INDIGENOUS KNOWLEDGE, SCIENTIFIC KNOWLEDGE: A MARRIAGE MADE IN THE CONDAMINE

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ABSTRACT

The National Water Initiative requires that Indigenous access and use of water resources be taken into account in water planning (s.52 – s.54). Yet, the technical forms of knowledge used by water planners and agency staff charged with management of water resources is often segmented, technically oriented, and doesn't make easy dialogue with the holistic knowing of Indigenous Australians. The challenges for Indigenous engagement on the groundwater amendment to the existing Water Resource (Condamine and Balonne) Plan (2004) are further complicated by uncertain connectivity between surface and groundwaters. The Indigenous engagement strategy taken in the Water Planning Tools project proposes an effective, ecumenical marriage between Indigenous and scientific/technical knowledge. Several simple assessments of current and traditional Indigenous use of water resources were conducted: interviews with Traditional Custodian groups were supplemented with historical records and a mapping exercise of key sites (billabongs, springs etc.) combined with photo essays. Mapping the significant surface water sites allows an overlay with more technical knowledge forms like groundwater modelling. This establishes connectivity between surface and groundwater and allows water planners to consider the extent to which ground-waters may have historically aided resilience and drought recovery of natural ecosystems. This methodology can be replicated in other water planning processes across Australia. From here, the measurable effects of groundwater extraction on significant Aboriginal sites can enter planning dialogue.

INTRODUCTION

Background

The Water Planning Tools (WPT) project was funded by the National Water Commission with the aim to enhance water planning by developing tools and processes that bring information and voices to the planning process that may not otherwise be easily accessible at different project sites across Australia.

The study area

The *Water Resource (Condamine and Balonne) Plan 2004* (WRP) was approved in August 2004 but did not address regional groundwater issues. In August 2009, the Minister for Natural Resources, Mines and Energy announced a proposed amendment to the WRP to address groundwater management in the Central Condamine Alluvium area (Figure 1).

The Department of Environment and Resource Management (DERM) then released an Information Report to help the community understand and participate in the process. Individuals, groups and other interested parties were invited to contribute to the development of the proposed amendment to the WRP through the formal submission process, and/or by nominating to the Community Reference Panel (CRP).

The Information Report (s.9.5) proposes that Indigenous interests feed into the planning process by means of representation by Traditional Custodians on the CRP. Traditional Custodians are defined as Aboriginal people with a genealogical connection to particular ancestral country in the Central Condamine Alluvium (CCA) planning area.

The Water Planning Tools project, in partnership with Traditional Custodians of the CCA planning area, welcomes the proposal that Indigenous interests feed into the planning process through the CRP. However, in accordance with good practice in Indigenous natural resource management (NRM) planning, a broader approach to information exchange is encouraged, including processes that respect and accommodate cultural differences (e.g. Jackson: 2009, 2006).

Indigenous engagement in water planning

National Water Initiative (NWI) is Australia's blueprint for water reform. Through it, governments across Australia agreed on actions to achieve a more cohesive national approach to the way Australia manages, measures, plans for, prices and trades water.

Government agencies under the NWI are obliged to consider the water needs of Indigenous Australians. The Water Access Entitlements and Planning Framework Outcomes of the NWI specify recognition of Indigenous needs in relation to water access and management (s.25ix). Recognition and accommodation of Indigenous water use is specifically developed in Sections 52 to 54 of the NWI, including that "water plans will incorporate Indigenous social, spiritual and customary objectives and strategies for achieving

