative Research Centre for the Sustainable Development of Tropical Savannas"
- a copy of which agreement has been initialled by the Parties as at the date hereof for identification.
- D. The Researcher has applied to the Commonwealth for a grant of financial assistance to enable the Researcher to establish and operate the Centre and to carry out the Activities of the Centre described in Schedule 1 to this agreement.

- E. The Minister has approved the making of a grant of financial assistance by the Commonwealth to the Researcher on the conditions set out in this agreement.

NOW IT IS HEREBY AGREED as follows:

- 1.1 In this agreement, unless a contrary intention appears:

"Activities of the Centre" means the research, training and Commercialisation activities to be carried out by or on behalf of the Centre as specified in Schedule 1;

"Account" means the account referred to in clause 12 Financial Provisions;

"Applicable Jurisdiction" means Northern Territory [specify a State or Territory of the Commonwealth of Australia whose law is to be the applicable law of the Contract];

"Asset" means an item of real or personal property, including a Capital Item, but not including Intellectual Property;

"Budget" means the budget specified in Schedule 4, and any revised budget approved by the Commonwealth under clause 3.4 [Establishment & Activities of Centre];

"Capital Item" means an Asset of a durable nature, the value of which exceeds \$20,000;

"Centre" means the Cooperative Research Centre referred to in Recital C and established by the Researcher in accordance with clause 3.1 [Establishment & Activities of Centre];

"Centre Title" means the name of the Centre specified in Recital C;

"Commercialise", in relation to Intellectual Property, means to manufacture, sell, hire or otherwise exploit a product or process, or to provide a service, incorporating that Intellectual Property, or to license any third party to do any of those things; and "Commercialisation" shall be similarly construed;

"Committee" means the Cooperative Research Centres Committee appointed by the Commonwealth for purposes of the CRC Program;

"Contract" means this agreement including the Schedules and any attachments thereto;

"Contract Material" means all material brought or required to be brought into existence as part of, or for the purpose of performing the Contract including, but not limited to, documents, equipment, information and data stored by any means;

"Contributions" means the Researcher's Contributions and the Third Party Contributions;

"Cooperative Research Centre" means a centre established under the CRC Program;

"CRC Program" means the Cooperative Research Centres Program referred to in Recital A;

"Field" means the field of research indicated in the Centre Title;

"Financial Year" means a period of 12 months ending on the anniversary of the commencement of the Grant Period, or where the context necessitates a part of such period;

"Grant" means the financial assistance to be provided by the Commonwealth as specified in Schedule 3 for expenditure on the activities of the Centre;

"Grant Period" means the period specified in Schedule 2;

"Head of Expenditure" means a category of expenditure provided for in the Budget;

"Intellectual Property" includes all copyright and neighbouring rights, and all rights in relation to inventions (including patents), plant varieties, registered and unregistered trade marks, registered designs, confidential information (including trade secrets and know-how) and circuit layouts and all other rights resulting from intellectual activity in the industrial, scientific, literary or artistic fields;

"Joint Venture Agreement" means the agreement referred to in Recital C;

"Liaison Officer" means the person nominated by the Researcher as required in clause 8 and Schedule 7;

"Minister" means the Commonwealth Minister having for the time being the administration for the Commonwealth of the CRC Program;

"Objectives of the CRC Program" means the objectives stated in Recital B;

"Performance Indicators" means the Indicators specified in Schedule 6;

"Qualified Accountant" means:

- (a) a person registered as a company auditor or a public accountant under a law in force in a State or Territory; or

- (b) a member of the Institute of Chartered Accountants in Australia or a CPA member of the Australian Society of Certified Practising Accountants;

"Quarter" means a period of 3 months or part thereof ending on 31 March, 30 June, 30 September or 31 December;

"Researcher" shall, where this context so admits, include the employees and authorised sub-contractors and agents of the Researcher involved in the Activities of the Centre;

"Researcher's Contributions" means the monies, Assets, personnel, facilities and services to be provided by the Researcher from its own resources in accordance with the Budget;

"Secretary" means the person for the time being holding, occupying or performing the duties of the office of Secretary to the Committee and any other person designated in writing by that person to perform any function or to exercise any of the powers of the Secretary under this Contract;

"Specified Personnel" means the personnel specified in Schedule 5 as personnel whose involvement is essential to the Activities of the Centre or such personnel as may be substituted for them in accordance with this Contract;

"Third Party Contributions" means the monies, Assets, personnel, facilities and services to be procured from third parties for the Activities of the Centre in accordance with the Budget;

"Timetable" means the timetable and milestones specified in Schedule 1.

1.2 In this Contract, unless a contrary intention appears:

- (a) words importing a gender include any other gender; and
- (b) words in the singular number include the plural and words in the plural number include the singular.

1.3 Unless the contrary intention appears:

- (a) a reference in this Contract to the Researcher includes each of the persons constituting the Researcher and their respective legal personal representatives, successors and permitted assigns; and
- (b) each of those persons shall comply with their several obligations contained in the Joint Venture Agreement which relate to, and are consistent with,

the obligations of the Researcher under this Contract.

- 1.4 Clause headings and notes in square brackets in this Contract are for convenient reference only and have no effect in limiting or extending the language of the provisions to which they refer, except for the purpose of rectifying any erroneous cross reference.
- 1.5 In the event of any conflict between the terms and conditions contained in the clauses of this Contract and any part of the Schedules and attachments (if any) then the terms and conditions of the clauses shall take precedence.

PAYMENT OF GRANT

- 2.1 The Commonwealth shall, during the Grant Period, pay the Grant to the Researcher in quarterly instalments, or otherwise at the times, in the instalments, in the manner and subject to the conditions (if any) as specified in Schedule 3.
- 2.2 The first instalment will be paid upon execution of this Contract. Such payment will be made on or before 28 July 1995, or within 28 days of the signing of this Contract if signing occurs on or after 1 July 1995.
- 2.3 Each subsequent quarterly instalment shall be made within 28 days of receipt by the Commonwealth of the Quarterly Report for the preceding Quarter in accordance with clause 13 [Quarterly Reports]. Payment of instalments shall be conditional upon -
 - (a) the making of all necessary Appropriations by Parliament;
 - (b) receipt of this Quarterly Report as aforesaid;
 - (c) the provisions of clause 15 [Deferral of Instalments & Termination]; and
 - (d) substantial observance by the Researcher of the provisions of this Contract.
- 2.4 The Commonwealth may pay an instalment notwithstanding that a condition of clause 2.3 other than condition (a) is not met.

ESTABLISHMENT AND ACTIVITIES OF CENTRE

- 3.1 The Researcher shall establish a Cooperative Research Centre under the Centre Title.
- 3.2 The Researcher shall, during the Grant Period, carry out the Activities of the Centre in accordance with the Timetable and the Budget.

- 3.3 The Researcher shall use its best endeavours to carry out the Activities of the Centre at a high standard, and to promote the Objectives of the CRC Program.
- 3.4 The Researcher shall, without delay, report to the Commonwealth any substantial changes to the Activities of the Centre, the timetable, the Budget, or the Joint Venture Agreement and shall not implement such changes without the prior written approval of the Commonwealth.
- 3.5 For the purposes of sub-clause 3.4, "substantial" means of a kind or magnitude likely to affect the Centre's performance with respect to the Objectives of the CRC Program. Substantial changes to be reported include, but are not limited to, variations to Specified Personnel (including Director) as per clause 7.2, variations to the parties to the Joint Venture Agreement, shortfalls in contributions from the parties to the Joint Venture Agreement, variations to the research program structure, variations to the research program milestones and/or performance indicators, variations to Heads of Expenditure as per clause 5.2, and variations to the procedures for handling Intellectual Property as per clause 9.2.

CONTRIBUTIONS

- 4. The Researcher shall provide from its own resources the Researcher's Contributions, and procure from third parties the Third Party Contributions, in accordance with the Budget. The value of the Contributions shall equal or exceed the amount of the Grant.

APPLICATION OF GRANT AND CONTRIBUTIONS

- 5.1 The Researcher shall use the Grant and the Contributions only for the Activities of the Centre and not for any other purpose.
- 5.2 Despite clause 3.4 [Establishment & Activities of Centre], the Researcher may reallocate the budgetary resources between Heads of Expenditure, provided that the actual total yearly expenditure on the Activities of the Centre under each Head of Expenditure does not differ by more than 20% or \$100,000 (whichever is the greater amount) from the allocation in the Budget without prior approval by the Commonwealth.
- 5.3 Subject to clause 5.4 Capital Items acquired from the Grant and the Contributions on acquisition shall vest as provided in the Joint Venture Agreement.
- 5.4 A Capital Item acquired in breach of clause 5.1 or 5.2 shall become the property of the Commonwealth on acquisition.

OTHER FINANCIAL ASSISTANCE

6. During the Grant Period, the Researcher may accept financial or other assistance for the Activities of the Centre otherwise than as provided in this Contract, provided such assistance does not affect adversely the Centre's performance with respect to the Objectives of the CRC Program. In any other case written approval must be obtained from the Commonwealth prior to accepting such assistance.

SPECIFIED PERSONNEL AND MANAGEMENT

- 7.1 The Researcher shall procure the services of the Specified Personnel and ensure that the Specified Personnel undertake work in respect of the Activities of the Centre as provided in Schedule 1 and Schedule 5.
- 7.2 The Researcher shall notify the Commonwealth immediately of any proposed changes in the Specified Personnel, the positions occupied and work to be performed by them, indicating the expected effect that the change will have on the Centre's performance with respect to the Objectives of the CRC Program. Any such changes shall not be implemented by the Researcher without the Commonwealth's prior approval, except to the extent that they are beyond the control of the Researcher.

LIAISON

- 8.1 The Researcher shall liaise with and report to the Commonwealth through the Secretary as reasonably required by the Commonwealth during the period of this Contract.
- 8.2 The Researcher shall grant to the Liaison Officer authority to receive and sign notices and written communications for the Researcher under this Contract.

INTELLECTUAL PROPERTY

- 9.1 The Intellectual Property in all Contract Material shall vest as provided in the Joint Venture Agreement, subject to the remaining provisions of this clause.
- 9.2 The Researcher shall at all times during the Grant Period have in place documented procedures to ensure that, before any Contract Material is published or disclosed to any third person, consideration is given to the potential prejudice to the subsistence or Commercialisation of any Intellectual Property in that material, including the possibility that publication or disclosure might preclude the grant of a patent or cause the loss of Intellectual Property in any confidential information. The Researcher shall promptly advise the Commonwealth of such procedures and any variation thereof and shall ensure that the procedures are complied with.

- 9.3 The Commonwealth shall ensure that nothing is done which might prejudice the subsistence or Commercialisation of any Intellectual Property in Contract Material, and, in particular, shall not publish or disclose the same to any third person so as to preclude the grant of a patent or cause the loss of Intellectual Property in any confidential information.
- 9.4 The Researcher shall use its best endeavours to Commercialise or otherwise make available any Intellectual Property in Contract Material and to do so in a manner that ensures that the maximum benefits accrue to Australia, including Australian industry, the Australian environment and the Australian economy generally. The use and exploitation of such Intellectual Property shall be consistent with the Objectives of the CRC Program.
- 9.5 The Researcher shall not assign or license Intellectual Property in any Contract Material having the potential for Commercialisation without imposing on the assignee or licensee conditions equivalent to those imposed upon the Researcher under clauses 9.2 and 9.4 and without the prior written approval of the Commonwealth. Such approval may only be withheld if the Commonwealth notifies the Researcher of a potential alternative for the exploitation of the Intellectual Property that in its reasonable opinion is superior to the proposed licence or assignment in terms of compliance with clauses 9.2 and 9.4.

PUBLICATIONS AND PUBLICITY

10. The Researcher shall use its best endeavours to ensure that where any person at any time publishes a book, article or newsletter or disseminates in any other form information relating to the Activities of the Centre, an appropriate acknowledgment, making reference to the Cooperative Research Centres Program, is given of the funding of the Activities of the Centre by the Commonwealth.

CONFLICT OF INTEREST

- 11.1 The Researcher warrants that to the best of its knowledge, at the date of signing this Contract, no conflict of interest exists which is likely to affect the performance of its obligations under this Contract.
- 11.2 If, during the Grant Period, a conflict or risk of conflict of interest arises in the performance of its obligations under this Contract, the Researcher undertakes to notify the Commonwealth immediately in writing of that conflict or risk.

- 11.3 The Researcher shall within seven days of notification of a conflict of interest inform the Commonwealth of the steps it will take to resolve the conflict of interest.
- 11.4 If the Commonwealth considers that those steps are inadequate, it may direct the Researcher to resolve the conflict in a manner proposed by the Commonwealth.
- 11.5 The Researcher shall, in those cases where so directed by the Commonwealth, secure for the Commonwealth in writing similar warranties and undertakings from Specified Personnel and any other persons engaged in the Activities of the Centre.

FINANCIAL PROVISIONS

- 12.1 The liability of the Commonwealth to support the Activities of the Centre is limited to the amount of the Grant.
- 12.2 The Researcher shall ensure that -
 - (a) proper accounting standards and controls are exercised in respect of the Grant and the Contributions; and
 - (b) income and expenditure in relation to the Activities of the Centre are recorded separately from other transactions of the Researcher.
- 12.3 The Researcher shall establish an account for purposes of the Activities of the Centre.
- 12.4 The Researcher shall ensure that -
 - (a) any moneys forming part of the Grant are deposited in the Account;
 - (b) any moneys forming part of the Contributions are deposited in the Account;
 - (c) all drawings on the Account during the Grant Period are used for the Activities of the Centre and not for any other purpose; and
 - (d) any interest on the balance of the Account is credited to the Account.

