Engaging with Indigenous water values through participatory action research

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Around 20% of Australia forms part of an Indigenous estate. Increasingly Indigenous people are demanding inclusion in historically top-down government driven decision-making processes, including planning for future water use. However, current reductionist planning processes operating on tight budgets and within short time frames typically exclude the spiritual and relational dimensions of knowledge and any opportunity for cross-cultural learning. In this paper I will draw on lessons learnt through one of several small projects, which developed in response to community concerns about a lack of engagement in water planning processes in the Northern Territory, Australia. Using a participatory action research approach the project evolved in response to the interests and concerns of the community and resulted in the creation of an Indigenous seasonal calendar to renew local interest in Indigenous language and knowledge. Lessons learned from the engagement, including the importance of local context, researcher flexibility, relationship building and issues encountered in the representation of Indigenous knowledge are highlighted.

Keywords: Indigenous knowledge; research reflection; relationships; cross-cultural learning

I. INTRODUCTION

Around 20% of Australia forms part of an Indigenous estate. Increasingly Indigenous people are demanding inclusion in historically top-down government driven decision-making processes, including planning for future water use. However, current reductionist planning processes operating on tight budgets and within short time frames typically exclude the spiritual and relational dimensions of knowledge and any opportunity for cross-cultural learning. In this paper I will draw on lessons learnt through a project which evolved in response to a community's concern about a lack of engagement in water planning processes in the Northern Territory, Australia. With close community interaction the research evolved into adapting and trialling a range of methodologies to engage Indigenous communities in discussion about why water is important to them, and to document social and cultural values of water so that they might better be considered in water planning processes.

I will focus specifically on one methodology: the documentation of Indigenous ecological knowledge that lead to the creation of a detailed seasonal calendar. The 'Ngan'gi Seasons' calendar emerged and evolved through participatory action research involving a researcher from CSIRO, an Australian research organisation, and Indigenous knowledge authorities from Nauiyu Nambiyu Aboriginal community on the Daly River, Northern Territory. The project ran for ten months and initially involved the documentation of Indigenous ecological knowledge and seasonal indicators, that evolved into the collation and production of a calendar that depicted the thirteen recognised seasons of the Ngan'gi set of Aboriginal languages, known as Ngan'gikurunggurr and Ngen'giwumirri. The research process required constant discussion and negotiation around knowledge interpretation, artificial scientific disjuncture and external actors' queries about knowledge representation. The paper will include comment on how Indigenous knowledge is perceived and reinterpreted by those outside the PAR process, and highlights the potential responsibilities of a researcher who brings new forms of knowledge into the 'public space'.

This paper aims to critically reflect on several aspects of the research engagement. Specifically:

- The process of participatory engagement in this context;
- The necessity of time and place in working with Indigenous knowledge authorities and in understanding local Indigenous knowledge, and
- The social learning that occurred as a result of the research process.

II. CONTEXT

This paper is strongly contextual and descriptive for several reasons. First, it would be contradictory to emphasise the importance of place-based learning and engagement in PAR, and then omit any discussion about the research context. Second, the critical response by 'external actors' to the tangible representation of Indigenous knowledge produced through the PAR process, drives the desire to avoid, as far as possible, a reductionist representation of the participatory research process that occurred. Third, and related to the preceding points, is the sense of responsibility to the Indigenous participants involved in the PAR, to provide a description of the method and process, as these were vital to the acceptance of the research to the community given poor experiences with prior researchers. The process of acquiring knowledge is at least as important as the actual knowledge that is gained (Cochran *et al* 2008).

Most PAR sets out to explicitly study something in order to change and improve it. Broadly, the PAR in this instance evolved and developed in the following way:

1. The Australian water reform process was the initial catalyst. The Australian Government's National Water Initiative (NWI) explicitly recognised the special character of Indigenous interests in water. One challenge to emerge from this recognition was for the nation's State and Territory Governments to incorporate Indigenous social, spiritual and customary objectives in water planning (including in regional water plans).
2. The lead researcher, Dr Sue Jackson of CSIRO, undertook research in one catchment of the Northern Territory on behalf of the (Aboriginal) Northern Land Council. In local meetings and discussions with Aboriginal people in the catchment she found that there were very low levels of awareness of water planning (and related reform) and that both the provision of information and capacity building are necessary precursors to Indigenous involvement in the process. Community members expressed a strong desire to see more research done about the Daly River and were keen to discuss their concerns about the river in the context of planning for some research to occur. This raised the question for enquiry: What are Indigenous interests in water? And in particular what are the social and cultural values that are attributed to water and how do these relate to water flows.
3. As the lead researcher had a history working in the field of Indigenous water interests, as well as in the geographical area in question, she applied for funding through a structured process to undertake a research program focusing on Indigenous interests in water and gathering information that could directly inform future water planning processes.
4. A process of community-level engagement occurred with discussion around the purpose and direction of the enquiry, what form the research should take, and who might be interested in being directly involved.
5. Subsequent fieldwork created the opportunity for experiential understanding of the problem, with the identification of new problems arising through the participatory process. For instance, the importance of the research process and the participatory nature of the project became heightened when the participant revealed that previous engagements with researchers had left them disappointed, concerned, and lacking trust in both researchers and the research process

6. The action output was that the participants re-engaged with research, having had their faith restored through a positive engagement. Participants also saw that research could be used to their benefit in helping to document local Indigenous knowledge. This is important as community members are concerned that Indigenous knowledge is being lost with the passing of elders from the language group, and at the same time, younger generations are disengaging with language, culture and Indigenous knowledge around hunting, fishing and being on Country.

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) is Australia's national science agency and one of the largest and most diverse research agencies in the world. CSIRO released its first Indigenous Engagement Strategy in 2007. The Strategy states that it aims to achieve greater Indigenous participation in CSIRO's research and development agenda and activities. As the organisation looks for ways in which they might boost their Indigenous engagement, including perhaps funding more research of Indigenous interest, this paper provides some insight and on-ground experiences into what some of the practicalities are of 'engaging' with Indigenous knowledge authorities and conducting participatory action research in these contexts. Such field observations might prove useful to any academy wishing to engage more with Indigenous knowledge authorities in Northern Australia and elsewhere.

Further, the experiences reported here contribute to a larger research program entitled 'Indigenous socio-economic values and river flows'. This three-year program which began in 2007 emerged from questions surrounding Indigenous interests in water, particularly as they relate to the Australian Government's National Water Initiative, Indigenous values of water and Indigenous engagement in water planning processes (Jackson 2006, 2008; Jackson & Morrison 2007). This project therefore aims to determine some of the values connected to river flows by Aboriginal people living along two Australian tropical rivers: the Daly River in the Northern Territory and the Fitzroy River in Western Australia. The research is currently being undertaken by CSIRO staff under the auspices of the Tropical Rivers and Coastal Knowledge (TRaCK) Hub (http://www.track.gov.au/).

TRaCK researchers work in accordance with the TRaCK Indigenous Engagement Strategy which has adopted Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS) Guidelines for Ethical Research in Indigenous Studies. TRaCK projects that involve collecting information from people are subject to the scrutiny of the Charles Darwin University Human Research Ethics Committee. One key understanding of TRaCK's Indigenous engagement strategy is that all Indigenous Knowledge remains the intellectual property of the Indigenous owner at all times, and that owners of that knowledge can negotiate the use of that information by researchers, that this use must be fully acknowledged, and that negotiation surrounding the use of Indigenous knowledge is an ongoing one that involves the researchers, the Indigenous Knowledge holders and is guided by the Charles Darwin University Human Ethics Committee Process. TRaCK has also signed research agreements with the Northern Land Council and Kimberley Land Council. These agreements clearly outline the Intellectual Property rights of their Aboriginal constituents, and the process for obtaining permissions and consent from research participants before collecting and documenting information, including Indigenous Knowledge. All research project information must also be forwarded to the respective Land Council sixty days before its intended publication date, to ensure protection against the publishing of sensitive information.

The second key understanding of the TRaCK Indigenous Engagement Strategy relates to the proper payment of Indigenous knowledge authorities, who both participate in research and are employed in often combined roles of community liaison/networker/sometime interpreter/sometime translator and research documenter. The 'Indigenous socio-economic values and river flows' project adopts a scaled remuneration system to ensure research participants and informants are paid in accordance with their level of skill and knowledge.