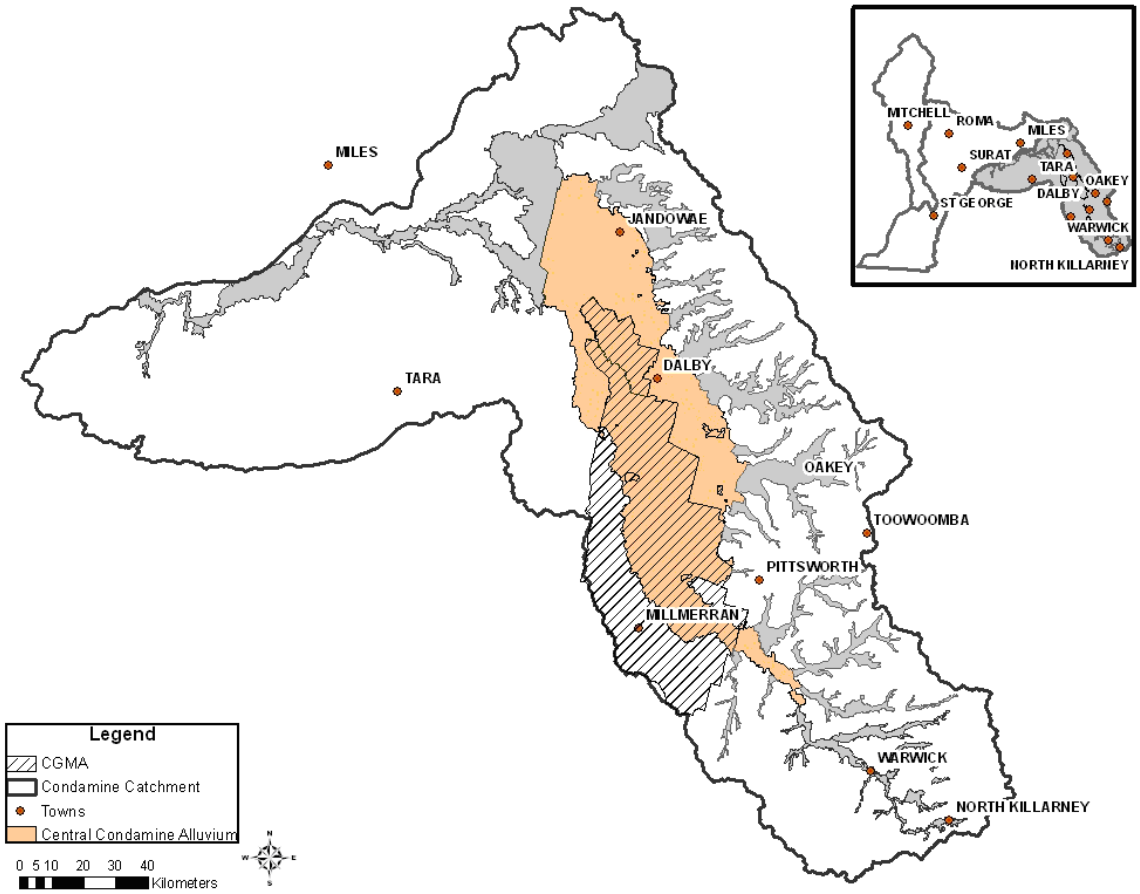

Figure 1: Condamine Catchment, Central Alluvium and Groundwater Management Area.
Source: Queensland Government Department of Environment and Resource Management (2009).