QUARTERLY REPORTS

- 13.1 During the Grant Period, the Researcher shall, within 1 month after the end of each Quarter, complete and forward to the Commonwealth a summary report incorporating -
 - (a) a financial statement in respect of that Quarter indicating the sources of funding (whether in the form of money or otherwise) of the Activities of

the Centre, and the application of that funding to each Head of Expenditure;

- (b) a declaration by the Researcher certifying the correctness of the particulars provided under paragraph (a) and including a statement that the Grant has been expended solely upon the Activities of the Centre and in accordance with this Contract;
- (c) estimates of sources of funding and Heads of Expenditure for the succeeding (current) Quarter.

13.2 A report provided under clause 13.1 shall be in the form specified from time to time by the Commonwealth.

ANNUAL AND FINAL REPORTS

14.1 The Researcher shall, within two months of -

- (a) the end of each Financial Year during the Grant Period,
- (b) the end of the Grant Period,
- (c) earlier termination of the Grant under clause 15 [Deferral of Instalment and Termination]

prepare and forward to the Commonwealth a report incorporating -

- (d) full details of the Activities of the Centre, including -
 - (i) any highlights, breakthroughs or difficulties encountered;
 - (ii) progress in the areas of research, education, collaboration and user involvement, commercialisation and the application of research results generally;
 - (iii) creation of any Contract Material containing Intellectual Property of potential commercial value;
 - (iv) a list of all publications authored or co-authored by the Researcher which relate to the activities of the Centre;
 - (v) a list of all personnel who participated in the Activities of the Centre; and
 - (vi) detailed information required for the evaluation of the Centre's performance in terms of the Performance Indicators;
- (e) a financial statement in respect of the Financial Year or part thereof indicating the sources of funding (whether in the form of money or otherwise)

of the Activities of the Centre, and the application of that funding to each Head of Expenditure; and

- (f) a statement by a Qualified Accountant, not otherwise involved in the Activities of the Centre, certifying that the financial statement presents fairly the sources of funding, the application of that funding and the financial position of the Centre for the Financial Year, in accordance with Australian accounting concepts and applicable Australian standards and the provisions of this Contract.

14.2 A report provided under clause 14.1 shall comply with any reasonable additional requirements which may be specified from time to time by the Commonwealth.

14.3 Material or information contained in a report provided under clause 14.1 may be used by the Commonwealth in the course of any activities within its functions unless to do so would be a breach of any obligation of the Commonwealth under this Contract to treat it as confidential.

DEFERRAL OF INSTALMENTS AND TERMINATION

15.1 During the Grant Period, the Commonwealth may give notice to the Researcher specifying that one or more of the circumstances following has arisen, and requiring the Researcher to remedy the same, namely:

- (a) the Activities of the Centre are not being carried out in accordance with clause 3 [Establishment & Activities of Centre];
- (b) the Researcher has failed to provide or procure the Contributions in accordance with the Budget, contrary to clause 4 [Contributions];
- (c) changes to the Specified Personnel have been implemented without the Commonwealth's approval, contrary to clause 7 [Specified Personnel & Management] and such changes are likely to affect adversely the Centre's performance with respect to the Objectives of the CRC Program;
- (d) a conflict of interest has arisen and has not been resolved to the satisfaction of the Commonwealth, contrary to clause 11 [Conflict of Interest];
- (e) the Researcher is in breach of any other condition of this Contract;
- (f) the Researcher has become or threatens to become or is in danger of becoming subject to any form of insolvency administration.

- 15.2 If within 30 days of a notice referred to in clause 15.1 the circumstances referred to in the notice have not been remedied, then the Commonwealth may, at its option -
- (a) defer or cancel payment of an instalment, in whole or in part; or
 - (b) terminate this Contract forthwith.
- 15.3 During the Grant Period, the Researcher may give notice to the Commonwealth specifying that the Commonwealth is in breach of a stated condition of this Contract.
- 15.4 If within 30 days of a notice referred to in clause 15.3 the breach has not been remedied, the Researcher may terminate this Contract forthwith.
- 15.5 Either party may terminate this Contract after 30 days notice to the other party that it considers the Centre is unlikely to achieve the Objectives of the CRC Program.
- 15.6 Upon termination of this Contract pursuant to clause 15.2, 15.4, or 15.5, the Researcher:
- (a) may draw from the Account moneys necessary to meet commitments properly made prior to the termination of this Contract;
 - (b) shall not incur any new commitments of expenditure from the Account unless they will be satisfied entirely from the proportion of the funds that will remain in the Account after the Researcher has complied with paragraph (c);
 - (c) within 3 months of termination of the Contract pay to the Commonwealth a proportion of the funds remaining in the Account after all commitments properly made have been met.
- 15.7 The proportion referred to in clause 15.6 shall be the proportion that the Grant moneys paid by the Commonwealth during the Grant Period bears to the total of the deposits made into the Account during the Grant Period.
- 15.8 A commitment referred to in clause 15.6 shall be deemed not to have been properly made (but without limitation) if -
- (a) it was made in breach of clause 5 [Application of Grant & Contributions]; or
 - (b) the resultant expenditure is likely to occur more than 3 months after the termination of this Contract.

ASSIGNMENT AND SUB-CONTRACTING

- 16.1 The benefit of this Contract shall not be dealt with in any way by the Researcher (whether by assignment, licensing or otherwise) without the prior written consent of the Commonwealth.
- 16.2 The Researcher shall not, without the prior written approval of the Commonwealth, sub-contract the performance of any substantial part of the Activities of the Centre. Any such approval may be given subject to such conditions as are considered necessary to ensure that the Centre's performance with respect to the Objectives of the CRC Program are not adversely affected.
- 16.3 The Researcher shall be fully responsible for the performance of the Activities of the Centre notwithstanding that the Researcher has sub-contracted the performance of any part of the Activities of the Centre.
- 16.4 Without limiting the generality of clause 16.2, any activities directly related to the Objectives of the CRC Program, and involving the application of more than one person year during any Financial Year, shall be deemed a substantial part of the Activities of the Centre.

RELATIONSHIP WITH COMMONWEALTH

- 17.1 The Researcher shall not represent itself, and shall endeavour to ensure that its employees, agents and contractors do not represent themselves, as being employees or agents of the Commonwealth.
- 17.2 The Researcher shall not by virtue of this Contract be or for any purpose be deemed to be an employee or agent of the Commonwealth.
- 17.3 Each of the persons who are in this Contract collectively described as the Researcher warrants and acknowledges that in entering into the Joint Venture Agreement they have relied upon their own independent legal advice and in particular (but without limitation) releases the Commonwealth from all liability which might arise from the use of any precedent joint venture agreements furnished by the Commonwealth.

INSURANCE

- 18. The Researcher shall effect and maintain adequate insurance to cover the Activities of the Centre in a similar way to the Researcher's other activities and, if requested, provide the Commonwealth with full information regarding its insurance arrangements.

INDEMNITY

19. The Researcher indemnifies and shall keep indemnified the Commonwealth, its officers, employees and agents (including members of the Committee) from and against all actions, claims demands, costs and expenses (including the costs of defending or settling any action, claim or demand) made, sustained, brought or prosecuted in any manner based upon, occasioned by or attributable to any injury to any person (including death) or loss of or damage to property which may arise from or be a consequence of any unlawful or negligent act or omission of the Researcher, its officers, employees or agents in carrying out the Activities of the Centre.

ACCESS

20. The Researcher shall at all reasonable times give to agreed persons access on such conditions as may be agreed to premises occupied by the Researcher where the Activities of the Centre are being undertaken and shall permit those persons to view the performance of the Activities of the Centre and any Contract Material or other material relevant to the Activities of the Centre, except for material provided to the Researcher on a confidential basis and material the viewing of which the Researcher reasonably believes may prejudice its Intellectual Property or other rights. Such agreement as is required to be obtained from the Researcher under this clause shall not be unreasonably withheld.

AFFIRMATIVE ACTION

21. The Researcher shall comply with its obligations, if any, under the *Affirmative Action (Equal Employment Opportunity for Women) Act 1986*. Information about the Act can be obtained from the Affirmative Action Agency on (02) 957 4333.

BIOLOGICAL AND RADIATION SAFEGUARDS

- 22.1 When conducting research in Australia pursuant to the Activities of the Centre on or involving humans or animals, the Researcher shall ensure that all relevant ethics codes and guidelines adopted by the National Health and Medical Research Council and the Genetic Manipulation Advisory Committee are observed.
- 22.2 The Researcher shall nominate to the Commonwealth one or several higher education institution(s) or Commonwealth or State research organisation(s) with a relevant ethics committee constituted in accordance with the codes and guidelines referred to in clause 22.1, to oversee all ethical clearances which may be required under those codes and guidelines. If more than one ethics committee is nominated the Researcher

shall indicate the respective areas of responsibility in such a way as to ensure that all activities of the Centre are overseen by one and only one ethics committee.

- 22.3 When conducting research in Australia pursuant to the Activities of the Centre which involves the use of ionising radiation, the Researcher shall ensure that persons performing procedures involving ionising radiation are appropriately trained and hold a relevant current licence from the appropriate State authority.
- 22.4 Whenever reasonably required by the Commonwealth, the Researcher shall furnish to the Commonwealth written evidence of compliance with the requirements of this clause.

UNAVOIDABLE DELAY

23. A party to this Contract shall not be entitled to exercise its rights and remedies upon the default of the other party if that default:
- (a) is caused by an act or event that is beyond the reasonable control of that other party;
 - (b) continues for less than one (1) month; and
 - (c) was not reasonably foreseeable at the time this Contract was entered into.

WAIVER

24. A waiver by the Commonwealth in respect of any breach of a condition or provision of this Contract shall not be deemed to be a waiver in respect of any other breach or of any subsequent similar breach.

ENTIRE AGREEMENT AND VARIATION

- 25.1 This Contract constitutes the entire agreement between the parties and supersedes all communications, negotiations, arrangements and agreements, either oral or written, between the parties with respect to the subject matter of this Contract.
- 25.2 No agreement or understanding varying or extending this Contract, including in particular the Activities of the Centre and the amount of the Grant shall be legally binding upon either party unless in writing and signed by both parties.

APPLICABLE LAW

- 26.1 This Contract shall be governed by and construed in accordance with the law for the time being in force in the Applicable Jurisdiction.

- 26.2 The Researcher shall ensure that the work done under this Contract complies with the laws from time to time in force in the State or Territory in which the Activities of the Centre, or any part thereof, is to be carried out.

NOTICES

- 27.1 Any notice, request or other communication to be given or served pursuant to this Contract shall be in writing and:

- (a) if given to the Commonwealth, signed by the Liaison Officer and forwarded to the Secretary at the address set out below or as otherwise notified by the Secretary:

The Secretary
Cooperative Research Centres Committee
Department of Industry, Science and Technology
51 Allara Street
CANBERRA ACT 2601

Facsimile: (06) 276 2002

- (b) if given by the Commonwealth, signed by the Secretary and forwarded to the Researcher, for the attention of the Liaison Officer at the address indicated in Schedule 8 or as otherwise notified by the Liaison Officer.

- 27.2 Any such notice, request or other communication shall be delivered by hand or sent by pre-paid post, facsimile or telex, to the address of the party to which it is sent.

- 27.3 In the absence of proof of receipt at another time, every notice, request or other communication in writing shall be deemed to have been delivered:

- (a) if sent by pre-paid post, on the day when it would normally be delivered in the ordinary course of post,
(b) if sent by facsimile, at the time of receipt by the sender of the transmission report confirming successful receipt at the conclusion of the transmission,
(c) if sent by telex, at the time of receipt by the sender of the answer back code at the end of the transmission.

DISPUTE RESOLUTION

- 28.1 A party to this Contract claiming that a dispute has arisen under this Contract shall give written notice to the other party designating as its representative in negotiations relating to the dispute a person with

authority to negotiate on its behalf. The other party shall promptly, and in any event within 14 days, give notice in writing to the first party designating as its representative in negotiations relating to the dispute a person with similar authority.

28.2 If the dispute is not resolved within 30 days of the latter designation required by clause 28.1 (or within such further period as the representatives may agree is appropriate) the representatives shall seek to agree on a process for resolving the whole or part of the dispute through means other than litigation or arbitration, (such as further negotiations, mediation, conciliation, independent expert determination or mini-trial).

28.3 If the parties have not agreed under clause 28.2 on a dispute resolution process within 14 days (or such longer time as is agreed) or if the process agreed upon pursuant to clause 28.2 failed to resolve the dispute, then any party which has complied with the provisions of clause 28.1 and 28.2 may in writing terminate the dispute resolution process provided for in those sub-clauses and may then refer the dispute to arbitration in accordance with, and subject to, the Institute of Arbitrators Australia Rules for the Conduct of Expedited Commercial Arbitration.

IN WITNESS WHEREOF the Parties have executed this Agreement on the dates respectively set out below.

