TRaCK
Tropical Rivers and Coastal Knowledge

Assets and Values

# Indigenous socio-economic values and river flows

Project 2.2 – Newsletter no. 2 | October 2010

*This newsletter is the second in a series reporting on research progress in the TRaCK Indigenous socio-economic values and river flows project. The research team, led by CSIRO's Sue Jackson, is now three-quarters of the way through the project and has the following results to present.*

Australia's tropical rivers account for about 70% of Australia's total runoff. With water becoming an increasingly valuable resource in southern Australia, there is growing interest in the water resources of the north, particularly for irrigated agriculture. There is also recognition that tropical river systems sustain important fisheries, and underpin a wealth of other natural and cultural assets valued by society. If we are to ensure that greater use of water in north Australia is sustainable then water planners and land managers will need good information on our tropical river systems – how they work and how people value and use them.

Australian Government
Department of Sustainability, Environment, Water, Population and Communities
National Water Commission
Fisheries Research and Development Corporation

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**TRaCK – *Research to support river and estuary management in northern Australia***

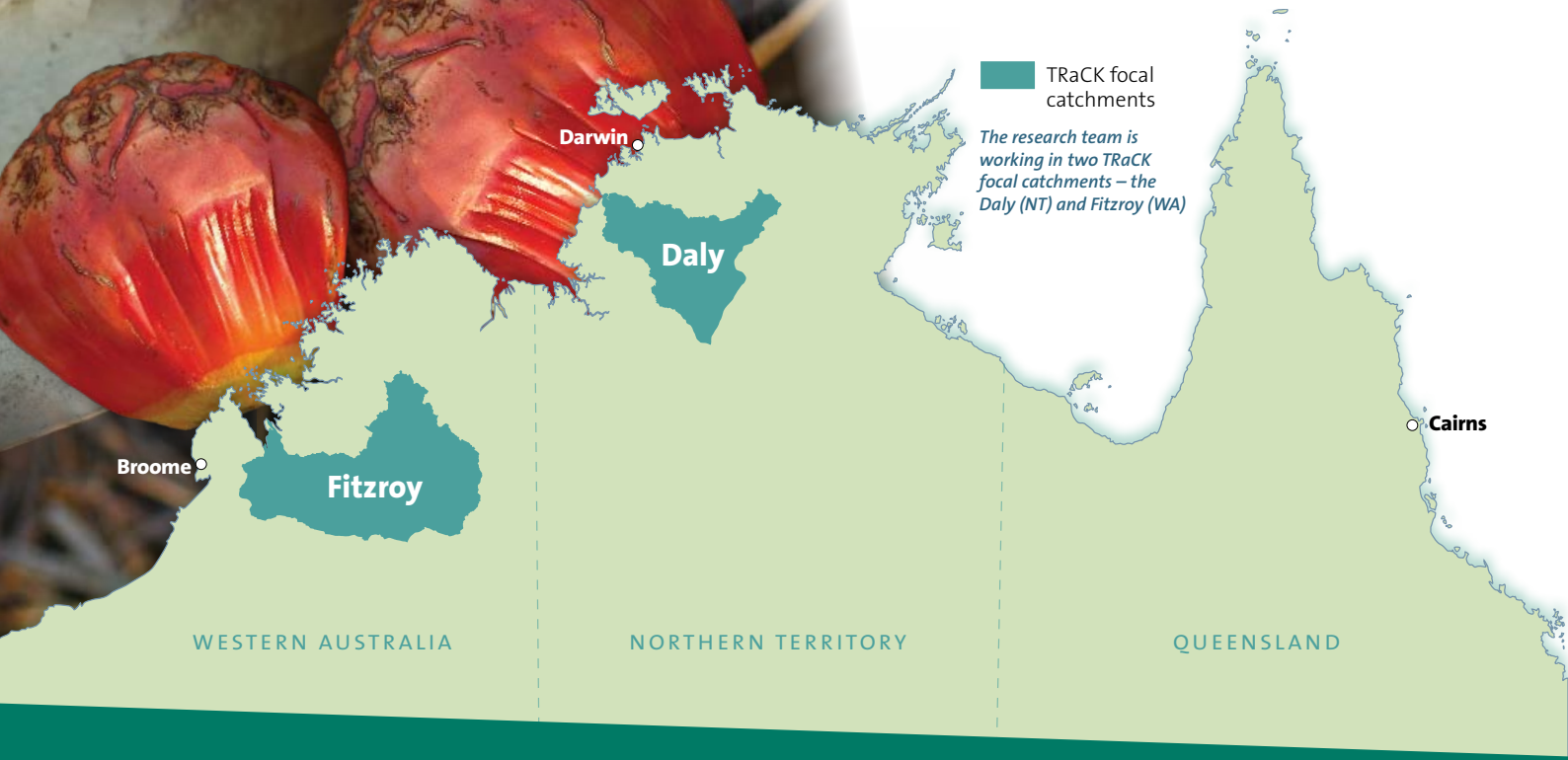
*TRaCK brings together leading tropical river researchers and managers from* Charles Darwin University, Griffith University, University of Western Australia, CSIRO, James Cook University, Australian National University, Geoscience Australia, Environmental Research Institute of the Supervising Scientist, Australian Institute of Marine Science, North Australia Indigenous Land and Sea Management Alliance, and the Governments of Queensland, Northern Territory and Western Australia.

