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NORTHERN TERRITORY GOVERNMENT

Beyond Measure
The economic and social value of Kakadu National Park

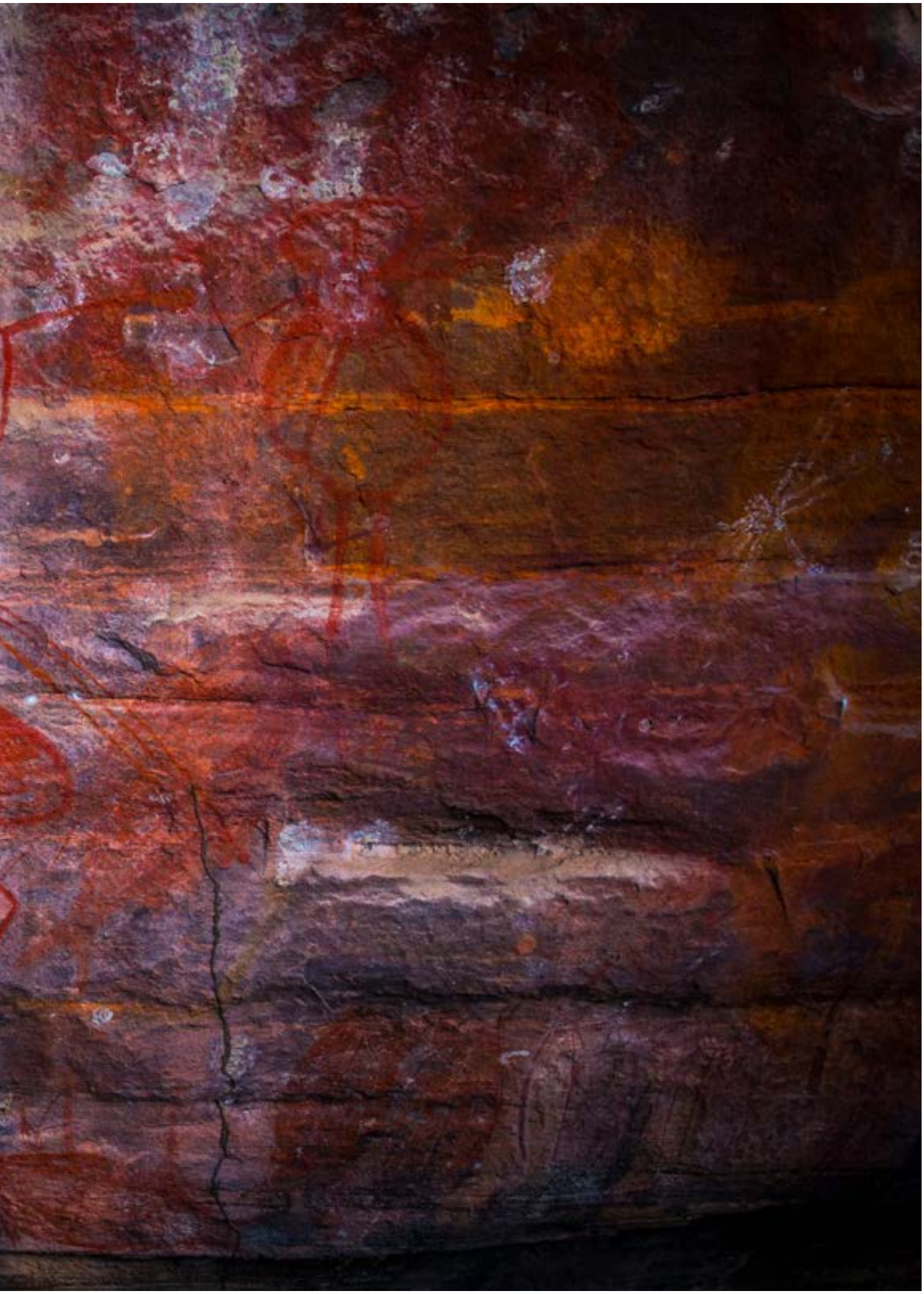
Department of the Chief Minister (NT)

2020

Acknowledgement of country

Deloitte is a national firm and we acknowledge the Traditional Owners of country on all the lands we travel and trade. This project has a special place in our hearts and we consider ourselves blessed to have been able to work with the local communities and their representatives in Kakadu and we pay our respects to the Bininj/Mungguy people, their Elders both past and present and we recognise and celebrate their continuing custodianship and culture.

Deloitte would like to acknowledge and thank Kakadu National Park's Traditional Owners and Parks Australia for their contributions to this research report.



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Glossary

Acronym	Full name
ABS	Australian Bureau of Statistics
CM&C	Department of Chief Minister and Cabinet
EBITDA	Earnings before interest, tax, depreciation and amortisation
ERA	Energy Resources Australia
FIFO	Fly-in fly-out
FTE	Full-time equivalent
FY	Financial Year
GBR	Great Barrier Reef
GDP	Gross Domestic Product
GOS	Gross Operating Surplus
GSP	Gross State Product
GAC	Gundjeihmi Aboriginal Corporation
IVS	International Visitor Survey
KCZ	Kakadu Conservation Zone
MOU	Memorandum of Understanding
NVS	National Visitor Survey
TRA	Tourism Research Australia
UNESCO	United Nations Educational, Scientific and Cultural Organisation

Executive summary

Kakadu National Park supports over 1,180 jobs and contributes $136 million to the Australian economy each year. It is a social asset worth $10 billion. It is a remarkable natural environment. It is Aboriginal Land, home to the world's oldest living culture.

At nearly 20,000 square kilometres, Kakadu National Park (Kakadu) is Australia's largest terrestrial national park and one of only 38 UNESCO World Heritage sites worldwide to be listed for dual natural and cultural values. It is Aboriginal Land, home to the world's oldest living culture, with Aboriginal groups occupying the region for over 65,000 years. Kakadu is jointly managed by the Commonwealth Director of National Parks/ Parks Australia and Aboriginal Traditional Owners. Kakadu encompasses not only unique cultural art sites but also contains a living cultural landscape, with the history and presence of the Traditional Owners recognised throughout Kakadu.

Kakadu offers rare experiences unlike anywhere else in the world. Famous landscapes, ancient rock art sites, waterfalls and hidden tracks, a variety of flora and fauna, fishing and bird watching experiences, all connected to Aboriginal culture.

This report assesses the economic and social value of Kakadu. It synthesises the findings of existing literature research on Kakadu, a survey of over 1,000 Australians and 500 members of the international community, and insights from stakeholder consultations including Traditional Owner groups, Aboriginal leaders, local businesses and government representatives.

The report estimates Kakadu's:

- Contribution to the Australian economy through industry value added and employment
- Social asset value to all Australians
- Brand value and contribution to national identity
- Significance of Kakadu's Aboriginal cultural values
- Environmental value of Kakadu's unique biodiversity.

In **economic terms**, Kakadu contributed $136 million in value added and over 1,180 jobs to the Australian economy in the 2018 calendar year. The majority of these jobs came from tourism activities in the Park.

Kakadu is more than just an economic asset. It is a **social asset** that some people experience directly by visiting and others value for its very existence, together worth an estimated $10 billion. This is based on the net present value of the annual figures for experience and existence value over the next 30 years. In context, this means Kakadu is worth one hundred times more than the market value of 20,000 square kilometres of land in the Northern Territory.

The social asset value is made up of two parts – the experience and existence value:

- The **experience value** of Kakadu is based on expenses, including travel and accommodation, plus the 'consumer surplus' – the additional value placed on the experience by both Territorians and Australians from other jurisdictions; this contributes $3.1 billion, or around 31 per cent to the social asset value.
- The **existence value** of Kakadu is based on how much Australians who do not visit believe it is worth to them, estimated through willingness to pay, discrete choice, and survival modelling. Specifically, the report analyses the value of the dual UNESCO World Heritage listing of Kakadu. The Park contributes $6.9 billion, or 69 per cent to the social asset value.

Kakadu also has a significant impact on Australia's international reputation and holds a significant **brand value.** 80 per cent say it contributes to our national identity, international standing and cultural identity.

There are many reasons why Australians and the international community are willing to pay to protect Kakadu:

While the report provides a dollar estimate of the social value of Kakadu, its environment and cultural features that are genuinely priceless.

From an **environmental perspective**, Kakadu has a remarkable catalogue of diversity:

- Thirteen categories of natural vegetation including mangrove, samphire, lowland rainforest, paperbark swamp, seasonal floodplains, sandstone rainforest and seven species of Eucalyptus
- Four major landforms including the Arnhem Land plateau and escarpment complex, the Southern hills and basins, the Koolpinyah surface, and the coastal riverine plains
- The fauna, including 275 bird species (one third of the Australian total), 64 different land mammals (one quarter of the Australian total), 128 different reptiles, 25 frog and 59 freshwater and estuarine fish species
- The flora, comprising more than 2,000 plant species, including 58 of major conservation significance
- The Ramsar-listed wetlands which provide a seasonal habitat for 2.5 million migrating waterbirds across the year.

Kakadu is Aboriginal Land of immense cultural, social and economic value to **Traditional Owners**. It covers the traditional lands of 19 recognised clan groups, which in pre-colonial times represented 12 distinct Aboriginal languages within its boundaries. The numerous clan groups of Kakadu represent a rich, diverse, and complex social structure and community system, which also acts as a well spring and touch stone for Aboriginal societies across all of Australia. The rock art in Kakadu was utilised as a means of storing and sharing traditional knowledge of the Aboriginal occupants, including between generations. This art now provides a window into the practices and teachings of Traditional Owners. In addition to internationally renowned rock art, Kakadu hosts cultural sites of the Bininj/Mungguy people, including sacred, ceremonial and occupational sites, which are some of the oldest in the world by archaeological standards. Kakadu offers a record of ancient and living culture and tradition. With over 5,000 identified rock art sites, and an estimate that an additional 5,000 to 10,000 may exist in total, as well as an estimate of several thousand archaeological sites, the quantity of cultural artefacts in Kakadu delivers a significant source of knowledge, history and reverence for all of Australia.

While the economic, social, environmental and Traditional Owner values are immense, Kakadu has faced many threats and challenges over many decades. The opening of the Ranger Uranium Mine in 1980 and its ongoing operations over the past four decades has caused tension. The recent announcement of the mine's impending closure creates further challenges, including anxiety about the future of the town of Jabiru. The number of visitors to Kakadu declined since its peak in the 1980s as supporting infrastructure has not received adequate investment. Increasing environmental threats, such as the invasion of Gamba Grass, are also placing pressure on the much needed preservation of Kakadu.

In response to declining visitation and these significant challenges, a range of stakeholders have implemented policies to transform Kakadu. From 2016, the Mirarr Traditional Owners of Jabiru developed a comprehensive vision and high-level masterplan to transition Jabiru from a mining services town to a world-leading cultural services, sustainable development and regional service hub post mining. This ultimately led to a Memorandum of Understanding (MOU) between the Gundjeihmi Aboriginal Corporation (representing the Mirarr people), Energy Resources Australia (ERA) and the Commonwealth and Northern Territory Governments. The MOU was formally signed in August 2019. Earlier in the year, pursuant to the MOU, the Commonwealth Government announced major funding for the region, committing to spending $216 million to revitalise Kakadu and Jabiru. In addition, the Northern Territory Government's 2019 budget included a $131.5 million commitment over four years to deliver a long-term plan for the future viability of Jabiru.

Ahead of us lie the challenges of transitioning Jabiru to the post-mining period in accordance with the Mirarr vision and masterplan, facilitating economic development, preserving environmental values and supporting traditional ownership in Kakadu.

The contents of this report may assist all levels of government and the wider public to fully understand Kakadu's contribution to Australia and what is at stake if stakeholders do not meet current and future challenges.

1. Introduction

1.1 Overview and background

1.1.1 Kakadu National Park

Inscribed on the World Heritage list since 1981 for its dual environmental and cultural values, Kakadu National Park (Kakadu) is one of Australia's most iconic landmarks. Proclaimed as a National Park in 1979, Kakadu covers 19,810 square kilometres of coastal zones, rainforests, floodplains and savannah woodlands in the Northern Territory. These landscapes are internationally recognised for their biodiversity and ecological value, hosting 33 per cent of Australia's bird species and 25 per cent of Australia's fish species. Kakadu is also home to the world's oldest living culture, with evidence of occupation by Aboriginal groups dating back over 65,000 years.

Besides servicing domestic and international tourism, the regional economy has historically supported uranium mining at the Ranger mine, which is surrounded by Kakadu but excluded from its boundaries. Under the terms of the Commonwealth authority to mine Ranger, operations will cease before 9 January 2021. Guided by the Mirarr people, the town of Jabiru is now transitioning towards becoming a fully regional services and tourism-based economy.

1.1.2 Scope of the report

The Department of the Chief Minister and Cabinet (CM&C) engaged Deloitte Access Economics to provide a report on the economic and social value of Kakadu to Australia.

This report measures the economic contribution of Kakadu to Australia's economy through its park operations as well as its tourism contributions. Survey data is also used to calculate the social value of Kakadu. Although these figures are not additive, they indicate the significant contribution that Kakadu makes to the Northern Territory, Australia and the world.

