

The distribution and ethnozoology of frogs (and toad) in north-eastern Arnhem Land (Australia)

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ABSTRACT

In this paper, I cover aspects of the ethnozoology of inhabitants of Gängan, an Aboriginal outstation located in Yolngu territory, in N.E. Arnhem Land, Northern Australia. I review the occurrence and distribution of frogs and the ethnozoology of these animals as viewed by Dhaḷwangu, a Yolngu clan. Particular emphasis is placed on amphibian traditions and beliefs, local nomenclature, taxonomy, and natural history as conceived by the Dhaḷwangu. A full understanding of the symbolism of *Garkman*, the frog, and its relatedness to other aspects of their culture is only beginning to be realized. The spread of the Cane toad in Yolngu lands will presumably have a significant impact on the other amphibians and the broader-ecosystem.

KEY WORDS

Ethnozoology,
amphibians,
frogs,
folk beliefs,
Aborigines,
Yolngu,
Arnhem Land,
Australia.

RÉSUMÉ

La distribution et l'ethnozoologie des grenouilles (et crapaud) dans le nord-est de la Terre d'Arnhem (Australie).

Dans cet article, je couvre des aspects de l'ethnozoologie des habitants de Gängan, une communauté aborigène, située en territoire Yolngu, dans le nord-est de la Terre d'Arnhem, dans le nord de l'Australie. J'examine la répartition géographique des grenouilles ainsi que l'ethnozoologie de ces animaux selon la perception des Dhaḷwangu, un clan *yolngu*. Un accent particulier est mis sur les traditions et croyances liées aux amphibiens, la nomenclature locale, la taxinomie et l'histoire naturelle selon les conceptions des Dhaḷwangu. Une compréhension globale de *Garkman*, la grenouille, et ses relations avec d'autres aspects de la culture aborigène émerge seulement. La propagation du crapaud des cannes dans les territoires *yolngu* aura sûrement un impact significatif sur les autres amphibiens et plus globalement sur l'écosystème tout entier.

MOTS CLÉS

Ethnozoologie,
amphibiens,
grenouilles,
croyances populaires,
Yolngu,
Terre d'Arnhem,
Australie.

INTRODUCTION

Animals can not be reduced to a functional or taxonomic zoology; the way they are part of men's speech, how they appear in his language, his beliefs and desires contributes to their understanding. How, in one word, our representations of the animality regulate our ways of defining and perceiving ourselves. What links man and animal is part of a complex mental process in which rituals and customs overlap in traditional everyday life, where religiosity, supernatural, magic-religious practices and beliefs keep close, and where modern science and traditional medicine, popular traditions and magic interfere. The great majority of anthropozoological knowledge, which shows significant variations according to the discipline and the periods, is too often the concern of oral transmission and will inevitably disappear with those who hold them if a systematic inventory is not made. As regards my project in Australia, the stake is very important because such a study takes place in the Aboriginal culture, which needs more than ever our support and our recognition in order that indigenous traditions and beliefs survive for future generations.

Many groups of Aborigines today still have a rich body of information about the natural world, including the frogs. This extensive knowledge reinforces the nearly universal observation by ethnozoologists that various groups of people living in intimate contact with the natural world "know so much" about nature (Berlin 1992). To date only a small fraction of Aboriginal ethnozoological knowledge has been researched. I have found bibliographical references referring to traditions and stories about frogs and their occasional importance as a water-supply, as food but most of the indigenous knowledge about these animals remains oral. During my first visit in north-eastern Arnhem Land (Nhulunbuy and Yirrkala; Fig. 1) in May-June 2001, Aboriginal people showed me bark paintings depicting frogs, they told me about places related to frogs, frog songs, frog stories and dances (particularly Dhalwangu people around Gängan and Gurrumuru because the frog is one of their totems).

