Indigenous environmental impact assessment: application of coastal traditional knowledge to Environmental Impact Assessments.

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Abstract

Environmental and cultural impacts related to potential offshore mining, oil and gas developments are of concern to Aboriginal people living at Yilpara, a remote community located on the Northern Territory coast where people continue to live a semi-traditional lifestyle. Although environmental impact assessments are required prior to commencement of any of these projects, they are likely to be inadequate as environmental impact assessments in Australia rarely consider traditional Aboriginal cultural and ecological knowledge.

To ensure the socio-cultural and ecological systems of the Yilpara community are offered maximum possible protection, their unique traditional knowledge as it relates to coastal environmental systems is being collected and used to better define and manage the potential environmental impacts from these developments. This paper examines the information that is available at a community level and seeks to apply it to coastal environmental impact assessments for undersea mining and off-shore oil and gas at locations around the wider north-east Arnhem land region, where a close cultural affinity is maintained. By taking the Aboriginal viewpoint, this work may be considered a significant step forward in the development of Aboriginal environmental impact assessments in the Australian context.

Introduction

Unlike Canada, Australia does not have legislation that makes consideration of Aboriginal cultural or environmental knowledge mandatory during environmental impact assessments. Instead, such considerations remain a matter of company or government policy, even though more recently they have begun to be interpreted as an essential part of a company's 'social license to operate' (Smith, 2011).

For the purpose of this paper, we take a broad approach to environmental impact assessment. Our approach accounts not only for theoretical impacts defined before development, but also those that occur during operations and into the post-rehabilitation phase of a project. We believe that traditional knowledge should not be limited in its application and has a role to play in each of those phases; and while it would not serve to replace that described by modern scientific method, it would assist by providing a clearer, cross-cultural method of assessment.

Recent interest in the minerals, oil and gas potential of the seafloor in Blue Mud Bay has prompted the government of the Northern Territory to issue a moratorium on seabed exploration and mining until the potential environmental impacts have been assessed. An important part of the assessment requires impacts to be evaluated in terms of cultural and social effects. The aim of this paper is to provide an insight into the quality of information that is held by Yolŋu living at Blue Mud Bay and how it may serve to inform the assessment process.

Location

Blue Mud Bay is located on the eastern coast of Australia's Northern Territory, just to the north of Groote Eylandt (refer Figure 1). The principal regional mainland communities are Yilpara, GanGan, Bukudal, Gurrka'wuy and Djarrakpi. Local Yolŋu consider themselves 'saltwater people'; and have developed a strong cultural affinity to the land and the sea.

Figure 1: Map of north-east Arnhem Land, showing major communities and Blue Mud Bay. Source: http://livingknowledge.anu.edu.au/learningsites/seacountry/06_map.htm

Traditional knowledge from Blue Mud Bay

Through observations over many thousands of years, Yolŋu inhabitants of the mainland areas around Blue Mud Bay and their families on Groote Eylandt have developed a unique set of cultural and environmental knowledge specific to coastal areas. The information available is currently stored as a series of species lists, with an indication of their value as cultural indicators; food sources; medicines or a specific environmental function available as an anthropological report (Barber, 2004). This level of information would serve as a valuable starting point for impact assessments.

Examples of the level of information that is available are provided in Table 1; and when linked visually to seasonal availability expressed by the stylized representation of the seasonal calendar shown in Figure 2 (Barber, 2005), a reasonably clear picture of interactions between the social, cultural and natural environments can be seen. While the calendar's outer circles show the seasons and prevailing wind conditions, the inner green and blue circles represent the times when particular fruit and animal species are abundant. This demonstrates how Yolŋu interpret environmental change; and how the patterns, degree and times of subsistence level impact occur.

Name	Habitat	Socio-economic value	Cultural value
Barramundi *Bhalin*	Ocean Estuary Rivers	Food	Totem
Kingfish *Nuykal*	Ocean	Food	Totem
Green turtle *Djalwatpu*	Beach sands Ocean	Eggs Meat	Totem
Leatherback turtle *Malarrka*	Beach sands Ocean	Eggs Meat	Totem
Whelk *Niniku*	Mangrove Marine rocks	Food	
Sand crab *Gingurrk*	Beach sands	Bait - trevally/parrotfish	indicator that mudcrabs are present
Mangrove heron *Djurrdjurr* *Dingkawa*	Mangrove	Eggs Meat	
Rail *Wilitwilitj* *Karridalbuwa*	Mangrove	Eggs	Calls indicate mud crabs are present
Pelican *Galumay* *Dumakbula*	Coastal	Meat	Feathers used in ceremony
Red kurrajong *Miyawarra*	Beach	Seeds eaten Wood for firesticks Bark for string/lines/ropes	Flowers indicate stingrays have plenty of fat
Cocky Apple *Mukuwarra*	Beach	Fruit roots for dillybag string/belts Leaves used to stun fish	Medicinal - treatment for boils flowers indicate time to look for turtles

Table 1: selection of species found at Blue Mud Bay with an indication of their socio-economic and cultural values.