III. PARTICIPATORY ENGAGEMENT IN THE RESEARCH PROJECT

Initial discussions were held between the project leader Dr Sue Jackson and community leaders from Nauiyu Nambiyu, Daly River whom she had worked with on water issues in the region since 2002. Potential research objectives for this project were discussed with community representatives from 2004, and the project began in 2007. At the formal start of the project, when the funding started, team members including myself went back to Nauiyu community with the project leader to be introduced to community leaders and to talk about what the research project might entail. We discussed which community members might be interested in participating, and sought names of people we should talk to at this earlier stage. It was recommended by the community that we present to the local corporation, Nauiyu Inc, which comprises of representative members of the community. As such we came back and presented with other TRaCK researchers a few months later. The representatives were happy for the project to go ahead, as people were concerned about development within the region, particularly increasing farming upstream, and had concerns about how such development might impact upon the river and their continued use of it. The period of initial engagement to determine the communities concerns and interests in the river and potentially what research they might be interested in seeing happen along 'their' stretch of the River, extended over several years. Once funding had been received the engagement period that led to a formal presentation to Nauiyu Inc was about 6 months. The research operated within and alongside community processes and institutions, following the advice of local leaders. The participation that occurred was dictated by cultural protocols that identified suitable participants as those with the knowledge and authority to provide a representative voice in the research project. The participants that emerged were people who were recommended by other community members and who in turn were keen to participate and organise others to participate. Patricia Marrfurra McTaggart was one such person. She had a strong motivation for involvement with a keen interested in language, linguistics and cultural renewal. Her father was a respected and knowledgeable Aboriginal man who taught his children cultural information and detailed hunting and fishing knowledge – so the importance of language and culture was instilled in her from an early age. She is concerned about the loss of language and culture in the younger generations, and during the research completed a decade-long project of recording the first written dictionary of her language.

At the beginning of this project the researcher (and author) had no relationship with any of the participants from the community. This necessitated that a reasonable amount of time in the initial stages would be spent establishing a working relationship with the Indigenous knowledge authorities interested in working on the project. This became particularly apparent after learning of the communities past research experiences. Disappointingly, we were told of several past projects where there was little or no follow-up by researchers that had collected Indigenous knowledge from people engaged on 'our' project. One project had involved the intensive collection of Indigenous ecological indicators, apparently for a student's tertiary education project. Patricia, a linguist and author in her own right, did not hear from the researcher again nor did she find out how the knowledge she had generously provided had been used. Perhaps the researcher truly believed that supplying the Indigenous knowledge authority with photocopied notes he had taken in discussion with her constituted research 'follow-through'. Other researchers have also failed to follow-up on projects they have discussed and started with community members. How research agencies engage with Indigenous knowledge authorities creates a legacy for the next researchers that arrive in the community, and this history provided the starting point for our project and reinforced the need to consistently communicate our intentions with members of the community, including being clear, open and transparent in all of our actions and to follow up and provide feedback to people at regular intervals.

IV. DEVELOPING RELATIONSHIPS AND THE IMPORTANCE OF TIME AND PLACE

The knowledge and information generated from participatory research activities are constructed by the context in which the research takes place. The importance of engaging with time and place when working with Indigenous knowledge authorities and in understanding local Indigenous knowledge is paramount. Indigenous knowledge (including language), particularly ecological and seasonal knowledge that the

project ended up focusing on, is both localised and strongly contextual. It is very difficult to both teach and learn about such knowledge when it is extracted from its context; when it is not taught within the place that it is intrinsically connected. Second, the research problem - that Indigenous interests in water are currently unknown and underrepresented in water planning processes, is partially a result of water planning institutions not understanding, or being concerned about, the limitations on Indigenous involvement in decision-making processes, because there had been no prior attempt to understand the context within which such decisions might be made.

As researchers, we were challenged in fundamental ways about how we believed the research world or any world 'usually' works. In the office a researcher invariably operates with urgency, where deadlines and milestones dominate and the constant connection via email and instant messaging contributes to an ever-increasing workload. In order to engage with key people in the community, we had to change how we operated, as we could only go as fast as the other research participants allowed.

To begin with, Aboriginal community leaders have exhaustive demands on their time, which often take the form of time-intensive meetings that are driven by new government programs or policies that communities must respond to, or face further marginalisation. These demands necessitate flexible research timeframes, in order that the research can work around participant's commitments. Sometimes we would find ourselves standing third in line behind government representatives outside peoples' homes in order to talk with them. Many times we worked around community engagements – meeting before Court sittings that demanded the translation skills of our participants, and catching up after Northern Territory Aboriginal Intervention meetings that were arranged in the time between calling our research participants to arrange meetings, and us arriving in the community.

