

CSIRO Submission 09/335

Inquiry into forestry and mining operations on the
Tiwi Islands

Senate Standing Committee on Environment,
Communications and the Arts

March 2009

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Background

CSIRO has a significant historical and ongoing research presence on the Tiwi Islands (Table 1), and is in a position to address terms of reference (a), (d) and (e) in the following section.

Based on its research, CSIRO identifies two conflicting national drivers that contribute to resource-use conflict on the Tiwi Islands.

First, there is increasing recognition that welfare-dependency is a significant contributor to Aboriginal disadvantage, and that remote Aboriginal communities would benefit from increased economic development. Tiwi traditional owners hold this view very strongly, and have actively encouraged and participated in a range of economic enterprises, including what is the largest forestry operation in northern Australia.

Second, the largely intact and healthy landscapes of northern Australia are significant national assets, and there is a strong desire to avoid the development mistakes that have led to environmental degradation in southern Australia. Intensive economic development on the Tiwi Islands could threaten their extremely high biodiversity values, as well as compromise a range of potential enterprises based on low-intensity use of natural resources and provision of environmental services.

CSIRO currently has strong research partnerships with the Tiwi Land Council (TLC) and Great Southern Forestry NT (GSF), and the following relationships are especially relevant to the Inquiry:

- CSIRO, TLC and GSF are partners in the Tiwi Carbon Study, which aims to identify the biophysical and economic potential of fire management for Greenhouse gas abatement on the Tiwi Islands, as a basis for possible livelihood opportunities for Tiwi people. An overview of the study is given as Attachment 1.
- CSIRO and TLC have co-developed a research proposal (Attachment 2) for establishing: (1) A strategic framework for Tiwi livelihood development that meets the broader social, economic and environmental aspirations of the Tiwi people; (2) Performance indicators and relevant benchmarks for monitoring and evaluation; and (3) Governance arrangements for most effectively realising the economic potential of enterprises such as savanna burning for Greenhouse gas abatement. This proposal has been submitted to the Federal and NT Governments for funding under the joint Health Country Healthy People Schedule.
- CSIRO, GSF, and ACIAR are partners in the ACIAR project “Realising genetic gains in Indonesia and Australian plantations through water and nutrient management,” which aims to develop forest growth modelling capacity, and explore management options to optimise productivity and economic benefits from commercial acacia plantations, both on Melville Island and Indonesia.
- CSIRO, TLC and GSF are partners in a long-term programme for eradicating African big headed ant and Tropical fire ant from the Tiwi islands.

- In collaboration with the NT Department of Natural Resources, Environment, the Arts and Sport and the Tiwi NRM subcommittee of TLC, CSIRO is contributing to a trial of water planning tools on the Tiwi Islands. As part of a national study funded by Land and Water Australia and the National Water Commission, it will assist Tiwi people to engage effectively in the development of a water plan to guide future water use.
- CSIRO has been contracted by GSF to assist with the development of a Rehabilitation Management Plan for buffer zone incursions, as required under the Variation to EPBC Act approval conditions (13 October 2008).
- Dr Alan Andersen from CSIRO Sustainable Ecosystems in Darwin is co-Chair of the Expert Biological Reference Group established by TLC and GSF to provide independent advice on ecological issues relating to the Tiwi forestry project.

Responses to terms of reference (a), (d) and (e)

a. an assessment of the environmental, economic and community impacts of existing and proposed forestry and mining operations on the Tiwi Islands including compliance with relevant environmental approvals and conditions;

Given CSIRO's experience and expertise on the Tiwi Islands, we have directed comments toward off-site environmental impacts of forestry operations.

Catchment hydrology

The dynamics of water-use by plantation forests may be different to that of native forests, due to the cycles of clearing and re-growth and application of fertilizer (the latter may increase leaf area and therefore result in higher annual water use). This has potential implications for catchment hydrology and consequently the health of water-dependent ecosystems. The most significant of these ecosystems on the Tiwi Islands are riparian and spring-fed rain forests, which have extremely high biodiversity values. However, there have been no studies of the effects of Tiwi forestry operations on catchment hydrology, so effects, if any, are unknown.