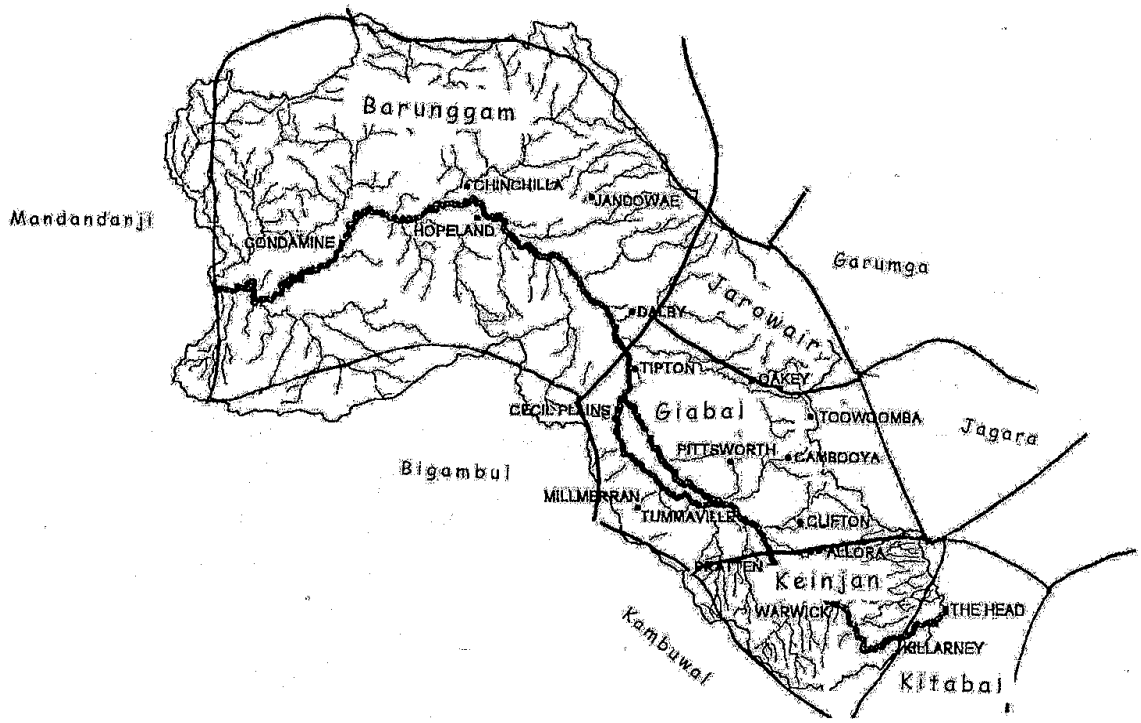

Figure 2: Aboriginal Tribes of the Condamine region
Source: Potter, Moles, Connors and Postle (2002:10)

these objectives *wherever they can be developed*." (s.52 ii) (Italics added).

The Queensland Government NWI Implementation Plan (2006: 27) identifies that Queensland has not made any specific legislative or WRP provisions for Indigenous interests, but contends that traditional use is covered by environmental flow allocations.

Tan (2009:23) argues "[Queensland's] water legislation appears to place a high priority on Indigenous interests …[though] despite this statutory recognition, no specific mechanisms are provided in the [*Water Act 2000*] to identify these interests and ensure trade-offs are transparent." Tan concludes, "This leaves the Act open to criticism that the recognition of Indigenous connections through the water planning process is merely symbolic."

The Australian Human Rights Commission *Native Title Report 2008* argues that Indigenous water rights are not adequately recognised by Australian law and policy because Indigenous and non-Indigenous perspectives of water and its management greatly differ. Non-Indigenous laws and management plans separate land from water and generally regard water as a resource for economic gain, primarily for its consumptive value, which is regulated and restricted to the industries or individuals able to pay the highest price.

Indigenous access and use suffers under these arrangements (AHRC, 2008: 169). Moreover, as Australia's water scarcity increases with drought, climate change, over-allocation and population growth, the capacity for the recognition and security of Indigenous rights to water will become increasingly important and highly competitive (AHRC, 2008: 171).

Under the *Aboriginal Cultural Heritage Act* 2003, the Minister and the Department of Environment and Resource Management are under a duty of care not to harm Aboriginal cultural heritage (s.23 (1) and Tan (2009: 24) argues that:

> It is likely that the duty extends to having a due diligence for water planning such that if the planning process results in deterioration of cultural heritage sites where water is featured, or impacts on water related landscape features, then agreement with an Aboriginal Party is required. No policy document refers to this and it is unclear and unlikely due diligence assessments are currently part of the WRP process.