Indigenous people value rivers in a number of inter-related ways; they provide bush foods and medicines, they are part of a culturally significant landscape and have the potential to sustain future water-related businesses and employment. Currently, Indigenous values associated with rivers tend to be poorly understood by decision-makers, and some are difficult to relate explicitly to particular river flow patterns and to address in water allocation decisions.

The research team is recording Indigenous knowledge relating to water and quantifying the economic benefit to Indigenous people from water-dependent resource-use in two catchments – the Daly (NT) and Fitzroy (WA). A participatory monitoring program has also been undertaken with communities in these catchments, with the aim of developing indicators to monitor outcomes for water management plans.

## Project aims

1. To document the significance of water and river systems (including groundwater) to Indigenous communities, particularly to Indigenous belief systems and environmental philosophy.
2. To quantify the direct economic value derived from Indigenous use of wild resources found in or reliant upon rivers and wetlands.
3. To assess the impacts of changes to flow regime on Indigenous communities.
4. To collaborate with Indigenous land management agencies to develop and trial a participatory community-based monitoring program for flow regime changes and wild resource use.



## How are we doing this research?

The project has a number of stages that will generate results useful to water managers. Approaches that were attractive to Indigenous research participants were selected. The stages and methods are show in the diagram below:

### Stage 1: Resource and values assessment

- Resource use mapping
- Qualitative social research
- Household surveys

**(Year 1-2)**

### Stage 2: Economic valuation

- Quantification of harvested species
- Calculation of replacement value
- Qualitative social research

**(Year 2-3)**

### Stage 3: Impact assessment

- Modelling of flow regimes, and potential flow alterations
- Assessment of impact and cost to Indigenous livelihood
- Social and cultural impacts of flow alteration

**(Year 3)**

The project is currently between Stage 2 – Economic Valuation and Stage 3 – Impact Assessment and has undertaken the following activities:

### 1. River use mapping – gathering data on Aboriginal resource use.

This information is gathered in small groups in each community. It is being used to:

- create maps of the spatial distribution of resource use to help understand which habitats are most commonly used and how river flows (particularly flooding and drying cycles) might affect those habitats; and
- develop seasonal calendars that record Indigenous ecological knowledge on seasonal change and assists researchers understand when specific species are available or are targeted by Indigenous people.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### 2. Household surveys – quantifying the harvest and consumption of aquatic resources.

Approximately 20% of households in the selected communities of Nauiyu Nambiyu (Daly River), Pine Creek, Fitzroy Crossing and Noonkanbah are being surveyed. Surveys involve repeated interviews with a senior member of a household. The survey targets aquatic species and habitats and asks how often people in the household have been fishing or hunting, who went on the trip, the location, total harvest, how much the surveyed household consumed, as well as some broad questions on the sharing and use of the harvested species. The surveys began in 2008 and will be completed by November 2010.

### 3. Social and cultural studies of Indigenous values

In collaboration with participating communities in the Daly and Fitzroy regions we have identified a range of research activities and methodologies to reveal the social and cultural value of river systems. These include documentation of local social histories and cultural and ecological knowledge, community artworks, seasonal calendars, river mapping, and a photography project with school children and community members. Dr Sandy Toussaint of the University of Western Australia conducted a small research project on the importance of fishing to Aboriginal people in the Fitzroy River valley during late 2009. The report was finalised in January 2010 and is available from CSIRO researchers or Sandy (sandy.toussaint@uwa.edu.au). These activities will contribute to a fuller understanding of the social impact of water use changes.