SIGNED on behalf of the Commonwealth)
 of Australia by Dr Andreas Dubs,)
 Assistant Secretary, Department of)
 Industry, Science and Technology) X
)
 in the presence of Mr Colin Hickey,)
 Director, Department of Industry)
 Science and Technology) X
)
 _____ [Date])

SIGNED for and on behalf of)
 the Northern Territory University)
 by its duly authorised officer)
)
 _____ [Name]) X
)
 in the presence of)
)
 _____ [Name]) X
)
 _____ [Date])

SIGNED for and on behalf of)
 The Australian National University)
 by its duly authorised officer)
)
 _____ [Name]) X
)
 in the presence of)
)
 _____ [Name]) X
)
 _____ [Date])

THE COMMON SEAL of the James Cook)
 University of North Queensland was)
 hereto affixed pursuant to a resolution of)
 the Council dated 6th October 1977)
 by me as the proper officer having custody)
 thereof)
)
 _____ [Name]) X
)
 in the presence of)
)
 _____ [Name]) X
)
 _____ [Date])

THE COMMON SEAL of The Department)
 of Conservation and Land Management)
 was affixed in accordance with The)
 Conservation and Land Management Act)
 by)
 _____ [Name]) X
)
 in the presence of)
)
 _____ [Name]) X
)
 _____ [Date])

THE COMMON SEAL of the Chief)
 Executive Officer of the Department of)
 Agriculture was hereto affixed by)
)
 _____ [Name]) X
)
 in the presence of)
)
 _____ [Name]) X
)
 _____ [Date])

SIGNED for and on behalf of The State)
 of Queensland by)
)
 _____ [Name]) X
)
 in the presence of)
)
 _____ [Name]) X
)
 _____ [Date])

SIGNED for and on behalf of)
 The Northern Territory of Australia by)
)
 _____ [Name]) X
)
 in the presence of)
)
 _____ [Name]) X
)
 _____ [Date])

SIGNED on behalf of The Director)
 of National Parks and Wildlife by)
)
 _____ [Name]) X
)
 in the presence of)
)
 _____ [Name]) X
)
 _____ [Date])

SIGNED for and on behalf of the)	
Commonwealth Scientific and Industrial)	
Research Organisation by)	
)	
_____ [Name])	X
)	
in the presence of)	
)	
_____ [Name])	X
)	
_____ [Date])	

SCHEDULE 1

ACTIVITIES OF THE CENTRE

RESEARCH ACTIVITIES

SUBPROGRAM 1: RESPONSES OF SAVANNAS TO STRESS AND DISTURBANCE

Sub-program Leader: Dr J Brown (CSIRO Division of Tropical Crops & Pasture)

Objectives

This Sub-program will provide the basic biophysical framework for extrapolation of research results from other Sub-programs, and provide information on soil-water-vegetation relationships for the development of land and water resource management strategies.

Its specific objectives are:

- To predict savanna structure and function in relation to biophysical determinants and disturbances associated with savanna land uses at scales relevant to management.
- To integrate quantitative and qualitative models of the biophysical constraints on savanna responses to disturbance into Sub-programs 2, 3, 4 & 5.

Strategy

Internationally, the primary determinants of savanna form and function are hypothesised to be plant available moisture and available nutrients, as affected by annual rainfall and soil texture. Secondary determinants are fire and herbivory. North Australia is well-placed to assess the role of variation in moisture and soil nutrients, as there are strong gradients in aridity and soil texture across the region. Moreover, most of the region is relatively unmodified by human land use pressure.

Sub-program 1 will use a network of sites distributed across the range of rainfall and soil conditions which support tropical savannas, using a combination of existing and new research sites. Such an approach is consistent with current international methodologies for studying savanna ecosystems, such as the Responses of Savannas to Stress and Disturbance Program of UNESCO and the Global Change and Terrestrial Ecosystems Program of the International Geosphere Biosphere Program. This research approach is based on modelling savanna responses to gradients in environmental variables and land-use regimes.

The Sub-program has two research projects:

Project 1.1 Savanna processes in relation to moisture, nutrients and disturbance.

Aims: The aim of this project is to determine the responses of functional attributes of savannas in relation to gradients in the primary determinants of savanna function.

Methods:

As a participating project in the Global Change and Terrestrial Ecosystems Program, a transect through representative sites in northern Australia has already been established - the Northern Australian Tropical Transect. The transect currently traverses the humid and semi-arid wet-dry tropics of the NT, but will be extended to include sites from WA and Queensland and to include more common disturbances. This will encompass sites which represent the full range of rainfall/soil fertility conditions over northern Australia. Land use history will be superimposed as another variable.

Functional biological attributes of savannas such as tree cover, grass productivity and biodiversity will be modelled in relation to catenary variation in physical variables such as plant available moisture and available nutrients. The responses of savannas to disturbance will be investigated using gradients of disturbance resulting from existing land uses, and via experimental manipulation of disturbance regimes, in particular the timing and intensity of grazing of the herbaceous layer. These will be assessed on soils of different texture along a gradient of rainfall from humid to semi-arid.

Project 1.2. Effects of disturbance on savanna hydrology.

Aims: Water is the single most important determinant of savanna structure and function. The aim of this project is to determine the fluxes of water through all components of the hydrological cycle in savannas. Such information is necessary for sustainable management of both domestic and commercial water use, and also to enable land managers to predict the consequences of vegetation change (eg. tree clearing or increases in woody species cover) on catchment hydrology.

Methods: Existing technologies allow the prediction of catchment water input and surface outputs, but the losses through evapotranspiration are unknown for savannas. Water fluxes through individual trees will be measured, and the catchment-scale processes of transpiration, overland flow and surface flow etc. modelled. Preliminary results indicate that transpiration of savanna vegetation accounts for the greater proportion of catchment water flux, but the extent to which this varies between catchments is unknown. One catchment will be selected in each of three sites (Darwin region, Douglas Daly and Charters Towers), representing sites with a combination of modified and unmodified vegetation, and exploited and unexploited ground water resources. A variety of methods will be used to scale up from precise, site specific measures of leaf area index to whole catchments, using geographic information systems and remote sensing technology to achieve this integration.

Research Staff

Contributed

Name	Proportion of time (%)	Organisation
Dr W Ahmad	30	Northern Territory University
Dr G Duff	20	Northern Territory University
Dr D Eamus	30	Northern Territory University
Prof G Hill	20	Northern Territory University
Mr A O'Grady	50	Northern Territory University
ARC Post-doc	30	Northern Territory University
Dr J Monaghan	10	James Cook University
A/Prof R Coventry	30	James Cook University
Dr P Novelty	10	Dept Agriculture (WA)
Mr A Craig	30	Dept Agriculture (WA)
Mr R Andison	40	NT Primary Industry & Fisheries
Mr R Dyer	60	NT Primary Industry & Fisheries
Mr M Ashley	20	NT Primary Industry & Fisheries
Mr D Chin	15	NT Power & Water Authority
Mr D Pidsley	50	NT Power & Water Authority
Mr P O'Regain	25	Qld Dept Primary Industries
Mr H Bishop	20	Qld Dept Primary Industries
Mr D Cowan	25	Qld Dept Primary Industries
Dr A Andersen	10	CSIRO Div Wildlife & Ecology
Dr G Cook	40	CSIRO Div Wildlife & Ecology
Dr J Ludwig	10	CSIRO Div Wildlife & Ecology
Dr D Stafford-Smith	10	CSIRO Div Wildlife & Ecology
Dr D Tongway	10	CSIRO Div Wildlife & Ecology
Dr R Williams	40	CSIRO Div Wildlife & Ecology
Dr J Brown	30	CSIRO Div Tropical Crops & Pastures
Dr E Bui	25	CSIRO Div Soils
Dr J Holt	25	CSIRO Div Soils

Additional

2 Research Fellows 100

Support Staff

Contributed

2.5 Technical Staff full-time equivalent

Additional

3 Technical Staff full-time

2 PhD Students

Outcomes

- Ability to predict the impacts of disturbance (grazing, fire and tree removal) and stress (drought and nutrient limitations) on savannas across a range of rainfall and soil regimes characteristic of northern Australia.
- Ability to predict water use by savanna vegetation and the impacts of disturbance (such as tree clearing or removal of groundwater) on hydrologic function.
- Qualitative and quantitative models of savanna responses to disturbance which can be incorporated into strategic and regional land use plans, conservation plans and a variety of management systems, including property management planning and decision support systems.

Milestones

First three years

- Develop quantitative models of the role of available moisture and nutrients on savanna plant and animal populations and communities in response to grazing, fire and drought.
- Develop quantitative models of the role of available moisture and nutrients in determining savanna structure and function.
- Develop initial empirical models for scaling population and community level processes determined at local study sites to landscape and regional scales.
- Develop quantitative models of how changes in vegetation cover affect water use in savannas.
- Develop qualitative models of how changes in groundwater affect vegetation structure.
- Provide qualitative models, suitable for use in Sub-program 4, to integrate biophysical responses of savannas to disturbance at scales commensurate with management.

Longer Term

- Develop new methods to scale research at plant and community levels to landscape and regional scales.
- Develop new methods to describe the biophysical constraints on savannas in tolerating disturbance.
- With Sub-program 3, develop indicators of ecosystem health and sustainability for management applications.
- With Sub-program 2, develop qualitative models at landscape and regional scale of the impact of disturbance on management of savanna fauna.

SUB-PROGRAM 2: BIOLOGICAL DIVERSITY IN THE SAVANNA LANDSCAPE

Sub-program Leader: P. Whitehead (Conservation Commission of the Northern Territory)

Objectives

This Sub-program will build upon the framework provided by Sub-program 1 and concentrate on the roles played by key resource patches within the matrix of the savanna. It will focus on the determinants of biodiversity at a regional scale, to provide guidelines for on and off-reserve maintenance of biological diversity.

Its specific objectives are to:

- Determine spatial and temporal patterning of resource availability across the extensive savannas, in relation to distribution, dispersal and ecological requirements of the savanna biota.
- Determine the impact of land-use and management practices on this patterning and faunal response.
- Identify biota undergoing significant change in status.
- Develop local and regional management strategies to avoid or ameliorate processes associated with adverse change while maintaining sustainable production.

Strategy

The research strategy has two main components. Firstly, it will consider how the extensive savanna system is used by native animal species, especially how these species deal with the profound variation in resources between seasons and years and between different locations. Land use practices impose a further level of variation in resource availability, and these will be considered in research integrated with Sub-programs 1 and 3. This series of studies will provide a broad assessment of the ecological requirements of savanna fauna, and the land-use implications of these requirements. The second component of this program will examine in more detail species and environments which appear to be especially vulnerable to land-use changes, or which otherwise provide the most pressing specific targets for conservation planning or constraints on land use planning.

The integrated datasets and assessments will be performed largely by State and Territory agencies and then applied by those agencies. The high level of integration achievable through the Centre program will be particularly valuable for achieving complementarity of State and Territory actions, and providing a national overview of particular value to the Australian Nature Conservation Agency. Participation of major (Aboriginal and pastoral) landholders in the process will enhance the prospect of implementation of appropriate management responses.

The Sub-program has four research projects:

Project 2.1 Biogeographic overview and identification of declining biota

Aims: To provide a biogeographic overview of the savanna flora and fauna, identifying major influences on distributional patterns. To identify biota undergoing significant change in status.

Methods:

Conduct surveys of vertebrate and some invertebrate fauna at sites used for study of savanna function in Sub-program 1 and at other sites as needed to reveal patterning. Assess historic changes in status of indigenous floral and faunal species through integration of existing relevant data; take repeated surveys at a number of sites previously surveyed and well documented; incorporate aboriginal knowledge. Monitoring will be undertaken of taxa thought to be declining across a range of management regimes, habitats and biogeographic areas.

Project 2.2 Resource variability and use by fauna of the savanna landscape

Aims: To document temporal and spatial variability in resources available to savanna fauna, how this fauna responds to this variability, and what implications this response has for land management.

Methods:

Using sites from Sub-program 1, and others where necessary to increase spatial distribution and replication, phenological patterns and abundance of key resources for fauna (eg. seeds, nectar, invertebrates) will be recorded. Experimental design for site selection will include consideration of land-use type and intensity. At these sites, temporal patterns in abundance and reproductive characteristics of selected fauna will be determined by standard census procedures, and related to variation in abundance and distribution to resource availability. For some targeted species, landscape use will be examined more intensively through marking and radio tracking studies. In the first instance, emphasis will be given to granivorous birds.

Project 2.3 Riparian habitats

Aims: To determine the significance of riparian habitats for savanna fauna and variation in their function as refugia under different land use and climatic conditions. To develop management strategies to maintain or enhance their value to regional fauna.

Methods:

Watercourses provide a critical focus for much of the savanna fauna, and characteristically their margins were the first environments to be degraded by intensive land-use. Much land use remains concentrated on them. This study will characterise riparian habitats through floristic and environmental descriptions and relate variations in condition to climate and prevailing land use. Exploitation of riparian habitat by a range of fauna will also be examined with special emphasis being given to small mammals. The significance of riparian refugia, and how climate and land use interact to determine the contribution of these habitats to maintenance of regional populations will be examined in detail. The

potential to enhance refugial function by exclusion of stock or manipulation of water availability will be studied experimentally.

Project 2.4 Fire sensitive vegetation

Aims: To determine the impact of prevailing fire regimes on persistence of fire sensitive plants and vegetation types in the savanna landscape. To develop fire management strategies to maintain fire-sensitive vegetation and the dependent fauna in the savanna landscape.