Introduced species

Forestry operations potentially promote the introduction and/or spread of introduced species. The major introduced plants of concern for the Tiwi Islands are *Acacia mangium* itself, and the African grasses Mission grass (*Pennisetum polystachion*) and Gamba grass (*Andropogon gayanus*). *Acacia mangium* has significant capacity for spreading beyond plantation areas, presumably aided by seed dispersal by birds. Substantial numbers of 'wildlings' have been recorded in nearby habitats, including rain forests, and GSF has an active 'search and destroy' program for managing these. The two African grasses are very serious environmental weeds in the Darwin region, and have potential for being likewise on the Tiwi Islands. Both species are promoted by disturbance, and so there is significant risk of their spread through forestry operations. CSIRO understands that there is very little, if any, Gamba grass in forestry areas. However, there are significant populations of Mission grass and these require ongoing management to prevent their spread into non-forestry areas.

Some of the most significant exotic animals at substantial risk of being introduced and/or spread by forestry operations are pest ants. CSIRO has a major programme of collaborative research on pest ants on Aboriginal lands in the Top End, including the Tiwi islands. Two significant pest ant species occur on the Tiwi Islands, the African big-headed ant *Pheidole megacephala*, and the Tropical fire ant *Solenopsis geminata*. There are no known populations of African big-headed ants associated with forestry operations, but a population of tropical fire ants does exist at the Maxwell Creek forestry camp. With assistance from CSIRO, GSF has an active eradication program for this population. Ongoing vigilance is required to prevent the re-introduction of these and other pest ant species to the Tiwi islands.

Threatened species

EPBC compliance conditions stipulate that forestry operations must not reduce the viability of EPBC-listed species. Special attention has been paid to faunal species, namely Butler's dunnart, red goshawk, masked owl and partridge pigeon. Pre-clearing surveys are required to identify the occurrence of the dunnart and nests of the listed birds, with a requirement for buffers of native vegetation to be placed around these. These pre-clearing surveys have revealed Butler's dunnart to be far more common and widespread than previously realised, and it is highly unlikely that forestry operations pose a substantial risk to it. Substantial research by external consultants and GSF has been conducted on the red goshawk, masked owl and, to a lesser extent, partridge pigeon. A population viability analysis has been conducted by Charles Darwin University for the Red goshawk (Hamel et al. 2008). This has revealed that forestry operations have a significant effect on fledgling success in nearby areas, but do not threaten population viability. To CSIRO's understanding there have been no population viability analyses conducted for the masked owl or partridge pigeon.

Sensitive habitats

EPBC compliance conditions stipulate that buffer zones be placed around designated sensitive habitats, primarily patches of rain forest. A range of plantation incursions into these buffer zones has been identified, and subsequent Variation to EPBC Act approval conditions (13 October 2008) requires their rehabilitation. CSIRO has been contracted to assist GSF with the rehabilitation of these incursions, in order to restore buffer functionality. CSIRO believes that it is unlikely that the incursions have had significant impacts on the sensitive habitats that are potentially affected, and that it is feasible to restore the functionality of affected buffers to prevent any future impacts. With assistance from CSIRO, a program for monitoring potential impacts on sensitive habitats has been established as part of the broader rehabilitation program.

d. an examination of the economic opportunity costs associated with existing developments including forestry operations;

The conversion of large tracts of native vegetation to plantation forests means that potential opportunities for alternative uses of affected land have been foregone, at least while the plantations remain. Alternative land uses include biodiversity conservation, and low-intensity enterprises based on natural resources and the provision of environmental services. On the other hand, plantation forestry provides new opportunities such as the development of an industry based on acacia seeds. It is not possible to undertake a meaningful analysis of opportunity costs of forestry

operations in the absence of a wide-ranging understanding of (1) the broader environmental, social, cultural and economic aspirations of Tiwi people, (2) the natural values and resources of Tiwi landscapes through the establishment of a comprehensive inventory, and (3) the full range of livelihood opportunities available. There currently does not appear to be such an understanding. This has been recognised by TLC, which has sought assistance from CSIRO in developing such a strategic framework for sustainable livelihood development (see Attachment 2).