Nauiyu Nambiyu, the community in which we worked, is a five hour round trip (drive) from Darwin where the research team is based. In the early stages of engagement, we as researchers were still new to the community and people were yet to see what we might contribute to the community and whether we would be coming back. Considering the past mixed history of community research engagement, this was to be expected. As such, if we wanted the time of community people we had to be prepared to wait, to come back 3 or 4 times over 2 days, whilst staying in the community, to see if someone was home and available to talk about the project.

I believe there were three key differences between ourselves and the government representatives that we witnessed demanding the time of community people, which contributed to successful relationship building and a positive research process. First, there was a lot of flexibility in the research project. We had research money and a broad aim to document the social and cultural importance of the Daly River and surrounding wetlands to Aboriginal people that lived in Nauiyu Nambiyu. Our research plan stated that we would determine the focus of the social-cultural component in collaboration with the community. Therefore the objectives and methodologies that we might have used were deliberately left open to allow the community to put forward ideas about what they thought was important and/or of interest to them. This allowed research participants to feel some ownership over the project, allowing a foundation for the creation of strong working relationships. Secondly, we were always mindful of taking up people's time, and were as flexible as possible - that is we never pushed people for their time and always offered to come back when it was most convenient for that individual. Thirdly, we were able to demonstrate that we valued peoples' time and knowledge, by paying each participant for the time they spent engaged on the project.

From previous experience I knew that payment of Indigenous knowledge authorities on this project should be handled directly between the researcher and the participant, immediately after each days work. This seemed to be the only way we could ensure that people were paid in a timely manner, which was integral to maintaining a good working relationship with research participants. CSIRO, like other research and government agencies, operates its finances and the payment for goods and services on a standard business model. That is, if we were to submit invoices on behalf of those participants who hold Australian Business Numbers they might wait at least 30 days for payment once the invoice had reached a central

processing point in another city. Likewise if participants were to be put on the 'casual payroll', they would have to wait up to 2 weeks to be paid each time they worked, and then a contract for their casual appointment would last only 3 months. The researchers on the project have worked creatively within institution structures in order to obtain the cash to pay 'cash in hand' to participants. This money is paid into our personal savings accounts, which we then withdraw in instalments, as we need to pay people, throughout each period of fieldwork. As researchers this is our personal choice to operate this way, for we depend on the development and ongoing maintenance of effective working relationships with each of our research participants, including Indigenous knowledge authorities to ensure that the project succeeds at all levels. However it is not a perfect system and it is something that will need to be addressed within many research organisations and institutions if they wish to successfully engage with Indigenous knowledge authorities. It is fortunate that there is sufficient flexibility for us to work within our system and to pay people instantaneously for their time. This, we feel, has contributed greatly to maintaining an enduring working relationship with our research participants.

Indeed, after four to five months of visiting the community on a fortnightly to monthly basis the community's Indigenous knowledge authorities, and potential research participants, began to open up to us. We were given private home numbers and we were prioritised over other meetings: that is community people would choose to sit and talk to us over attending other group meetings that had been arranged by government agencies. Each time we visited the community we were invited along to go hunting or fishing in the evenings and on the weekend. At this point it felt there was true engagement, and that a participatory process was occurring that might lead to a collaborative relationship (Churchman & Emery 1966). Trust seemed to be beginning to grow, and so began a process of teaching and learning on Country that culminated in the production of the Ngan'gi seasons calendar.

V. TEACHING AND LEARNING ON COUNTRY

The context in which the research took place determined the knowledge and information that was collected and documented. All of the research occurred either in the community, by the Daly River or out in the surrounding wetlands, whilst hunting, fishing, collecting bush resources and preparing food. If something was explained whilst sitting and talking in the community, the discussion would be followed by a statement that I would be taken to a certain place and shown/demonstrated the information/knowledge that had been imparted, either later that day or at another time. Participants were very keen to teach from Country, and it wasn't sufficient enough that I would be told something; it had to be put into context where possible, and as the season permitted.