## Who are we working with?

In the Daly River region the project team is working with the communities of Kybrook Farm & Pine Creek and Nauiyu Nambiyu (Daly River). In the Fitzroy Valley of the Kimberley, residents from the communities of Bayulu, Bungardi, Darlgunya, Junjuwa, Ngurtuwarta, Muladja and Yungngora have been engaged along the Fitzroy River. Representatives from a number of language groups are involved in the research and include Ngan'gi, Malak Malak and Wagiman speakers from the Daly region and Bunuba, Gooniyandi, Walmajarri and Nyikina-Mangala speakers from the Fitzroy region.

We work closely with our project Steering Committee which includes representatives and specialists from the Northern Territory's Department of Natural Resources, Environment, the Arts and Sport, the Western Australian Department of Water, the Australian National University, the University of Western Australia and CSIRO, and seek to keep our local and regional stakeholders regularly updated through our e-newsletters.

## What have we found so far?

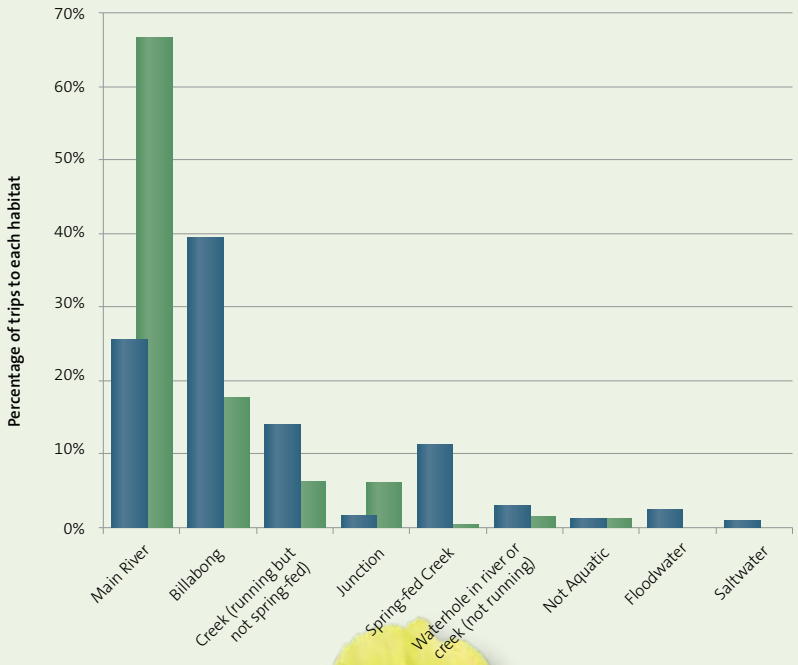
### Economic surveys

Of the eight household surveys planned in each of the study catchments all have been completed in the Daly River catchment and one remains to be completed in the Fitzroy catchment in November. Preliminary analysis of data taken from 2009 surveys shows a pattern of species – habitat linkages.

### Where are people hunting?

The plants and animals harvested for customary use are often associated with a particular type of habitat. For example, Magpie Geese (*Anseranas semipalmata*) are often found on billabongs late in the dry season and Bull Sharks (*Carcharhinus leucas*) are often caught in the main river channels on the first flows of the wet season. More broadly, we can begin to assess which habitat areas are most commonly used for hunting and fishing activities. Understanding species-habitat linkages, and knowing which habitats are most commonly used for harvesting activities, can help prioritise the management of valuable areas.

## Where people are hunting
### in the Daly and Fitzroy catchments

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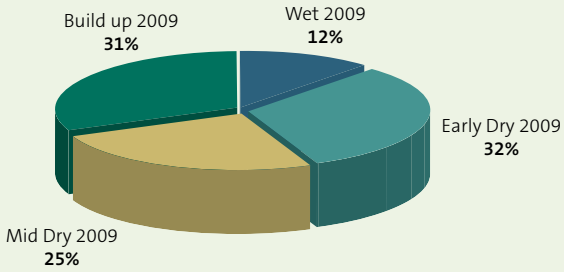
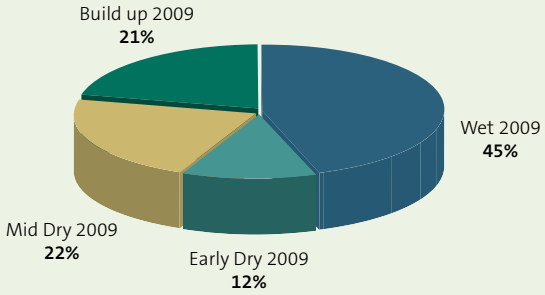
## When are people hunting?