Methods:

Callitris stems will be permanently tagged in stands throughout the species' range. Different fire regimes (varying timing and frequency of burning) will be imposed upon the landscapes surrounding the stands. Tree mortality and seedling recruitment will be assessed from permanent plots. Demographic models of *Callitris* stands will be derived to predict long-term consequences of various fire regimes and hence the most appropriate form of fire management to conserve the communities. Similar approaches will be adopted to study the mortality of individual rainforest trees (including *Allosyncarpia*) and hence the position of rainforest boundaries. The existing rainforest monitoring program in WA will continue. In combination, these studies will provide insights into the role of fire in reducing landscape heterogeneity, and hence in eliminating refugia that would otherwise buffer fauna against environmental change. These localised studies will be supported by examination of regional fire histories and the dynamics of vegetation in the broader savanna landscape. Remote sensing studies, combined with large numbers of widely dispersed fire monitoring plots that can be appraised rapidly by land managers for changes in floristics and cover, will provide information at a range of scales. These data will assist other Sub-programs by contributing information on fire history.

Research Staff

Contributed

Name	Proportion of time (%)	Organisation
Dr R Noske	20	Northern Territory University
Dr P McConvell	10	Northern Territory University
A/Prof C Johnston	10	James Cook University
Dr J Luly	10	James Cook University
Mr A Craig	30	Dept Agriculture (WA)
Dr N McKenzie	10	Dept CALM (WA)
Dr G Wardell-Johnston	100	Dept CALM (WA)
Mr G Graham	50	Dept CALM (WA)
Dr D Bowman	50	NT Conservation Commission
Mr P Brocklehurst	10	NT Lands, Planning & Environment
Mr P Dostine	30	NT Conservation Commission
Mr D Liddle	20	NT Conservation Commission

Mr G Allan	50	NT Conservation Commission
Mr P Whitehead	30	NT Conservation Commission
Dr J Woinarski	60	NT Conservation Commission
Herbarium staff	30	NT Conservation Commission
Senior Scientist (TBA)	50	NT Conservation Commission
Dr J Russell-Smith	50	Australian Nature Conservation Agency
Dr R Braithwaite	20	CSIRO Div Wildlife & Ecology

Additional

2 Research Fellows	100
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Support Staff

Contributed

5.5 Technical Staff	full-time equivalent
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Additional

3 Technical Staff	full-time
3 PhD Students	

Outcomes

- Extension of models developed in Sub-program 1 to predict availability of resources required by selected savanna fauna under different land uses.
- Qualitative and quantitative models to predict faunal responses, including distribution and abundance, and to relate these responses to variation in resource availability.
- Identification of landscape components that are particularly significant for maintenance of biological diversity.
- Identification of biota that are most sensitive to variation in patterns of land use and disturbance.
- Identification of land use patterns that are most likely to sustain flora and fauna.
- Assessment of present fire management regimes and their impact on the maintenance of biological diversity.
- Integration of information and models which predict biological diversity with models which predict savanna processes and land condition from more readily measured indicators (Sub-program 3).

Milestones

First three years

- Preparation of an integrated database of distribution and abundance of savanna fauna, including historical information.
- Analysis of existing information to identify biota undergoing change in status.

- Selection of faunal groups to be monitored and resource types to be assessed. Selection and establishment of study sites to sample variation in these savanna attributes.
- Initiation of study of riparian habitats, fire sensitive vegetation types and resource use by savanna biota.
- Development of models to predict broad-scale distribution of flora and fauna from climatic and other abiotic variables and in relation to land use regimes.

Longer Term

- Application of models of faunal distribution and abundance to examine implications of likely changes in broad-scale patterns of land use.
- Development of both general and spatially explicit models to predict variation in availability of key resources for selected fauna in relation to land use.
- Development of linked models of patterns of distribution and abundance of selected fauna in relation to resource availability. Use of these to predict qualitative or quantitative changes in faunal status under different patterns of land use.
- Identification of fire management regimes which promote the persistence of fire-sensitive vegetation types in savanna landscapes.
- Identification of management regimes capable of maintaining the refugial function of riparian habitats.
- Development of integrated management options applicable at a range of scales to promote maintenance of vulnerable landscape elements and biota.

SUB-PROGRAM 3: INDICATORS FOR SUSTAINABLE LAND USE

Sub-program Leader: Dr. P Novelly (Dept of Agriculture Western Australia)

Objectives

This Sub-program will draw upon the information provided in Sub-programs 1 and 2, and focus specifically on identifying indicators of change in the condition of land, water and biological resources within the savanna. Land uses to be addressed in this sub-program include grazing, tourism, and traditional use of resources by Aboriginal people. Issues such as the prevention and control of woody weed invasion will also be addressed.

Its specific objectives are:

- To determine the sustainable productive potential of savannas for a range of different land use objectives
- To develop robust, sensitive, practical and cost-effective indicators of change in land-condition, biodiversity and productive potential at a range of different scales
- To develop cost-effective strategies for restoration of savannas

Strategy

The key research philosophy is that of state-and-transition modelling. A landscape may be in one particular state, but it may change to an alternative state, in response to alterations in biophysical conditions, such as extremes of climate, fire, or variation in land use pressure. The research strategy will be to develop and refine a series of useful, robust, cost-effective indicators which reflect the state of the land, and alterations between states, and which are applicable at various scales, from paddock to region. The program will initially investigate indicators for use in the management of pastoral resources, by correlating abundance data for key indicators with measurements of land condition derived from this Sub-program and Sub-programs 1 and 2. A variety of indices of state and condition is proposed, from soil surface condition, to bio-indicators such as perennial grass abundance, and the abundance of key animals, both invertebrates and vertebrates. Extensive ground-truthing of remotely sensed data will enable the scaling up of these indices. Once established, the methodology will be extended to the identification of indicators suitable for other land uses, such as tourism, via management systems developed in Sub-programs 4 and 5.

The Sub-program has three research projects:

Project 3.1 Indicators of sustainable land production and land condition

Aims: The aim of this project is to relate indicators of economic productivity of pastoral properties to indicators of variation in intensity of land use, and variation in land state, for a number of different land types across the monsoon tropics.

Methods:

Indicators of pastoral productivity will be derived from monitoring trials such as those currently in the Victoria River District and Kimberley. Indicators of land state, land-use intensity and change in land state will be derived from ground-based studies at sites where economic indices have been derived. Variables to be assessed will include physical parameters such as soil surface condition, and abundance, spatial and temporal distribution of pasture grasses, and production related variables such as sex-ratios and weaner weights. These will be correlated with remotely-sensed assessments of the same land states, which will allow extrapolation across scales and land types. Data collected from monitoring sites will be incorporated into State and Transition Models, to determine the relationships between changes in indicators and changes in productive potential, and to identify thresholds in land condition indicating potential changes in state (e.g. vulnerability to woody weed invasion, loss of native pasture species).

Project 3.2 Faunal Indicators of Sustainability

Aims: To identify taxa associated with various forms of disturbance; To examine the utility of conspicuous biological indicators of environmental condition, and to relate these indicators to the indicators of economic production derived from project 3.1.

Methods:

Within the rich assemblage of northern Australian wildlife there are particular taxa (plants, vertebrates and invertebrates) which are conspicuous markers of the state of the land and its processes. Some of these plant and animal taxa are associated only with lands in undisturbed condition; others occur only when the lands are under stress or in impaired state. The occurrence of particular indicator taxa may provide a convenient shorthand assessment of present condition and of the management required to restore lands to a preferred condition, that is they may provide a measurement or definition of the ecological sustainability of land uses.

This project will initially investigate indicators for pastoral practices, by correlating presence/absence or abundance of taxa with the biophysical measurements of land condition derived under Sub-program 1, with indicators of productive potential derived in project 3.1. Common sites will be used amongst these programs as much as possible. Once established, the methodology will then be extended to the identification of indicators for other land uses, such as tourism.

Based on these information sets, a group of species will be identified as indicators on the basis of their conspicuousness (or ease of sampling detection) and tight association with particular land condition. Where possible, these correlative determinations will be tested by dynamic studies examining change in species composition following exclosure or removal of exclosure.

Project 3.3 Savanna Restoration.

Aims: The aim of this project is to develop cost-effective means of restoring ecological function to savannas which have reached a state wherein basic ecological

function is insufficient to maintain productive potential. Such states may be represented by savannas wherein palatable, perennial grasses have been replaced by unpalatable, annual species, where extensive scalding has developed, and in particular, where there has been extensive invasion of the savanna by woody weeds.

Methods:

State and transition models from Project 3.1 will be used to determine the best, cost-effective means of achieving savanna restoration, and of identifying areas within the savanna which are vulnerable to change. The project will include investigations of the ecology of, and control methods for, woody weeds, and how these methods can be incorporated into land management strategies (fire use, spatial and temporal distribution of grazing intensity, identification of seed dispersal mechanisms and conditions for establishment). Outputs from this project will be evaluated in Sub-program 4, to assess the cost-benefit of savanna restoration technologies, and the constraints on adoption of these.

Research Staff

<i>Contributed Name</i>	Proportion of time (%)	Organisation
Dr J Gardiner	10	James Cook University
Dr P Novelty	30	Dept Agriculture (WA)
Mr A Craig	20	Dept Agriculture (WA)
Mr S Petty	10	Dept Agriculture (WA)
Mr J Vitelli	40	Qld Dept of Lands
Dr J Johnson-Barnard	20	Qld Dept of Lands
Dr W Palmer	10	Qld Dept of Lands
Mr P O'Reagain	75	Qld Dept Primary Industries
Dr J Lindsay	25	Qld Dept Primary Industries
Mr L Wiksteed	15	Qld Dept Primary Industries
Mr R Applegate	30	NT Lands, Planning & Environment
Mr P Brocklehurst	10	NT Lands, Planning & Environment
Mr D Clift	30	NT Lands, Planning & Environment
Mr M Dilshad	20	NT Lands, Planning & Environment
Mr R Karfs	80	NT Lands, Planning & Environment
Senior Scientists (TBA)	80	NT Lands, Planning & Environment
Mr N McDonald	30	NT Primary Industry & Fisheries
Dr A Cowie	30	NT Primary Industry & Fisheries
Dr A Andersen	50	CSIRO Div Wildlife & Ecology
Dr R Williams	10	CSIRO Div Wildlife & Ecology
Dr J Ludwig	10	CSIRO Div Wildlife & Ecology

Dr D Tongway	10	CSIRO Div Wildlife & Ecology
Dr J Brown	20	CSIRO Div Tropical Crops & Pastures
Dr F Tiver	30	CSIRO Div Tropical Crops & Pastures

Additional

3 Research Fellows	100
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Support Staff

Contributed

2.8 Technical Staff	full-time equivalent
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Additional

4 Technical Staff	full-time
3 PhD Students	

Outcomes

- Cost-effective and accessible methods for monitoring and detecting changes in land condition and productive potential, for use by land holders and government agencies with responsibilities for land condition monitoring.
- Identification of plant and animal species which can serve as useful indicators of land condition.
- Identification of effective technologies for restoration of savanna ecosystems.

Milestones

First three years

- Establish monitoring sites on Victoria River Downs Station using remotely sensed and ground based land condition assessment techniques.
- Report on the methods and findings of the current National Landcare Program funded Land Resource Monitoring project and begin establishment of monitoring sites over adjacent properties in the Victoria River District.
- Analysis of State and Transition Models on Victoria River District data.
- Commence remote sensing assessment and establish monitoring sites in the Gulf Region of the Northern Territory.
- Preliminary analysis of responses of selected faunal communities to plant available moisture and available nutrients.
- Identify major types of degradation and preliminary likely causes of savanna degradation by region.
- Develop and/or refine remote sensing technologies to identify degraded savanna areas.
- Initiate landscape scale experiments designed to restore ecological functions to degraded areas across a range of ecosystem types in tropical savannas

Longer Term

- Results from State and Transition Modelling and the establishment of land resource monitoring sites over the Victoria River, Gulf, Daly Basin and Barkly Tableland biogeographic regions.
- Development of cost effective and accessible methods for monitoring and detecting change in the land condition and production potential of significantly diverse biogeographic regions in the tropical savanna.
- Develop models of responses of selected faunal communities to plant available moisture and available nutrients.
- Develop models of responses of selected faunal communities to disturbance.
- Incorporation of faunal data into State and Transition models.
- Identification of selected faunal indicators of disturbance and development of protocol for their use.
- Identify possible international markets for exporting technology, develop monitoring techniques and integrate research results into decision support systems at paddock, property and regional scales.

SUB-PROGRAM 4: SUSTAINABLE MANAGEMENT

Sub-program Leader: Dr R Hynes (Qld Dept of Lands)

Objectives

This Sub-program will provide a socio-economic framework to evaluate the outcomes of sub-programs 1-3, and add the human and economic dimensions to provide management systems for savanna land users.

Its specific objectives are:

- To develop and provide an effective information network of biophysical and socio-economic data and information systems to facilitate the linkages of projects throughout the Centre.
- To provide socio-economic information and complement scientific studies with an understanding of cultural attitudes towards the use of tropical savannas.
- To develop and promote decision making principles for savanna land managers and policy makers for the maintenance and restoration of the ecosystems.

Strategy

The focus on management necessarily involves the integration of single and multiple land use technologies, value systems, existing patterns of behaviour and cultural practices, and ecosystem components. Management systems always exist within a cultural framework. Central to management is decision-making, especially for the allocation of resources among competing owners and potential or actual users. Research into the sustainability of land capability, cultural values and income for savanna management systems therefore must include research into the management systems *per se* in addition to all components, within the savannas, such as people and their value systems, and the bio-physical environment.

In the broad context, the research will need to analyse many issues including relevant government policies, the allocation of property rights, social equity (who pays and who benefits?), rates of resource depletion, social rates of time preference, regional socio-economic effects and impacts, and the role of the savanna in the Australian economy. In a more specific context, the socio-economic analyses will examine separately and interactively the mining industry, pastoral industry, mixed farming, Aboriginal community (non-pastoral) land use, tourism, conservation management, and public good uses such as defence developments and water catchments. A dominant question in the research of these management systems is the "what is the effect of different styles and intensities of savanna land use?".

