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## An online spatial database of Australian Indigenous Biocultural Knowledge for contemporary natural and cultural resource management



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### HIGHLIGHTS

- We present a world-first compilation of national Indigenous biocultural documents providing a one-stop-shop of Australian IBK knowledge.
- IBK was traditionally passed down orally through generations; however, in there is increasing interest in IBK which requires other forms.
- Large spatial gaps in Australian IBK documentation illustrate extensive opportunities to expand cross-cultural natural resource management.
- IBK can no longer be ignored in Australia, considering the increasingly large proportion of Indigenous land ownership.
- Cross-cultural power sharing in national decision-making is required to allow the uptake of multiple knowledge systems.

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### ABSTRACT

With growing international calls for the enhanced involvement of Indigenous peoples and their biocultural knowledge in managing conservation and the sustainable use of physical environment, it is timely to review the available literature and develop cross-cultural approaches to the management of biocultural resources. Online spatial databases are becoming common tools for educating land managers about Indigenous Biocultural Knowledge (IBK), specifically to raise a broad awareness of issues, identify knowledge gaps and opportunities, and to promote collaboration. Here we describe a novel approach to the application of internet and spatial analysis tools that provide an overview of publically available documented Australian IBK (AIBK) and outline the processes used to develop the online resource. By funding an AIBK working group, the Australian Centre for Ecological Analysis and Synthesis (ACEAS) provided a unique opportunity to bring together cross-cultural, cross-disciplinary and trans-organizational contributors who developed these resources. Without such an intentionally collaborative process, this unique tool would not have been developed. The tool developed through this process is derived from a spatial and temporal literature review, case studies and a compilation of methods, as well as other relevant AIBK papers. The online resource illustrates the depth and breadth of documented IBK and identifies opportunities for further work, partnerships and investment for the benefit of not only Indigenous Australians, but all Australians. The database currently includes links to over 1500 publically available IBK documents, of which 568 are geo-referenced and were mapped. It is anticipated that as awareness of the online resource grows, more documents will be provided through the website to build the database. It is envisaged that this will become a well-used tool, integral to future natural and cultural resource management and maintenance.

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## 1. Introduction

The Intergovernmental Platform on Biodiversity and Ecosystems Services (IPBES),<sup>1</sup> established in April 2012, was charged with strengthening the science–policy interface of biodiversity and ecosystem services for the conservation and sustainable use of biodiversity, long-term wellbeing and sustainable development. The aims of the IPBES are to: help reduce the gaps in knowledge on declining biodiversity and actions to reverse trends, identify gaps in knowledge, support policy, and build capacity to support the interface between policy and knowledge (Koetz et al., 2012; Diaz et al., 2014). In 2010, participants from 121 member states at an inter-governmental and multi-stakeholder IPBES meeting in Busan, Korea, recommended that the word ‘knowledge’ should be used throughout, rather than ‘scientific information’, as knowledge is a more inclusive notion that encompasses western, formal science as well as Indigenous and local knowledge (UNEP, 2010) [see [http://www.unep.org/pdf/SMT\\_Agenda\\_Item\\_5-Busan\\_Outcome.pdf](http://www.unep.org/pdf/SMT_Agenda_Item_5-Busan_Outcome.pdf) (accessed 11 December 2014)]. Furthermore governments have agreed that the IPBES was to be guided by a set of operating principles including: ‘... to recognize and respect the contribution of Indigenous and local knowledge to the conservation and sustainable use of biodiversity and ecosystems.’

The key role of Indigenous and local knowledge in biodiversity conservation and management has been consistently highlighted within many international directives. For example, Aichi Target 18 of the Convention of Biological Diversity states that ‘by 2020, the traditional knowledge, innovations and practices of Indigenous and local communities, relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of Indigenous and local communities, at all relevant levels’.