Seasonal conditions have a strong influence on customary harvest activities. Many preferred hunting places are not easily accessible during the wet season, and some favoured species can only be harvested in a short time period. Knowing more about when people are hunting (see pie charts below) helps us understand the types of river flows and wetland conditions that are targeted during harvesting activities.

### When people hunt in the Daly River region in the NT




### When people hunt in the Fitzroy River region in the Kimberley, WA




## What's being harvested?

### Daly River, NT

The most commonly harvested species in the Daly River catchment were:

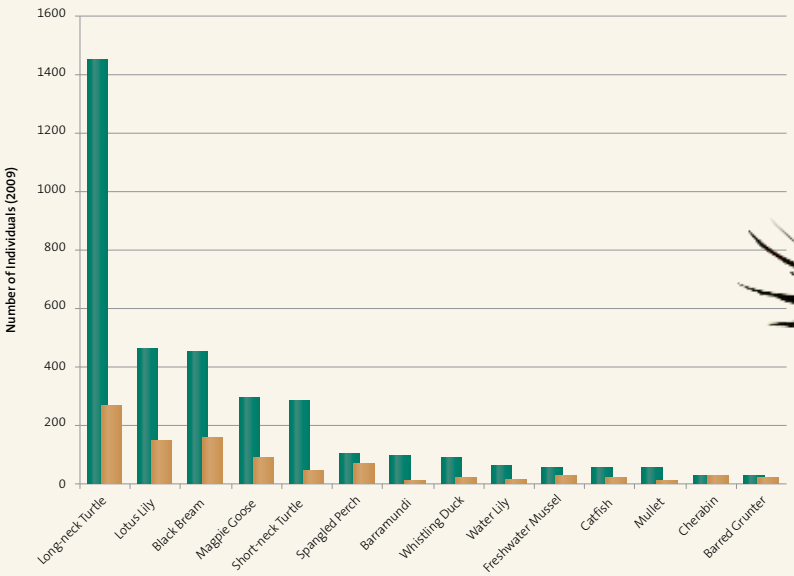
- Long-necked Turtle (*Macrochelodina rugosa*)
- Lotus Lily (*Nelumbo nucifera*)
- Black Bream (*Hephaestus fuliginosus*)
- Magpie Goose (*Anseranas semipalmata*)
- Short-necked Turtle (*Emydura/Elseya* spp.)

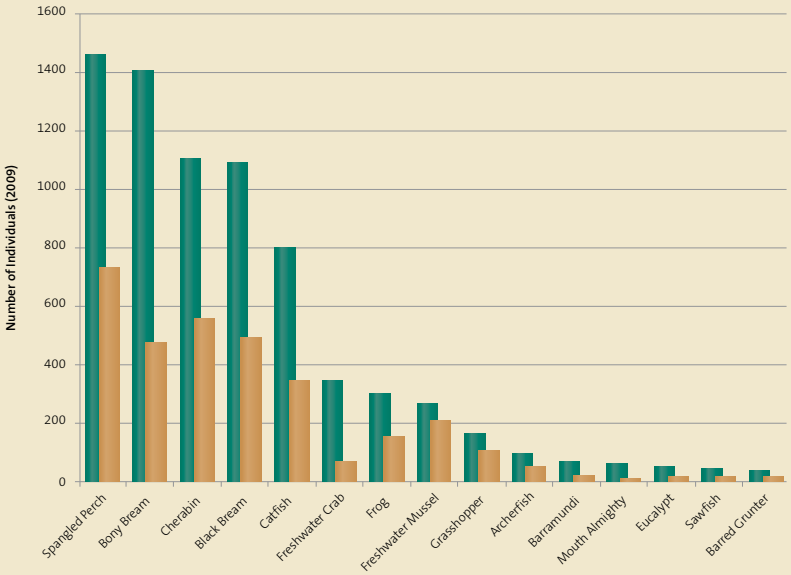
### Fitzroy River, WA

The most common species harvested in the Fitzroy River catchment in the Kimberley were:

- Spangled Perch (*Leiopotherapon unicolor*)
- Bony Bream (*Nematalosa erebi*)
- Cherabin (*Macrobrachium rosenbergii*)
- Black Bream (*Hephaestus jenkinsi*)
- Catfish (*Arius* sp.)