METHODS

The present paper is based on first hand material collected during the period August to December 2002, in N.E. Arnhem Land, on Yolngu and more specifically on Dhalwangu land at Gängan homeland, but also in Yirrkala (Buku-Larrnggay Art Centre) and Nhulunbuy. During this 5 months period, I essentially worked with Gawirrin Gumana, a Dhalwangu elder, Nawurapu and Balku Wunungmurra, and a few other Dhalwangu people. For one week (18-22 November 2002), a Ph D biologist student (CDU, Darwin), Lorrae Mc Arthur, and two Dhimurru (Land Management Aboriginal Corporation based in Nhulunbuy) rangers, Djäwa and Balu Palu Yunupingu, joined me to collect frogs in the Gängan area. As amphibians were encountered in the field they were identified by scientific name, Dhay'yi name and any comment from Dhalwangu people helping us were recorded in written form, sometimes on videotape and audiotape. Because of the very dry conditions, the frog activity was pretty non-existent; meanwhile, we found 7 different species of frogs and many Cane toads. (Research undertaken as part of post doctorate studies).

THE DHALWANGU

East Arnhem Land is one of the Northern Territory's administrative regions that covers about half of the geographical area known as Arnhem Land. It runs from the Crocodile Islands (Milingimbi) in the west, to Groote Islandt on the Gulf of Carpentaria in the east and Numbulwar to the south. The same area is an administrative region of the Aboriginal and Torres Strait Islander Commission (ATSIC) and is called Miwatj.

The biggest single cultural group – and about half of the Miwatj region – is the Yolngu, which is the word for Aboriginal human being. The term has only recently become widely accepted as a name of a cultural group. Until they had extensive contact with European Australians they might have referred to themselves only by clan names instead of by a group name. Anthropologists earlier this century called them Murngin, Miwuyt and other names. (Duffy 1998: 16).



Fig. 1. – Map of north-eastern Arnhem Land (*Saltwater*: 28). © Buku-Larrngay Mulka Centre.

A substantial body of anthropological data exists on the Yolngu. Warner (1937) writes on the "Murgin", Berndt (1955) on "Wulamba", Shapiro (1981) on 'Miwuyt' marriage, and Morphy (1977), Keen (1978), and Williams (1986) among others on 'Yolngu).

The 3000 or so Yolngu who lived on the wedge-shaped peninsula of north-east Arnhem Land formed a linguistic enclave, albeit modified by linguistic diffusion. They spoke suffixing languages (of the Pama-Nyungan language family) while their neighbors to the south and the west spoke prefixing languages (of the non-Pama-Nyungan language family). Yolngu languages were more closely related to those of Cape York Peninsula in northern Queensland across the Gulf of Carpentaria and those of the people of the semi-desert than those of their neighbors. (Keen 1997: 22).

The Dhalwangu belong to the Yirritja moiety. They speak a language called *Dhay'yi* or *Dayi*, a Yirritja language (also spoken by the Djarrwak clan), which position is quite weak because of scattering and children speaking others languages. About 200 people continue to use this language.

Gawirrin Gumana is a ceremonial leader for the Yirritja moiety and Dhalwangu clan. He is a leader too for the Homeland community of around 150 people in Gangan and a Uniting Church Minister. Eminent artist, he is an important spokesman for his people on issues of indigenous self-determination and rights. He is involved in the homeland management and also plays an important role in the Buku Larngay Mulka Arts Centre in Yirrkala. He speaks 13 dialects and normally refuses to speak English. Because English is not my first language, he very kindly used that language and most of our conversations were in pidgin: Aboriginal English.

The father of Nawurapu and Balku Wunungmurra was a ceremonial leader for the Yirritja moiety and Dhalwangu clan and an eminent artist too. He was one of the first, with Birrikiti and Gawirrin Gumana, to return to the Dhalwangu clan sacred country of Gangan and establish the infrastructure of a community. At Gangan, he taught his children how to paint. He broke from the Yolngu tradition in teaching his

daughters how to paint as well as his sons. He did this to ensure the continuation of the law and to recognize the distinction between sacred art and art produced for the market. I met Nawurapu's father the 2nd of September when I went to Gangan with Dhimurru rangers for a day trip. Unfortunately, he got very sick and we never were able to work together. He died in Gangan the 14th of January 2003. His death is a deep personal loss to me. I finally worked with two of his sons: Nawurapu and Balku.