Our research questions drew us to engage with fundamentally 'different' knowledge systems and ways of knowing. Participatory action research as a methodology facilitated this engagement, as the research was allowed to unfold as more information and knowledge came to the fore, and as questioning and learning on behalf of both the researcher and Indigenous knowledge authority continued. There was no hurry to reach a 'conclusion' and this was important, as time was an essential component of the research. Time was essential to allow for both teaching and for confidence to build, including confidence of the Indigenous knowledge authorities that I could be trusted with the information they were imparting to me. For example, at the start I had little knowledge of local botany. Once, when sitting with a group of older women who were telling me about different uses of plants and animals in the area they wished to explain the importance of one plant that lived along the river. They said 'you know, that tree with the orange fruits that lives along the river'. The group went very quiet and looked to me to be quite unimpressed when I had to tell them that I didn't know the plant they were trying to explain. From that point on I felt I had to win back the groups confidence that I wasn't going to waste their time and that something worthwhile would come of our interactions, unlike previous research experiences.

There is a need for care when engaging with 'different' belief systems due to there being so much room for misinterpretation. The overarching research question was interested in the direct connection between Indigenous social, cultural and economic values and river flows. This is because water plans are primarily

interested in water allocations, and if we could identify how much water is needed to protect Indigenous interests, we could directly inform the water planning process. It was for this reason that the research questions focussed on the use or value of the local river, surrounding wetlands and related water systems. It was puzzling to the Aboriginal research partners that we wished to separate the water (river and wetlands) from the surrounding landscape, when talking about values. In response, and in order to respect Indigenous knowledge systems that see Country as an indivisible entity, the research quickly evolved to incorporate the values and interests in all aspects of Country (Rose 1996).

In documenting knowledge I chose to write notes, often on bush trips, rather than using audio recording as people appeared uncomfortable, even though they had agreed to the use of the digital recorder. The knowledge was collected in different places, at favoured fishing and hunting places and places of cultural significance. I was taught stories of historical and contemporary use of water places as well as environmental cues, seasonal indicators and species-specific information as it was seen and recalled. I was challenged to see a different way of knowing the world, and that this different way was very real and practised and not only revealed (or hidden) in stories of the past or the 'dreamtime'. I was shown fishing and hunting methods, food preparation and collection. I was aware of the challenge early on of 'hearing' the Indigenous language I was working with, and being keen to keep information flowing I found myself selecting information to document, writing those words I could catch or understand when the flow of information came faster than I could write. I was limited by my ability to hear new/different words in language, but I don't believe this was a problem in the end because of the amount of time that was spent going over the information later.

A hallmark of genuine participatory action research process is that it may change shape and focus over time as participants focus and refocus their understandings about what is 'really' happening and what is really important to them (Wadsworth 1998). There was no intention of creating a seasonal calendar at the outset of the research, only to collect information that showed a social or cultural attachment to the Daly River and surrounding wetlands. It was sometime during the collecting of information that the importance of the seasonal cycle became more apparent and Patricia said she would like to see the information displayed in a way that was accessible to younger generations – and might be used as a teaching aid. She said that she had wanted to do something like this for a while, and that other researchers she had worked with had given her false hope or promise that they would assist her with this.

Preparing malarrgu (long-necked turtle) gut for eating

Hunting for malarrgu (long-necked turtle during Lirrimem (season) (Molly Yawulminy and Emma Woodward)

Miwulngini (red lotus lily) that has been collected from a billabong

Anganni (Magpie goose) being prepared for roasting

Minimindi (waterlily) that has been roasted in the coals, ready to be eaten

Ewerrmisya (freshwater crocodile) eggs are a favourite food of older people

Migemininy (bush apple) is favoured by awin (the black bream) when it falls into the water

Figure 1. The importance of context in PAR: place-based learning

It was this flexibility that allowed the community to drive outcomes including the kind of products they were interested in: for instance the creation of poster that could be used in schools.

VI. Creating the Ngan'gi Seasons Calendar

The period of discussing and recording Indigenous seasonal knowledge occurred over a nine- month period. The timely questioning of seasonal change was integral to the compilation of the seasonal calendar, so we collected season specific information according to the seasonal observations that came and went.

The next stage of development was to think how the information might be displayed on a poster. It was me that first put a circle on a piece of paper and asked whether this might represent the cyclical nature of seasons, and in retrospect I wish I hadn't have. Although others have used the circle to represent seasons – including those writing of Indigenous seasonal knowledge for other Indigenous language groups, where did this circle come from? Who decided this should represent the nature of seasons or cycles? Other ancient cultures have used the circle in architecture and art, which has been interpreted in a modern setting as being representative of a cycle, but I think its use in this context requires further investigation. I really started thinking of the use of a circle in representing knowledge when Patricia gave me the photocopied notes from the researcher who had sought Ngan'gi seasonal knowledge from her previously. He too had been

using circles to present information, until I came to a table showing Ngan'gi knowledge of 'cause and effect'. It specifically stated that Patricia wanted this information shown in table form.