The significance of Kakadu to Aboriginal Traditional Owners is also considered, for whom Kakadu represents fundamental cultural values which are impossible to calculate within a market-based framework.

Kakadu also contributes unique environmental value to the Northern Territory, delivering significant value to

About the survey

This report is informed in part by a bespoke survey fielded by Dynata in April 2019. The survey was undertaken by over 1,000 Australians and 500 international residents. The international survey was delivered to people in New Zealand, the United Kingdom, the United States and China.

The results of the survey feature in several parts of the report, including the chapters on economics, brand, and social asset. More details about the survey are explained in Appendix D.

Participants were asked about the duration and total cost of their prior visits to Kakadu, and their views on the value of this experience, and how much they would be willing to pay to preserve Kakadu in the face of a range of scenarios. The participants also included those who haven't visited Kakadu, and covered general perceptions and attitudes towards Kakadu as a cultural and natural asset to Australia and the world.

Australia's biodiversity and brand as a whole.

1.2 Why value Kakadu National Park?

The Australian identity is shaped by our relationship to the natural environment. Australia is renowned around the world for its spectacular landscapes, from coastal wilderness to tropical rainforests, sprawling arid bushland to the red desert centre, and the timeless north.

With significant biodiversity in flora and fauna, as well as some of the oldest land surface on earth, Australians have an intrinsic understanding of the wonders of the natural environment, and the importance of preserving it for the benefit and enjoyment of all.

Aboriginal Australians in particular have a profound spiritual, social and cultural connection to the natural environment. Land, and its flora and fauna, are the source of Aboriginal laws and customs, the core of their identity and sense of belonging, a living cultural knowledge. The international recognition of Kakadu's outstanding environmental and cultural significance demonstrates the magnitude the international community also places on preserving Kakadu for future generations.

Clearly, the value of Kakadu can never be fully captured by a single dollar figure. However, the contents of this report should give Kakadu's social, cultural, and environmental values greater significance in decision-making, and help inform future policy settings around Kakadu and Jabiru. This may assist government and the wider public to fully understand the contribution of Kakadu to Australia's economy and society more broadly.

Valuation studies

In this report we cover valuation from a variety of perspectives to recognise that there is no single best view. Understanding economic activities within Kakadu, its brand values, and its role in the tourism industry can assist with planning and investment decisions. Valuing Kakadu to our society can help raise public awareness and inform government policies. This report also gives significant treatment to environmental values and, the perspective of Traditional Owners. Identifying and measuring the value of Kakadu is also important to help the international community understand the contribution of Kakadu to Australia and the world. Like other reports by Deloitte valuing environmental assets, this report and valuing Kakadu is not to imply it should be commodified or privatised. Often, natural assets are ignored because their value cannot be fully captured commercially.

Studies valuing Kakadu National Park

This study builds on the work of existing economic studies seeking to estimate the economic value of Kakadu. Incorporating the results of these previous studies not only assisted in the framing of the survey for measuring the economic and social value of Kakadu, but also provided important context around the framing of the environmental and economic debates which have been associated with Kakadu over time.

Many of the earliest studies of the economic value of Kakadu were produced in the context of ongoing debates surrounding the uses of Kakadu for tourism, mining, or conservation purposes. For example, the study by Carlsen, Wilks and Imber (1994) on behalf of the Resource Assessment Commission estimated Australians' total value for preserving the Kakadu Conservation Zone, at $435 million, compared to an estimated $102 million in value for proposed mining activity.[1]

Many previous studies have primarily focused on estimating the value of tourism towards Kakadu. For example, Tremblay (2008) estimated that Kakadu contributed $8.28 million to tourism expenditure in the Northern Territory, and a further $15.79 million for the Top End.[2] Buckley (2004) estimated the economic impact of Kakadu's World Heritage listing on visitor numbers, finding that the proportion of international visitors increased from 10 per cent in 1982 to 50 per cent in 2000.[3]

This study therefore seeks to fill a gap in the literature, by providing a comprehensive assessment of the economic, social, and cultural value of Kakadu to Australian consumers, Traditional Owners, and Australian society more broadly.

1.3 Report structure

The rest of this report is set out as follows:

- **Chapter 2** provides a background of Kakadu National Park and current plans for its future
- **Chapter 3** presents the economic contribution of Kakadu to Australia
- **Chapter 4** assesses the brand value of Kakadu to Australia
- **Chapter 5** analyses the social and cultural value of Kakadu to consumers and broader society
- **Chapter 6** discusses the Traditional Owner value of Kakadu
- **Chapter 7** explores the importance of protecting Kakadu's natural environment for future generations to also enjoy

2. The future of Kakadu National Park

2.1 The history of Kakadu

Covering almost 20,000 square kilometres in the Northern Territory, from the coast of the Top End to the hills and gorges 150 kilometres to the south, Kakadu is the largest national park in Australia.[4] Aboriginal people have occupied the area for over 65,000 years, making Kakadu home to the world's oldest living culture.[5]

2.1.1 National Park and World Heritage Listing

Kakadu was officially proclaimed as a National Park in 1979 under the former *National Parks and Wildlife Conservation Act 1975*.[6] Almost half of the land in Kakadu belongs to Traditional Owners under the *Aboriginal Land Rights (Northern Territory) Act 1976* (Land Rights Act),[7] with the balance subject to long-standing claims under the Act, set to be granted Aboriginal land following the scheduling of these claims by the Federal Parliament earlier this year.[8] Traditional Owners lease this land to the Director of National Parks and manage Kakadu jointly with Parks Australia.[9]

First inscribed on the World Heritage List in 1981, Kakadu has been internationally recognised for its outstanding ecological, anthropological, and archaeological values.[10] Encompassing a diverse range of natural ecosystems, Kakadu's rainforests, floodplains, coastal zones and savannah woodlands are home to 64 mammal, 275 bird, 128 reptile, 25 frog and over 59 freshwater and estuarine fish species.[11] Further land was added to the World Heritage listing in 1987 and 1992, as well as the disputed Koongarra mining enclave in 2011. The Ramsar Convention on Wetlands lists 1,979,766 hectares of Kakadu as wetlands of international importance, hosting native Australian birds as well as migratory birds from the rest of the world throughout the year.[12]

Kakadu is also a living cultural landscape, one of only 38 UNESCO World Heritage sites worldwide to be listed for dual natural and cultural values.[13] Today, around 300 to 400 Aboriginal people permanently reside within Kakadu, on 'outstations' or 'homelands', speaking Aboriginal languages such as Gun-djeihmi, Kun-winjku and Jawoyn on a daily basis.[14] Recent archaeological findings have shown Aboriginal groups have occupied the area for over 65,000 years,[15] the earliest evidence of human habitation in Australia.[16] Traditional Owners continue to practice their customs and traditions within Kakadu, with ancient sites featuring contemporary rock paintings alongside 20,000 year old galleries.[17] These paintings depict a wealth of images of Aboriginal society over the ages, from their hunting and gathering practices before the last ice age, to ships and wagons from their first contact with Europeans.[18]

2.1.2 Uranium mining

The richness of the area's natural resources also extends beneath the surface, with globally significant uranium deposits discovered within the area at Ranger, Jabiluka and Koongarra in the 1960s. While the Land Rights Act recognised Traditional Owners' rights to these areas in 1976, it also created specific exceptions to allow for mining enclaves at these areas, excluding them from the World Heritage listing in 1981.[19] The Jabiluka and Koongarra deposits were not developed.

While Koongarra was later incorporated into the World Heritage area in 2011, mining went ahead at Ranger after 1979. This decision marked the beginning of long-running debate between various environmental, Aboriginal, and mining groups over the appropriate usage of the land. Jabiluka in particular contains sacred sites of fundamental importance to the Mirarr people, a Bininj clan, and development ceased at the site in 1999.[20]

A series of environmental incidents throughout the mine's operational history added to this controversy, with many incidents documented since 1979.[21] One incident, for example, was the potable water contamination incident in 2004, where the potable supply to Jabiru-east was shut down.[22]

Operated by the ERA, the Ranger Uranium Mine is one of the largest in the world, with a project area of 79 square kilometres.[23] In accordance with its Commonwealth authority to mine, the Ranger Mine will cease operations before January 2021. Plans for rehabilitation of the site are intended to restore Ranger to as close a state as possible to its natural condition prior to 1979.

The planning for this rehabilitation process has begun and will be completed in consultation with the Commonwealth Government, the Northern Territory Government, Traditional Owners and other stakeholders.[24]

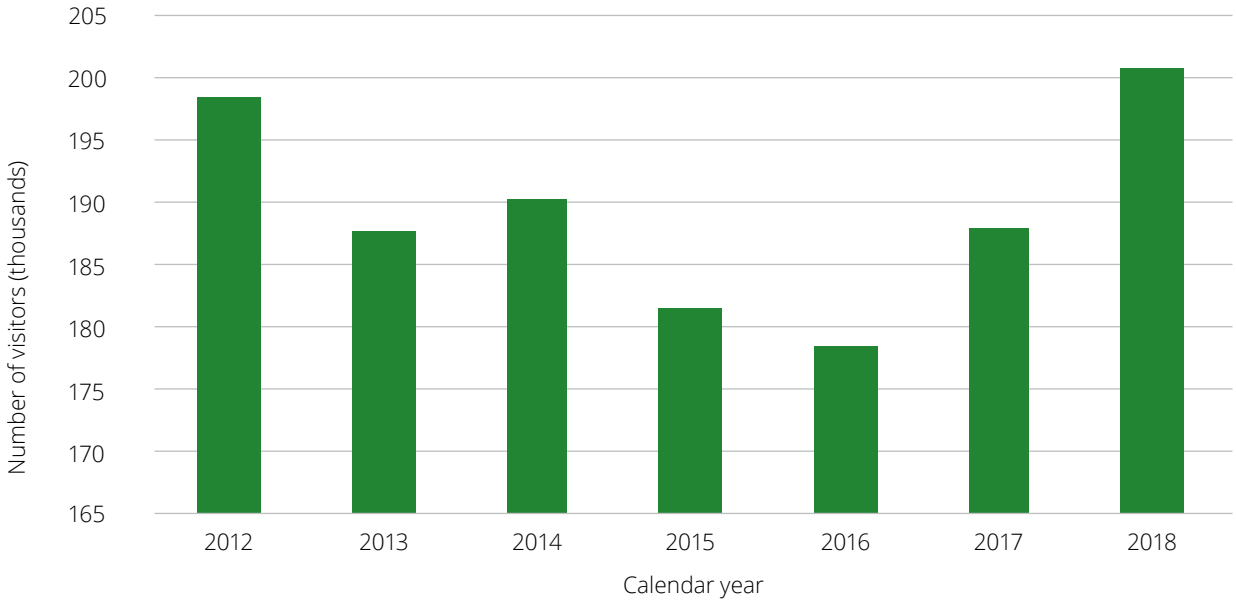
At Jabiru, the 2019 Memorandum[25] outlined how the parties will work together through the remediation process. Specifically, it covers what is required, arrangement for long term management of hazardous substances, funding arrangements and the delivery process.

2.2 Kakadu National Park today

Besides supporting the mining industry and supporting services, Kakadu's regional economy also relies on tourism. Kakadu's rich environmental and cultural heritage has made it a major attraction for both domestic and international visitors, promising abundant landscapes and wildlife.

Kakadu welcomed 200,577 visitors in 2018, representing an increase of 6.4 per cent on the previous year and its highest annual visitation since 2012.[26] Between 2012 and 2016, visitation to Kakadu declined each year, with the exception of 2014, which saw a slight increase in visitors from the previous year.[27] In 2016, Kakadu saw its lowest level of visitation over the past seven years, with 178,414 visitors entering Kakadu.[28]

Chart 2.1: Visitation to Kakadu National Park, domestic and international, 2012 to 2018.



Source: Parks Australia[29]
Note: This visitation data is estimated from vehicle counters into Kakadu[30]

2.2.2 Challenges for Kakadu National Park and Jabiru

In 1982, the town of Jabiru was established to support uranium mining in the region, particularly the Ranger Uranium Mine. As mentioned, ERA will cease mining activities at the Ranger Mine in 2021.[31]

While the announcement of mining activities ceasing in 2021 has increased the urgency of repositioning Kakadu and Jabiru towards a tourism-based economy, the region faces a number of challenges in doing so.

The Northern Territory's tourism sector has seen declines in recent years, with international visitor numbers in particular dropping since the 1980s. While the Territory recorded approximately 300,000 international visitors per year in the 1980s, only an estimated 289,000 visited in 2018.[32]

Kakadu's tourism infrastructure has also fallen behind that of other tourism destinations. Kakadu has previously recognised the need to develop a modern and integrated infrastructure which promotes Kakadu's internationally recognised World Heritage status.[33] Road infrastructure is also of variable quality and vulnerable to seasonal conditions. For example, in 2018, access to one of Kakadu's major attractions, Twin Falls, was closed due to water level concerns until the end of the region's tourism season in August.[34]

Meanwhile, the tourism landscape has become increasingly competitive, with cities and regions across Australia increasing their efforts to capture a greater share of the 9.2 million international tourists who visited Australia in 2018.[35] Expanding the contribution of tourism to the regional economy will require Kakadu to find new ways to compete more effectively with an expanding number of other destinations, in Australia or overseas.