FROGS IN NORTH-EASTERN ARNHEM LAND

Five families of frogs (one of them deliberately introduced in 1935) have long been recognized in Australia; these families are the tree frogs (family Hylidae), southern frogs (family Leptodactylidae), true frogs (family Ranidae), narrow mouthed frogs (family Microhylidae) and the introduced toads (family Bufonidae). However, two proposed changes in recent years have received varying degrees of acceptance by Australian herpetologists. These changes involve the two principal groups of Australian frogs: the southern frogs and the tree frogs. Recent studies have suggested that the Australian members of these families are not as closely allied to their counterparts in other parts of the world (especially in the Americas) as previously believed, and that consequently these Australian frogs should be more accurately regarded as regional families in their own right. The result has been the construction of two frog families: the Myobatrachidae and the Pelodydidae.

There is a confusion about the use of the name "frog" and "toad" in Australia. Technically, true toads are by definition members of the family Bufonidae; hence Australia possesses only one toad – the marine toad of South and Central America (*Bufo marinus*, known here as Cane toad) which was introduced into Australia's cane fields from Hawaii in 1935 to combat insect pests." (Cogger 1983: 50-53).

There are 212 described species of frogs in Australia (5 % of all the world species). Twenty-seven species of frogs are listed "Endangered" or "Vulnerable". Of these listed species, eight may already be extinct and at least two are teetering on the brink.

The Northern Territory remains a frontier land for herpetologists. As many species have been

described since 1960 as were described before that date. The environment remains little fragmented or modified. Few species have been studied in detail and scientists have only recently documented the detailed knowledge about herpetofauna possessed by Aboriginal people. Compared with the recent loss of wildlife in most areas in Australia, the wildlife of northeast Arnhem Land generally is notable for its apparent intactness. Most of this region has been little modified by European influences.

THE FROGS

LIMNODYNASTES ORNATUS

Description: A small or moderate-sized frog with a rotund body and short limbs (males 31-37 mm; female 35-42 mm). The skin is smooth.

The fingers are elongate, cylindrical and unwebbed. Females have flanges on the first two fingers. The toes are webbed at the base or unwebbed.

The color is extremely variable ranging from grey/sandy, brown or reddish brown with or without elaborate markings consisting most commonly of bars across the limbs, mid-dorsal stripes and W-shaped marks on the head.

Origin of species name: *ornatus* means "ornate" and describes the beautiful color and markings of some specimens.

Comments: Found the 19/11 on the river at night time.

LITORIA CAERULEA

Description: A large tree frog with a broad body and short limbs (male 66-77 mm; females 60-110 mm). There are enlarged parotoid glands.

The fingers are broad and flattened with very large discs. The toes are webbed extensively.

This species is uniformly green or may bear white spots.

Origin of species name: From the Latin *caerulea* meaning "blue" which is the color of preserved specimens. Presumably the European scientists who examined the first specimens from Australia were unaware of the color change.

Yolngu name: *Garkman or Bakpirr*.

Comments: The 11/10/2002 a few children came with a green tree frog. They found it close one of the reservoirs. One was heard the 19/11 at night time in the open forest north of Gängen along the road to Malalmi.

LITORIA WOTJULUMENSIS

Description: A moderate-sized to large, elongate ground-dwelling frog with a pointed head and very long legs (male 33-38 mm; female 45-70 mm).

The fingers are long and slender, unwebbed and with moderately large discs. The toes are fully webbed.

The color ranges from brown to yellow with a broad dark stripe on the side of the head, and with or without dark mottling upon the back.

Origin of species name: Named after the Aboriginal settlement of Wotjulum Mission in Western Australia.

Comments: Found the 19/11 on the river at night time.

LITORIA TORNIERI

Description: A small to moderate-sized, elongate and agile ground-dwelling frog (male 28-36 mm; female 27-34 mm).

The fingers are long and slender and have very small discs and basal webbing. The toes are approximately one-half webbed.

The back usually is pale brown or sandy but at night may be brick red with areas of yellow. There is a dark brown stripe along the side of the head. The back of the thighs is marked with continuous black bands on a yellow background.

Origin of species name: Named in honor of Mr. Tornier.

Comments: Found the 19/11 on the river at night time.

LITORIA NASUTA

Description: A moderate-sized frog with a remarkably elongated head, body and limbs. The skin on the back bears longitudinal ridges (male 33-45 mm; female 36-55 mm).