It is of particular significance that, as the primary knowledge holders regarding cultural heritage (*cf Aboriginal Cultural Heritage Act 2003* s.5(b)), and as ss.7 and 8 of the ACH Act make clear, the primary determinant of significance of an area or object *resides with the Aboriginal parties*, consistent with their tradition. Yet, site registration under the *ACH* Act is required for its powers to be invoked. In summarising the key findings for Indigenous water rights in Queensland, Tan (2009) concludes:

(1) Queensland's NWI Implementation Plan may not go far enough to fulfil the intent of the NWI in relation to Indigenous interests;
(2) Cultural heritage legislation places a duty on the state to carry out a due diligence assessment for water planning if cultural heritage is threatened;
(3) There is no specific statutory or policy requirement for Indigenous engagement beyond the general duty that a Community Reference Panel (CRP) must provide for cultural, economic and environmental interests in the plan area;
(4) Special measures are taken to engage the Indigenous community [sic] but these are *ad hoc*;
(5) A State-wide comprehensive Indigenous engagement strategy is required.

Indigenous knowledge and impact assessments

Irrespective of current tenure arrangements, Indigenous Australians maintain a strong sense of custodianship, responsibility and belonging to country. This relationship, developed over tens of thousands of years, has profound spiritual, cultural, economic and legal aspects, including a deep concern about the declining environmental health of this country. In the 82% of Australia owned and occupied by non-Indigenous others, Indigenous groups maintain a cultural NRM responsibility, often without government sanction or recognition to exercise that responsibility (Jackson, 2006; Smith, Szabo and George, 2004).

Consequently, Indigenous communities express a desire to collaborate with government agencies and stakeholders, and to develop partnerships with researchers and land managers to exchange knowledge and solve identified problems. Yet concerns have been raised by Indigenous groups, scientists, non-government environment groups and some communities about the limitations of the currently segmented portfolios and processes that inform planning decisions. Information exchange is essential if Indigenous people are to participate effectively in water planning.

Different approaches to impact assessments reflect different values. A technical approach emphasises 'expert' validation of data and evokes 'one best answer'. By contrast, a so-called political approach suggests many answers. Jackson (2006: 11) argues:

> Many traditions relating to water can escape the attention of scientists and resource managers who rely solely on measurable physical evidence. So too, can Indigenous knowledge of the ecological properties and functions of water when environmental assessments are undertaken, yet this knowledge is valuable in understanding environmental change and adapting to environmental pressures.

Indigenous knowledge is acquired in three main ways: observation, traditional teachings, and revelation (Brant-Castellano, 2000). Indigenous observation is undertaken over long time scales and Traditional teachings encompass knowledge that has been passed down through generations. In most expressions of creation stories, for example, the creation of waterways is often by a spirit-being in the form of the Rainbow Serpent, while evil bunyips that lurk in deep billabongs are studiously avoided. Yet M^{c}Avoy (2006: 97) argues that "there is no place in modern river management systems for the protection of Indigenous spiritual values".

Mackenzie and Bodsworth reported in the results of a national survey of water planners, that "methods for engagement with Indigenous stakeholders were highlighted as the most requiring improvement in the assessment of future training needs" (2009: 25).

It is not only possible, but advantageous, to lower barriers between the 'technical' and 'political' forms of NRM knowledge. There are three types of barriers (or biases) to Indigenous knowledge in a typical impact assessment process. The first is the limitation imposed by a short timeframe. We know that the unrecorded oral history in the Condamine goes back tens of thousands of years (Potter et al., 2002). A focus on the present is necessary, but it can obscure how much history is removed from discussion. It can also mean that there is not always an accurate baseline for sustainable resource use. In the Condamine, analysis of the earliest available bore data (1969) suggests a likely 6m drop in some areas from 'pre-development baseline' connectivity (DERM, personal communication, September 2009).

The second limitation concerns a 'culture of segmentation', by which artificial divisions narrow and limit the scope of the impact assessment to consider *only* 'groundwater' or *only* 'surface water', or 'effects on native flora' and so on, rather than a holistic view of country. This limitation is an artefact of core western systems, such as discipline training and the policy scope of government agencies, but it is at odds with the inherent connectivity characterising Indigenous knowledge. The risk of this myopia is to disenfranchise Indigenous knowledge by excluding its archetypal holism from the assessment process.