The focus of this Sub-program is to develop and promote better decision making to achieve the long term ecologically sustainable development and restoration of the Australian tropical savannas. This will be achieved, firstly (Project 4.1), through the

establishment of a comprehensive network access to existing socio-economic and physical data bases. Secondly (Project 4.2) through an understanding of the existing cultural and resource values relevant to the savannas. Thirdly (Project 4.3), savanna land managers will benefit through the development and application of improved savanna use and management technologies. Fourthly (Project 4.4), savanna users and the general community will benefit through the development and application, by policy makers, of multiple land use methodologies that effectively incorporate cultural, ecological and production values.

The Sub-program has four research projects:

Project 4.1 *Tropical savanna information management.*

Aim: To provide a comprehensive information network for all the research projects in the Centre.

Methods:

Data management will deal with issues such as hardware management, data acquisition, organisation and exchange, and brokerage between members of the Centre and non-member organisations. A major activity will be to achieve agreements between participating organisations for data sharing, and mechanisms to facilitate this process. Economies of size will be best achieved by pooling Centre resources in the areas of data handling, management and storage, statistical analysis, geographic information systems, modelling and programming where possible. Services provided by the data management unit will include the integration and exchange of data between the Centre and external State, Territory and Federal databases (e.g. ERIN).

Project 4.2 *Social and resource valuation for tropical savanna.*

Aim: To understand and measure the cultural bases to savanna land use and the best way to value unpriced resources.

Methods:

Several issues will be researched. Cultural studies of the Aboriginal knowledge of plants and animals will be extended to complement scientific knowledge. Historical studies of Settler records of vegetation changes and of social and economic changes will further complement the scientific knowledge. A comparative analysis of Settler and Aboriginal concepts of 'nature' and 'productivity' in several different environments of north Australia and build on work already under way in the Victoria River District. This study will give a better understanding of power and knowledge in relation to the environment and management policies.

A comparative evaluation of existing methods to value non-priced resources will be made initially. One promising new method of defining and quantifying attitudes is the discrete choice mathematical survey model. This model will be adapted and applied for use in quantifying attitudes to savanna land use, experiential expectations and management issues relevant to tourism, pastoralism, Aboriginal communities, mining and other industry and ecological systems of savanna use. Research will also extend these surveys to estimate proxy "demand" curves essential to defining the value to society of various ecosystem

components such as bio-diversity, riparian and aquatic systems and of environmental impact assessments in the tropical savanna.

Project 4.3 Management options for tropical savanna land managers.

Aim: To identify, develop and implement sustainable management systems for tropical savanna users in partnership with the land users.

Methods:

Several related research strategies will be followed in two priority areas. The first research priority is measuring the economic, ecological and social benefits of different intensities and styles of land use. Component research will include determining optimal cattle stocking rates, analysis of completed pasture and grazing trials, pattern analyses of existing industry data on estimated property carrying capacities, development and/or application of pasture and grazing management models (e.g. CSIRO LandAssess), dynamic linear programming models incorporating risk, grazing systems research in the Kimberley and Queensland grasslands. These components will be used to develop general ecological and economic relationships between pastoral productivity and level of sustainable resource use.

Benefit-cost relationships of the role of new ley farming technologies in the development of mixed farming systems will be assessed (e.g. in the Katherine Daly Area). The project will undertake an evaluation of the cultural importance of Aboriginal land use, particularly hunting and harvesting, across a continuum of land use intensity. The relative benefits and costs of several Aboriginal and non-Aboriginal cattle operations in similar environments will be analysed.

The economic optimum visitor densities for boats on inland waterways and for plunge pools will be assessed. The project will implement a study of nature tourism (or Ecotourism) as it is a rapidly expanding sector (20% per annum) of the tourism industry and one that offers great potential in the savanna areas. The study will involve a stock take of bio-diversity, site potential, site carrying capacity and site protection. It will include surveys of tourists experiences and expectations, a study of current trends in north Australia and an evaluation of management plans and actions.

The second research priority area will focus on resource access and infrastructural development for the mining industry in the tropical savanna. The research activities will include a survey of cultural attitudes and perceptions of mining and landholder communities with an interest in tropical savannas. Benefit-cost assessments of various options for accessing mineral deposits, and for infrastructural support for the mining developments will be undertaken giving due regard to the social and cultural requirements of the affected landusers.

Through these methods this project will meet the challenge of developing management systems which can be applied to particular land uses scattered throughout a region and other systems which can be applied to the management of resources in a particular region (property to catchment scale). This project is focussed on delivering the achievable

outcomes of savanna management systems to clients. This will be achieved by close linkages with project 5.2 (*Extension*), by building indicators derived from Subprogram 3 into management systems, and by placing project results in the political and broader socio-economic context provided by projects 4.2 and 4.4.

Project 4.4 Management information for policy makers.

Aim: To develop better decision making principles and procedures for savanna policy makers to achieve the long term ecologically sustainable development of multiple land uses and management systems integrating diverse enterprises.

Methods:

The two research priorities are to define and measure the role and contribution of various land uses to the socio-economy of the savanna and to develop and evaluate methods of integrating diverse enterprises into more socially useful regional and management systems. Several research activities will be pursued in these priority areas.

This project will evaluate the various regional studies of the savanna areas made to date. The relative contribution to the economy of individual industries and other sectors (such as public sector activity) in the savanna region will be assessed using established information in economic input-output models. This study will be extended to assess the contribution that the savannas make to the Australian economy and the relevance of the products and knowledge of the savannas to the international community. This project will also evaluate the role and contribution of public goods (water catchments, weeds, defence, etc.) and the development of infrastructures. This study will clarify economic efficiency and social equity issues involved in the determination of policies supplying public goods.

Methods of integrating diverse users and enterprises will be variously investigated. A socio-political evaluation of joint management in the Kakadu National Park will set important precedents for the management of lands owned or occupied by indigenous people both in Australia and overseas. Such schemes offer models for alternative management schemes for the mining, tourism, agriculture and pastoral industries. A study on the potential for regional agreements will build on work already begun in the Kimberley and will investigate ways by which regional control could be managed. The research will investigate how ideas of land and group relationships can be reflected in regional structures capable of allowing Aboriginal control over land and the activities on it. This project will involve comparative work in selected overseas countries.

A related project will be a systematic audit of plans of management for the major savanna National Parks (Bungle-Bungles, Mitchell Plateau, Keep River/Gregory, Litchfield, Nitmiluk, Kakadu, Lawn Hill, Cape Range). The project will be aimed at identifying the constraints on implementation of plans of management in three areas: natural area management, cultural heritage management and visitor management.

Studies will be undertaken into some key methodology issues underlying the concept of sustainable savanna use. These include adaptive holism, discounting for future generations, land use externalities, risk management, and indigenous knowledge.

As a model, multiple land use strategies will be developed for the Kimberley. This will identify the processes to facilitate multiple land use. A model catchment management plan, for the Ord River watershed, will be developed. More generally, research effort will develop and evaluate risk-weighted options for the long-term regional integration of management systems across the savanna. Useful methodologies must draw upon relevant social, economic and bio-physical data in addition to constraints imposed by policies, such as international conventions. Integration of the current and future management systems will be through a variety of techniques ranging from the establishment of a set of principles to the utilisation of quadratic linear programs.

Research Staff

Contributed

Name	Proportion of time (%)	Organisation
Prof C Cooper	30	Northern Territory University
Dr W Hazelton	30	Northern Territory University
Dr C Healey	20	Northern Territory University
Dr P Hiscock	20	Northern Territory University
Prof A Powell	20	Northern Territory University
Dr P Reynolds	10	Northern Territory University
Dr P Trembley	30	Northern Territory University
Dr R Vemuri	30	Northern Territory University
Ms F Dawson	20	Northern Territory University
Level B IT, TBA	20	Northern Territory University
Dr D Rose	55	ANU North Australia Research Unit
Dr G Crowe	50	ANU North Australia Research Unit
Research Fellows	85	ANU North Australia Research Unit
Dr D King	10	James Cook University
Mr J Monaghan	10	James Cook University
Dr J Monypenny	10	James Cook University
Dr L Fitzpatrick	10	James Cook University
Prof P Pearce	10	James Cook University
A/Prof T Nevard	20	James Cook University
Dr P Novelty	30	Dept Agriculture (WA)
Mr S Petty	40	Dept Agriculture (WA)
Ms E Jack	40	Dept Agriculture (WA)
Dr J Scanlan	20	Qld Dept of Lands
Dr R Hynes	20	Qld Dept of Lands
Mr G McKeon	10	Qld Dept Primary Industries
Mr G Fordyce	30	Qld Dept Primary Industries
Mr K Shaw	50	Qld Dept Primary Industries

Mr P Smith	50	Qld Dept Primary Industries
Mr L Wicksteed	15	Qld Dept Primary Industries
Mr J Kernott	50	Qld Dept Primary Industries
Mr R Shepherd	15	Qld Dept Primary Industries
Mr W Holmes	40	Qld Dept Primary Industries
Mr M Butler	10	NT Conservation Commission
Mr G Kirby	50	NT Primary Industry & Fisheries
Mr R Andison	40	NT Primary Industry & Fisheries
Mr M Ashley	10	NT Primary Industry & Fisheries
Mr P Grue	30	NT Primary Industry & Fisheries
Mr K Whelan	20	NT Mines & Energy
Mr K Hooper	20	NT Mines & Energy
Dr D Braithwaite	10	CSIRO Div Wildlife & Ecology

Additional

4 Research Fellows 100

Support Staff

Contributed

5 Technical Staff full-time equivalent

Additional

3 PhD students

Outcomes

- Development of a relevant socio-economic and biophysical information network using a geographic information system framework, and of models for research workers and decision makers in the savanna region, both from within and outside the Centre.
- Measures of group and individual variation in attitudes and perceptions to savanna land use and management. Quantification of the attitudinal and cultural basis to the socio-economic benefits derived from land uses. Practical models to realistically value ecosystems and components parts. Quantitative measures of the social importance of ecosystem changes. More effective and efficient EIA protocols.
- Management options relevant to optimal cattle carrying capacities on pastoral land, optimal visitor densities at popular tourist localities, efficient inland fisheries management plans, optimal harvesting and land use technologies for Aboriginal communities, optimal enterprise mixes for farms in the higher rainfall areas, and mineral resource access and development.
- A dynamic view of the priorities for sustainable savanna management. Planning principles and packages for savanna policy makers.

Milestones

First three years

- Develop tools and techniques for integrating data exchange between different operating systems, software systems, data base management systems, programming languages, modelling systems and geographic information systems.
- Development or adaptation of methods to measure and understand the cultural basis of savanna land use and of effective ways to value unpriced resources associated with savanna enterprises.
- Identification, development and provision of pastoral management options and benefit/cost assessments for tropical savanna land managers and users. For various sectoral enterprises this will address:
 - Pastoral*: optimal/variable stocking rates and risk management.
 - Aboriginal*: optimal stocking rates.
 - Tourism & Conservation*: optimal visitor densities relative to sustainability of conservation or scenic values.
 - Mining*: improved access to mineral resources.
 - Mixed farming*: review of ley farming techniques in wetter areas.
- Development of improved principles and procedures for savanna policy makers which include a dynamic view of sustainable savanna management. Use of these to audit selected National Park management plans.

Longer Term

- Development of tools and/or saleable packages to integrate and establish linkages between spatial data management systems and parameter and hybrid models.
- Integration of socio-economic values and environmental values in assessing management options for savanna land-use.
- Identification, development and provision of pastoral management options and benefit/cost assessments for tropical savanna land managers and users. For various sectoral enterprises this will address:
 - Pastoral*: interaction between production and environmental constraints
 - Aboriginal*: community scale land management, hunting and harvesting rates.
 - Mining*: infrastructural development rates.
 - Mixed farming*: assessment of sustainability of ley farming.
- Development of improved principles and procedures for savanna policy makers which include a dynamic view of sustainable savanna management. Use of these for regional government to develop land management agreements, to undertake risk assessment and to develop strategic plans for selected areas.

EDUCATION ACTIVITIES

SUB-PROGRAM 5: EDUCATION AND EXTENSION

Sub-program Leader: Prof G Hill (Northern Territory University)

Objectives

This Sub-program will provide mechanisms by which needs for education and information can be identified in the community, and will design delivery of this information either directly to the clients, or indirectly through links with existing education and extension facilities amongst participating agencies. It will ensure that the outcomes of the Centre programs are applied to the management of tropical savannas through community awareness and training, at the enterprise, regional, State and Federal level.

Its specific objectives are:

- To provide training at both PhD and MSc levels to produce graduates capable of undertaking high level research and management of tropical savannas.
- To provide extension services to users and managers to ensure sustainable development of tropical savannas.

Strategy

The education and extension activities of the Centre will provide the interface between the research of the Centre and the community which the centre is serving. A key feature of the Sub-program will be the close interface between the program and social research activities of the Centre (Sub-program 4), such that flexibility to respond to changing community needs for training and education is maintained. The Sub-program will use and enhance the facilities and expertise currently in place at the Northern Territory University, James Cook University and extension services provided by the various participating agencies. While education and extension will be co-ordinated through this Sub-program, each of the Centre Sub-programs will contribute through training of post-graduate students. Personnel involved in research in other Sub-programs will be directly involved in training and extension as part of their contribution to the activities of the Centre.