After seeing this I explicitly asked her what she thought of the use of the circle to depict the Ngan'gi seasons. She said that it made sense as a circle has no beginning or end like the cycle of the seasons – it just kept going. Interestingly there are other language groups that we are working with in the Daly and Fitzroy River regions that have seen the completed seasonal calendar and wish to complete one for their own language group. They have all seen the circular depiction and it will be interesting to see whether there will be different visual representations of seasonal knowledge in those calendars yet to come.

I gave a copy of the Ngan'gi Seasons poster to a work colleague who asked me if I had to get copyright permission to produce the calendar. I was a bit stumped for a moment because I thought they might have been talking about the Intellectual Property surrounding the Indigenous Knowledge but they were talking about the use of the circular representation to depict the seasonal calendar. They had seen this used somewhere else, both in Aboriginal cultural interpretative centres in Australian National Parks and elsewhere – and assumed that someone would own the right to the design and circular representation of seasons.

Figure 2. The Ngan'gi Seasons Calendar can also be viewed and downloaded at http://www.csiro.au/resources/Ngangi-Seasonal-Calendar.html

VII. Social Learning

The development of the calendar facilitated social learning for some and not others. For examples, while the representation and interpretation of the knowledge that was documented occurred through an intensive and systematic ongoing discussion between myself as the researcher and representative of the research agency (CSIRO) and Patricia as the representative of Ngan'gi Indigenous ecological knowledge, it wasn't long before external actors became vocal in seeking their own interpretations of how the knowledge should be represented. This began within the research agency with a communication specialist asking that I reconsider the fact that there were no English months on the calendar. How would tourists and non-Indigenous community members engage with such knowledge if there were no English months with which

to reference Indigenous knowledge against? Perhaps I could consider writing on the poster at least when the Wet and Dry seasons occurred to make it more accessible to the 'general public'?

Further comments were made by non-Indigenous visitors at the launch of the calendar at the community's annual Arts Festival: 'On the next version you should put the English months on – it is hard to understand', was a suggestion phrased in a manner which indicated that the speaker thought we had not considered the option and forgotten something so obvious, whilst others said 'the next calendar should be all in 'Ngan'gi language' and 'you should make two calendars, one side all Ngan'gi language and on the other side English'. While the calendar was received with interest and enthusiasm by the public, these comments were interesting as I believe they reflected an automatic assumption by a number of people that the research agency had made the decisions about how the Indigenous knowledge was represented in the end product. The display of the Indigenous knowledge actually involved considered decision-making by the Indigenous knowledge authority.

The knowledge I carefully documented and recorded over a period of nine months talking with Patricia and her extended family was constantly checked and rechecked. We discussed the meanings of words, their accurate context, their spellings and their links with other words and seasons. The importance of each seasonal observation and occurrence then had to be discussed, as there was not enough space on the paper to include all knowledge that had already been noted down. We discussed which stories and knowledge should receive prominence on the outside of the calendar, and what knowledge should be contained under each seasonal heading. This was mixed in with discussion about which photographs were most appropriate to include and which colours would be most representative of seasons.

We discussed the mixed use of English and Ngan'gi in the poster and I specifically asked Patricia whether she thought we should add the English months of January, February, and March etc to be lined up against the Ngan'gi seasons. She said that when she thought of the English calendar month words her head was empty – they held no meaning for her and for Ngan'gi speakers. Further, Ngan'gi seasons do not occur according to a specific date each year, the season is in existence when specific events occur in the environment, such as a change in colour of the spear grass. Indeed, Ngan'gi seasons might fall during different months each year.

The responses by these 'external actors' led me to consider whether people's reactions to the representation of the knowledge would have been so critical if they had realised the holder of the Indigenous knowledge had suggested those very design elements.

This outcome highlights the need for both parties in the initial stages of engagement to clearly discuss the point of the research, what the outcomes might be and what purpose the products and outputs are likely to serve – including who the target audience is. We were quite clear from the beginning of the calendar's construction that the importance of the end product laid foremost in its potential use by the community. We had already documented the information that we could use to show attachment to place. This included Indigenous phenological knowledge – the seasonal timing of life cycle events (Lantz and Turner 2003), which we intended to analyse further to see how changes to river flow might impact on Indigenous knowledge systems and resource use.