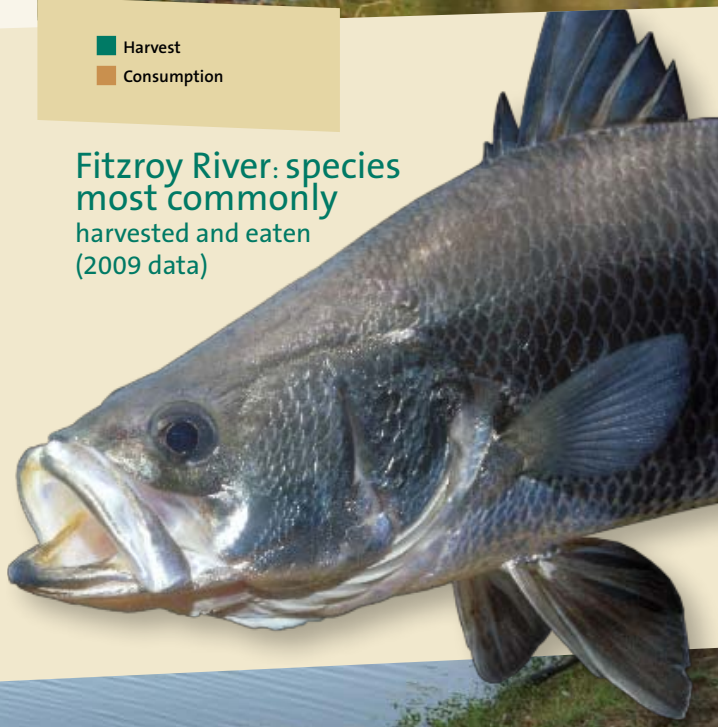
## Daly River: species most commonly harvested and eaten (2009 data)




## Fitzroy River: species most commonly harvested and eaten (2009 data)



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Different plants and animals are available at different times of the year. Certain river flow conditions trigger customary harvesting activities, either because of ecological triggers for feeding or movement of species, or because those flows are recognised by Indigenous people as an indicator of success. Examples include the increased capture of Bull Sharks (*C. leucas*) during the first dirty water coming down the river in the pre-wet season storms; the increased harvest of Long-necked Turtles (*M. rugosa*) late in the dry season as they aestivate (bury themselves and slow their metabolic processes) in the mud of drying billabongs, and the increased harvest of Magpie Geese (*A. semipalmata*) during the build-up as they feed on billabongs in preparation for breeding.

## Who's eating the harvested plants and animals?

Household consumption of the animals and plants in the above graphs is substantially lower than the number of individuals being harvested. This is because a number of families join harvesting trips and share the catch within the community and beyond. In particular, Magpie Geese and Long-necked Turtles are harvested by a small number of households and shared around or traded with extended family, friends and others in surrounding communities. Given the important social role of food exchange, it is clear that any changes to water use that have a detrimental impact on key species like turtle may have a wide impact, affecting communities living beyond the areas from which aquatic resources are harvested.

## Monitoring

A participatory monitoring program with Indigenous communities in the Daly and Fitzroy River regions is developing indicators to monitor outcomes for water management plans. The focus of the monitoring trial is to test the development and use of indicators that are relevant to the Indigenous communities involved in the program. Monitoring plans have been drafted with four groups and a range of methods are being tested including:

- Establishment of permanent photo points. Permanent photo points have proved to be a quick, consistent and easy-to-replicate way of collecting information on water levels, aquatic and riparian vegetation changes (including weed growth), disturbance by cattle and feral animals, and, in some cases, the characteristics of cultural sites. Results to-date range from little change at some sites, to significant change at others.
- Measurement of water quality. A range of water quality parameters have been measured at different locations. Discussions continue about how these measurements relate to what

is "normal" or "natural" at each site, and how the measured parameters relate to Indigenous perspectives of aquatic health.

- Catch rates and recording of fishing trips. This method has proved very time intensive and does not yield consistent results. Detailed effort information has proved problematic, although catch measurements have been straightforward when applied.
- Using transects to assess landscape changes. Using transects for assessing weeds and disturbance along river banks by cattle and feral animal has been successful in some communities but not in others. For example, counting weeds in extreme heat and humidity whilst walking through rugged terrain can prove quite challenging for older project collaborators.
- Using data recording sheets for 'cultural values' at sites. This method is being trialled and will be developed further.