2.3 Public policy and Kakadu National Park

A range of public stakeholders have responded to these challenges by implementing policies to facilitate the region's transition towards a tourism-based economy. Parks Australia published the sixth Kakadu National Park Management Plan in 2016, aiming to manage Kakadu and its uses through the coming decade.[36] The plan attempts to balance the competing needs of protecting Kakadu's environmental and cultural heritage whilst also enhancing Kakadu for visitors. Policies include protecting endangered species, furthering cross-cultural awareness between park staff and Traditional Owners, as well as making park campgrounds more accessible for visitors.

From 2016, the Mirarr Traditional Owners of Jabiru developed a comprehensive vision and high-level masterplan to transition Jabiru from a mining services town to a world-leading cultural-services, sustainable development and regional service hub, post mining. This guided the settlement of the Jabiru Native Title claim and discussions about the future of the town, and more broadly, the region.

Jabiru Native Title and the Mirarr Traditional Owners

On 9 November 2018, The Federal Court of Australia held a hearing to recognise the Native Title rights of the Mirarr People over areas of the Jabiru Township and its immediate surrounds.

First filed in 1998, on behalf of the Mirarr people, this Native Title application represents years of struggle that the Mirarr people have faced to gain ownership of their land within Kakadu. This milestone presents another reason why valuing Kakadu is important in highlighting the cultural significance this land has for the Aboriginal and broader community.

In 2017, the Gundjeihmi Aboriginal Corporation (GAC), representing the Mirarr Traditional Owners, published the Jabiru Masterplan 2018–2028 and later the Jabiru Business Case prepared by the Stafford Strategy Group.[37] Areas of focus include securing tenure for Jabiru in order to provide certainty for investors, and resolving issues around air access and power for the town. Jabiru should also become a tourist and cultural services centre, featuring cultural and scientific research as well as a Bininj (Aboriginal) Resource Centre.

The MOU between the GAC, ERA and the Commonwealth and Northern Territory Governments was formally executed in August 2019. Pursuant to this, in January 2019, the Commonwealth Government announced major funding for the region, committing to spending up to $216 million to revitalise Kakadu and Jabiru.[38] Policies are focussed on upgrading road and tourism infrastructure. This includes upgrading camp grounds, improving tracks, viewing platforms and signs, as well as improving internet and phone network connectivity. In addition to this, the Northern Territory Government has also made a $131.5 million commitment over four years to deliver a long-term plan for the future viability of Jabiru.[39] This funding commitment will go towards the creation of a Bininj Resource and Development Centre to support Aboriginal learning, essential infrastructure, new government services centre and improved education and health facilities.[40]

2.4 Case study: AAT Kings

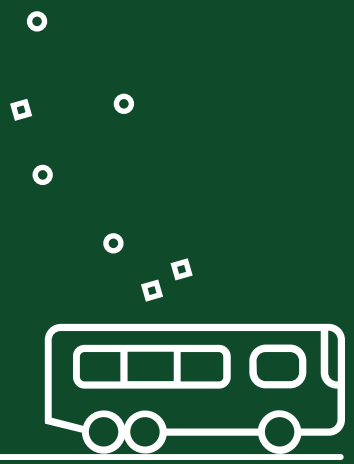
AAT Kings is an Australian and New Zealand coach tour operator, offering a range of day tours, short breaks and guided holidays across the Northern Territory and Australia. In Kakadu specifically, AAT Kings offers a range of trips to consumers, including day trips, two-night trips and three and four night short breaks. Within Kakadu, AAT Kings operates up to three tours a day and employs 15 drivers throughout the Top End.

AAT Kings is one of the larger tourism providers that operate in Kakadu. However, the company uses a number of smaller tourism providers to offer services, including joining with Kakadu Tourism to offer the Yellow Water Billabong Cruise and Gunlom Falls Adventure with Kakadu Cultural Tours (KCT) to provide the Guluyambi Cultural Cruise and Mercure Crocodile Hotel for guests accommodation.

Annually, AAT Kings has a customer base of 13,500 individuals. In recent years, particularly, 2017 and 2018, AAT Kings has not seen growth in their visitor market in Kakadu.

Operating in Kakadu's unique landscape offers a magnitude of benefits for the business, however it also poses some challenges. In particular, the wet season creates a number of difficulties for tourism providers. Access to sites is limited during the wet season due to high water levels, placing constraints on the sites that can be visited during the season. Infrastructure and roads throughout Kakadu are also a challenge, the rough terrain and lower quality roads can result in high maintenance costs for vehicles.

Although these challenges exist within Kakadu, AAT Kings has identified a number of unique opportunities for their operations in Kakadu. Operating year round and opening further attractions in the wet season has the ability to encourage more visitation outside of peak travel times. The Yellow Water Cruise is a highlight for many visitors. The opportunity exists to offer more immersive Aboriginal cultural experiences such as this one throughout Kakadu.



Economic contribution in 2018

3. Economic contribution

Kakadu National Park contributed $136 million in value added and over 1,180 jobs to the Australian economy in 2018.

This chapter presents the contribution of Kakadu to Australia's economy in the 2018 calendar year. The analysis in this chapter focuses on the quantifiable contribution of Kakadu to economic measures such as Gross Domestic Product (GDP) and employment in Australia.

3.1 Measuring the economic contribution

Kakadu contributes significantly to the economy through a number of commercial channels, which ultimately contribute to the national accounts of Australia.

The economic contribution of Kakadu is mainly derived from the economic activities that occur as part of tourism in the region. As such, the economic contribution study focuses on value added to the economy, and the employment supported from this sector. We do not directly include the impacts of uranium mining, but it is discussed on subsequent pages.

To get the full contribution of Kakadu to the Australian economy, apply the same reasoning to all economic activities attributed to Kakadu (e.g. a tourist paying for a guided tour of Kakadu or a family having dinner at the Mercure Crocodile Hotel). Further details on the framework behind economic contribution studies can be found in Appendix A.

For example, a tourist may dine in the Crocodile Hotel in Jabiru during their visit to Kakadu. The value of the dining service is counted under value added. In order to provide the dining service, the restaurant has to purchase produce from local suppliers. The value of the produce is counted as the value of intermediate inputs. Gross output captures both the value of the dining service and the value of the produce.

Much like the example above, Kakadu contributes to full time equivalent (FTE) employment directly and indirectly. Direct employment through activities such as tourism, which also contributes indirect employment to local businesses through the increase in demand that tourism generates. The definitions used to describe the different contribution Kakadu has to employment are detailed in Table 3.1.

Table 2.1: Visitation to Kakadu National Park, domestic and international, 2012 to 2018.

Job type	Definition
Full time equivalent (FTE)	Employment of approximately 40 hours per week
Direct FTE	Direct industry-related FTEs
Indirect FTE	Flow on FTEs from direct FTEs
Total FTE	Direct and indirect FTEs

3.2 Economic contribution

Overall, **Kakadu contributed $136 million in value added** to the Australian economy in the 2018 calendar year. In terms of employment, Kakadu supported more than **1,180 full-time equivalent jobs in Australia.**

The data sources for estimating the economic contribution of Kakadu were visitor numbers to the region in 2018, provided by Parks Australia and regional expenditure data sourced from the National Visitor Survey (NVS) and the International Visitor Survey (IVS) conducted by Tourism Research Australia (TRA).

The visitor numbers made available by Parks Australia are estimated using traffic counters, these are installed at the northern and southern entry points to Kakadu. Calibration surveys are used to convert vehicle classifications and counts into estimated visitor numbers.

To estimate the tourism expenditure of visitors to Kakadu, regional expenditure in the tourism region of Litchfield Kakadu Arnhem was used, which is the most granular data available to inform visitor expenditure of visitors to Kakadu. The expenditure profile of Litchfield Kakadu Arnhem has been applied to the visitor number provided by Parks Australia, to capture regional expenditure in Kakadu. Domestic visitors spent $88.6 million in the region, while international visitors spent $31.9 million.

Induced tourism activities in the Northern Territory

The economic contribution of Kakadu includes an *induced* component of tourism expenditure. This refers to those who travelled to the Northern Territory with the main purpose of visiting Kakadu. Using survey data, it is estimated that 60 per cent of interstate visitors and 72 per cent of international visitors to the Northern Territory travelled for the purpose of visiting Kakadu in 2018.

The additional expenditure attributed to these visitors was estimated at $105 million, with the majority being spent by interstate travellers ($66 million), and the remaining $39 million spent by international visitors in the Northern Territory.

Table 3.2: Economic Contribution of Kakadu National Park, 2018

	Northern Territory
Consumption ($)	$201.7
Direct output ($)	$135.7
Value added ($ millions)	
Direct ($)	$69.0
Indirect ($)	$67.5
Total value added	**$136.4**
Employment (FTE)	
Direct	728
Indirect	460
Total employment	**1,188**

Contribution of uranium mining

Home to globally significant uranium reserves, the impacts of uranium mining have profoundly shaped Kakadu and Jabiru's local economy since mining began in 1981. Mining currently directly contributes to approximately a third of employment in the region;[41] while historically, the township of Jabiru was built as a service town to support the industry. While the mineral lease at Jabiluka did not proceed after 1999, Ranger became one of the largest and longest-operating uranium mines in the world, with a project area of 79 square kilometres.[42]

In its 37 years of operation, the Ranger mine produced more than 128,000 tonnes of uranium. While demand for the resource has fallen since the 2012 Fukushima incident, uranium oxide (U_3O_8) remains a valuable resource demanded across the globe. ERA estimates that Ranger 3 Deeps body currently contains approximately 43,858 tonnes of measured and indicated uranium oxide.[43] Using the current price for uranium oxide, this stock has a potential gross value of $2.1 billion.[44]

Besides the value of these resources, Ranger also supported employment and production in Jabiru and Kakadu. In particular, ERA estimates that Ranger has contributed:

- More than $500 million in royalties to Aboriginal interests and to the Northern Territory and Commonwealth Governments[45]
- $230 million on establishing the town of Jabiru, including on constructing commercial properties, housing, a public pool and sporting facilities, an airport, and more[46]
- $108 million to Jabiru's economy every year thereafter, through salaries and local expenditure.[47]

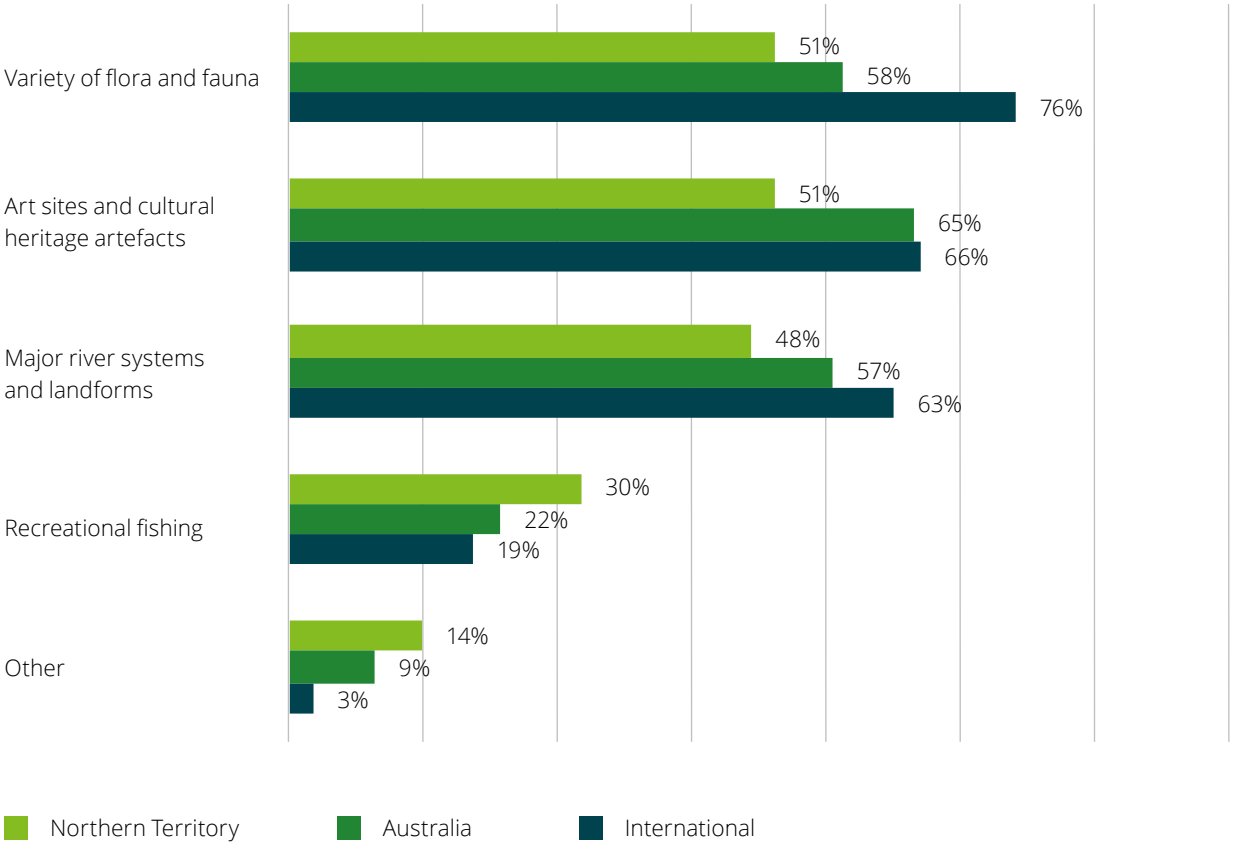
The land will not be developed again without the consent of the Mirarr Traditional Owners. The current operator, ERA is now focused on processing and exporting uranium from their existing stockpile of ore, as well as overseeing the progressive rehabilitation of the sites to their pre-existing state, a task which is scheduled to continue until 2026.[48]

3.3 Tourism value of Kakadu

A significant component of the economic contribution from Kakadu comes from tourism. To help explain and analyse this, a number of questions in the survey for this project focused on the attitudes of tourists to Kakadu.