e. an examination of the prospects for alternative economic development opportunities and impediments for the Tiwi Islands including sale and promotion of cultural products, community development activities, land and sea management, and opportunities for involvement in future carbon trading and emissions offsets schemes;

There is strong national interest in the potential for Indigenous economic activities relating to low-intensity use of natural resources and land management for the provision of ecosystem services. A particularly prospective opportunity in northern Australia is fire management for Greenhouse gas abatement. Approximately 60% of Tiwi savanna woodlands and open forests are burnt each year, and these produce substantial emissions of the Kyoto-compliant Greenhouse gases methane and nitrous oxide. There is significant potential for reducing the extent and severity of Tiwi fires in a Greenhouse gas abatement context, as is being done in the western Arnhem Land region with industry funding. The Tiwi Carbon Study (Attachment 1) is investigating the biophysical and economic potential of such fire management for Greenhouse gas abatement on the Tiwi Islands. Fires also influence rates of carbon sequestration by savanna ecosystems. Such sequestration is not Kyoto-compliant, but must be understood for whole-of-system Greenhouse gas accounting. The Tiwi Carbon Study is also addressing this issue.

References

Hamel, M., Bradshaw, C. and Garnett, S. (2008) Population viability analyses for the Red Goshawk (*Erythrotriorchis radiatus*) on the Tiwi Islands. Unpublished report, Charles Darwin University.

Table 1. Summary of CSIRO research on the Tiwi Islands.

Project	Scope	Duration
Development of plantation forestry	Silvicultural research relating to the establishment of a plantation forestry industry on the Tiwi Islands	1960s and 1970s
Seed collection from Tiwi Islands	Research collections from native populations. Seed still held by the Australian Tree Seed Centre	1970's - 1995
Forest tree genetic improvement (with Conservation Commission NT)	Establishment and collection from seed orchards of <i>A auriculiformis</i> , <i>A. crassicarpa</i> and <i>E. pellita</i> .	1988-1995
Pest ant management (with TLC, GSF and NHT)	Invasion biology and control of the pest ants <i>Pheidole megacephala</i> and <i>Solenopsis geminata</i>	2004 -
<i>Acacia mangium</i> taxa by P trials (with ACIAR and GSF NT)	Develop forest growth modelling capacity, and explore management options to optimise productivity and economic benefits from commercial <i>Acacia</i> plantations, both on Melville Island	2006-
Tiwi Carbon Study (with TLC and GSF NT)	Identification of the biophysical and economic potential of fire management for Greenhouse gas abatement	2008 -
Buffer incursion Rehabilitation Management Plan (with GSF NT)	Development of a management plan for rehabilitating incursions of buffer zones designed to protect sensitive habitats.	2008 -
Tiwi water management (with NT NRETAS, TLC, LWA and NWC)	Trial of water planning tools for developing a Tiwi water management plan.	2009 -

Tiwi Carbon Study**Aim**

This research partnership between the Tiwi Land Council, Great Southern Plantations and CSIRO aims to identify the biophysical and economic potential of fire management for Greenhouse gas abatement on the Tiwi Islands, as a basis for possible livelihood opportunities for Tiwi people.

Background

Tropical savannas contain about 30% of Australia's terrestrial carbon stocks, and are the continent's most fire prone biome, with up to half or more of many landscapes being burnt each year. These fires make a significant contribution to the nation's accountable (non-CO₂) Greenhouse gas emissions, and strongly influence rates of carbon sequestration. There is growing national and international interest in reducing the extent and severity of these fires in a Greenhouse gas abatement context. This has the potential to transform regional economies in northern Australia, especially by providing livelihood opportunities for remote Aboriginal communities where mainstream economies are very limited.

Burning increases Greenhouse gas dynamics in two ways. First, it influences the rate at which carbon is sequestered by vegetation and in the soil. Such sequestration is not recognised under current Greenhouse accounting rules, but this will possibly change in the near future. Second, accountable Greenhouse gases such as methane and nitrous oxide are released into the atmosphere during savanna burning, and such emissions can be directly abated by reducing the extent and severity of fire. This is the basis of the Western Arnhem Land Fire Abatement project, where Aboriginal rangers are being funded to use strategic early season burning to reduce the overall extent and severity of fire.