The third limitation typical of impact assessments is spatial, relating to the geographic area for which Indigenous input is sought. These limitations gained acknowledgement in the federal processes of Sea Country Planning under the Commonwealth's marine planning program. In the Condamine, the boundaries are defined by the Central Condamine Alluvium. The natural Indigenous response, 'whole of country', is not confined to the amendment area, but includes country abutting the area and beyond.

METHODOLOGY

Participants

Participants are Aboriginal people from the groups recognised as Traditional Custodians of the country in the Central Condamine Alluvial area. Though no group in the current study has secured a Native Title Claim, they are legally classed as Non-Registered Native Title Claimants, and generally accept each others' claims on country boundaries.

Method

Planning tools for engagement with Traditional Custodians were collaboratively developed with these participants. This consultation process occurred in several stages, establishing shared knowledge and trust before seeking decisions about particular tools for engagement. Increasingly, there are substantial demands on the time of Traditional Custodians, particularly in NRM matters. An important part of this process was allowing participants to determine for themselves the preferred means and extent of participation. An overall process was concluded by way of the researcher describing different tools, with participants choosing among the methods. The tools selected favoured face-to-face interaction between the researcher and Indigenous participants, and oral, visual and experiential (rather than written) forms of information gathering.

The first process comprises semi-structured, audio-recorded interviews with individual participants. Structure was provided by (a) establishing the connection between the individual participant and the Traditional Custodian group, (b) establishing the linkages of the Traditional Custodian group with their country, (c) participants' knowledge about the water resources prior to the lifetime of the individual, which was supplemented by reflections on information from historic records and other secondary sources, (d) participants' knowledge about how water resources have changed during their lifetime, and (e) participants' preferred water future for the Central Condamine Alluvial groundwater, and the community, economy and environment dependent on it.

Participants shared their knowledge of social, customary and spiritual Indigenous access and use of water resources in the Central Condamine Alluvial area, and discussed how recreation, food, flora and fauna, medicine, myth, cultural law and other issues relate to Indigenous use of the water resources. Following each interview the researcher created an interim interview report, with particular attention given to cultural uses of water. This interim report was provided to the participant to amend or remove any culturally sensitive material for a final report.

Second, participants guided the researcher on a field trip to create a photo essay of relevant sites discussed in the interviews. Visual research has traditionally been used in anthropology and sociology disciplines. Recently, it has gained popularity in a

variety of social science disciplines including cultural geography, psychology, and health studies (Baldwin and Ross, 2006; Pink, 2004). Visual data can be incorporated into qualitative research projects in a variety of ways. These include analysing existing photographs and videos, using photographs to elicit discussions about certain topics, or by producing photographs or video during participant observation or interviewing (Pink, 2004). For example, the photo essay is able to generate and integrate information that cannot be accessed verbally, and provide a richer, more complete portrayal of the context as it is *experienced* by participants.

The third process is a mapping of significant water sites. During each interview the researcher and participant marked the significant tribal water sites discussed during the interview on a large scale topographical map of the study area. The photo essays and mapping exercise were collated to a poster, which was submitted to the planning process.

In early 2010 the Water Planning Tools project plans the release of a 3-dimensional hydrogeological visualisation (the Groundwater Visualisation Tool or GVT) of groundwater activity in the Condamine, based on data provided by DERM. One aim of this tool is to explore linkages between groundwater and surface water, particularly for the often ephemeral water bodies that characterise the region. It will show how different (hypothetical) levels of groundwater extraction impact on the water table and country. In this way, it attempts to establish potential connectivity between significant water sites and groundwater systems, linking diminution or loss of surface water resources with groundwater extraction.