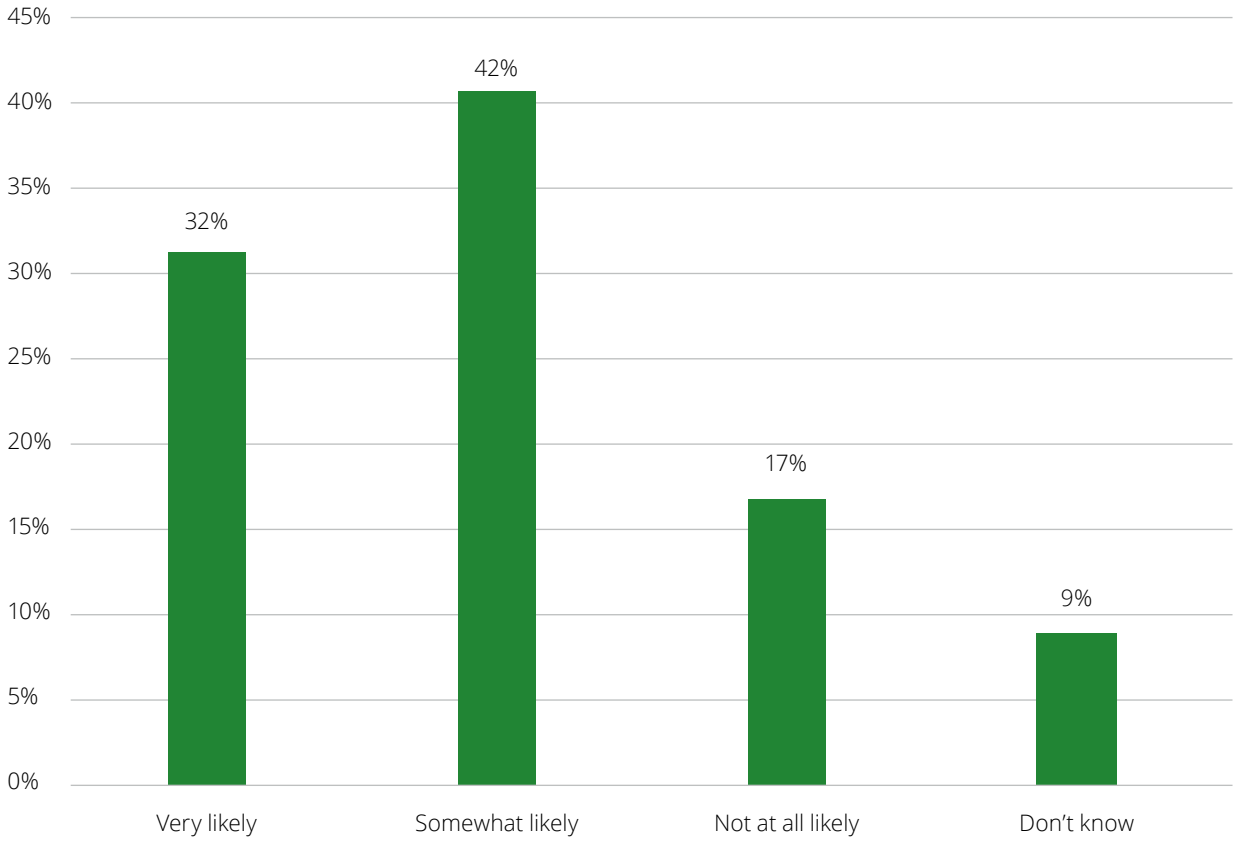
Individuals visit Kakadu for a variety of reasons. Among the international community, 76 per cent of respondents indicated that they visited Kakadu for the variety of flora and fauna. Among domestic travellers, art sites and cultural heritage artefacts were the main reason for visiting (65 per cent). Major river systems and landforms were also a drawcard for Australian respondents, with 63 per cent indicating these as their reason for visiting.

Chart 3.1: Why individuals chose to visit Kakadu National Park



Source: Deloitte survey conducted by Dynata

Chart 3.2: The likelihood of individuals visiting Kakadu National Park in the future



Source: Deloitte survey conducted by Dynata

Note: Domestic and International results have been combined

Of the more than 500 respondents who had visited Kakadu, 89 per cent were either very satisfied or satisfied with the nature and wildlife experiences within Kakadu. Respondents were also either very satisfied or satisfied with:

- Local community and cultural experiences
- Quality of accommodation choice

Another interesting finding is that tourists see Kakadu as unique. 64 per cent of the respondents to the survey commissioned for this report said that the sights and experiences of Kakadu were unique, while 32 per cent believed that they are somewhat unique.

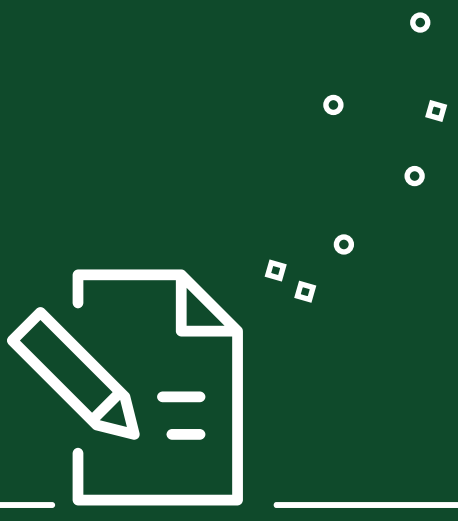
Of those who had not visited Kakadu, 42 per cent indicated they are somewhat likely to visit, and another 32 per cent indicated that they are very likely to visit Kakadu in the future.

3.4 Case study: The Mercure Kakadu Crocodile Hotel

The Mercure Kakadu Crocodile Hotel is four-star accommodation located in the township of Jabiru, on the border of Kakadu. It is one of the most distinctive hotels as it shaped to represent Kakadu's saltwater crocodile. The hotel is the only full-service hotel in Kakadu. It offers 110 guest rooms, a restaurant and bar, meeting rooms and full business facilities.

The hotel is Aboriginal-owned and operated by Kakadu Tourism (a joint venture between Indigenous Business Australia and the Gagudju Association) in conjunction with AccorHotels. During the Northern Territory's peak tourism season the hotel employs 80 staff, while in the wet season this decreases to around 35 staff. The hotel also houses a collection of Aboriginal art including paintings and digeridoos in an onsite gallery, and featured in the hotel lobby, which can be purchased by the public.

In 2018, the Crocodile Hotel saw its most successful year in 12 years. During the wet season, Australians represent the majority of visitors to the hotel. In the dry season the customer base becomes more diverse, with increased visitation from the international community, from France, Italy, the United Kingdom and more recently, China. Aboriginal cultural experiences present the most significant opportunities around attracting visitation to the hotel and Kakadu.



"Standing on the escarpment at Ubirr you experience the vastness of Australia and Kakadu National Park. It is a spiritual experience."

Rick Allert, Chair of Kakadu Tourism

4. Brand value

A nation brand is a blended set of emotional and rational associations that a person makes when they hear a country's name, or when they are exposed to imagery, sounds or other cues that evoke a country in people's minds. It includes the popular image and international reputation held by a country. Nation brands influence and shape the purchasing and economic decisions made by tourists, immigrants, inward investors and traders, and international partners.[49] Despite Australia's remoteness and smaller population, Deloitte previously found that Australia has a strong nation brand, ranking just outside the world's top ten.[50] This chapter examines the contribution of Kakadu to Australia's brand.

4.1 Informing Australia's national identity

In a country shaped by our relationship to the natural environment, Kakadu represents an important component of Australia's national identity. From rocky red cliffs jutting out of dense green bushland, waterfalls spilling into lush emerald rainforests, and bleached coastal plains stretching out to the ocean, many of Australia's most recognisable landscapes are found within Kakadu's borders. These quintessentially 'Australian' landscapes are filled with the greatest biodiversity of any similarly-sized region in Australia's north,[51] as well as the oldest anthropological evidence of human habitation in Australia.[52] Even for Australians living outside the Northern Territory, Kakadu represents an unspoiled natural beauty and ancient wilderness, evoking similar notions of 'Australia' as captured by other iconic areas such as the Great Barrier Reef, Uluru-Kata Tjuta National Park, or the Snowy River.[53]

Many non-Aboriginal Australians take pride in Kakadu's ancient cultural heritage, and use elements of this heritage to "construct and negotiate (their own) identities".[54] Australians across the continent often consider the outback and Kakadu to be their "backyard playground".[55] Waterton concludes that Kakadu presents non-Aboriginal Australians with both 'comfortable and challenging notions of national belonging and identity',[56] aspects which continue to shape the Australian national identity today.

4.2 Impacting on Australia's international reputation

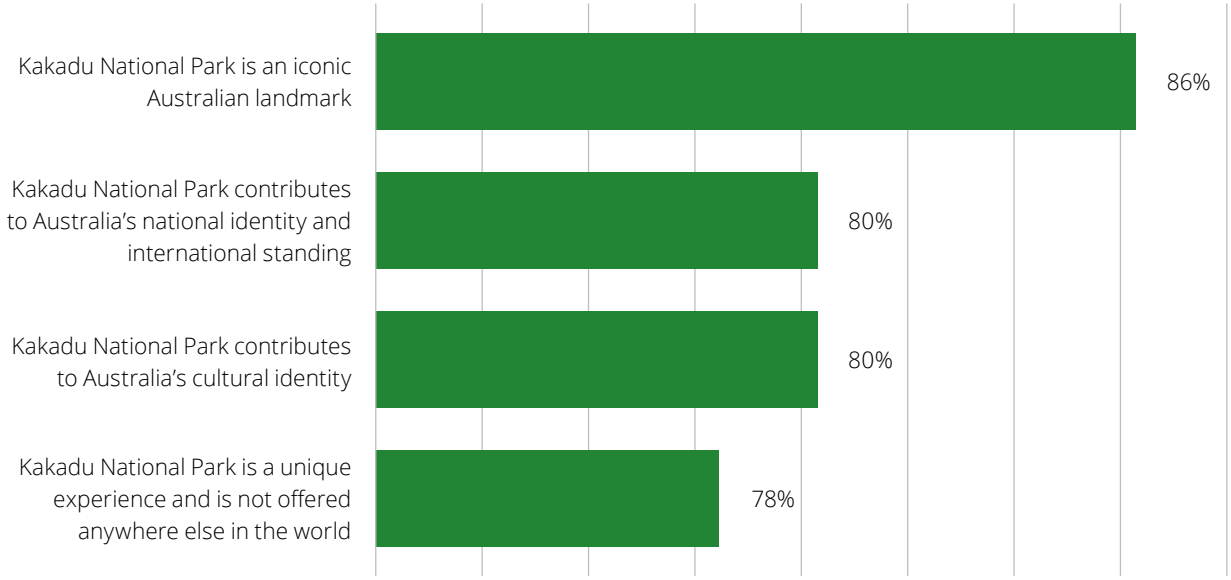
The unique elements of Kakadu and its Northern Territory location combine to make a significant impact on Australia's international reputation. Of the more than 1,500 people Deloitte Access Economics surveyed in Australia and overseas, 75 per cent of respondents either strongly agree or agree that Kakadu contributes to Australia's brand globally, with Australians and international respondents rating Kakadu's significance to Australia's brand similarly.

Furthermore, a majority of all those surveyed agreed or strongly agreed that Kakadu:

- Is an iconic Australian landmark
- Contributes to Australia's national identity and international standing
- Contributes to Australia's cultural identity
- Is a unique experience that is not offered anywhere else in the world.

While Kakadu contributes to Australia's global brand and is a powerful drawcard for tourists, it is not a standalone brand. Its associations are magnified by the broader environmental and human context in which it is known – as a natural environment of great and unique beauty, and as a site of unparalleled First Peoples cultural significance and heritage. These elements combine with other aspects of Australia's reputation to build our nation brand internationally.