The fingers are long and slender and have small discs. The toes are about one-half webbed.

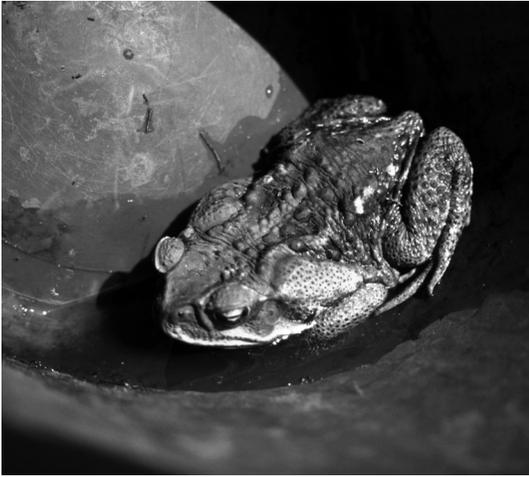


FIG. 2. – Cane toad (*Bufo marinus*). (Photograph by the author).

The back is brown with a black stripe along the side of the head and black patches on the body and limbs.

Origin of species name: Means “large-nosed”. Commonly called the “rocket frog”.

Comments: Found the 20/11 on the river at night time.

Yolngu name: *Wangul* (but this is also the generic term too for all the frogs).

CRINIA BILINGUA

Description: A small, short-limbed species with an ornate pattern of markings including a pale bar between the eyes preceding a backwardly – projecting triangular patch.

The toes are narrowly fringed and the tympanum is clearly visible.

The flanks are commonly paler than the dorsal surface. The skin texture includes smooth, warty forms.

Origin of species name: Means “with 2 different type of calls”.

Comments: 3 were found the 19/11 on the river at night time.

UPEROLEIA ARENICOLA

Description: A small, robust species with a rough skin and well developed skin glands (male 18-23 mm; female 20-25 mm).

The fingers and toes are long, slender and unwebbed.

Color grayish to sandy with obscure darker markings. The groin and back of the thighs are orange-red.

Origin of species name: Means “sand-dweller”.

Yolngu name: *Ririririga*.

Comments: The first one was found the 14/9/2002 by Brandon, Gawirrin’s grand son, in the sand close to his house. Seven others were brought the 19/9 by Mary, Nawurapu’s wife and their daughter. They were found in the sand close to the airstrip. 5 were found the 20/11 in a sand pit close to the community reservoirs.

BUFO MARINUS

A large to very large robust, ground-dwelling species with an extremely warty skin and large parotoid glands (male 80-150 mm; female 90-230 mm).

The fingers are short and unwebbed, the toes long and extensively webbed.

Color ranges from very dark olive to dark brown and (occasionally) a pale sandy yellow.

Origin of species name: Means literally “marine”.

Yolngu name: *Yätj Garkman*.

Comments: The 6/10/2002, Melissa’s daughters, Djarka and Gangarrarriwuy Wanambe, came and showed me a Cane toad close their house, near the tap. Next day, the 7/10, a few children came with another Cane toad, found close another tap. In 4 days, during our field week, Lorrae Mc Arthur and myself found 14 Cane toads in and around Gängan. The last day (20/11), Salwan, Nawurapu’s adoptive son came with another one; he found it in their shower.

THE CANE TOAD (*BUFO MARINUS*)

The 22nd of June 1935, 101 Cane toads (Fig. 2) were introduced in Queensland to control grey-backed cane beetles (*Lepidoderma albobirtum*). At that time, the sciences of ecological and biological control were in their early development and the potential consequences of the introduction were not appreciated.

In 1984, Freeland wrote:

The Cane toad has a broad range of preferred habitats, a flexible feeding behavior, a broad taxonomic and size range of prey items, the potential for fast rates of population growth and an extremely effective, toxin based defense against predators. Since its introduction in 1935, it has greatly increased its range, and continues to do so. Although Cane toads do not appear to control the insect pests they were introduced to control, and appear to have a devastating impact on the native fauna, data supporting these contentions are circumstantial (1984: 89). (See also Tyler 1976: 76-91; Tyler 1994: 104-105).