These activities will range from formal and field based course delivery, field demonstrations of technology and research results, involvement in training workshops and training of personnel through placement.

Issues to be addressed include:

- keen but often emotional interest in land use issues due to lack of balanced information.
- conflicts between various landusers in the community due to deficiencies in educational training and inadequate dissemination of information..
- lack of trained extension and research staff located in the tropical savanna region.

- lack of trained educators in tropical environmental science and resource management at the secondary and tertiary levels, and the need to upgrade training of graduates in these areas.

The issues listed are not restricted to tropical Australia, but are common internationally, providing an expanded opportunity in marketing education in tropical environmental science and resource management. One feature of the education Sub-program will be the further development of a joint (Northern Territory University/James Cook University) Coursework MSc program in Tropical Environmental Science and Resource Management, focussing on savanna related issues.

The Sub-program has two projects:

Project 5.1 Education & Training

Research training of PhD students will be undertaken by Centre research personnel in each of the above Sub-programs, through the participating Universities. A total of 24 PhD students will be supported by the Centre through these two nodes. Emphasis will be placed on having joint supervision between University staff and staff of the other participants of the Centre. Current specialist postgraduate programs do not provide adequate training for savanna land managers. A coursework MSc program will be developed and delivered by the Centre, drawing on the combined resources of the Northern Territory University and James Cook University, coupled with the broad range of specialist expertise available through personnel participating in the Centre. Specialist streams to be developed within the program may include:

- Rangeland Management,
- Conservation of Biodiversity on and off Reserve,
- Tropical Resource Management and Land Use Planning,
- Environmental Management of Mining Activities and
- Business Management of Savanna-based Enterprises.

These specialist streams will be conducted by the University partners but making particular use of personnel from Industry and Stakeholder partners (e.g. the Australian Nature Conservation Agency, the Conservation Commission of the NT, Qld and WA Government Departments). The Centre will develop distance education and multi-media teaching programs to allow the participating agencies to apply existing expertise to the special problems of providing instruction, training and technology transfer across the vast distances between the major nodes of the Centre.

The combined expertise available throughout the Centre will aid in the establishment of innovative, multi-disciplinary postgraduate training programs based on a whole-systems approach to the problems of resource management at a range of scales and for a range of land uses.

Curriculum development for undergraduate programs dealing with savanna management at the Northern Territory University, James Cook University and Batchelor College (the latter catering to Aboriginal students from all parts of northern Australia) will also be undertaken as part of this project. The major areas of need will be identified from Sub-program 4. Specialist short courses catering to users such as the mining and tourism industries (e.g. minesite environmental managers and ecotourism guides), and professionals employed by conservation and land management agencies will also be included. The public education facilities of the Australian Nature Conservation Agency and the Conservation Commission of the NT will be utilised to deliver the products of Centre research to the public sector.

Project 5.2 *Extension*

Extension related research will be action research (learning while doing), and will focus on investigations of social decision making processes which affect the adoption of sustainable development practices. The work will focus particularly on group processes. Issues to be addressed include:

- Working with new and existing landholders and community groups to understand existing local knowledge systems, practices and cultural paradigms which impact on the management of tropical savannas.
- The impact of personal development techniques, within community groups, in facilitating the identification of, and self-directed challenge to, paradigms related to land management systems.
- The integration of community groups with the research process both in terms of research design and in terms of interpretation and shaping of research products within commercial management systems.
- The development of techniques which optimise the spread of new ideas and attitude change to land managers not directly participating in the group process.

The research will be undertaken through existing extension activities within the participating agencies, particularly Qld Dept of Primary Industries, the NT Department of Primary Industry and Fisheries and the Dept of Agriculture (WA). Delivery of Centre research results will take place through these extension activities, which will benefit from the shared experience and close integration of the three main state agencies. Additional research will be conducted to investigate the suitability of agricultural extension models for application to other landusers. This project will link closely with research activities in Subprogram 4, particularly in relation to the development and promotion of management systems for savanna-based enterprises. Use will be made of existing linkages between participating agencies and organisations such as the Rural Extension Centre, Gatton campus, University of Queensland.

Research Staff

Contributed

Name	Proportion of time (%)	Organisation
Dr G Duff	20	Northern Territory University
Dr D Eamus	5	Northern Territory University
Prof G Hill	30	Northern Territory University
Mr A Arnott	15	Northern Territory University
Mr A Barnaart	10	Northern Territory University
Dr J Cameron	15	Northern Territory University
Mr R Irvine	15	Northern Territory University
Mr G Shaw	15	Northern Territory University
Mr P Wignell	15	Northern Territory University
Mr G Williams	10	Northern Territory University
A/Prof R Young	15	Northern Territory University
A/Prof G Arger	30	James Cook University
A/Prof R Coventry	30	James Cook University
Dr L Fitzpatrick	10	James Cook University
Mr C Gardiner	10	James Cook University
Mr L Wicksteed	15	Qld Dept Primary Industries
Mr R Dodt	25	Qld Dept Primary Industries
Mr R Shepherd	15	Qld Dept Primary Industries
Mr R Sullivan	50	NT Primary Industry & Fisheries
PMP Economist	50	NT Primary Industry & Fisheries

Additional

1 Lecturers	100
1 Extension Fellow	100
Short-term Contract Lecturing Staff	1 full-time equivalent

Support Staff

Contributed

3 Primelink Officers, 100% each, NT Primary Industry & Fisheries

Additional

1 Technical Staff	full-time
1 PhD Student	

Outcomes

- PhD and MSc graduates sought for employment in research and management of tropical savannas
- Development of a self-sustaining coursework MSc program in savanna ecology and management.
- Extension of Centre outcomes to users and managers to improve practice in sustainable use and development of tropical savannas.
- Development of innovative extension practices to savanna users at all levels of sophistication.
- Development of effective public education infrastructure for promoting principles of the sustainable development of tropical savannas.

Milestones

First three years

- Development of new units within existing coursework Msc programs of the Parties.
- Commence specialist short courses.
- Complete curriculum development for key areas, based on needs analysis (Sub-program 4) e.g. Aboriginal land management.
- Extend the Local Consensus Data group process (currently underway in North Queensland) across the Northern Australian Savanna to include groups in all major land and climatic systems.
- Develop comprehensive understanding of local knowledge systems and categorise cultural attitudes or paradigms which impact on the adoption of changed management systems and publish results.
- Have identified key user groups and topics for extension research and developed new methodology for delivery of extension services to particular user groups.

Longer term

- Undertake review of postgraduate coursework and research programs based on client feedback.
- Develop full Msc Program in Tropical Savanna Management.
- Establishment of distance and multimedia education activities, based upon results of needs analysis.
- Educational activities of the Centre to be operating on full cost recovery basis.
- Assist groups to establish "manager/user demonstration" projects to explore improved management systems.
- Establish formal guidelines for innovative extension programs which target key user groups and facilitate introduction of these programs.

COMMERCIALISATION/TECHNOLOGY TRANSFER

The Centre will be largely a supplier of services rather than a producer of commodities. In Australia there is already a substantial market in consultancies for specific problems and in the preparation of environmental impact statements or management plans. The markets for such services overseas is likely to increase as Asia-Pacific and other countries become more environmentally conscious about the use of their savannas. The savanna ecosystem is the most heavily populated biome in a global context and savannas occur throughout the tropics. The Centre aims also to develop a MSc course in Savanna Management which should attract fee-paying students. It would be the responsibility of the business manager of the Centre to develop these markets and to develop a strong consultancy group to service their needs.

In particular, the Centre will commercialise its outcomes and transfer its technology by

- Publication of research outcomes in refereed, scientific journals.
- Providing extension services to savanna users and managers as outlined in Project 5.2 of the Education and Extension Sub-program.
- Undertaking commissioned projects for Research and Development corporations and other agencies.
- Selling access to intellectual property and expertise to private companies.
- Commercialising computer based decision support technology.
- Developing courses for fee-paying students.
- Providing consultancy and contract services to a national and international market.
- Publicising Centre activities through the media.
- Conducting conferences, seminars and workshops to exchange information, knowledge and results of Centre research with the broader research and user community.

Staff Responsibilities

All professional scientific staff will be responsible for publications of their results and contributions to conferences, seminars and workshops.

Responsibility for coordinating extension services to savanna users and managers will rest with the staff of Project 5.2.

Responsibility for the establishment and coordination of educational services will rest with the staff of Project 5.1.

The Business Manager of the Centre will be responsible for the coordination and marketing of consultancy, educational and commercial material.

Milestones

First three years

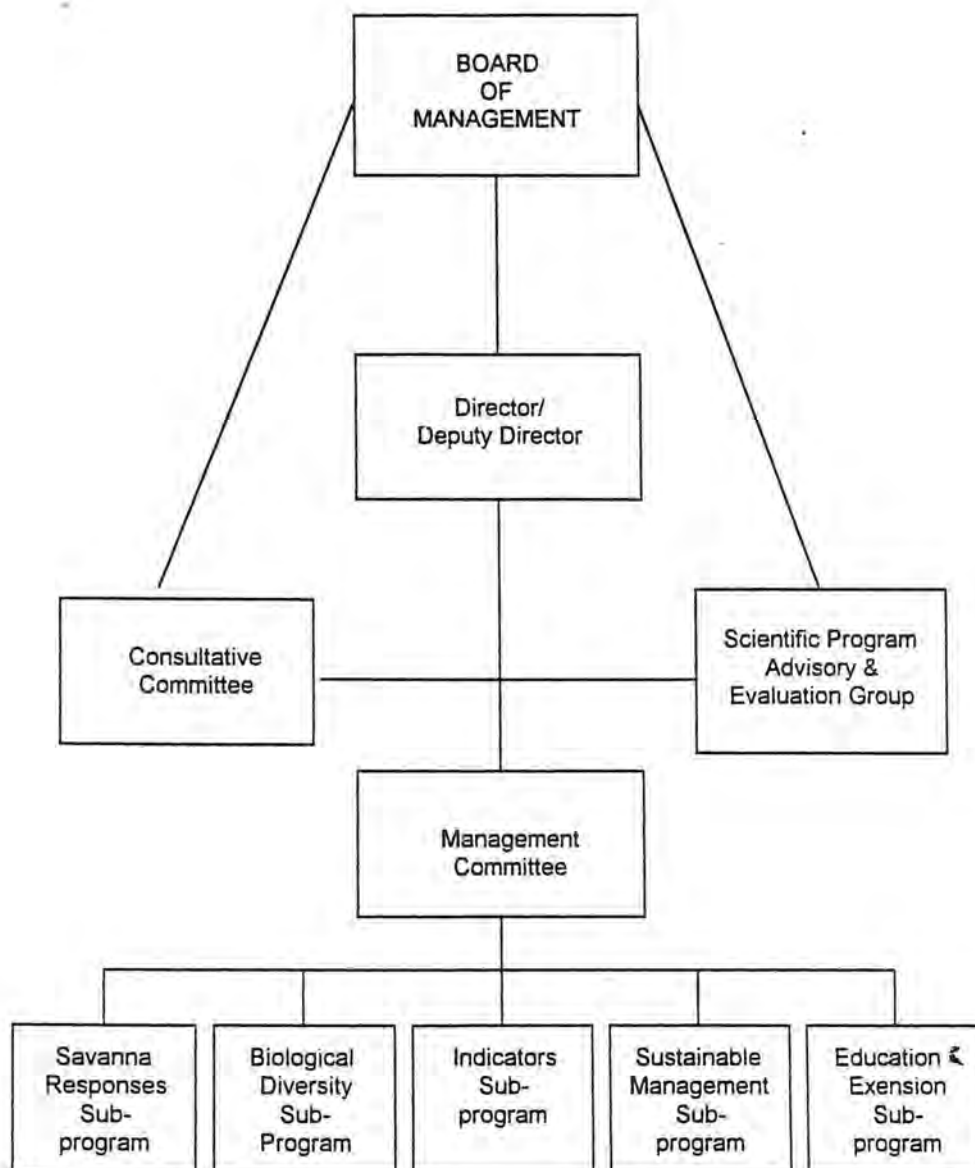
- Publication record in refereed journals.
- Develop units towards MSc by coursework programs.
- Have hosted 1-2 substantial conferences, seminars or workshops.
- Have undertaken 1-2 external consultancies and research contracts.
- Have reported several outcomes of substance in the media.

Longer term

- Have established a self-supporting consultancy and contract research group.
- Have established a self-supporting MSc program.
- Have hosted major international conferences in savanna research and management.

ADMINISTRATION AND MANAGEMENT

The administrative base of the Centre will be in Darwin on the campus of the Northern Territory University. The management structure for the Centre is illustrated below:



The **Board of Management** will comprise representatives of stakeholders and the Parties and have responsibility for overall policy on research and education, resource allocation and formal evaluation of programs and activities of the Centre. It will consist of an independent Chairperson, the Chairperson of the Consultative Committee an Aboriginal representative, a Mining Industry representative, a Pastoral Industry representative a Universities' representative, a Northern Territory representative, a Western Australian representative, a Queensland representative, a CSIRO representative and an Australian Nature Conservation Agency representative.

The **Director** will act as the Chief Executive Officer of the Centre and be responsible for day-to-day management, subject to overall control by the Board of Management.

The **Deputy Director** will assist the Director in the management of the Centre and act in his or her place when necessary.

The **Management Committee** will consist of the Director, Deputy Director and the Program leaders. It will advise and assist the Director in day-to-day management of the Centre.