The photo essay/mapping exercise and the GVT create a bridge between scientific and Indigenous knowledge. Connecting Indigenous knowledge of important water sites with hydrogeological modelling of groundwater recession provides a retrospective impact analysis (i.e. showing the impacts of past groundwater extraction on current ecosystem health). In turn, this contributes to an *ex ante* risk analysis of water resources and ecosystems imperilled by continuing groundwater extraction.

The report and poster developed from these three elements (interview, photo-essay, mapping exercise) were provided to participants for their approval. At this time, participants were able to remove or amend information that would not be appropriately presented to external domains. These two outputs then became formal submissions from Traditional Custodians in the DERM public consultation round.

Smith, Szabo and George (2004) document activity in six case studies that facilitate effective Indigenous engagement on NRM initiatives: (a) time and timing, (b) dedicated resources, (c) support for Indigenous processes, (d) effective leadership, (e) recognition, (f) capacity building, (g) Indigenous diversity, (h) scale, (i) integration with social and economic objectives, and (j) effective and on-going communication. These findings, as far as practicable, were implemented in the design of the present engagement. Specifically, the following measures were employed:

(1) A relaxation of the timeframe for the Indigenous submission was negotiated with the Department of Environment and Resource Management (DERM) and the researcher worked with the time constraints of Indigenous participants;

(2) Funding was provided by the WPT project to assure an effective Indigenous engagement process that incorporated a wider range of issues including social, spiritual and customary values associated with Indigenous country, recognising that "for Indigenous people there is no conceptual division between nature and culture – they are interdependent and indivisible" (Smith, Szabo and George, 2004). This occurred above and beyond any engagement activity led by DERM, specifically because the WPT project has the mandate and the discretion to *trial* methods of engagement – the WPT project aim was to develop an effective engagement process that can be replicated by agency staff and water planners elsewhere;

(3) Respectful and effective Indigenous engagement is based on negotiation over every element in the engagement process, in a context underpinned by formal agreements such as an MoU;

(4) As well as reporting into the formal Government submission process, the Water Planning Tools project included capacity-building outcomes in its design, creating reports (with distinct content as negotiated with participants) for the Traditional Custodian groups who participated in the process, and as a resource for regional Indigenous engagement, through local NRM groups.

(5) Indigenous diversity was valued with the Water Planning Tools project seeking input from different Indigenous groups, not simply relying on the most forthcoming participants.

(6) Though scale remains a core concern in the manner of a typical impact assessment, each of the traditional custodian groups whose country fell in the government review area was invited to discuss impacts on the whole of their country.

(7) The demand for Indigenous input to NRM planning is growing, and respect for the knowledge, experience and involvement of Indigenous participants was reflected in a payment for their involvement; and

(8) Flexibility in the approach taken with difficult-to-engage participants was complemented with advocating further roles for those individuals who wanted more – e.g. nomination to the DERM Community Reference Panel and access to developmental workshops to investigate and progress registration of key sites on the *Aboriginal Cultural Heritage Act* register.

RESULTS AND DISCUSSION

Interviews typically ran for 1 to 2 hours and were an expedient source of information. The guided visits to country were highly valued by Traditional Custodians and provided rich and explicit evidence of the effects of groundwater extraction. This really assisted 'buy-in' during the early stages of negotiation and made participants' stories and experiences more real, showing a genuine 'return on investment'. The photo essays and mapping exercise, which were collated to a poster, were invaluable in communicating these effects.

Participants reported clear linkages, such as springs, between groundwater and surface sites. Accounts of these direct connections were provided to the GVT developers. Social, spiritual and customary matters were also discussed regarding sites with indirect connections to groundwater, such as the ephemeral 350Ha Lake Broadwater (with a potential 10GL capacity) that have historically been a source of recharge to the Central Condamine Alluvial aquifers.