The next step for the monitoring trial is to test the use of handheld computers, automated databases and reporting. The project team will test whether the use of this technology can:

- improve consistency amongst the people recording data,
- make monitoring more straightforward and rapid, and
- automate data collation and report outputs.

In April, Aboriginal ranger groups from across the Kimberley, Pilbara and Northern Territory participated in the Kimberley Ranger forum. The project's monitoring program was discussed in a workshop at the forum, with the Gooniyandi land management group presenting the monitoring work they have undertaken to-date. Environmental monitoring by Aboriginal ranger groups is gaining momentum in northern Australia, with groups keen to seek more information and skills to monitor on country.

## Recording Indigenous Knowledge

The Nauiyu community's Ng'angi Seasons Calendar, which was highlighted in last year's newsletter, has fulfilled community expectations by being actively used as an educational tool in schools in the Daly River region. The project team has also worked with the MalakMalak (Traditional Owners of the land around Nauiyu Nambiyu) language group to document and produce the MalakMalak and Matngala plant

knowledge poster, which highlights important food and medicine plants and their seasonal availability in the Daly River catchment. The project team have also been working with two language groups in the Fitzroy catchment – the Gooniyandi and Walmajarri - to document important plants and animals and seasonally-specific information about Aboriginal use of the Fitzroy River and wetlands, including detailed information about fishing methods and techniques.

Photovoice methodology has also been trialled with school children and community members in both the Daly and Fitzroy catchments. Photovoice empowers people to comment about what is important to them through photography, using the photos to then help tell a story. The Photovoice project with Nauiyi Nambiyu community members concluded with the presentation of photos and short stories at the Merrepen Arts Festival in May. Most photos show places along the Daly River and surrounding creeks and billabongs where project participants like to visit with family to relax, camp, fish and hunt. The project team is also working with the Kulkarriya Community School at Noonkanbah in the Fitzroy catchment to engage students in thinking about the importance of the river, and creating an interactive map of historic and contemporary photos and stories about the community and surrounds.

In April, a workshop was held on the banks of the Daly River for Saint Francis Xavier School students, TRaCK river researchers and community elders. The aim of the workshop was to promote the exchange of river knowledge and to provide an update of TRaCK research in the region. Activities included an electro fishing demonstration, fish and 'water bug' identification and naming, both in English and the local Ngan'gi language. Patricia McTaggart of Nauiyu Nambiyu provided expert assistance with the Ngan'gi language names.

## Where to from here?

The research project is now entering the final analysis stage during which time we will be assessing the impact of changes to river flow on Indigenous socio-economic values. We will draw on hydrological, ecological and economic data from other TRaCK projects to assist in modelling potential changes. With data on the likely impacts of change in water use on the fish species frequently caught by Indigenous households, for example, we will be able to estimate the economic cost of changes to river flow that may be incurred by Indigenous people reliant on aquatic resources.

# MalakMalak and Matngala plant knowledge

DALY RIVER, NORTHERN TERRITORY, AUSTRALIA

The bark of **Elu** (Mal), **Kerewey** (Mat) *Buchanania obovata* is used in a preparation for the treatment of skin sores and fungal infections.

**Arimada** – Early rains begin. The north-west sea breeze, **Nol**, begins to blow.

**Lemberrengety** (Mal) **Ngarangga** (Mat) *Flacourtia territorialis*. A favoured sweet fruit that is eaten when red-brown.

**Palaty** (Mal) **Kuri** (Mat) *Dioscorea bulbifera*. This yam is ready to collect in the wet season. It takes lengthy preparation, soaking in running water and roasting, to make it safe to eat.

**Wulngum** (Mal) **Pindalany** (Mat) *Planchonia careya* fruit ready for eating.

**Menytyil** (Mal), **Menyyer** (Mat) *Barrringtonia acutangula* leaves and bark are used as a fish poison, **Taratywolul**, and also to heal skin sores.

**Pundumirri** – Late dry season when it is humid and hot.

**Ariwarik** – The monsoon time.

**Mungam** *Grewia retusifolia*. Fruit are eaten when they turn brown. The leaves and roots are boiled in water and used to treat diarrhoea.

**Yilik** (Mal) **Mirang** (Mat) *Nelumbo nucifera*. The seeds are called **Numurru** (Mal) or **Miyangmiyang** (Mat) and can be stored for when food is scarce during the wet season.