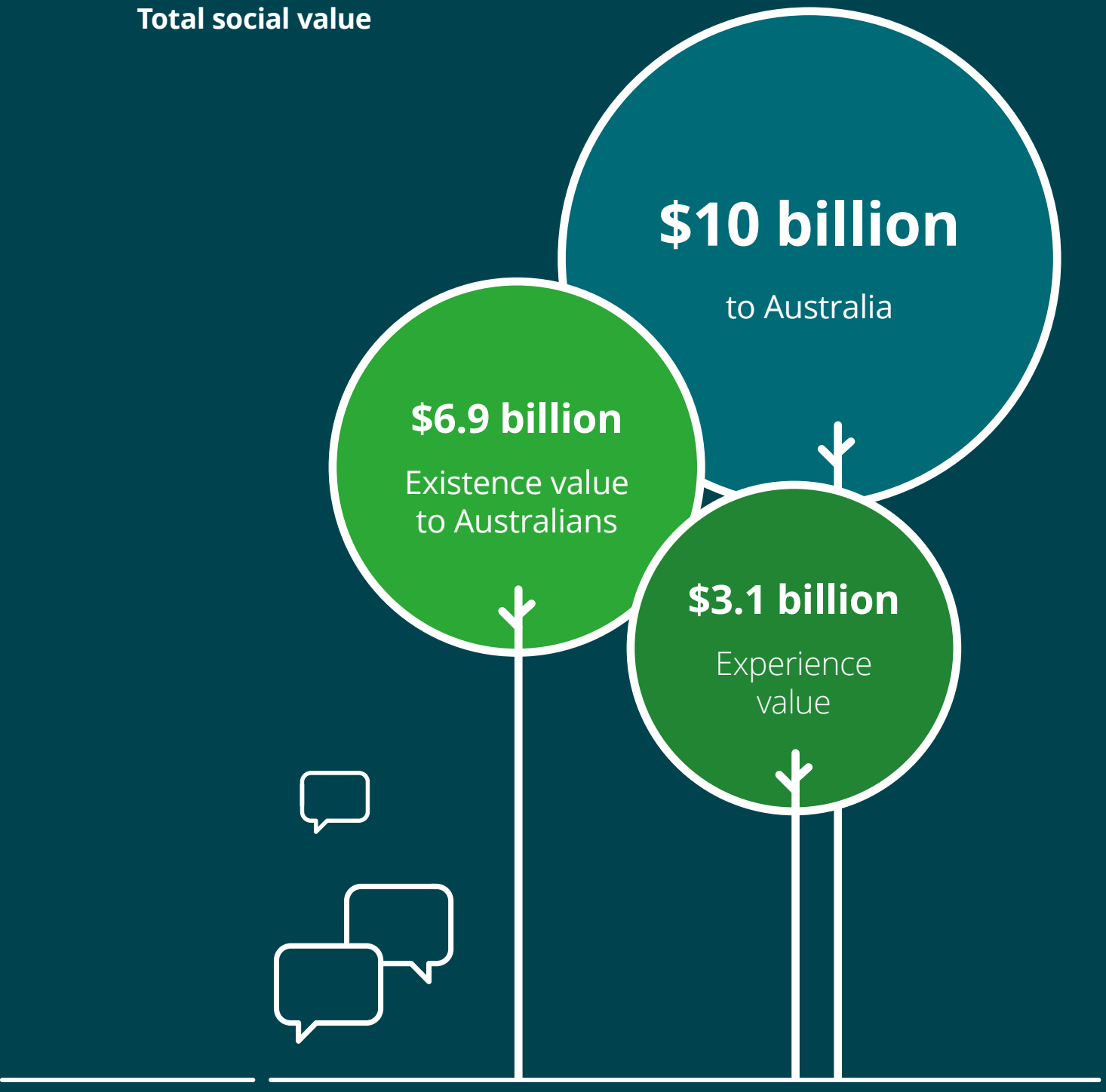
Chart 4.1: What Australians and the international community think about Kakadu National Park



Source: Deloitte survey conducted by Dynata

Note: Domestic and International results have been combined

Total social value



5. Social value

Kakadu National Park's social asset value is $10 billion.

While the figure presented in Chapter 3 captures the annual Gross State Product (GSP) contribution of Kakadu, there are other ways that Kakadu contributes to the welfare of society. This chapter quantifies the social, cultural and economic value of Kakadu to Australians.

There are a number of different frameworks that extend measures of value beyond GSP or Gross Domestic Product (GDP). These frameworks are sometimes called 'Total Economic Value'[57] and categorise values between 'use' and 'non-use', which can be further divided into sub-components. In this chapter, we use two simple ideas to capture the most relevant parts of value: **experience value**, that is how much people like visiting Kakadu, and **existence value**, that is how much people like Kakadu just being there even if they have not visited. Together, these are the social asset value of Kakadu.[58]

5.1 Quantifying the value of Kakadu

The main technique to estimate the experience and existence values that are not revealed by the market is to survey a sample of individuals who would have this value. In this case, a survey was fielded to a representative sample of Australians and international residents to understand how they value Kakadu.

As mentioned in Chapter 1, Deloitte Access Economics and Dynata Research conducted a research survey of over 1,000 Australians and 500 international residents.[59] The survey was administered online and designed to reveal attitudes and preferences towards Kakadu. The results of the survey provide a way to estimate the value of Kakadu beyond its pure economic contribution to the economy. The questions focussed on three main areas:

- General perceptions and attitudes towards Kakadu as a natural asset to Australia and the world for all respondents
- Australian and international respondents tourist activity and associated costs
- Australian and international respondents willingness to pay a levy to protect the future health of Kakadu.

The survey results were analysed and then paired with established economic methods to estimate the total social and economic values. The methods were developed based on the existing literature in **Appendix C** and applied as outlined in **Appendix E.**

The full list of survey questions and results are presented in **Appendix D**.

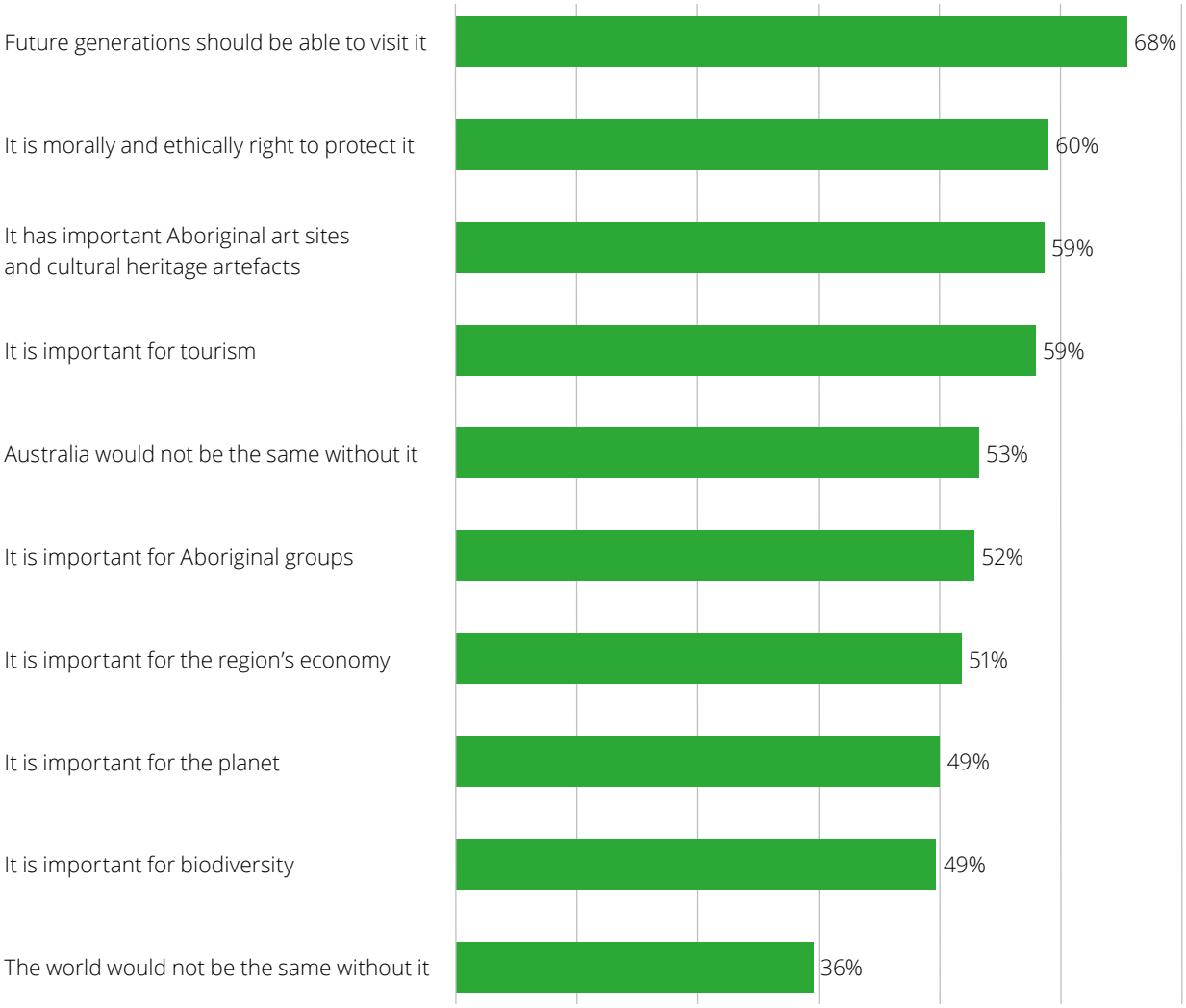
5.2 Why do people value Kakadu National Park?

Australians and the international community value Kakadu for a range of reasons. Some reasons are more concrete, such as their belief in protecting Aboriginal art sites and cultural heritage, while others are more abstract such as their belief that Australia would just not be 'the same' without Kakadu. The values people attribute to Kakadu are their own. They are shaped by life experiences and circumstances that will never be fully known. However, our research provides important insights into what people are considering when they value Kakadu, and why they might, or might not value it.

5.3 Why are Australians willing to pay to protect Kakadu National Park?

Australians want their children and future generations to be able to visit Kakadu and enjoy it (68 per cent of Australians surveyed think future generations should be able to visit). This desire is supported by a sense of the morality in guaranteeing the future health of Kakadu and an acknowledgement of the importance of the Aboriginal art sites and cultural heritage artefacts that exist in Kakadu.

Chart 5.1: Why Australians are willing to pay to protect Kakadu



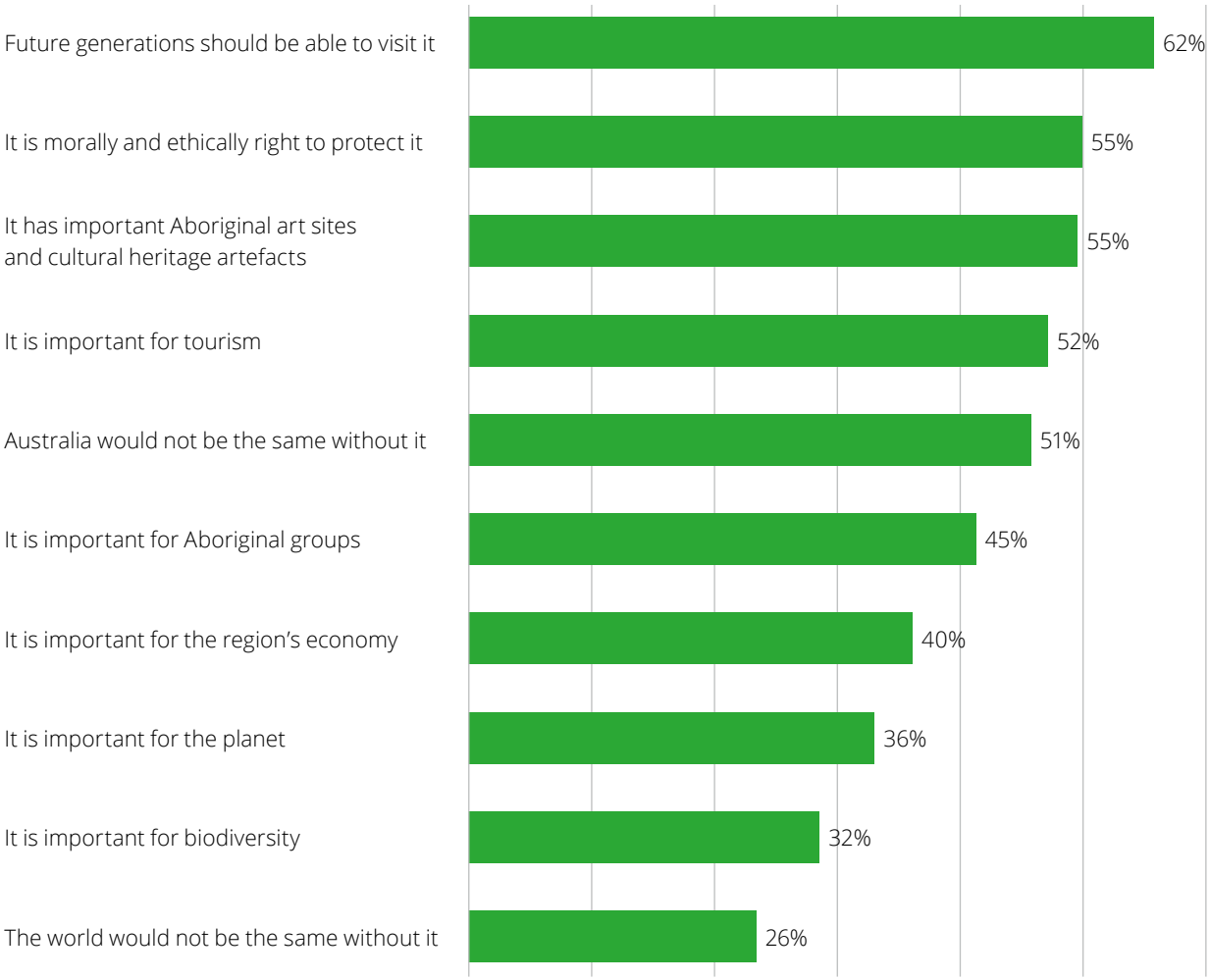
Source: Deloitte survey conducted by Dynata

Note: This is a 'Select all that apply' question

5.4 Why is the international community willing to pay to protect Kakadu National Park?

The international community values Kakadu for a range of reasons. Mostly importantly, international visitors desire to protect Kakadu for future generations to be able to visit. International visitors also value Kakadu's important Aboriginal art sites and cultural heritage but they equally want to protect the biodiversity of Kakadu, which is understandable given its World Heritage status.