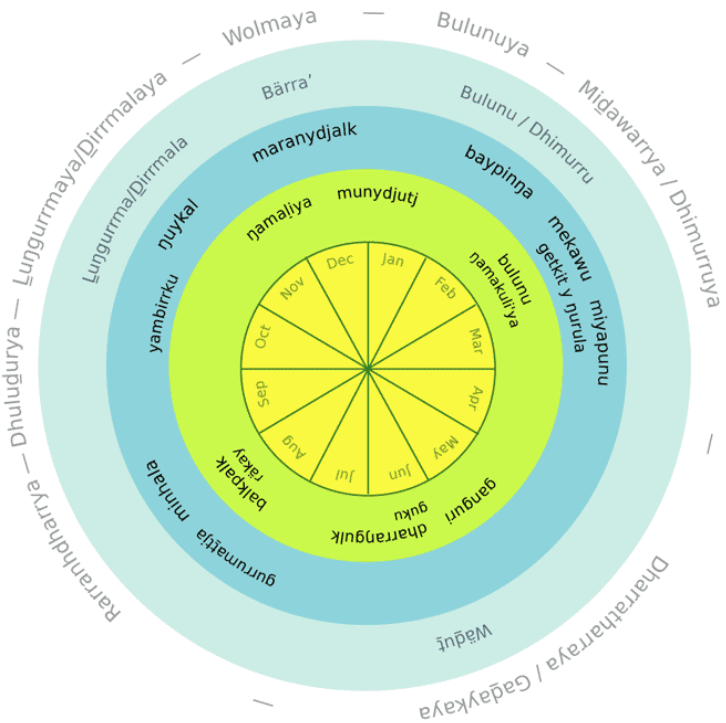

Figure 2: Representation of a simplified seasonal calendar for Blue Mud Bay. Source: http://livingknowledge.anu.edu.au/learningsites/seacountry/10_observing_seasons_e.htm

The seasonal calendar is useful for the environmental impact assessment process because it allows us to link culturally important species with space and time. Significant disruption to seasonal catches of particular food species such as *djulkumu* (mud-mussels); *marandjalk* (sting-ray); and *namurra* (black-lip oysters) or declines in numbers of bird species such as *barriparri* (curlews); or *wilitjwilitj* (rails) that take food from tidal and mangrove habitats might serve as suitable surrogate measures of coincidental and/or detrimental impacts to the marine environment.

Integrating traditional knowledge into impact assessments

By understanding which species are of critical importance in Yolŋu culture and when and where, we place ourselves in a position to expand the manner by which environmental impacts are assessed – moving away from a solely European viewpoint, to one which is a fusion of Aboriginal and non-Aboriginal thought. This not only produces a more complete picture of the complex interplays between people and the natural environment, but also provides one that is also readily understood by Aboriginal people.

A significant amount of work has already been done in western Arnhem Land that shows how a link between engineering principles and traditional knowledge can be forged and applied to mine closure (Smith, 2008; Smith, 2009). Our next objective is to transfer this work to other phases of mining operations and to other types of environment, such as the seafloor. To be successful, culturally appropriate measuring tools that match the perceptions and understanding of Aboriginal people need to be developed for specific types of industrial development at specific locations.

In terms of environmental management and rehabilitation, we believe that analysis of changes in diversity and abundance of signature (or critical) species in culturally appropriate areas could serve as suitable measures of success. While this approach might be readily suitable to isolated lakes, rivers or streams in a varying terrestrial landscape, we recognize that applying it to a more uniform and larger seascape may pose some fundamental difficulties. For example, larger marine species tend to be more mobile and not confined to specific locations in the ocean, making a meaningful definition of what represents acceptable levels of abundance and diversity in the marine environment difficult to obtain.

Limitations

This approach has further limitations because data describing baseline measures of species populations in Blue Mud Bay are generally unavailable. Seafloor ecosystems, especially those related to coral and seagrass, around Blue Mud Bay are largely unmapped meaning that the ecological values ascribed to Blue Mud Bay are largely unknown. It is well known that seagrass is an important habitat that supports larger marine creatures such as *djununguyangu* (dugong) and *djalwatpu*, *malarrka* and *muluthurr* (all species of marine turtle). This means that careful management of seagrass habitats would be necessary in the face of mining or oil and gas production.

Whether or not change in dugong numbers serves as a measure of environmental impact resulting from loss of seagrass habitat in Blue Mud Bay is uncertain, as these species are migratory and difficult to observe. However, turtle populations might be more useful indicators since turtles return to the same breeding grounds on an annual basis. It may therefore be possible to identify meaningful trends through temporal observation of non-marine species that utilize intertidal and coastal habitats; and apply these to environmental impact assessments.

Unfortunately, quantitative data on turtle populations is currently unavailable and this would need to be measured prior to undertaking any mining activities in the region. Yolŋu are adept observers of nature and already understand the migratory and breeding habits of turtles, placing them in an ideal position to act as environmental monitors and collect this information prior to development of the seafloor's mining, oil and gas potential. The same situation exists for bird, crustacean and plant species that can be collected from tidal and mangrove habitats. However, once we have this type of information, we will also need to integrate it in a meaningful manner with European engineering principles if improved methods of impact assessment are to be created.

Conclusions

Although a large amount of observational information related to Blue Mud Bay ecosystems and how Yolŋu interact with them has already been acquired, significant gaps in our knowledge remain. The gaps relate largely to quantitative baseline surveys of culturally important species and high-quality mapping of seafloor habitats, especially those of seagrass and corals. Yolŋu are in an ideal position to collect this information and use it to develop systems of environmental impact assessment that reflect their viewpoints.

Allowing Yolŋu this opportunity will allow development of an integrated, cross-cultural means of environmental impact assessment suitable for all phases of operations; while also allowing the Northern Territory Government to meet its objective of assessing impacts in terms of cultural and social effects. By applying a philosophy similar to that already used for mine closure projects; a more accurate assessment of the potential impacts caused by recovery of minerals, oil and gas from the near-shore marine environment of Blue Mud Bay may be possible.

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