



Australian Government

Department of the Environment, Water, Heritage and the Arts

**Marine and Tropical Sciences Research Facility (MTSRF)
December 2007 Milestone Report**

Project 1.2.1 – Status and Trends of Biodiversity and Ecosystem Services

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Summary

2.

This Milestone Report summarises progress achieved during the first reporting period of FY2007-2008 for Project 1.2.1 Status & Trends of Biodiversity and Ecosystem Services (June-November 2007). Summaries of the 5 sub-projects are:

1. State of the Environment framework:

This reporting period has been largely devoted to the workshopping and refinement of indicators and thresholds of concern for the condition of ecosystem processes, ecosystem services and assets. Data collation and checking has also continued based on the workshop results, and a data base has been created. Workshops were held with 22 scientific experts of Wet Tropics assets on 13th June (air/climate), 14th June (biodiversity), 18th June (water and soil), with follow-up interviews and data collation extending until November. Overall this process has produced the following results:

- 29 ecosystem services
- 45 ecosystem processes
- 94 key agents
- 153 indicators of key agent condition

Thresholds of concern have also been identified where possible. Indicators of threats to key agents have also been identified, but not yet refined.

Important links have been made with the SEQ Catchments NRM Board, which has started an Ecosystems Services Project which explores similar approaches to State of the Environment reporting. Links have also been made with the FNQ 2025 Statutory Regional Plan, which requires the development of State of the Region indicators. Progress has also been made in engaging Indigenous communities and incorporating traditional ecological knowledge into indicators. Coordination has continued with Terrain NRM and WTMA, with the inclusion of key personnel at the workshops and follow-up meetings.

2. Rainforest Plant Key:

Activities for the Rainforest Plant Key (RFK) have concentrated on the herb and orchid modules. In October 2006 a workshop was held in north Queensland with local participants testing the beta version of the orchid module of the RFK. Although the orchid module is not funded by MTSRF, completing this element of the identification package for all rainforest plants is relevant. The beta version of the orchid module of the Rainforest Key, Australian Tropical Rainforest Orchids, with 224 species in 111 genera, has been developed in the software package Lucid.

3. *Altitudinal rainforest biodiversity:*

This project is currently on track with the first year of data collection complete. Since June the following fauna surveys have been carried out:

- 45 bird surveys
- 66 reptile surveys
- 22 spotlight surveys
- 117 microhylid frog surveys

The data collection across the four permanent altitudinal sites has been carried out each month and the resulting sampling summary is:

- 4250 Malaise trapping days
- 4250 Dung beetle trapping days
- 1210 leaf litter samples collected
- 4250 data logger days
- 4250 i-button logger days
- 2040000 Microclimate measurements taken
- 102000 Microclimate temperature readings

4. *Geospatial gap analysis:*

The database for alignment of all the Wet Tropics climate data is almost complete, and linking across data type is being sorted out. In June SLATS data was purchased, with Foliage Projective Cover (FPC) in percentage cover, updated for 1995, 1997, 1999, 2001 using clearing and regrowth data.

5. *Threatened lowland species and communities:*

A joint field trip with QEPA and AWC to Mt Elliot to compare site selection and survey methodologies has been undertaken to maximize data sharing potential. A result of the survey efforts included a requirement to substantially re-map the RE community distribution for the upper part of the mountain, which had never been ground-surveyed before, and a doubling of the species list for the rain forest communities on the mountain top. Surveys were also undertaken on the Walter Hill Range including the scarcely-surveyed REs 7.8.1a and 7.12.50. Surveys of the Main Coast Range including the first full botanical survey of RE 7.12.37i, and surveys of communities mapped as 7.12.19a and 7.12.20 have been undertaken.

For reference: Milestone extracted from Project Schedule 3rd December 2007 Milestone description:

- List of indicators for assessing resource condition and thresholds of concern workshopped and identified [CSIRO]
- Update on monitoring of altitudinal rainforest biodiversity including location and number of sites surveyed and findings from surveys to date [JCU]
- Update on gap analysis and gap filling of lowland threatened species and communities [CSIRO]
- Update on gap analysis and gap filling of geospatial data [CSIRO]
- Summary of any communication activities undertaken to date, including minutes of meetings/workshops [CSIRO]

Project Results

Description of the results achieved for this milestone

1) State of the Environment framework:

Progress has continued as planned, with the following key results:

a. Indicators of asset condition:

In June 2007 workshops were held to identify ecosystem services, ecosystem processes, key agents, indicators of condition and thresholds of concern for the four assets of air/climate, biodiversity, water and soil. Thresholds of concern were also developed wherever possible. A total of 34 scientists and NRM managers were invited with extensive experience of Wet Tropics ecology, much of which was derived from Rainforest CRC projects. Invitees included members of researchers from 8 other MTSRF projects, and Terrain NRM and WTMA.