Chart 5.2: Why the International community is willing to pay to protect Kakadu



Source: Deloitte survey conducted by Dynata

Note: This is a 'Select all that apply' question

5.5 Experience value

A starting point for measuring the experience value of those who visit Kakadu is to calculate the transaction costs. Even for local visitors from the Northern Territory, these per-person costs of travel to Kakadu, accommodation, meals and tours can be significant. For interstate visitors, the costs are significantly higher. Table 5.1 lists the transaction costs for Northern Territory and interstate visitors, noting that we record different costs (e.g. $1,264) for the 60 per cent of visitors who travelled for the main purpose of visiting Kakadu, compared with $450 for the 40 per cent who travelled for a different main purpose. These shares of main purpose versus other purpose came from the survey results.

In addition, the experience value may exceed the financial costs of visiting, by an amount referred to as the 'consumer surplus'. A common way to measure this value suggested by the literature is by using contingent valuation. In this case, we asked survey participants whether their visit would change given an increase in price, assuming that the experience was at least as valuable as the amount they paid. Figure 5.2 presents a simplified example of how we used the survey to establish consumer surplus. Across the four transaction values we consider, the survey results suggest an average consumer surplus of about 20 per cent.

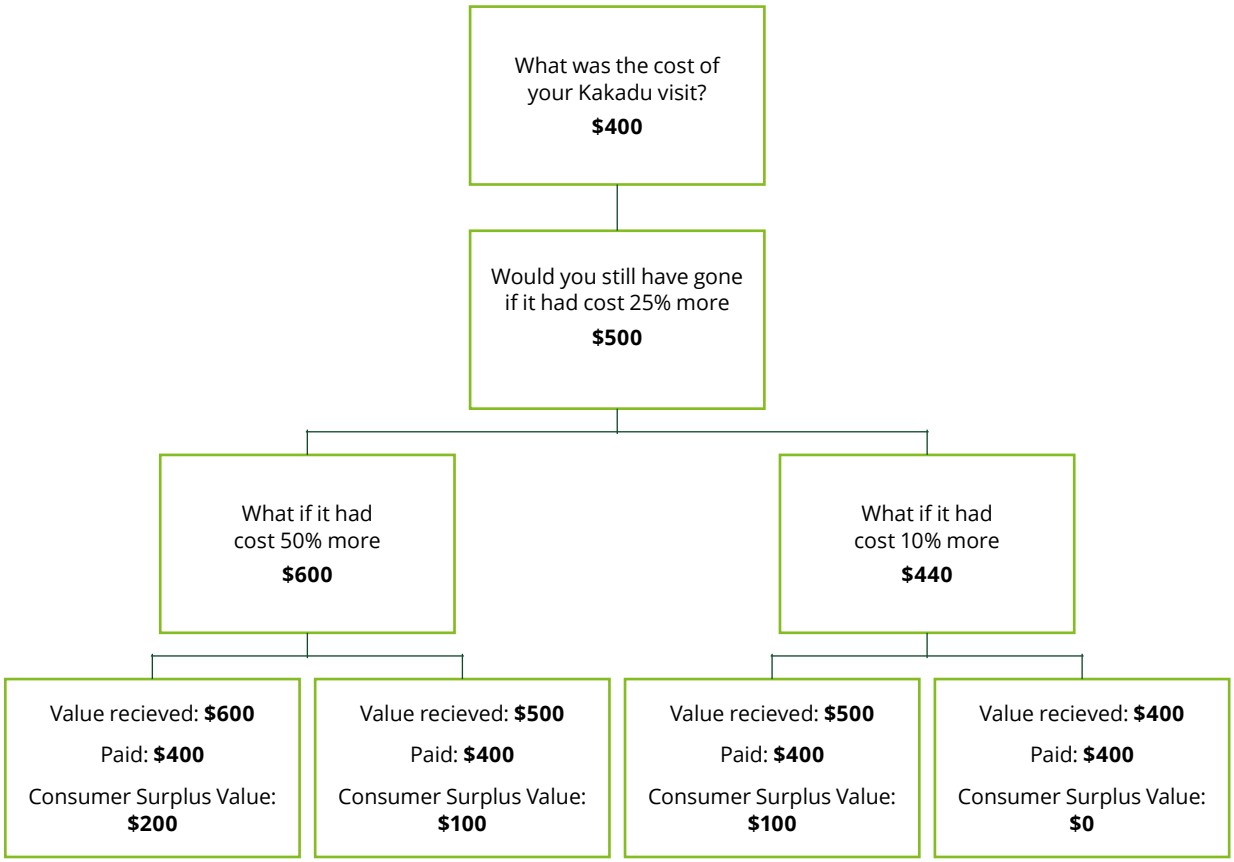
Table 5.1: Transaction and consumer surplus of visitors to Kakadu National Park

	Northern Territory visitors	Interstate visitors
Transaction and consumer surplus (per person)		
Visitors: main travel purpose Kakadu		
Transaction value	$ 470	$ 1264
Consumer surplus	$ 120	$ 275
Visitors: main travel purpose not Kakadu		
Transaction value	$ 417	$ 450
Consumer surplus	$ 76	$ 82
Visitor volumes*	80,231	83,483
Total values (2019)		
Transaction value		$144 million
Consumer surplus		$30 million
Total experience value		$175 million
Total experience value (30 year net present value)		$3,143 million

Source: Deloitte survey conducted by Dynata

*based on National Park visitation data and Stafford Strategy estimates of interstate share of visitors

Figure 5.2: Consumer surplus



As shown in Table 5.1, adding transaction and consumer surplus values across visitors provides a total experience value of $175 million in one year. We note that this is a similar order of magnitude to an estimate completed for 1990 by Knapman and Stanley – using a different methodology (travel cost) and different visitation figures, their upper estimate of visit value was $98 million (after adjusting for inflation over the intervening thirty years). Considered over a 30-year period, and using a discount rate of 3.7 per cent, the experience value of Kakadu is **$3.1 billion**. Knapman and Stanley finish their paper commenting that this is a minimum value because more research should be undertaken into non-use economic values, the subject of the next section.

5.6 Existence value

Kakadu does not only provide value to those who directly visit or use it. Many Australians also place a value on having the **option** to visit it in the future, or appreciate the **existence** of Kakadu as a cultural asset which others can visit and use. This value is termed **existence** value, and is measured using a contingent valuation approach. This is a survey-based approach is of estimating the value an individual places on a non-market entity.

Our research shows that Australians and the international community hold Kakadu in high esteem. 80 per cent of Australians, and 80 per cent of international respondents, either strongly agree or agree that Kakadu contributes to Australia's national identity and international standing.

The way people value and perceive Kakadu extends beyond consideration of its natural ecosystem. This value does not have a market price and understandably varies according to an individual's circumstances and experiences. The existence value of Kakadu to an individual has been measured using a contingent valuation survey that elicits the willingness of individuals to pay for Kakadu's protection. To ensure respondents had a realistic constraint in mind, the survey elicited what they would be willing to pay in an annual amount for "Kakadu to maintain its UNESCO world heritage status". That is what all Australians would pay every year over the next 30 years.

Australia

64 per cent of Australians surveyed were willing to pay for the preservation of Kakadu. Australians have a median annual willingness to pay of $19.48 to ensure that Kakadu is protected into the future. Taken across the adult population, that produces an annual willingness to pay figure of $382 million. This is an estimate of Australia's existence value. To convert this from an annual figure to a total value asset figure, a 30-year net present value (NPV) is applied to a social discount rate of 3.7 per cent per year (see **Appendix F** for discussion). The total existence value to Australians over this period is **$6.9 billion.**

International

Of respondents across the four countries surveyed, all valued Kakadu and 77 per cent were willing to pay for its preservation. The international willingness to pay figures are calculated as an economic, social and icon asset value for a range of reasons. To extrapolate the values, apply assumptions and present an 'international' or world existence value would be unreliable. Underlying biases in the data, contextual cultural factors, language barriers and purchasing power differences all provide challenges to modelling.

The median willingness to pay among international respondents is three times higher than Australian respondents at $67.03. This could reflect stronger preferences among the international community to preserve the natural environment in general, including Kakadu. This would be particularly true for international visitors that come to Australia to visit Kakadu, who, through their purchases, provide an indication for visiting natural environments.

Ultimately, the survey respondents, while broadly representative, cannot speak for the world when considering the existence value of one of Australia's iconic natural and cultural assets. Despite the international existence asset value not being reported in equivalent terms to the Australian existence value, the insights from the research are no less valuable and clearly show, as an international asset, Kakadu would be worth several times the Australian value.

Option value

A modest share of the existence value of Kakadu derives from its option value. This refers to the value the public places on the option to be able to visit Kakadu at a future date.

60 per cent of all domestic survey respondents stated they would place a value on the option to visit Kakadu in the future. Those who have visited Kakadu before (12 per cent) valued the option of a future visit more, with 26 per cent of those respondents stating they would place a significant amount ($100) on keeping Kakadu open versus 17 per cent among respondents who had not visited. Overall, 68 per cent of those who have visited stated they would value the option of a future visit to Kakadu.

However, our main option value derives from the domestic respondents who have never visited Kakadu, 58 per cent of which stated they would value the option of a future visit. Over the Australian population, this sums up to $374 million, representing 5 per cent of Kakadu's total existence value of $6.9 billion.

Interpreting results

It is important to recognise both the value and limitations of survey-based willingness to pay analysis to measure the existence value of Kakadu. Neatly summarised in a 2018 report to the New Zealand Treasury[60], while economic appraisal is important so that environmental values are not valued at zero, willingness to pay results may overstate values because surveys themselves draw respondents' attention to the environmental issues. In addition, respondents may be more forthcoming in paying to protect one environmental asset within their income constraint as a one-off, but if there were multiple demands at once, this may not be the case. The $6.9 billion figure outlined in this report should therefore be treated as an order-of-magnitude estimate of existence value, rather than a precise estimate. Sensitivity analysis presented in the appendix of this report further elaborates on how changes to methodological choice can also impact the estimates. The box below helps provide some context about what we can conclude about the estimates in this report.

5.7 Summary

Overall, Kakadu has an estimated total social asset value of $10 billion.

A significant proportion of this is attributed to those people who have visited Kakadu and experienced its unique natural wonders. The connection these people feel to Kakadu and what they actually pay to visit, is an important part of its value.

Beyond this, a significant proportion of Kakadu's total value arises from those who have never visited. This reflects the value Australians have in being able to leave Kakadu to future generations, to know others can experience the natural and cultural wonders that live within it and its importance as a dual-listed World Heritage site.

The **$10 billion** asset value comprises two parts:

- Australians who have visited Kakadu as tourists – on a bucket-list trip, on a family holiday, as a part of a road trip – derive **$3.1 billion** in value
- Australians who have not yet visited Kakadu – but value knowing that it exists – derive **$6.9 billion** in value

This value is conservative in that it only represents an Australian perspective. Were it to consider the international community's value, it is clear it would be much higher.