Outcomes

- Improved knowledge of Greenhouse gas emissions from fires in different savanna types and in different seasons
- Predictive understanding of above- and below-ground carbon sequestration in relation to fire, to be incorporated into a comprehensive model of savanna carbon dynamics on the Tiwi Islands
- Understanding of the effects of different fire management options on biodiversity
- Identification of the economic potential of emission abatement through changed fire management
- Integration of fire abatement into a broader Tiwi livelihood framework

Activities

- Experimental study of the effects of different fire management options on carbon sequestration and biodiversity
- Refinement of emission estimates for fires in different savanna types and in different seasons
- Assessment of biophysical potential for emission abatement, using fire history during 1997-2006 as a benchmark
- Economic analysis of fire management for Greenhouse gas abatement as a livelihood option.
- Development of a broader framework for sustainable Tiwi livelihoods

Healthy Tiwi Country, Health Tiwi People

This document is a research proposal developed by the Tiwi Land Council And CSIRO in response to the recent report *Healthy Country, Healthy People: Supporting Indigenous Engagement in the Sustainable Management of Northern Territory Land and Seas: A Strategic Framework*.

The report reviews Indigenous land and sea management in the NT, proposes a 3-5 year investment strategy, and identifies a range of priority needs. It identifies fragmentary program delivery as a key barrier to successful outcomes. There are similar problems with a fragmentary approach to NRM issues, which are often considered in isolation from each other and from broader social, cultural and economic objectives. NRM ('healthy country') needs to be directly linked to an overarching strategic framework for sustainable livelihood development that meets broader social ('healthy people') aspirations. Such a strategic framework is crucial for the identification of outcome-based performance indicators for program monitoring and evaluation, which the report identifies as a priority need.

The proposal is to use the Tiwi Islands as a case study for addressing these issues, in the context of facilitating economic opportunities from fire management for Greenhouse gas abatement. Tiwi is an ideal case study because it has a distinct geographical and cultural identity, has strong customary decision-making processes and representative governance arrangements through the Tiwi Land Council, has a range of carbon-related land-use options (most notably plantation forestry) that fire management needs to be integrated with, and there are excellent relationships with researchers from CSIRO.

The aim of the proposal is to develop an over-arching strategic framework for sustainable Tiwi livelihoods to ensure that NRM-based enterprise opportunities are co-developed to meet broader Tiwi social aspirations. This framework will then be used as a basis for: (a) Developing collaboratively defined, outcome-based performance indicators, and documenting relevant benchmarks, for program monitoring and evaluation; and (b) Facilitating appropriate ownership and governance arrangements for most effectively realising the economic potential of savanna burning for Greenhouse gas abatement within local livelihood aspirations.

The deliverables from this work will be:

1. A strategic framework for sustainable Tiwi livelihood development
2. Performance indicators and relevant benchmarks for Healthy Country, Healthy People monitoring and evaluation; and
3. Governance arrangements for most effectively realising the economic potential of savanna burning for Greenhouse gas abatement.

The CSIRO lead researchers will be:

- Dr Sue Jackson, who is widely regarded as the leading expert on Indigenous NRM in northern Australia
- Mr Glenn James, who has two decades of experience as an anthropologist working on Indigenous participatory planning, community governance, sustainable livelihoods, and enterprise development in northern Australia
- Ms Andra Putnis, who has extensive experience with Government delivery of Indigenous NRM programs, and was lead author of the *Healthy Country, Healthy People* report.

The project will be linked to CSIRO's national effort in Indigenous livelihood development and sustainable communities through a Steering Committee comprised of:

- Dr Marcus Lane, Leader of CSIRO's Social and Economic Research Program, and a leading expert in Indigenous NRM (based in Brisbane)
- Dr Stefan Hajkowicz, Leader of CSIRO's Sustainable Regional Development research (based in Brisbane);
- Dr James Butler, Leader of CSIRO's Indigenous Livelihoods research (based in Cairns); and
- Mr Sean Rooney, Leader of CSIRO's Sustainable Communities Initiative (based in Canberra).