He also remarks that:

Cane toads feed also on human faeces and disseminate eggs of the human parasites (*Ascaris lumbricoides*, *Trichuris trichiura* and *Schistosoma mansoni*), as well as eggs of the dog hookworm, *Uncinaria*. Cane toads also carry human strains of *Salmonella*. Many bush settlements, particularly Aboriginal outstations, do not have modern sanitation and the Cane toad may pose a definite additional health hazard among people whose health status is already lower than that of the majority of Australians. Cane toads may also cause the loss of food animals for, and animals of religious significance to, Aboriginal people (e.g. frogs, goannas, freshwater tortoises, ...). (Freeland 1984: 34).

According to Gawirrin, Nawurapu and his brother Balku, the first Cane toads reached Gangan in 2000 but their number increased with the wet season in 2001. The 6th of October, I was called and told that a Cane toad had been found by Melissa's daughters close to their house. Next day a few children brought me another one. During my stay, even with the severe drought it was easy to find them in the community, around the taps, at night time.

Many Gangan residents pointed out too that the number of frogs, water goannas and freshwater tortoises has rapidly decreased the last years. One of the reasons might be the spread of the Cane toad into Arnhem Land but such an alarming diminution has also to be linked to intensive and extensive hunting and also death caused by spread of rubbish (animals swallowing plastic bags or being trapped in tins or cans). (About Risk assessment for Cane toads in Kakadu, see <http://www.deh.gov.au/ssd/publications/ssr/pub/ssr164.pdf>).

FROGS IN DHALWANGU CULTURE

For Dhalwangu people, some natural species are regarded as being more important than others. *Garkman* is the generic Yolngu name for all the frog species. "We call all frogs, *Garkman*, that is only one *Garkman*, nothing else, everything is frog [...], English people call them frog but we call them *Garkman*, only one *Garkman*, one name; I mean, one name *Garkman* for everybody *Garkman*, small and big" (Gawirrin). He told me they use other names for different frog species:

- *Garkman* is the name of the green tree frog (*Litoria caerulea*, living in the community and around) but also the generic term for frog;
- *Bakpirr* is the name of a green frog;
- *Wangul* is the name of the "rocket frog" (*Litoria nasuta*);
- *Ririririga* is the name of a tiny, brown/ black frog with dots living in sand, mud or wood ground (*Uperoleia arenicola*);
- *Bakung-bakung* means also frog.
- *Yätj Garkman* is the name of the cane toad (*Bufo marinus*). It means devil (or bad) frog.

The division into moieties applies to the whole universe, so Ancestral Beings, plants and animals likewise belong to just one moiety. *Garkman* is the generic term for frog for both moieties, but some frogs are Yirritja and some are Dhuwa.

The Ancestral Beings, whose journeys, activities and emotions shaped the land, are the direct relations of Yolngu people today. This ancient time is also the present and the future. This force that created life is still active today: it is a contemporary religious belief and experience (Djon Mundine, *BUKU-LARRNGAY MULKA CENTRE* 1999: 10). "Paintings and other works of art are manifestations of the Ancestral Past, of the Dreamtime, when the world creative powers transformed the earth through their actions, determining the form of the landscape as it is today. Not only did they create the rivers, lakes and streams, the shape of the hills and valleys, the stars in the sky and the forest on earth; they also gave order to the world by naming the flora and fauna and the places that they journeyed to, and by establishing the form of social life, clans and moieties, marriage rules and the structure of ceremonies. (Morphy 1987: 21).

The Aborigines have very keen powers of observation. They watch closely the habits, and study carefully the characteristics of animals and birds, and in time, the information gained is woven into the legends. The frogs have played, and still play today, a role in Aboriginal people's mythology and a body of frog myths appears to have been shared by different groups. These animals are incorporated in their totemic cosmology and ritual.