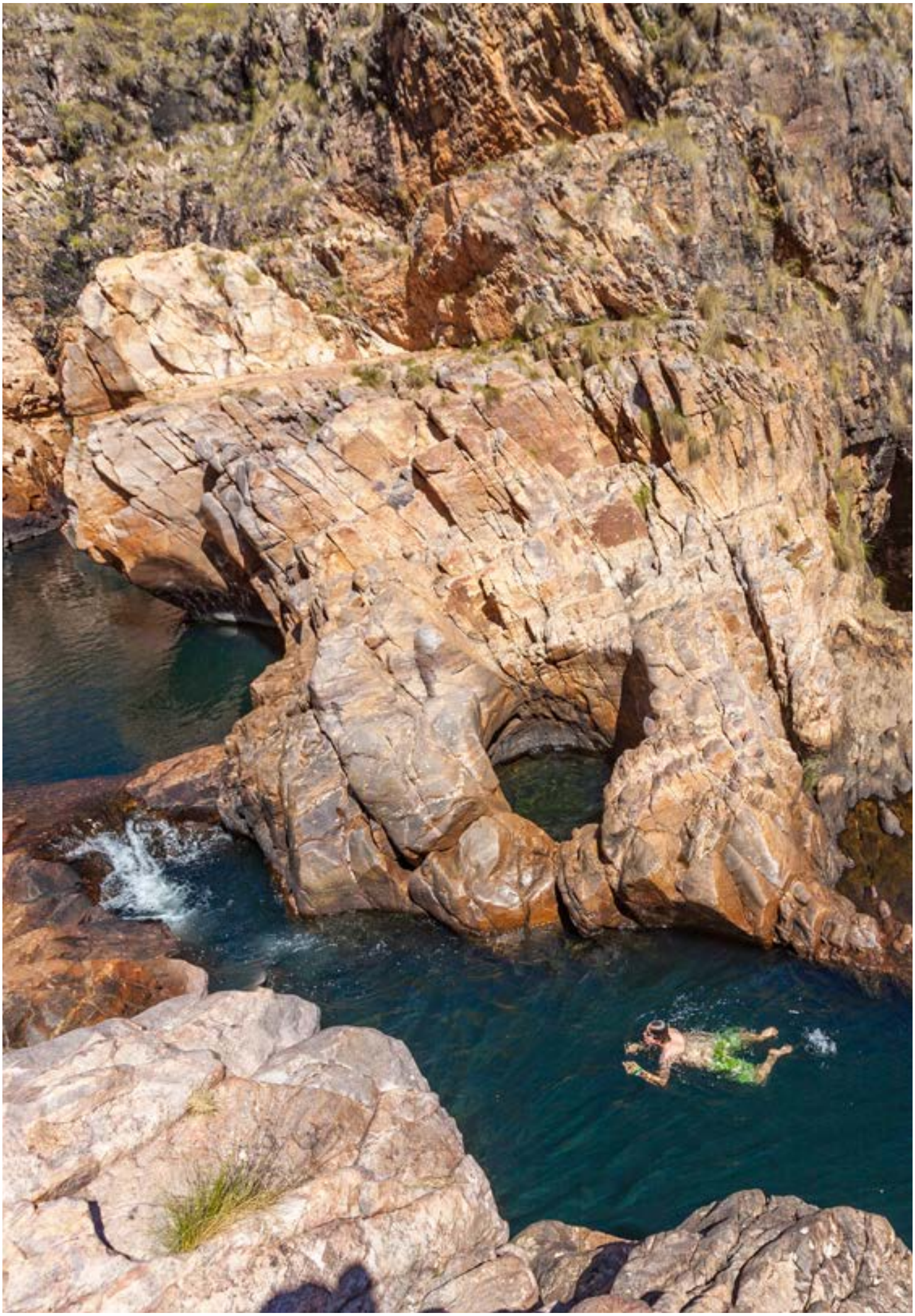
Valuing Australia's icons

This report estimates Kakadu's social value at $10 billion. Australia does not have many comparable estimates for its other environmental and social assets such as Ningaloo Reef, the Blue Mountains or Uluru. Two previous studies from Deloitte Access Economics have valued the Great Barrier Reef (GBR) (at $56 billion) and the Sydney Opera House (at $6.7 billion).[61] These provide some context and basis for reflection.

First, we observe that the Great Barrier Reef is valued more highly than Kakadu, mostly because of its higher experience value ($32 billion compared with $3.1 billion); it can be accounted for by the higher levels of visitation and tourism to the GBR region, and suggests that Kakadu has potential to increase its value if more people experience it first-hand.

Existence value is also higher for the GBR ($24 billion vs $6.9 billion), reflecting its higher iconic status. But, as previously noted, these are order-of-magnitude estimates. We also note small differences in what is being valued: for the GBR major threats could be contemplated as a scenario; for Kakadu, the situation was broader, covering both the environmental and cultural bases of UNESCO World Heritage Listing.

By contrast, Kakadu's value of $10 billion is higher than the Sydney Opera House. This mainly reflects methodological differences. The latter study used a much higher discount rate of 7 per cent (in accordance with NSW Treasury Guidelines, for investments), which lowers its value. Kakadu, being an environmental asset that cannot be replaced, uses a lower social discount rate of 3.7 per cent, which is explained further in the **Appendix F**.



Traditional Owner value

6. Traditional Owner value

We would like to thank the Northern Land Council for their collaboration and support to develop the content and depth of discussion in this Chapter, ensuring that the traditional Aboriginal owners of Kakadu are rightfully and respectfully represented in this important report.

Kakadu is named in honour of the Gagudju people[62] and their language, which was the major language spoken in the north of Kakadu[63] prior to the impacts of colonisation. The history and presence of the Traditional Owners of Kakadu are recognised and honoured both in name, as well as through the protection and management of the ever-present display of Aboriginal culture in Kakadu. Through Kakadu a rich connection between the current and historical practices of the oldest culture on earth, Australian Aboriginal culture has been maintained.

The presence of the world's oldest living culture is evident in Kakadu in both tangible experiences, including the extensive array of art and archaeological sites, and intangible associations, such as the ongoing connection to country of Traditional Owners, who carry the knowledge, language and traditions of their ancestors.

"The whole landscape is evidence of not only their past activities but also their current presence (Chaloupka, 1993)."[64]

Kakadu covers the traditional lands of approximately 19 recognised clan groups[65], representing over 12 distinct Aboriginal languages[66] within its boundaries. Clan groups have distinct practices and responsibilities for looking after, and speaking for, their own area of country. The numerous clan groups in Kakadu represent a rich, diverse, and complex social structure and community system in Kakadu.

Anthropologist Gareth Lewis explains that for Traditional Owners of Kakadu, "each individual [has] ownership rights to land in their father's estate along with complimentary usage and managerial rights over land in their mother's estate extending as ceremonial rights and responsibilities". Producing an intricate network of rights and interests in land, mediated through family connections, traditional law and custom and ritual knowledge and ceremony.[67]

With many clan groups identified as having connections in Kakadu, a general classification has been agreed for Traditional Owners of the northern region of Kakadu, who are known collective as *Bininj*. Whereas the Traditional Owners of the southern region are referred to collective as *Mungguy*. Traditional Owners of Kakadu are therefore known as Bininj/Mungguy.[68]

Anthropological evidence provides further detail on identity, explaining that "home entails identity which for Kakadu Traditional Owners is prescribed as a birth-right from having been born into either a *gunmogurrgurr* or *mowurrwurr* clan-based identity.[69] This identity connects individuals and their families in lines of descent with the creation ancestors who shaped the world (in form, meaning, people, language, laws) and left their spiritual essences at sacred places to be cared for by the descendants.[70]

6.1 Understanding the knowledge and culture that lies within

It is the presence of Aboriginal culture in Kakadu which provides one of the best records of human history in the world, through one of the world's greatest concentrations of rock art sites. The rock art tells a story of Aboriginal culture from an estimated 20,000 years ago, up to recent history. The art offers elements of the knowledge of the Bininj/Mungguy people who have occupied the region continuously for over 65,000 years.

In addition to rock art, Kakadu hosts cultural sites of the Bininj/Mungguy people, including sacred, ceremonial and occupational sites, which are some of the oldest by archaeological standards. Kakadu therefore forms a living museum, offering a record of ancient and living culture and tradition.

With over 5,000 identified rock art sites, and an estimate that an additional 5,000 to 10,000 may exist in total, as well as an estimate of several thousand archaeological sites, the quantity of cultural artefacts in Kakadu delivers a significant source of knowledge and reverence.

In addition to the extensive quantity, the quality of cultural sites in Kakadu is also highly regarded. Including some literature describing the rock art as the largest and in general, best preserved body of rock art in the world.[71] Rock art in Kakadu offers unique qualities, including the 'X-Ray' style of painting, large depictions of mythical beings, and a rare example of a painting using a blue pigment.[72]

Through the cultural records available in Kakadu, a great depth of detail and knowledge from history and Aboriginal culture can be garnered. The art alone, depicts an extensive history of Aboriginal people in the region, detailing the changes that have been experienced in the environment, amongst species, and in the lifestyles in Kakadu.

While a number of visible elements of culture exist in the Kakadu, anthropologist Gareth Lewis explains the great depth of the cultural assets held by Kakadu Traditional Owners, who command a rich knowledge system which maps country, society, history and resources in the finest and most precise detail, and preserve this knowledge in narrative, mythology, song, design and ritual.[73]

The deep and rich traditional knowledge that exists in Kakadu generates value that is difficult to quantify and measure because it have many benefits, such as those arising from tourism associated with traditional cultural expressions (art, story-telling, dance, etc.). Notions of value of traditional knowledge must also consider the benefit arising from over 65,000 years of cultural and spiritual connections, which extend from Traditional Owners to many Australian Aboriginal cultures connected to the culture of Kakadu through song-lines and a shared sense of identity. As well traditional knowledge generates benefit for many, through tens of thousands of years of effective land and heritage management, resulting in pristine environments in Kakadu. Traditional knowledge systems are also valued for the broad social and wellbeing benefits resulting from both spiritual and cultural practices, to outcomes resulting from employment or healthy behaviours associated with culture. Recognising the limits of current systems for measuring such value, this chapter aims to highlight that traditional owner knowledge has immeasurable valuable.

6.2 Sharing the spiritual value of Kakadu

The rock art in Kakadu was utilised as a means of storing and sharing traditional knowledge of the Aboriginal occupants, including between generations. This art now provides a window into the practices and teachings of Traditional Owners. The stories and meanings in the art, maintained through the knowledge held by Traditional Owners, forms the intangible cultural heritage of Kakadu, which includes spiritual beliefs, cultural practice, and language amongst other measures.

It is through the art and knowledge of the Bininj/Mungguy people, which has formed over 65,000 years that it is possible to understand the extensive record of generations of the Bininj/Mungguy people from the Kakadu region.

From the ancient records and continuing culture of the Bininj/Mungguy people, some of the creation stories of Kakadu continue to be communicated openly. Such as the belief that it was the creation ancestors who formed the landscapes and features of Kakadu, as well as the laws, plants, animals and people of Kakadu. It was through this process that Aboriginal people were taught to live with the land, and from then on Aboriginal people became keepers of their country.[74]

This resulted in a system of sharing and instilling cultural knowledge and practice which has resulted in Traditional Owners of Kakadu continuously caring for country, looking after dreaming places, communicating with ancestors and teaching practices to the next generation for over 65,000 years.

Cultural knowledge passed between generations offers striking observations about the land, such as information about Bulanjang or 'Sickness Country', where it is believed the essence or spirit of Bula, an important creator is located. Sickness country coincides with high concentrations of uranium, thorium, arsenic, mercury, fluorine and radon in the water and air. Jawoyn cultural belief teaches that disturbance of this area will result in catastrophic outcomes.

The intimate knowledge of Kakadu and learnings of Traditional Owners of successive generations has generated a powerful resource for the historical, present and future management of Kakadu. As evidenced by the use of this knowledge in the current management of Kakadu, through a joint management process whereby Bininj/Mungguy people and Parks Australia work closely together.

Anthropologist Gareth Lewis, helps to explore the concept of spiritual value, noting "For Aboriginal Traditional Owners of land within the Park, Kakadu is home in the most profound sense. It is the basis of each individual's life cycle: it is where ones' spirit emerges from the landscape to be born through a mother, it is where one is reared, nourished and taught throughout the life journey, and ultimately it is where one's spirit returns at the end of life."

Quantifying spiritual connection to land[75]

Quantifying in dollar terms spiritual connection to land is very difficult, but this should not diminish its significance in thinking about the value of Kakadu to Traditional Owners. The principles were recognised in 2019, when the High Court recognised the value of 'spiritual connection to land' in its $2.5 million compensation ruling for Native Title holders from the remote NT town of Timber Creek. The intangible harm caused by disconnection with country was given more weight than the market-based assessment of economic loss. Claimant Lorraine Jones said after the ruling that loss of culture, 'hurts like something happens to your family.'

6.3 Connecting culture to nature and land

The cultural value of Kakadu is intrinsically tied to the natural value of Kakadu, with the Traditional Owners identifying the land and its spirits in unison. For the Bininj/Mungguy people the natural habitat is inseparable to the people who occupy it, making it part of cultural and social practice. Professor Deborah Bird Rose explains:

> "Indigenous people talk about country the same way they talk about a person... People say that country knows, hears, smells, takes notice, takes care, is sorry or happy."[76]

The value Traditional Owners attribute to the natural landscape in the Park is also supported by UNESCO, which has provided world heritage listing to Kakadu for its natural significance. Kakadu is recognised for its wide variety of ecosystems, including savanna woodlands, open forest, floodplains, mangroves, tidal mudflats, coastal areas and monsoon forests.

Kakadu provides Traditional Owners with a connection to their heritage which spans over 65,000 years. It is this heritage which has maintained the natural habitat recognised at the highest global standard for its diversity and environmental value. This connection affords a cultural history so strong in its continuity it remains unmatched by any existing culture.