Like the customary knowledge of Indigenous peoples worldwide, Australian Indigenous Biocultural Knowledge (IBK) exists and is transmitted primarily in oral form and is held by Indigenous custodians. In some places, this knowledge has been documented, often with assistance from non-Indigenous collaborators. This documented knowledge is held in a variety of forms, ranging from ‘grey’ literature such as unpublished reports, photos and videos, to more scholarly literature such as academic journal articles and books. Some of these records are publicly available and accessible. However, in most cases they are not, with even the project collaborators finding access difficult and records of their very existence not readily discoverable. In the past, the documentation of IBK has largely been facilitated by anthropologists, social scientists, historians and geographers, and to a limited extent by biophysical scientists (Ens et al., 2015). This partly explains why there has been, until recently, only a limited understanding and implementation of IBK by conservation scientists, management and policy makers. This is due largely to a long-standing divide between the social and biophysical science communities (Snow, 1959, 2012). The Australian IBK Working Group, supported by the Australian Centre for Ecological Analysis and Synthesis (ACEAS), has attempted to address this divide by designing and populating an online spatial database and website user interface ([www.aibk.info](http://www.aibk.info)). The aim of this resource is to raise awareness about the IBK that has been documented in Australia, as well as to highlight where the strengths, gaps and barriers and opportunities are for further engagement between Indigenous and non-Indigenous scientists, land managers and decision-makers.

Digital technologies including spatial mapping, electronic data collection tools and online databases have become increasingly common tools amongst broader society, not only to disseminate knowledge for learning, but also to facilitate collation, analysis, strategic development,

planning and networking. In the biological sciences, online databases range from international genomic databases such as GOLD (Bernal et al., 2001) to species distribution databases such as the Atlas of Living Australia,<sup>2</sup> the latter incorporating aggregate data from a wide range of data providers such as museums, herbaria, community groups, government departments, individuals and universities.

### 1.1. Online databases

Online databases are particularly useful for dispersed user groups and for sharing and mobilizing resources. They have been adopted for many purposes in recent years as programming for online access has improved (with the development of SQL, for example). A selection of relevant international and open-access databases are listed in Table 1. One database somewhat similar to the novel Australian Indigenous Biocultural Knowledge (AIBK) online database presented here, is the Traditional Ecological Knowledge \* Prior Art Database (TEK \* PAD), developed by the Science and Human Rights Program of the American Association for Advancement of Science. The TEK \* PAD provides an international index and keyword search engine of existing Internet-based, public domain documentation that focuses on Indigenous knowledge of uses of plant species. TEK \* PAD is a searchable archive of traditional knowledge documentation, that aims to promote Traditional Ecological Knowledge to the broader public, to establish and protect Indigenous knowledge as prior art. Data includes taxonomic and other species data, ethnobotanical uses, scientific and medical articles and abstracts, as well as patent applications themselves.

In Australia, databases and cultural information management systems are increasingly being developed by Indigenous natural and cultural resource management groups as well as co-managed National Parks. For example, Cultural Systems Solutions [<http://www.culturalss.com.au>] have created locally informed and culturally meaningful databases for a number of Indigenous co-managed World Heritage Areas, including Kakadu and Uluru-Kata Tjuta National Parks. These natural and cultural information management systems document place related information and advocate ongoing collection of data such as through the use of CyberTracker data collection software (Ansell and Koenig, 2011; Ens, 2012b) and hand held multimedia recording devices. As public and private sector participation in online and electronic data storage, spatial analysis and geographic information systems (GIS) increases, there will be more benefits accrued through data collation, communication and networking around spatially explicit topics of interest.

### 1.2. On-line GIS and knowledge communication

The multidisciplinary nature of desktop GIS technology means that its diffusion, appropriation and use have been spread across a variety of domains. The analytical potential of mapping techniques has been made more powerful by the introduction and widespread use of GIS and the digital databases linked to them. Numerous applications are available today to store and distribute spatial data over the Internet, using Web Map Services (WMS), Web Feature Services (WFS) and Web Coverage Services (WCS).

In a recent review of public participation in GIS, Sieber (2006) noted that GIS has been used as a tool for community empowerment, capacity building and social change, and that it has facilitated public involvement in policymaking. Sieber (2006) observed that the uptake of GIS has facilitated an ‘informationally-enabled democracy’, which has been driven by community groups, academics, and the public and private sectors, who are engaged in promoting broad access to information and resources. Increasing the accessibility to research and knowledge is considered vital for development (Chan et al., 2011). As 16th century philosopher Francis Bacon famously stated, ‘Knowledge is power’ (Bacon, 1597).

<sup>1</sup> <http://www.ipbes.net/about-ipbes.html>.

<sup>2</sup> <http://www.ala.org.au>.

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