Indigenous knowledge is abiding and social, spiritual and customary involvement with water sites are passed through the generations, for example in the keeping and telling of stories about these sites, and by the experiences that each individual has gained at these sites camping, swimming, fishing, collecting freshwater mussels, yabbies or turtles and gathering berries like mookarins, geebungs and snottygobbles, and medicine plants like gummi gummi. Every participant in this engagement clearly expressed the loss, sadness and distress of drought as it impacted on the riparian ecosystems. Beyond the drought, many significant water sites have lost their enduring groundwater connectivity: - 'permanent' springs that bubbled up from the ground in Kambuwal country no longer flow. Great soaks, such as those that border Allora are now dry stretches of grassland and small wiry gums.

Lake Broadwater's historic cultural values included birthing sites (many birthing sites are located by freshwater), seventeen separate types of medicine plants have been identified at various sites around the lake, and of course, an abundance of other plants (450 plant species have been identified in total) used for making tools, baskets, canoes and so on. Additionally, it was home to a wide range of bird and animal species (240 bird species alone), some endemic, and many now rare or threatened.

When we visited Lake Broadwater at the end of 2009, a distinct ring of river red gums made a 4km perimeter around the parched lake bottom. Desiccated crabs and pipis were shallow-buried beneath the lake floor. Evans' (2007) technical report on the effect of groundwater extraction on surface flows found that leakage increases progressively as the groundwater level adjacent to the surface flow falls, even if the water table level falls to a point where the aquifer is disconnected from the surface flow. With diminished overland flows because of reduced rainfall and depletion of the Condamine aquifers, it may be many years (if ever) before Lake Broadwater is restored. There are 4,661 species registered on the Wildnet database in the Condamine Balonne basin, but this biodiversity cannot be maintained with the loss of such integral areas in the landscape.

Kambuwal Elder, Mr Barry Brown was raised on a Reserve perched between a permanent billabong and the Dumaresq River. During our visit Mr Brown found the billabong marginally recovered from the worst he'd ever seen it, a few months prior in August 2009. We searched the site, fruitlessly, for any of the various riparian bush foods that were staples of his childhood experience.

In 2009, Barunggam Traditional Custodians reported catching fish that were infested with sores because of poor water quality (Barunggam Elder, Mrs Averill Dillon, personal communication, December 2009). Lack of flow and volume in surface streams was reported by all of the Traditional Custodians, with the evidence simply in dry river and creek beds, algal blooms, turbidity and stagnation.

The more common form of connectivity between surface and groundwater inevitably occurs below the surface. In the Condamine River area the CSIRO Sustainable Yields project (CSIRO, 2008) and Groundwater Model Calibration Report (Barnett, and Muller, 2008) reported that water-level contours showed discharge from streams into the alluvium, and that this constituted the large majority of aquifer recharge. This groundwater connectivity no doubt provided a measure of resilience to riparian ecosystems (DERM, 2009), which we may be equally sure, have suffered through similar drought in the past. Of course, with continued drawdown on the aquifer the supporting groundwater level has dropped substantially – in some areas more than 25m. The extent to which this resilience is now compromised is yet to be fully revealed and assessed. CSIRO estimate that the full impact of existing groundwater mining will not be felt for 20 or more years (MDBC, 2006: 31).

As mining interests expand in the area there are additional environmental impacts. Each of the Traditional Custodian groups very clearly expressed strong concerns about the permissions and extraction volumes of groundwater removed for coal seam gas (CSG) production. The initial stakeholder survey reported in April 2009 by the Water Planning Tools project also included observations from non-Indigenous individuals of mines diverting stream-beds and other surface water flows.

Groundwater evaporation ponds used by CSG producers and others minimise the volume of

ecological waste to be managed. At one site, Bentonite (a clay used for dam wall construction) had failed, and a thirty centimetre band of salt had settled around various leaks from one dam site (Barunggam Elder, Mrs Averill Dillon, personal communication, October, 2009). When the researcher and Barunggam Traditional Custodians visited the site in December 2009, 1.5 metres of topsoil had been removed and replaced, and the dam filled in. Lucerne had been scattered over the surface. However, all of the bull-oaks and she-oaks in the country immediately around the salt crustations were dead.