One story about Garkman, staying in here in Gāngan, is the green frog: Garkman, the green tree frog, a Yirritja one, which belongs here in Gāngan. He lives somewhere around there [showing on the map], Girriti, a creek or what you call a billabong. He is staying always around here, moving around, from place to place, in the water and the land [pointing the land around us]. The frog is following the water, the water and the green grass, what you call weed in English, we call it gunbirr. He is always with water, new water [silence]. The frog was floating by water, not deep, just floating by water, following the river and moving with other animals: Minhala, the long-neck tortoise, Dakawa, the yabby, you call it crayfish, Baypinnga, the saratoga fish and other animals like: Gany'tjurr, the heron, the white-faced heron, Wurang, the cormorant. [silence]. The rain was coming down and Garkman was following the water, following the river, Gāngan river. Because of the rain, he was washed away, [showing the map] fare away to Baraltja. Garkman went out in Baraltja, out in the sea, he was washed away, far away following the tide. Following the tide far out, again and again, out and in, and he came back to Garraparra. The frog went into saltwater [silence]. This story is only moving, comes and goes, by the water, freshwater only no saltwater [showing the map], because he [the frog] can not live in saltwater. That is why I [the frog] am here in saltwater; "I have to go back to land", thought Garkman. He was looking for land [showing the map], sitting there like a frog and the frog changed into a rock. On the land here [Gunyurru island], that rock. He changed into a rock because maybe he was dying, that is why he became a rock; maybe he was dying because of the saltwater. Maybe he died there. There is a water hole there on the back of the rock [Garkman's back], drinking water [silence]. That story in Garraparra, that is what we are looking at: he was dying and his spirit in the sea, was dying too. He made himself a rock and his life or spirit is still in the water, in the sea, not in the freshwater. (Gawirrin, o.c).

Gawirrin told me that there is another frog Dreaming in Galiwin'ku (Gupapuyngu language).

Other important totems of the Dhalwangu clan, linked with *Garkman*, are *Minhala*, the freshwater tortoise, *Dakawa*, the freshwater yabby,

Gany'tjurr, the white-faced heron, *Wurang*, the cormorant, *Baypinnga*, the saratoga fish, *Balin*, the barramundi, *Mundukul*, the lightning snake and *Galayr*, the white heron. All these animals share the same natural habitat and cover the main types of habitat in Dhalwangu country. The internal relations between the species are based on close observation of their natural behavior.

The story of Barama, Lany'tjung and Galparimun (three of the main Yirritja ancestral beings) broadly shape the ancestral significance of the country. The different sites along the river (country of the Dhalwangu clan around Gāngan) are totemically associated with the prevalent animal species. Each animal belongs or makes his appearance in a specific environment where other animals or ancestral beings also appear and other events occur.

The association between water and frogs is quite widely distributed over Aboriginal Australia. For Yolngu people, *Garkman*, the frog symbolizes the Wet season and fauna and flora are celebrating the renewal of life with the coming rain. "If you listen to the frog calls, *Garkman* tells you where the water is, where you can find water to drink" (Gawirrin). Nawurapu told me that: "*Garkman* calls when the lightning is. *Garkman* knows that the water will come and tells that the water is close."

Garkman is associated with both rain and flood, with weather and seasonal change. In fact, he is a weather symbol. The Frog Dreaming is sometimes part of the Rain Dreaming.

Relationships between Aboriginal man and the flora and fauna world are encased within complex layers of a mythological structure, which explains both ecological and religious relationships and their interrelatedness with man. This mythological component of Aboriginal scientific observation is seen at its best in the art that Aboriginal people have created on stone, bark [...] (Gillespie 1982:18).

Gawirrin and Nawurapu both told me that *Garkman* appears in song cycles. "*We can use Garkman in ceremony, only our side [Yirritja] can sing and dance the frog, and that in circumcision ceremony, men to men. As far as I know myself, Garkman is somewhere, but not here. We can sing, yes, we believe Garkman is from this country, not*

only for this country. But you know, he was here with the rain, and raining water, also flood water.”, Gawirrin explained. “We sing the frog in circumcision ceremonies and death ceremonies, in washing ceremonies and burning ceremonies.”, he added.

As well as the landscape they had created, the relevant *wangarr* [ancestors] also left behind for the clan sacred objects, designs and names that were manifestations of themselves, imbued, like the land, with their spiritual essence and power. They passed on, too, to the founding members of each clan their language, law, paintings, songs, dances, ceremonies and creation stories, all emanating from the *wangarr* presence and activity in clan land. Together, the land and this sacred clan property, both tangible and intangible, form a clan member’s *djalkiri*, his or her “foundation”, as Yolngu people translate this important concept. (Hutcherson 1995: 12).