**Palaty** (Mal) **Kuri** (Mat) *Dioscorea bulbifera*. This yam is ready to dig up when the 'cheeky yam grasshopper' called **Palaty** (Mal) sings out to let you know.

**Yyety** *Cochlospermum fraseri*. The flowers signal that freshwater crocodile eggs are ready to be collected and eaten.

**Din'girri** (Mal), **Bunggarra** (Mat) *Syzygium eucalyptoides* produces a sweet fruit, and flowers that attract bees and sugarbag (native bee-hives).

**Aridangit** – Early to mid dry season when it can get cold at night-time.

**Dirrikwak** – Late wet season when the rains are stopping.

**Wulngum** (Mal) **Pindalany** (Mat) *Planchonia careya*. This plant is spiritually and culturally important to MalakMalak and Matngala people.

**Mer** (Mal) **Meriki** (Mat) *Brachychiton megaphyllus* pods are burnt before the seeds inside are eaten.

**Punggulerrp** – The wind from the south east, **Dangit**, begins and the stems of the spear grass dry out and burning can begin.

**Kaleykaley** – The refreshing wind called **Kaleykaley** begins to blow.

**Nimir** (Mal) **Tyambor** (Mat) *Dioscorea transversa*. The 'long yam' is highly sought after, often found in jungle patches and dug up during **Kaleykaley**.

The leaves and pods of **Darik** *Acacia auriculiformis* may be rubbed in water to produce a soapy lather for washing. The lather can also be used as a fish poison to stun fish in small pools.

**Muntyalk** (Mal) **Keter** (Mat) *Nymphaea macrosperma* has large seed heads that can be roasted or eaten raw. In the past the seeds were collected, dried and kept wrapped in Paperbark in preparation for the wet season when food was short.

The flesh of ripe **Pinyyakper** *Morinda citrifolia* can be chewed to treat colds and flu.

NOVEMBER: **Elu** (Mal) **Kerewey** (Mat) *Buchanania obvata*

DECEMBER: **Pulu** (Mal) **Tyerrak** (Mat) *Brachystelma glabriflorum*

JANUARY: **Wom** (Mal) **Bon** (Mat) *Vitex glabrata*

FEBRUARY: **Munenput** (Mal) **Matyamatya** (Mat) *Flueggea virosa*

MARCH: **Ali** (Mal) **Warwi** (Mat) *Ficus racemosa*

APRIL: **Mungam** *Grewia retusifolia*

MAY: **Bemburrtyak** *Syzygium suborbiculare*

JUNE: **Nging** *Antidesma ghesaembilla*

JULY: **Elu** (Mal) **Kerewey** (Mat) *Terminalia ferdinandiana*

AUGUST: **Muntyalk** (Mal) **Keter** (Mat) *Nymphaea macrosperma*

SEPTEMBER: **Muram muram** (Mal) **Tyangatya** (Mat) *Pandanus spiralis*

OCTOBER: **Ali** (Mal) **Warwi** (Mat) *Ficus racemosa*

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Compilation and Production: Emma Woodward (CSIRO).
Images: Jacinda Brown, Emma Woodward.

This compilation draws on work published in Lindsay, B. et al (2003) *'MalakMalak and Matngala plants and animals: Aboriginal flora and fauna from the Daly River area, northern Australia'*.

Design and layout: First Class in Graphic Design.

MalakMalak ecological knowledge contributors:
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*The MalakMalak and Matngala Plant Knowledge seasonal poster featured at the Merrepen Arts Festival in May 2010. The Nauiyu Nambiyu Photo Voice Project was also on display, featuring visual accounts of favourite harvesting spots and other stories by community members.*


Assets and Values

An analysis of the flow ecology relationships that are vital to sustained Indigenous resource use will enable water planners to take account of Indigenous values in water use decisions and will contribute to advancing methods to quantify Indigenous water use requirements. By the end of 2010 the project team will have evaluated the success of the participatory monitoring program and will be in a position to make suggestions to Indigenous land management groups, State and Commonwealth environmental agencies as well as water planners and managers. The socio-cultural information brought together under this project will provide a fuller context to the economic data. It will also have resulted in a number of community driven projects that have articulated the importance of tropical rivers to Indigenous communities and brought scientists and local communities together in the exchange of environmental knowledge.

A final newsletter will provide a comprehensive report on the project's findings in April 2011.


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