The target audience was never intended to be tourists but local school children who might learn the Ngan'gi names of key species that they catch and eat with their families on a regular basis – rather than using Kriol, which is becoming increasingly prevalent. Copies of the seasonal calendar were distributed to schools within the region and other community institutions, while numerous other requests for copies of the calendar were made by primary, secondary and tertiary institutions, academics and other members of the public. There have also been requests from the public for more information about how the calendar was created. Some people wanted more than the end product, they wanted to know the detailed process, the process of engagement, that resulted in the calendar and they encouraged the writing down of this process so that it might be of use to others.

These reflections by the 'external actors' however did lead me to be more critical of my role in representing the knowledge. A clear example of one ontological challenge is evident in the design of the central calendar circle which has been evenly divided into 13 segments, each representing one Indigenous season as understood by Ngan'gi speakers. The division of the annual calendar/cycle into a number of seasons of equal length is certainly a Eurocentric concept that I mistakenly imposed on the distinction of the Aboriginal seasons. The term 'season' seems to be more accurately defined in the Aboriginal context as the name of a time when something is observed. For example, 'Memenyirr' is the 'season name' that refers to when yirrng (the pig-nosed turtle) – is constantly lifting her feet as she lays her eggs in the hot, burning sand. This can be observed over quite a short time period that only requires one observation for the season to be in effect. This 'season name' also coincides with other season names such as Lirrimem; when cicadas are heard calling out for the rain, and Ngunguwe; meaning mirage, and is in existence when a heat shimmer is seen during the middle of the day.

There have been other unforeseen benefits and positive outcomes from the engagement that resulted in the Ngan'gi Seasons Calender. One education worker reported that she was visiting Nauiyu Nambiyu in her role as lecturer to the Aboriginal teacher aides in the local school and was trying to start a discussion about Indigenous Ecological Knowledge (IEK) and education. She said it was going very slowly when she came upon one of the Ngan'gi Seasons calendars in the school library. The calendar prompted a long and detailed discussion on the validity and importance of IEK in education, and she felt that the calendar gave the idea of IEK more validity and legitimacy amongst the Indigenous aides.

Patricia also told me one day, after we had been working on the calendar for a while, that members of her extended family, who were also artists, had started asking Patricia questions about a range of plants and animals that weren't so common. It was felt that these questions had come about as a result of the project that we were working on and had led people to start looking more closely around them and 'looking at their environment in a new way'. The artists then started incorporating plants and animals that they hadn't painted before into their paintings – creating more diversity in the artwork being produced. This was quite a powerful outcome of the research.

I believe that the research empowered participants, and that social learning occurred for participants through experiencing research as both a positive and beneficial experience that produced a useful tangible product. This was in contrast to other past experiences with researchers. A positive research outcome was that at the conclusion of the project participants actively sought engagement with other research institutions who could also assist them further in documenting other aspects of Indigenous knowledge including historical cultural practice.

VIII. EVALUATION

Due to the perceived 'success' of the calendar and its adoption as a teaching tool in schools and other institutions, more funding has been secured to create similar calendars with other Indigenous language groups across northern Australia. It will certainly be interesting to gauge the diversity in methodologies and representations of knowledge that emerge from the eight different situations, but which might be seen by external actors as being essentially the 'same' exercise. It will also be interesting to see whether this type of knowledge representation is necessarily the right fit for all places and times. How reproducible are these seasonal calendars and what assumptions are we making in seeking funding based on one PAR experience? A research project that subsequent engaged a different language group on documenting Indigenous ecological knowledge within the same geographical space has already produced a very different learning experience. Engaging future Indigenous research participants on similar projects using PAR means discrete negotiations around representation, and being careful that 'lessons learnt' in one context do not cloud social learning opportunities in other spaces.

The idea that research can legitimise Indigenous knowledge in the eyes of some Aboriginal people throws forth many questions. Where do our responsibilities lie as research agencies and academies in

working with Indigenous knowledge authorities to assess impact of our combined engagement? How do we better monitor the outcomes and impacts of the PAR engagement that has occurred? Whose indicators should be used for evaluation?

I think as researchers working with Indigenous knowledge authorities we need to start taking very seriously evaluation of the engagement that has occurred. This would involve initiating a space for shared reflection and open critique. It is this learning, through the active process of evaluation, which will inform the creation of productive engagements between Indigenous knowledge authorities and research institutions in the future.

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