Yolngu art combines a brilliant evocation of their Dreamtime past with their present feelings for their environment. Frogs are quite often pictured; I found drawings, paintings on bark, on hollow logs, didgeridoos and carvings showing or representing this animal (Fig. 3).

Morphy explains:

In northeast Arnhem Land, paintings, songs, dances and secret names are owned by patrilineal clans. A person also has certain rights in the paintings of his mother’s clan and mother’s mother’s clan. People have differential access to the clan’s paintings according to their age and sex. Greatest authority is vested in the hands of senior members of the clan. It is they who decide when to teach younger members of the clan, how to do the particular paintings and it is they who decide when to explain to them the significance of the designs. Young clan members can produce paintings only with the consent of senior clan members and do not have the authority to pass on information about their meaning to outsiders. (1987: 19-20).

The paintings and sacred objects produced in ceremonies are not simply representations of Ancestral Beings, nor are the ceremonies themselves simply re-enactments of Ancestral Events. They are, in a sense, manifestations of the Ancestral Beings and recreations of the events that they took part in. [...] Looking after the paintings, songs and other components of their sacred law is not only a necessary part of fulfilling their obligations to the Ancestors who have entrusted them with their land. The painting also provide them with their own channel of communication with the Ancestral Past, a channel of communication that can be passed on to subsequent generations of the clan or cult group. (1987: 21-2).



FIG. 3. – Nawurapu Wunungmurra, *Garkman* the frog, detail of a painting (acrylic on canvas; Gift from Nawurapu and Baluku Wunungmurra). © Nawurapu Wunungmurra.

Each painting, and sometimes each part of the painting, has many levels or layers of meaning associated with it. (See Keen 1997: 295, about control of religious knowledge). A painting may be interpreted as a record of events that took place on the journey of the Ancestral Beings who crossed the land. As well as providing images of the Ancestral Beings and of the Ancestral Past, the paintings link the Ancestors to particular places associated with their creative acts. A painting may be interpreted as a map of an area of land.

The elements of Yolngu paintings fall into two classes of iconographical meaning: they refer either to mythological events or to topographical features. Many Yolngu paintings can be interpreted from two quite distinct perspectives: first as a record of mythological events, and second as a map of a particular area of land (Morphy 1991: 218).

The custodians of Dhalwangu (and Yolngu) *rom* [law] have each their own version, which varies slightly from one place to another whilst still shar-

ing a core narrative. The same story can be told in many different ways according to context and focused to meet a particular audience or to emphasize a particular aspect. All the paintings I've reviewed depict Dhalwangu country: the land, freshwater and saltwater and the totemic life forms that inhabit the area because in Yolngu life, everything is connected. The paintings represent a way of looking at the world and of ordering life's experiences in terms of relationships between a human and an ancestral domain. The paintings can be fully understood only when related to the songs and dances and ritual events that accompany their production and revelation in ceremonial context.

At the heart of the Yolngu conception of the world is the relationship between the "inside" and the "outside". Inside is the determining world of the ancestral past that generates surface form. Outside is the world of everyday life, the world of the ordinary, which is simultaneously a world of change and diversity. (...) Yolngu look to the inside to find the origins of things, the organizing pattern of life, the permanence of the relationship between ancestral being and land. In the inside, knowledge is controlled, meanings are partly hidden. The journey to the inside requires guidance. But Yolngu also look to the outside through exchange, engagement and communication with others. The exchange of paintings and sacred objects with neighbouring Aboriginal groups was one of the ways of establishing mutual respect and understanding, of cementing alliances, of arranging marriages, ... By giving outsiders access to their art Yolngu hope to draw them some way towards the inside, to encourage them to develop an understanding of Yolngu values and to respect their continuing right to exist on their land and in their culture. (Morphy & Smith Boles 1999: 83; see also, Berndt 1962).