Twenty-two accepted the invitations, and workshops were held at JCU Cairns on 13th June (air/climate), 14th June (biodiversity), 18th June (water and soil), with follow-up interviews and data collation extending until November. Overall this process has produced the following results (see **Attachment 1**):

- 29 ecosystem services
- 45 ecosystem processes
- 94 key agents
- 153 indicators of key agent condition, divided into primary and surrogate indicators

Data sources suggested by the workshops are now being followed up, and a database has been created in collaboration with Terrain NRM. Workshops will be held in January 2008 to cross-check and verify the indicators and data sources, and thresholds of concern, and to explore possible surrogates for unavailable data.

b. Indicators of key threats:

The workshops also highlighted threats to key agents of ecosystem processes' condition, indicators and potential thresholds of concern. Indicators and data will be refined and reviewed in early 2008.

c. Data analysis:

Following the review of indicators for condition and threats, an analysis of indicators' relative importance will be undertaken using network theory. This will yield key 'headline' indicators which are of highest priority.

d. Spatial representation of condition and threats:

Linkages have been made with the SEQ Catchments NRM's Ecosystem Services Project, which is mapping ecosystem functions in the landscape, and the value of the ecosystem services provided. This project delivers into the monitoring of the SEQ 2020 Statutory Regional Plan. On 16th October members of the project team (James Butler, Caroline Bruce, Deb Harrison) travelled to Brisbane for a 1 day meeting to compare approaches. In partnership with SEQ Catchments a methodology is now being developed to spatially represent ecosystem processes, and to overlay threats to those processes to identify priority areas for management. This will allow the translation of indicators into a spatial context, and the reporting of these in spatial units such as the Wet Tropics World Heritage Area, catchments, and landscapes.

e. Coordination with FNQ 2025 Statutory Regional Plan:

The project has also engaged the ongoing process of designing the FNQ 2025 Statutory Regional Plan, which requires State of the Region monitoring for the plan's progress. At a meeting on 17th August with the Office of Urban Management and DLGP, Cairns, the contribution of Status & Trends was determined.

f. Coordination with WTMA and Terrain NRM:

To better coordinate Terrain NRM and WTMA requirements, a meeting was held between these clients and RRRC on 2nd August in Cairns. Linkages with WTMA have been maintained through the attendance of Ellen Weber at the asset condition workshops, and a meeting with Dr. Steve Goosem on 23rd August to establish the integration of WTMA spatial reporting requirements and the asset/ecosystem services framework. Coordination with Terrain is maintained with the co-location of Kath Shurcliff and Deb Harrison at JCU Cairns, and the coordination with Allan Dale, Terrain NRM's CEO.

g. Integration of Indigenous indicators:

Engagement with Wet Tropics Indigenous communities to explore the integration of traditional ecological knowledge into State of the Environment reporting has progressed significantly. Following meetings with the Aboriginal Rainforest Council, an introductory field trip was held on 10th August with the Ngadjon and Mallanbarra Yidinji groups. An MSc student from JCU, Aurelie Delisle, will begin investigating indicators for the health of country during December 2007 using a pre-agreed co-research framework negotiated through ARC. Dr. Leanne Cullen, a CSIRO postdoctoral fellow based in Cairns will also continue this work investigating linked socio-cultural and biophysical indicators of the condition of the Wet Tropics World Heritage Area. Linkages have also been established with the Torres Strait Regional Authority, who are developing Indigenous-derived indicators for MTSRF project 1.3.5 Data synthesis and development of the Torres Strait component of the Integrated Report Card.

h. Linkages with MTSRF 4.9.7:

Linkages have also been established with Dr. Helen Ross (UQ) and Dr. Margaret Gooch (JCU) to integrate with MTSRF project 4.9.7, Social Resilience and Water Quality. The objective of this integration is to link reporting frameworks of the bio-physical condition of natural assets with the social capacity to respond. Team members attended the project workshop in Cairns on 18th July, and a follow-up meeting in Townsville on 8th August.

i. MTSRF project 5.10.2 Wet Tropics Integrated Report Card:

No further progress has been made with the integrated report card, as it is being re-scoped.

2. Rainforest Plant Key:

Progress has continued as planned. Activities for the Rainforest Plant Key (RFK) have concentrated on the herb and orchid modules. During the past 6 months a workshop was held in October in north Queensland with local participants testing the beta version of the orchid module of the RFK. Although the orchid module is not funded by MTSRF, completing this element of the identification package for all rainforest plants is relevant.

3. Altitudinal rainforest biodiversity:

This project is currently on track with the first year of data collection complete. Since June 2007 the following fauna surveys have been carried out:

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A meeting in June was held between Steve Williams, Collin Storlie and Peter Grimbacher to discuss the databasing of insect sample sorting. A suitable data entry design was agreed upon and is now in place. Samples were provided to Peter Grimbacher from those collected on monthly trips for further sorting at his lab in Cairns.