The **Consultative Committee** will provide advice to the Board of Management and the Management Committee as to what research, development, education and extension activities should be undertaken by the Centre. It will be chaired by the Executive Director of the Office of Northern Development. Its members will be expert representatives of the users of the outcomes of the Activities of the Centre and such other persons as the Board of Management may determine. As a minimum, the Committee shall have two members representing each of aboriginal and pastoral interests and one member representing each of mining, tourism and conservation interests.

The **Scientific Program Advisory and Evaluation Group** will provide independent advice to the Board of Management and the Management Committee on research directions and the quality of the research of the Centre and will evaluate the research outcomes of the Centre. In addition the group will provide linkages with national and international scientific activity relevant to the research program of the Centre. Its members will be appointed by the Board of Management and will be persons who are nationally and internationally recognised experts in the Field.

A **Business Manager** will be appointed to assist the Director in financial management of the Centre including aspects of intellectual property and commercialisation.

RADIATION SAFEGUARDS AND ETHICAL CLEARANCES

Scrutiny of research programs for ethical clearances will be undertaken by the Animal Experimentation Ethics Committee and Human Ethics Committee of the Northern Territory University.

SCHEDULE 2

GRANT PERIOD

The Grant Period, during which the Activities of the Centre supported by the Commonwealth under the CRC program is a period of 7 years, commencing on 1 July 1995.

SCHEDULE 3

PAYMENT OF THE GRANT

1. The Grant payable under this Agreement by the Commonwealth to the Researcher (in 1994/95 dollars) is \$16.200 million over the Grant Period (of seven years) commencing on 1 July 1995.
2. In the first Financial Year, a total of \$1.200 million is payable in four equal quarterly instalments.
3. In the second and subsequent Financial Years, a total of \$2.500 million is payable for each Financial Year in four equal quarterly instalments.

SCHEDULE 4

BUDGET

A. Tables

SCHEDULE 4 - TABLES (1995/96 \$'000s)

CRC FOR THE SUSTAINABLE DEVELOPMENT OF TROPICAL SAVANNAS

Table 1 - In-kind Partner Contributions

Partner	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	GRAND TOTAL
Northern Territory University								
Salaries	346.9	346.9	346.9	346.9	346.9	346.9	346.9	2428.3
Capital								
Other	846.4	846.4	846.4	846.4	846.4	846.4	846.4	5925.1
Total	1193.3	1193.3	1193.3	1193.3	1193.3	1193.3	1193.3	8353.4
Australian National University								
Salaries	130.2	130.2	130.2	130.2	130.2	130.2	130.2	911.4
Capital								
Other	260.4	260.4	260.4	260.4	260.4	260.4	260.4	1822.8
Total	390.6	390.6	390.6	390.6	390.6	390.6	390.6	2734.2
James Cook University								
Salaries	120.4	120.4	120.4	120.4	120.4	120.4	120.4	842.8
Capital								
Other	216.7	216.7	216.7	216.7	216.7	216.7	216.7	1517.0
Total	337.1	337.1	337.1	337.1	337.1	337.1	337.1	2359.8
Dept of CALM (WA)								
Salaries	135.0	135.0	135.0	135.0	135.0	135.0	135.0	945.0
Capital								
Other	155.3	155.3	155.3	155.3	155.3	155.3	155.3	1086.8
Total	290.3	290.3	290.3	290.3	290.3	290.3	290.3	2031.8
Dept of Agriculture (WA)								
Salaries	186.0	186.0	186.0	186.0	186.0	186.0	186.0	1302.0
Capital								
Other	234.4	234.4	234.4	234.4	234.4	234.4	234.4	1640.5
Total	420.4	420.4	420.4	420.4	420.4	420.4	420.4	2942.5
State of Queensland								
Salaries	364.9	364.9	364.9	364.9	364.9	364.9	364.9	2554.3
Capital								
Other	620.3	620.3	620.3	620.3	620.3	620.3	620.3	4342.3
Total	985.2	985.2	985.2	985.2	985.2	985.2	985.2	6896.6
Northern Territory of Australia								
Salaries	852.3	852.3	852.3	852.3	852.3	852.3	852.3	5966.1
Capital								
Other	963.1	963.1	963.1	963.1	963.1	963.1	963.1	6741.7
Total	1815.4	1815.4	1815.4	1815.4	1815.4	1815.4	1815.4	12707.8
Aust Nature Cons Agency								
Salaries	21.8	21.8	21.8	21.8	21.8	21.8	21.8	152.6
Capital								
Other	33.6	33.6	33.6	33.6	33.6	33.6	33.6	235.0
Total	55.4	55.4	55.4	55.4	55.4	55.4	55.4	387.6
CSIRO								
Salaries	214.0	214.0	214.0	214.0	214.0	214.0	214.0	1498.0
Capital								
Other	481.5	481.5	481.5	481.5	481.5	481.5	481.5	3370.5
Total	695.5	695.5	695.5	695.5	695.5	695.5	695.5	4868.5
TOTAL IN-KIND CONTRIBUTIONS								
Salaries	2371.5	2371.5	2371.5	2371.5	2371.5	2371.5	2371.5	16600.5
Capital								
Other	3811.7	3811.7	3811.7	3811.7	3811.7	3811.7	3811.7	26681.7
GRAND TOTAL (IN-KIND)	6183.2	6183.2	6183.2	6183.2	6183.2	6183.2	6183.2	43282.2

SCHEDULE 4 - TABLES (1995/96 \$'000s)

CRC FOR THE SUSTAINABLE DEVELOPMENT OF TROPICAL SAVANNAS

Table 2 - Cash Expenditure

Partners	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	GRAND TOTAL
Northern Territory Uni	33.3	33.3	33.4					100.0
James Cook Uni	50.0	50.0						100.0
TOTAL CASH FROM PARTICIPANTS	83.3	83.3	33.4					200.0
FUNDING FROM THE CRC GRANT	1200.0	2500.0	2500.0	2500.0	2500.0	2500.0	2500.0	16200.0
TOTAL CRC CASH BUDGET	1283.3	2583.3	2533.4	2500.0	2500.0	2500.0	2500.0	16400.0
CASH EXPENDITURE								
Salaries	642.3	1380.9	1630.0	1630.0	1630.0	1630.0	1630.0	10173.2
Capital		200.0						200.0
Other	641.0	1002.4	903.4	870.0	870.0	870.0	870.0	6026.8
GRAND TOTAL (CASH)	1283.3	2583.3	2533.4	2500.0	2500.0	2500.0	2500.0	16400.0
GRAND TOTAL (IN-KIND) FROM TABLE 1	6183.2	6183.2	6183.2	6183.2	6183.2	6183.2	6183.2	43282.2
TOTAL RESOURCES AVAILABLE TO CENTRE	7466.5	8766.5	8716.6	8683.2	8683.2	8683.2	8683.2	59682.2

SCHEDULE 4 - TABLES (1995/96 \$'000s)

CRC FOR THE SUSTAINABLE DEVELOPMENT OF TROPICAL SAVANNAS

TABLE 3 - Expenditure by Programs

		1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	GRAND TOTAL
SAVANNA REPSONSES									
Cash	Salaries	134.8	289.7	342.0	342.0	342.0	342.0	342.0	2134.3
	Capital		42.0						42.0
	Other	134.5	210.3	189.5	182.5	182.5	182.5	182.5	1264.4
	Total	269.2	542.0	531.5	524.5	524.5	524.5	524.5	3440.7
In-kind	Salaries	497.5	497.5	497.5	497.5	497.5	497.5	497.5	3482.8
	Capital								
	Other	799.7	799.7	799.7	799.7	799.7	799.7	799.7	5597.8
	Total	1297.2	1297.2	1297.2	1297.2	1297.2	1297.2	1297.2	9080.6
BIODIVERSITY									
Cash	Salaries	97.1	208.8	246.5	246.5	246.5	246.5	246.5	1538.2
	Capital		30.2						30.2
	Other	96.9	151.6	136.6	131.5	131.5	131.5	131.5	911.3
	Total	194.0	390.6	383.1	378.0	378.0	378.0	378.0	2479.7
In-kind	Salaries	358.6	358.6	358.6	358.6	358.6	358.6	358.6	2510.0
	Capital								
	Other	576.3	576.3	576.3	576.3	576.3	576.3	576.3	4034.3
	Total	934.9	934.9	934.9	934.9	934.9	934.9	934.9	6544.3
INDICATORS									
Cash	Salaries	121.4	261.0	308.1	308.1	308.1	308.1	308.1	1922.7
	Capital		37.8						37.8
	Other	121.1	189.5	170.7	164.4	164.4	164.4	164.4	1139.1
	Total	242.5	488.2	478.8	472.5	472.5	472.5	472.5	3099.6
In-kind	Salaries	448.2	448.2	448.2	448.2	448.2	448.2	448.2	3137.5
	Capital								
	Other	720.4	720.4	720.4	720.4	720.4	720.4	720.4	5042.8
	Total	1168.6	1168.6	1168.6	1168.6	1168.6	1168.6	1168.6	8180.3
MANAGEMENT									
Cash	Salaries	206.4	443.8	523.9	523.9	523.9	523.9	523.9	3269.7
	Capital		64.3						64.3
	Other	206.0	322.2	290.4	279.6	279.6	279.6	279.6	1937.0
	Total	412.5	830.3	814.2	803.5	803.5	803.5	803.5	5271.0
In-kind	Salaries	762.2	762.2	762.2	762.2	762.2	762.2	762.2	5335.4
	Capital								
	Other	1225.1	1225.1	1225.1	1225.1	1225.1	1225.1	1225.1	8575.5
	Total	1987.3	1987.3	1987.3	1987.3	1987.3	1987.3	1987.3	13910.9
EDUCATION & EXTENSION									
Cash	Salaries	82.6	177.6	209.6	209.6	209.6	209.6	209.6	1308.3
	Capital		25.7						25.7
	Other	82.4	128.9	116.2	111.9	111.9	111.9	111.9	775.0
	Total	165.0	332.2	325.8	321.5	321.5	321.5	321.5	2109.0
In-kind	Salaries	305.0	305.0	305.0	305.0	305.0	305.0	305.0	2134.8
	Capital								
	Other	490.2	490.2	490.2	490.2	490.2	490.2	490.2	3431.3
	Total	795.2	795.2	795.2	795.2	795.2	795.2	795.2	5566.1

SCHEDULE 4 - TABLES (1995/96 \$'000s)

CRC FOR THE SUSTAINABLE DEVELOPMENT OF TROPICAL SAVANNAS

TABLE 4 - Total Cash and In-kind Resources

ALL PROGRAMS

Cash	Salaries	642.3	1380.9	1630.0	1630.0	1630.0	1630.0	1630.0	10173.2
	Capital		200.0						200.0
	Other	641.0	1002.4	903.4	870.0	870.0	870.0	870.0	6026.8
	Total	1283.3	2583.3	2533.4	2500.0	2500.0	2500.0	2500.0	16400.0
In-kind	Salaries	2371.5	2371.5	2371.5	2371.5	2371.5	2371.5	2371.5	16600.5
	Capital								
	Other	3811.7	3811.7	3811.7	3811.7	3811.7	3811.7	3811.7	26681.7
	Total	6183.2	6183.2	6183.2	6183.2	6183.2	6183.2	6183.2	43282.2
GRAND TOTAL (CASH AND IN-KIND)		7466.5	8766.5	8716.6	8683.2	8683.2	8683.2	8683.2	59682.2
TOTAL SALARIES (CASH AND IN-KIND)		3013.8	3752.4	4001.5	4001.5	4001.5	4001.5	4001.5	26773.7
TOTAL CAPITAL (CASH AND IN-KIND)			200.0						200.0
TOTAL OTHER (CASH AND IN-KIND)		4452.7	4814.1	4715.1	4681.7	4681.7	4681.7	4681.7	32708.5

B. List of Major Resources

i) Major Resources Contributed by the Researcher

Centre personnel will have access to the facilities of the parties to this agreement at the locations listed below on exactly the same basis and subject to the same terms as staff normally employed by the respective parties. The Parties will provide office and laboratory space and support for Seconded Personnel employed with the Grant who are working in their respective laboratories/institutions.

Northern Territory University

Facilities of the faculties of Arts, Business, Education, Law and Science at the Northern Territory University.

Provision of 295m² of dedicated space for the administrative centre and Directorate of the Centre for the years 1995/96 and 1996/97, valued as office rent at \$100/m²/yr, making a contribution of \$29,500 pa.

Contributed Staff

Name	% time	Name	% time
Dr W Ahmad	30	Dr G Duff	40
Dr D Eamus	35	Prof G Hill	50
Mr A O'Grady	50	ARC Post-doc	30
Dr R Noske	20	Prof C Cooper	30
Dr W Hazelton	30	Dr C Healey	20
Dr P Hiscock	20	Prof A Powell	20
Dr P Reynolds	10	Dr P Trembley	30
Dr R Vemuri	30	Ms F Dawson	20
Dr P McConvell	10	Level B IT, TBA	20
Mr A Arnott	15	Mr A Barnaart	10
Dr J Cameron	15	Mr R Irvine	15
Mr G Shaw	15	Mr P Wignell	15
Mr G Williams	10	A/Prof R Young	15

The Australian National University

Office and support facilities of the North Australia Research Unit of the University, located at Ellengowan Drive, Casuarina, NT.

Contributed Staff

Name	% time	Name	% time
Dr D Rose	55	Research Fellows	85
Dr G Crowe	50		

The James Cook University of North Queensland

Office and laboratory facilities of the Faculty of Science on the campus of the James Cook University of North Queensland, Townsville.