Nearby, was a series of rockwells - water storages that are, over time, burned and scraped into rocky ground. Generally, rockwells would not be considered part of the technical parameters of the proposed groundwater planning amendment in the Condamine, since they simply capture overland flow from the rock surface into which they are crafted. Nonetheless, they are another important aspect of Indigenous interaction with water resources, being strategically sited for travel across country. As is often the case, there were other culturally significant sites in this area (not specifically discussed for cultural reasons). The area is under development, with proposed placement of a major road a risk to these important sites. In this instance, however, the connection with groundwater planning still occurs because the road placing these sites at risk is an access road for the aforementioned groundwater evaporation pond.

In Aboriginal spirituality, everything in the natural world is a symbolic footprint of the metaphysical beings whose actions created the world. There is a spiritual connection, particularly for those members of the Kambuwal and Giabul Traditional Custodian groups holding the carpet snake totem, to the whole of the Murray Darling system. Dreaming stories vary throughout Australia, and there are different versions on the same theme. Nonetheless, in many of the expressions of Dreamtime creation (both recounted by participants, and across the extensive literature), the Rainbow Serpent formed the waterways of the Murray Darling as she made her way across the surface of the land, up to the Bunya Mountains. Another Rainbow Serpent dreaming line connects the Bunya Mountains groundwater with the groundwater at Stradbroke Island[1], and to subterranean flows that continue up the east coast of Queensland to Rainbow Beach and beyond. The Rainbow Serpent also travelled another dreaming line, deep underground, before she emerged at Uluru, which is one of her eggs (Giabul Traditional Custodian, personal communication, October 2009).

[1] This connection between the groundwater of the Bunya Mountains and the groundwater at Stradbroke Island has been repeatedly and independently recounted and/ or confirmed over the past five or so years in the author's interaction with Aboriginal people.

CONCLUSIONS

Participants reported that sites such as springs which had a clearly established connectivity with groundwater have lost this groundwater connectivity during their lifetime. Participants also reported that sites such as Lake Broadwater, which had indirect connectivity with groundwater (as a source of recharge), have been lost or compromised because of the widening gap between the surface and groundwater levels.

The result is a consequent loss of amenity at these water sites that includes opportunities for Elders and parents to pass on cultural knowledge, to engage in customary pursuits such as gathering food, medicine and other plants of traditional value, fishing and swimming, and significant spiritual grief caused by effectively removing Traditional Custodians' ability to effectively maintain these sites, potentially extending to adverse impacts on Totemic animals as surface ecosystems become drier and less viable.

Groundwater extraction should be reduced as soon as possible to a level of sustainable yield in order to prevent further damage to surface ecosystems. Wherever possible, groundwater extraction should be reduced to less than the sustainable yield in order to remediate existing damage, and to prevent aquifer collapse and subsidence.

The legislative and policy mechanisms available for supporting Indigenous cultural values at law are not working at peak effectiveness, demonstrated by two key facts: (1) Since its inception in 2003 only two sites have been placed on the *Aboriginal Cultural Heritage Act* Register and (2) not one of the 20,000 sites placed on the *ACH* Register was identified as a water site (DERM, personal communication, October, 2009). It is an express intention of the Traditional Custodians that efforts be made to place significant water sites under the protection of the *ACH* Register.

It is emphasised that although the methodology discussed in this paper is robust, the results obtained from this engagement were able to be achieved only after sensitive, genuine and sustained effort to establish trust in the researcher and the engagement process. It is one of the great undiscussed matters of Indigenous engagement that 'cultural trepidation', remains a barrier to better Indigenous/non-Indigenous dialogue. In plain English, whitefellas cautious of 'stuffing it up' should remain mindful that Indigenous cultures are respectful cultures. Though respect for Indigenous cultures has been absent from the political landscape in Australia for a long time, if a respectful space for Indigenous engagement is created, it will fill. So, a word of encouragement to planners and practitioners seeking this engagement: be open, honest and humble to acknowledge and address any inadvertent mis-steps.

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