CONCLUSION

Only seven species of frog and one species of toad (*Bufo marinus*) were identified inhabiting the Gangan area. Seasonally dry conditions and possibly the presence of the cane toad have resulted in a largely preliminary species list for the Gangan area of north-eastern Arnhem Land. Wet season surveys and an increased research period are required to compile a more complete species list. In optimal climatic conditions it is expected that more species, including endemic and possibly undescribed species, occur within north-eastern Arnhem Land. With the possible threat of *B. mar-*

inus having an impact on frog species, it is important to continue research in remote areas such as Gangan. Research into areas where the toad already exists may act as a useful predictor to the possible impact of *B. marinus* on what is presently considered intact frog populations in similar habitats around the Top End. Such research may also support any knowledge collected concerning indigenous customs, such as the significance of frog species in Aboriginal culture, and highlight possible impacts of *Bufo marinus* on totemic species. (Mc Arthur Field report, Boll 2003: 61).

Due to time constraints placed on the anthropological fieldwork and often the absence of my informants, some aspects of this research need to be readdressed and further work is necessary to validate estimated data. In the course of gathering data for this project, the wealth of local knowledge from traditional owners was used. I realize how lucky I was to be shown some paintings and even more to be taught some of their significance. While this article gives some indications of the cultural significance of *Garkman* the frog, many questions are left unanswered. The further research that is planned (early 2005) includes: field trips to sites of significance (especially to document place names and map them correctly), field trips to identify frog species and their distribution, describe more precisely the folk-classification of the animal kingdom and the links between totemic species and the land, discovering the links between totemic species and their role in ceremonies... According to my informants, Dhimurru rangers and other Yolngu people, there is much more information to be collected from other Dhalwangu places (Gurrumuru, Gapuwiak, Galiwin'ku, ...). Other Yirritja clans also have knowledge about *Garkman* and Dhuwa clans too (Wangurri people in Dhälinybuy, Ritharrngu people in Donydji...). Yolngu traditional culture today remains strong but we should be anxious to obtain this knowledge before it disappears. Aborigines have much to teach us about the environment and how animals, plants and ourselves are integrated. We should be eager to learn from them before this knowledge is lost forever because a crucial period of change. – "To help protect our wildlife, and traditional culture, it is important that we look out for

toads and get rid of them”, Dhimurru senior cultural adviser Mr Munungurritj said. –“For thousands of generations, the management of natural and cultural resources was entirely the domain of the Yolngu, the original inhabitants. If nothing is done, this Cane toad, like the yellow crazy ant, will destroy our culture, our land, our life”, Dhimurru senior ranger Balu Palu Yunupingu added. We also have to recognize the value of the knowledge and the practices of Aboriginal peoples and incorporate this knowledge and these practices into ecology. Recording ethnozoological knowledge on frogs (which may be at risk of disappearing as the indigenous amphibious species themselves might disappear due to possible impacts of some introduced species such as the Cane toad) and particular aspect of Aborigines’ life as it exists at the present time (particularly exploring traditional beliefs and activities) should also help retain indigenous cultural heritage in order for future generations to benefit from their integrity. Frogs may not be good to eat in north-eastern Arnhem Land, as they are in other parts of Australia (*Australian Geographic* Jan.-March 2001: 25-26) but in the past they may have been “good to think”. (Lévi-Strauss 1964). Garkman as a symbol for the Dhalwangu clan in the oral and mythic literature is powerful and important. The symbolic associations are varied (songs, myths, totems and land are all closely intertwined), and are generally focused around water, clan wells, spirit-children, change of seasons, reproduction, reincarnation... A full understanding of the symbolism of Garkman and its relatedness to other aspects of the culture – totemic geography, rituals (songs, dances) – is only beginning to be realized.

Amphibians are of value to humans in many ways among their scientifically, culturally, ecologically and aesthetically. In view of the evidence for global decline of amphibian populations, additional research is urgently needed in all these areas both from a broad approach and a detailed case study perspective.

Interdisciplinary research between social and natural science should be vigorously enhanced to address the human dimension of global environ-

mental change. Modern scientific knowledge and traditional knowledge should be brought together in interdisciplinary projects dealing with the links between culture, environment and development in such areas as the conservation of biological diversity, management of natural resources, understanding of natural hazards and mitigation of their impact.

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