Contributed Staff

Name	% time	Name	% time
Dr J Monaghan	10	A/Prof R Coventry	30
A/Prof C Johnston	30	Dr J Luly	10
A/Prof T Nevard	20	Dr J Gardiner	10
Dr D King	10	Mr J Monaghan	10
Dr J Monypenny	10	Dr L Fitzpatrick	20
Prof P Pearce	10	A/Prof G Arger	30
Mr C Gardiner	10		

Department of Conservation and Land Management (Western Australia)

Facilities of the laboratories of the Department at the Western Australian Wildlife Research Centre, Ocean Reef Rd, Woodvale, WA as follows: office accommodation (12m²), laboratory space (30m²).

Contributed Staff

Name	% time	Name	% time
Dr N McKenzie	10	Dr G Wardell-Johnston	100
Mr G Graham	50		

Department of Agriculture (Western Australia)

Facilities of the Frank Wise Institute of the Department, Kununurra, WA as follows: library (40m²), office accommodation (140m²), laboratory space (133m²), workshop (300m²) and geographic information computer system.

Contributed Staff

Name	% time	Name	% time
Mr A Craig	80	Dr P Novelly	70
Mr S Petty	50	Ms E Jack	40

The State of Queensland

Office and laboratory facilities of the Department of Lands at Charters Towers and Woollongabba, Qld.

Office and laboratory facilities of the Department of Primary Industries at Charters Towers, Mareeba and Townsville, Qld.

Research station facilities of the Department of Primary Industries at Swan's Lagoon, Qld, including access to cattle herd.

Contributed Staff

Name	% time	Name	% time
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Department of Lands

Dr J Scanlan	20	Dr R Hynes	20
Mr J Vitelli	40	Dr J Johnson-Barnard	20
Dr W Palmer	10		

Department of Primary Industries

Mr G McKeon	10	Mr G Fordyce	30
Mr L Wicksteed	45	Mr P Smith	50
Mr J Kernott	50	Mr K Shaw	50
Mr R Shepherd	30	Mr R Dodt	25
Mr W Holmes	40	Mr P O'Reagain	100
Mr H Bishop	20	Mr D Cowan	25
Dr J Lindsay	25		

Northern Territory of Australia

Laboratory and office facilities and research infrastructure

Access to the laboratory and office facilities (160 m²) leased from CSIRO by the Conservation Commission of the NT at McMillans Road, Berrimah NT to house staff whose time is contributed to the Centre and new staff engaged with the Grant. Use of the Digital computer network, vehicles and radio telemetry equipment of the Conservation Commission of the NT as available at that laboratory for the Activities of the Centre.

Use of the laboratory, office, glasshouse facilities and associated land (180 ha) of the Berrimah Agricultural Research Centre of the NT Department of Primary Industry and Fisheries at McMillans Road, Berrimah NT to house staff whose time is contributed to the Centre and new staff engaged with the Grant.

Office accommodation (40 m²) and associated Digital computer network at Palmerston, NT of the Department of Lands, Planning and Environment of the NT to house Land Conservation staff.

Infrastructure (flumes etc) on the Douglas-Daly Research Farm for studies of agricultural hydrology.

Use of accommodation and facilities of the Department of Primary Industry and Fisheries at their research stations at Coastal Plains, Douglas-Daly, Katherine and Kidman Springs as negotiated for particular parts of the Activities of the Centre.

Use of a network of monitoring sites and exclosures of the Department of Primary Industry and Fisheries throughout the tropical savannas as negotiated for particular parts of the Activities of the Centre.

The laboratory facilities at Hudson-Fysh Ave, Parap NT and office facilities at Sasco House, Cavenagh St, Darwin NT (combined area 1246 m²) of the Power and Water Authority of the NT, to house Authority staff whose time is contributed to the Centre.

Use of a network of monitoring points incorporating weather stations and piezometers and associated equipment established by the Power and Water Authority of the NT with a capital value of \$140,000.

Support funding

Provision of \$90,000 pa by the Conservation Commission and the Department of Lands, Planning and Environment of the NT for operating costs (travel, minor equipment etc) to support their contributed staff.

Provision of \$26,000 pa by the Power and Water Authority of the NT for operating costs (equipment depreciation and analytical services) to support their contributed staff.

Background intellectual property

From the Conservation Commission of the NT: NT vegetation map with geographic information systems coverage and floristic environmental data for 1200 sites, lancewood vegetation survey, wetland vegetation survey, rainforest floristic and environmental survey for 1200 sites, rainforest fauna survey, Barkly's grazing study, Connell's lagoon flora and fauna survey, fire history mosaic, herbarium records, aerial surveys of Top End taken during 1983-present (includes ferals, Magpie Geese, waterbirds, banteng and buffalo), coastal wader surveys, waterbird rookery surveys, biological records scheme, specimen records scheme, NT flora and fauna database, conservation and recreational values database, land resource surveys, soils physical and chemical composition, vegetation surveys at various sites, modified ecosystems database, Mimosa distribution and treatment. As well, various computer models and tools: rainforest flora identification key, flora identification key, enhancements to Conservation Options Decision Analysis, soil/water runoff models, LANDASSESS state transition models.

From the the Department of Primary Industry and Fisheries: stock turnoff system, range conditions assessment system, production data and statistics, noxious weeds system, plant pathology and mycology herbarium, entomology collection system.

Access to the water resources information database (HYDSYS) and use of surface and ground water computer models of the Power and Water Authority of the NT.

Contributed Staff

Name	% time	Name	% time
<u>Conservation Commission</u>			
Dr D Bowman	50	Mr M Butler	10
Mr P Dostine	30	Mr D Liddle	20
Mr P Whitehead	30	Dr J Woinarski	60
Herbarium staff	30	Senior Scientist	50
Mr G Allan	50		

Department of Lands, Planning and Environment

Mr R Applegate	30	Mr D Clift	30
Mr M Dilshad	20	Mr R Karfs	80
Mr P Brocklehurst	20	Senior Scientist	80

Department of Primary Industry & Fisheries

Mr G Kirby	50	Mr R Andison	80
Mr M Ashley	30	Mr P Grue	30
Mr N McDonald	30	PMP Economist	50
Dr A Cowie	30	Mr R Dyer	60
Mr R Sullivan	50		

Power & Water Authority

Mr D Chin	15	Mr D Pidsley	50
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Department of Mines and Energy

Mr K Whelan	20	Mr K Hooper	20
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Australian Nature Conservation Agency

Access to limited laboratory, office and other facilities of the agency at Kakadu National Park, Jabiru, NT and Mitchell St, Darwin NT.

Subject to appropriate agreements being established with the Centre on the transfer of digital information, the Agency will provide full access to non-confidential data held on its geographic information system, including mapping of fire history data for Kakadu National Park.

Contributed Staff

Name	% time
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Dr J Russell-Smith	50
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Commonwealth Scientific and Industrial Research Organisation

The laboratory and office facilities of the CSIRO Division of Wildlife and Ecology, McMillans Road, Berrimah, NT

Limited office and laboratory facilities of the CSIRO Division of Tropical Crops and Pastures, Davies Laboratory, University Drive, Townsville, Qld

The laboratory and office facilities of the CSIRO Division of Soils, Davies Laboratory, University Drive, Townsville, Qld.

Contributed Staff

Name	% time	Name	% time
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Division of Wildlife and Ecology

Dr A Andersen	60	Dr G Cook	40
Dr J Ludwig	20	Dr D Stafford-Smith	10
Dr D Tongway	20	Dr R Williams	60
Dr D Braithwaite	30		

Division of Tropical Crops and Pastures

Dr J Brown	50	Dr F Tiver	30
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Division of Soils

Dr E Bui	25	Dr J Holt	25
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ii) Major Resources funded by CRC

Staff and Students

Title	Number of Positions	Sub-program
Director	1	Administration
Deputy Director	1	Administration
Business Manager	1	Administration
Administrative support	2.5	Administration
Research Fellows	2	1
	2	2
	3	3
	4	4
	1	5
Lecturers	2	5
Technicians	3	1
	3	2
	4	3
	1	5
PhD Students	2	1
	2	2
	3	3
	3	4
	1	5

Capital Item

Provision of new office space for administration and staff at Northern Territory University in the new Faculty of Science Building, Casuarina campus, \$200,000.

C. Estimation of Value of Overhead Contributions

An overhead contribution for each party was determined as a multiplier of direct salary of contributed staff by the Party to cover some or all of salary on-costs, corporate and administrative overheads, office rent, facilities such as library and computing, technical support and laboratory facilities. The multipliers used and their bases are given below.

Northern Territory University

Multiplier 2.44

Firstly, includes salary on-costs (0.52) which were determined using internal University financial information. Secondly, includes an infrastructure factor (1.92) covering support services to contributed staff including technical support, depreciation of buildings and equipment and University administrative and corporate costs as recommended by the Australian Vice-Chancellor's Committee, but with a 20% loading to account for the remote location of Darwin as recommended by the Department of Employment, Education and Training.

The Australian National University

Multiplier 2.0

Determined using University internal financial information and includes salary on-costs, support services to contributed staff, depreciation of buildings and equipment and University administrative and corporate costs.

The James Cook University of North Queensland

Multiplier 1.8

Determined using internal University financial information and includes salary on-costs (0.5), laboratory technical services and depreciation of equipment (0.3) and University administrative and corporate costs (1.0).

Department of Conservation and Land Management (Western Australia)

Multiplier 1.15

Determined using internal WA Government financial information and includes salary on-costs (0.24) and Departmental administrative and corporate costs (0.91).

Department of Agriculture (Western Australia)

Multiplier 1.26

Determined using internal WA Government financial information and includes salary on-costs (0.24), direct project support costs (0.11) and Departmental administrative and corporate costs (0.91).

The State of Queensland

Multiplier 1.7

Determined using internal Queensland Government financial information and includes salary on-costs, office rent and corporate services support.

Northern Territory of Australia

Multiplier 1.13

Determined using internal NT Government financial information and includes salary on-costs of professional and technical staff salaries (0.29) and Departmental administrative and corporate costs (0.84).

Australian Nature Conservation Agency

Multiplier 1.54 -

Determined using internal Agency financial information and includes salary on-costs (0.25) and organisational administrative and corporate costs, with no capital amortisation (1.29).

Commonwealth Scientific and Industrial Research Organisation

Multiplier 2.25

Determined using internally published financial information of the Organisation to establish the average figure of the ratio of all costs to direct research salary costs.

SCHEDULE 5

SPECIFIED PERSONNEL

Name	Organisation	%time in Centre	Role
Dr P West	CRC	100	Director
Dr R Hynes	CRC	80	Deputy Director &
	Qld Dept Lands	20	Leader Sub-program 4
Dr J Brown	CSIRO Div Tropical Crops & Pastures	50	Leader Sub-program 1
Mr P Whitehead	Conservation Comm, Northern Territory	30	Leader Sub-program 2
Dr P Novelly	Department of Agriculture (WA)	70	Leader Sub-program 3
Prof G Hill	Northern Territory University	50	Leader Sub-program 5

SCHEDULE 6

PERFORMANCE INDICATORS

A. COOPERATIVE ARRANGEMENTS

- The level of participation of the participants and users in major decisions concerning the Activities of the Centre
- The extent and frequency of the interaction of the personnel from the participants in the conduct of the Activities of the Centre
- The extent of interaction with other research funding bodies
- The extent and form of interaction between other researchers, research groups and institutions in Australia and overseas
- The extent and form of commissioned, collaborative and contract research undertaken with users and owners of tropical savanna land.

B. RESEARCH AND RESEARCHERS

- The extent to which Program objectives and milestones have been achieved
- The level of publication of Centre outcomes in refereed scientific journals, as papers delivered at conferences or as book chapters
- The level of success in obtaining research grants and other research funds from external funding bodies
- The extent to which researchers in Australia and overseas are attracted to visit the Centre
- The extent of national and international recognition of Centre participants through awards, academic invitations and media interest

C. EDUCATION AND TRAINING

- The extent and nature of graduate training programs developed by the Centre
- The number of postgraduate students in the Centre and their ability to find employment after graduation

- The extent to which non-university staff are involved in the supervision of postgraduate students and the distribution of students amongst participating organisations
- The extent to which the extension services of the Centre are successful in modifying management practices within tropical savannas
- The extent and nature of the involvement of users in the development and conduct of training programs

D. APPLICATION OF RESEARCH

- The extent to which Australian and overseas industry and users adopt research technology developed by the Centre
- The extent nationally and internationally to which Centre recommendations for land management practices are adopted
- The extent of advice and consultancy services provided to users and industry
- The level of financial returns to savanna users stemming from Centre research

E. MANAGEMENT AND BUDGET

- The establishment of procedures to monitor and report on research progress and other achievements of the Centre
- The extent to which the Activities of the centre are modified in line with new knowledge or changed expectations of users
- The extent to which the activities of the centre are integrated across state, territory and sectoral boundaries
- The accuracy of recording and reporting financial transactions, the balance of expenditure against budget and the efficiency of the audit process.

SCHEDULE 7

LIAISON OFFICER

The Liaison Officer is the person for the time being holding, occupying or performing the duties of Director, currently occupied by Dr Philip West, or such other position as may be notified by the Researcher to the Commonwealth in writing.

SCHEDULE 8

RESEARCHER'S ADDRESS FOR SERVICE

The Researcher's address for service of communications is

The Director,
CRC for Tropical Savannas,
Northern Territory University,
DARWIN NT 0909

Facsimile: (089) 41 0460
Telephone: (089) 46 6834
E-mail: To be advised