4. *Geospatial gap analysis:*

Steve Williams and Jeremy van DerWal have been aligning the database for all the Wet Tropics climate data, and linking across data types. In June 2006 SLATS data was purchased, with Foliage Projective Cover (FPC) in percentage cover, updated 1995, 1997, 1999, 2001 using clearing and regrowth data. This updated information will enable prompt analysis of recent vegetation cover and clearance. The data is stored on the CSIRO Atherton server.

5. *Threatened lowland species and communities:*

Surveys have been progressing in linkage with MTSRF Project 1.4.3 Threatened Species and Communities (Attachment 9). A joint field trip with QEPA and AWC to Mt Elliot to compare site selection and survey methodologies has been undertaken to maximize data sharing potential. A result of the survey efforts included a requirement to substantially re-map the RE community distribution for the upper part of the mountain, which had never been ground-surveyed before, and a doubling of the species list for the rain forest communities on the mountain top. Surveys were also undertaken on the Walter Hill Range including the scarcely-surveyed REs 7.8.1a and 7.12.50. Surveys of the Main Coast Range including the first full botanical survey of RE 7.12.37i, and surveys of communities mapped as 7.12.19a and 7.12.20 have been undertaken.

Work has also begun on the collation of spatial data on the distribution of weeds and ferals in the Wet Tropics. When complete in 2008, these data will provide both a threat layer for the spatial comparison with ecosystem processes and condition, and a gap analysis for future survey work in collaboration with MTSRF project 2.6.2 Identification and Impact of Invasive Pests in the Wet Tropics Rainforest.

Problems and opportunities

An opportunity exists to collaborate with the Torres Strait Regional Authority to compare and contrast different approaches to developing indicators for assessing the status and trends of natural assets. In the Wet Tropics, the emphasis is on biophysical knowledge based on established scientific research. However, in the Torres Strait the emphasis is on Indigenous community-derived indicators, undertaken through MTSRF project 1.3.5 Data synthesis and development of the Torres Strait component of the Integrated Report Card. These potential linkages will be explored in early 2008.

Other issues

Linkage between the 5 sub-projects in MTSRF project 1.2.1 are now being developed, particularly in terms of vegetation gap analyses, and the delivery of data on the spatial distribution of weeds and ferals by Dan Metcalfe. Similarly, Steve Williams' altitudinal survey data will soon contribute to the assessment of biodiversity condition within the World Heritage Area.

Communications, major activities or events

In addition to communications mentioned above, the following activities have also taken place in June-November 2007:

- James Butler presented project progress and results to the Terrain NRM Board members on 19th October in Mossman;
- Steve Williams attended a workshop with IUCN (Oct 2007) in London on “*Developing criteria to assess vulnerability to climate change*” to guide future IUCN listing of threatened species;
- Steve Williams attended the Australian Greenhouse Office workshop (Oct 2007) – “*A strategic assessment of the vulnerability of Australian Biodiversity to climate change*”;
- Steve Williams and Jeremy Van DerWal participated in the Australian Greenhouse Office (Sept 2007) workshops on “*Climate change, species and ecosystems- identifying key science questions for Australia*” and a modelling workshop on “*Biodiversity and Climate change: improving predictions*”;
- Jeremy Van DerWal attended a modelling workshop on “*Species' Distribution Modelling Methods for Biologists*” at University of Queensland (Nov 2007) run by CSIRO National Research Flagships;
- Steve Williams (Sept 07) presented a public forum talk about climate change impacts on Wet Tropics biodiversity at the Queensland Museum, Brisbane;
- Dan Metcalfe and James Butler have had a poster accepted on the methodology used and results to date for the distribution of weeds and ferals, to be displayed at the 16th Australian Weed Conference, Cairns, May 2008 (Metcalfe, D.J., Lawson, T. & Butler, J (accepted) *Mapping the distribution of weeds and ferals in the Wet Tropics Bioregion*. (Poster) 16th Australian Weed Conference, Cairns, May 2008.

During next milestone reporting period

Workshops are planned for January/February 2008 with regional experts to cross-reference indicators, data availability and potential surrogates for the state of the environment framework. Following these, workshops will be arranged to finalise indicators of threats, and data availability. The analysis of indicators will then be undertaken using network theory to rank their relative importance. Methodology to establish a spatial representation of ecosystem processes and threats will be developed in collaboration with the SEQ Catchments.

Surveys of the altitudinal rainforest biodiversity will continue, as will those for the lowland threatened vegetation and communities, and these data will be incorporated into the spatial representation of ecosystem processes and threats. Exploratory development of Indigenous-derived indicators of natural asset condition will also continue.

Coordination with WTMA, Terrain NRM, the FNQ 2025 Statutory Regional Plan and other relevant MTSRF projects will also continue.