It is this connection which highlights the true value of Kakadu, the land, the people and its story, for this has been intrinsically valued by the Traditional Owners who have fought to protect this, over other alternatives, despite the disincentives and challenges faced when fighting for their culture and country.

Anthropologist Gareth Lewis explains further that for, Aboriginal people, sacred sites are constitutional elements of their cultural beliefs, practices and responsibilities. Accordingly, the protection and management of sacred sites in Kakadu provides for the maintenance and recognition of cultural values, enhanced cultural esteem of Kakadu Traditional Owners and confidence in culturally appropriate use of the Park. Furthermore, as sacred sites and other cultural values are still being recorded in the Park, it is not yet possible to be fully cognisant of all of Kakadu's cultural assets.[77]

6.3.1 Magnifier of national value

This rich cultural knowledge and the maintenance of continuing traditions also act as a source of enrichment and connection for Aboriginal societies across the entirety Australia.

The continued connection, protection and maintenance of Traditional Owner culture in Kakadu National Park also offers broad national benefits, through the maintenance of the deep cultural knowledge and connections that exist in and between Aboriginal communities across Australia. The depth and value of knowledge of Aboriginal culture to the nation is indicated through the concept of songlines, dreaming tracks or strings, an Aboriginal cultural knowledge system connecting different people and sacred sites which can extend across Australia.[78]

"For example, one songline starts at Yirrkala in Arnhem Land, where the Yolngu believe Barnumbirr (Venus) crossed the coast as she brought the first humans to Australia from the east (Allen, 1975; Norris & Norris, 2009). Her song, contained within the Yolngu Morning Star ceremony, describes her path across the land, including the location of mountains, waterholes, landmarks, and boundaries. The song therefore constitutes an oral map, enabling the traveller to navigate across the land while finding food and water".[79]

Songlines are attributed to supporting important trading routes pre-colonisation, which have now laid the basis for some of the current network of highways across Australia.[80] In addition to navigation, songlines provide detailed knowledge about land, animals, plants and seasonality. Importantly, songlines also support the connection of Aboriginal communities through belonging, social connection and strengthening identity.[81]

Deloitte's own Indigenous Leaders tell us that many of the songlines of the nation travel though the communities and landscape of Kakadu and many of the cultural and knowledge practices engaged in across the rest of the country operate through an interconnected web of relationships and community that links Kakadu to the heart of Aboriginal society everywhere.

Professor Deen Sanders OAM, an East Coast Worimi Man, says "Kakadu is a place of spiritual, cultural and social strength to every Aboriginal Australian. The strength of knowledge and culture represents national value for all Australians (Aboriginal and non-Aboriginal alike) and earns respect and reverence from each one of us."

6.4 Traditional Owner value and economic benefits

A range of economic benefits are derived from Kakadu by Traditional Owners, extending from obtaining sustenance from the Park via the hunting, harvesting and exchange of traditional and contemporary resources,[82] to income from employment, land use arrangements, and other sources such as business contracts.

The potential economic value arising from Indigenous cultural intellectual property, and associated research activities in Kakadu are also notable, however this is seen to be wholly undervalued, due to the limited understanding of the complex social and economic systems which underpin Kakadu Traditional Owner connections to their lands,[83] resulting in the unique set of ancient and ongoing cultural practices being undervalued and underutilised. Despite the current undervaluation, the protection and application of Indigenous cultural intellectual property rights and interests in Kakadu provides an opportunity to maximising the control of access to, use, and economic potential of Indigenous knowledge systems.

Traditional Owner value of the Park may be amplified through businesses associated with the use of knowledge contained in Indigenous cultures, and Aboriginal controlled and owned land, such as tourism resulting in economic and other benefits, including greater social understanding and the creation of Aboriginal employment. Tourism to Kakadu offers Traditional Owners the option to share their customs, practices and stories directly with visitors, which can play a prominent role in changing how Aboriginal people and places are perceived.[84]

Aboriginal cultural tours are some of the most popular attractions within Kakadu, including tours operated by Traditional Owners such as Guluyambi Cultural Cruises, and Yellow Water Cruises. A recent survey by Tourism NT found that the majority of Australians surveyed (living outside the Northern Territory) want to learn about Aboriginal beliefs and connection to land,[85] 67 per cent of interstate visitors to the Northern Territory were interested in visiting sacred rock art sites, and willing to pay to do so.[86] Aboriginal cultural tourism can thus be an important tool in amplifying Aboriginal voices, sharing their stories with the broader community.

Tourism to Kakadu can help to generate a greater social understanding of issues facing Aboriginal Australians, both within Kakadu and more broadly. Cultural tourism can help promote cultural awareness through directing visitors' interests towards an Aboriginal perspective on history and culture, which in turn can assist Australia's overarching progress towards reconciliation.[87] The chance to hear Aboriginal voices and stories in Kakadu may lead non-Aboriginal Australian visitors to Kakadu to reflect on their own perceptions and attitudes towards Aboriginal culture and history.[88] Tourism to Kakadu can therefore help contribute towards creating a shared understanding between the Traditional Owners of Kakadu and visitors to Kakadu, and more broadly between Aboriginal Australians and non-Aboriginal Australians, that may not otherwise exist.

Tourism activities in Kakadu create opportunities for additional Aboriginal employment and enterprise within the region. Aboriginal staff are employed both directly in Kakadu and in the wider regional tourism industry, in occupations with varying levels of cultural engagement – from tour guides within Kakadu, to hospitality staff within local hotels and restaurants. Aboriginal organisations and enterprises also create opportunities for employment in the cultural tourism sector, such as in the production of Aboriginal artistic products and other merchandise, or traditional performances and cultural activities. Some Aboriginal policy literature supports the view that participation in this 'cultural economy' is more engaging to Aboriginal youth than traditional employment.[89] The increased scale of cultural production which is enabled by tourism to Kakadu may therefore create additional opportunities for rewarding employment and skills development for the local Aboriginal community.

More generally, increasing employment is widely recognised to generate a range of economic and social benefits for Aboriginal people and communities, from supporting higher living standards through increased income,[90] to improving mental and physical wellbeing,[91] and even improving social cohesion within communities.[92] However, these traditional benefits must be considered alongside the recognised negative impacts associated with cultural tourism for Aboriginal Australians. For example, there is a distinction between Aboriginal-controlled and Aboriginal-themed tourism, with the latter dominating the former.[93] Futhermore, studies have shown that Aboriginal employment is often confined to low-skilled positions, while the majority of material benefits are accrued by non-Aboriginal managers.[94] Kakadu's joint management therefore faces an ongoing challenge in supporting Aboriginal engagement within the tourism industry, whilst protecting Traditional Owners' cultural values.

6.5 Broader conceptions of Traditional Owner value

Traditional Owners values associated with human rights, self-determination, health and wellbeing are also evidenced as arising from connection to Kakadu, to the land itself and culture embedded in the landscape. Aboriginal cultural values and practice are identified as being intrinsic to the health and welfare of Aboriginal people, and through better outcomes across a diverse range of dimensions of socio-economic wellbeing, result in economic benefits for Aboriginal people, local, regional and national economies.[95, 96]

Deen Sanders, one of Deloitte's Senior Indigenous leaders, explains that the health and wellbeing of Aboriginal people is not just reinforced through the basic human rights of being able to engage in cultural practice, it is an essential element of Aboriginal identity and cultural responsibility to be able to participate in and perform acts of culture and knowledge sharing.

Deen has explained that Aboriginal culture is framed in the language of responsibility, where all Aboriginal people have a responsibility to engage in, and to teach, the practice of their culture, not just as a matter of education or spiritual or economic practice but as a practical matter of caring for the land, for the people and for the places of knowledge. For many Aboriginal people, and Elders in particular, there is no distinction between the practice of work and the practice of culture. Culture itself is economic in that "culture creates the opportunity for work and value to be created".

While this chapter has presented the broad and significant value of Kakadu to the traditional Aboriginal owners of the Park, Aboriginal Australians who share in culture, and all Australians who benefit from the rich culture that exists through the connection of Traditional Owners of the Park to their land, we have deliberately avoided suggesting this can be appropriately measure through current means and understanding. Recognising our present systems for measuring such value would be utterly inadequate, we pose an alternative approach to measuring value, and a challenge to continue to be explored, by asking what would be the difference without this incredible cultural connection in Kakadu?

7. Environmental value

One of only 209 UNESCO World Heritage sites across the globe recognised for their natural heritage,[97] Kakadu is not only listed on account of its outstanding natural beauty – the abundant plant and animal life found within Kakadu's varied landscapes are some of the most diverse in the world, and the famous rocky escarpment and stone country preserve a unique record of millennia of geological history.

Coupled with its distinct cultural values, this ecological diversity and natural beauty creates one of the largest National Parks in the world with dual cultural and environmental values – in fact, Kakadu is one of only 38 sites in the world which maintains a dual World Heritage listing today.[98]

UNESCO natural heritage values

Kakadu has maintained its original 1989 listing for natural heritage values under the following World Heritage criteria:

- Criterion (vii): Contains superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.
- Criterion (vii): Outstanding examples representing significant ongoing geological processes, biological evolution and man's interaction with his natural environment.
- Criterion (x): Contains the most important and significant natural habitats for conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science and conservation still survive.

7.1 Recording millennia of geological history

Kakadu's rocky escarpment and stone country contain some of the oldest exposed rocks in the world, a unique record of the earth's geological history.[99] Kakadu's first rocks formed over two and a half billion years ago, followed by millennia of flooding and erosion creating seas, cliffs, swamps and deserts.[100] The stone country of the Arnhem Land plateau first emerged 1,650 million years ago, and the escarpment complex emerged out of sea cliffs only 140 million years ago. These ancient features contrast with the more dynamic floodplains to the north such as at Yellow Water, Mamukala, and Ubirr, which formed only 2,000 years ago and are continually transformed by floods and changing sea levels today.

7.2 Preserving unmatched ecological diversity

Kakadu contains a unique abundance of flora and fauna, with a variety of habitats and ecosystems contained within Kakadu's four major land forms: the Arnhem Land plateau and escarpment complex; the Southern hills and basins; the Koolpinyah surface; and the coastal riverine plains.[101] These ecosystems are home to a huge diversity of flora and fauna, including 275 bird species, 64 different land mammals, 128 different reptiles, 25 frog and 59 freshwater and estuarine fish species – amounting to one third of Australia's bird species, and one quarter of Australia's land mammals.[102] Some of these species belong to Australia's most rare and vulnerable species, such as those in the table on the following page. Furthermore, the internationally-recognised Ramsar-listed wetlands to the north provide a seasonal habitat for 2.5 million immigrating waterbirds across the year.

Table 7.1: Rare and vulnerable species of fauna recorded within Kakadu National Park

Species	Status (TPWC Act,[1] IUCN[2])	Significance of KNP*
Speartooth shark *(Glyphis glyphis)*	Endangered: TPWC Act Critically endangered: IUCN	Moderate-High
Pig-nosed turtle *(Carettochelys insculpta)*	Vulnerable: IUCN	High
White-throated grass wren *(Amytornis woodwardi)*	Vulnerable: TPWC Act, IUCN	High
Yellow chat *(Epthianura crocea tunneyi)*	Endangered: TPWC Act	High
Gouldian finch *(Erythrura gouldiae)*	Vulnerable: TPWC Act	Moderate
Arnhem leaf-nosed bat *(Hipposideros diadema inornata)*	Vulnerable: TPWC Act, IUCN	High
Arnhem rock-rat *(Zyzomys maini)*	Vulnerable: Endangered	High
Oenpelli python *(Morelia oenpelliensis)*	Vulnerable: TPWC Act	High
Yellow-snouted gecko *(Diplodactylus occultus)*	Vulnerable: TPWC Act	Moderate

1 Status according to *Territory Parks and Wildlife Conservation Act 1976 (NT)*
2 Status according to the International Union for the Conservation of Nature

*Significance of Kakadu to the species' status[103]

Source: National Environmental Research Program, 2014[104]

Kakadu's flora also contains more than 2,000 plant species,[105] including 58 of major conservation significance.[106] Natural vegetation can be classified into 13 categories, including mangrove, samphire, and seven species of Eucalyptus, lowland rainforest, paperbark swamp, seasonal floodplains, and sandstone rainforest.

Table 7.2: Unique plant species within Kakadu National Park

Popular plant species	Description
Pandanus	Conggirr is the most common of the three species of pandanus found in Kakadu. The leaves have a 'cork-screw' arrangement and the dead leaves hang in skirts.
Speargrass	This is tall grass that gets its name from its spear like seeds and is found in Kakadu's lowlands from March to April.
Kapok bush	A small native tree with yellow leaves.
Darwin woollybutt	A common tree in Kakadu which has dark woolly bark on the lower half of the tree's trunk.
Water lily	Commonly found in the waterways and wetlands of Kakadu.

Source: Department of Environment and Energy[107]

The threat of climate change and rising sea levels

Climate change is considered the greatest threat to global health in the 21st century.[108] Global warming and increasing greenhouse gas emissions is causing sea levels to rise, resulting in coastal erosion and saltwater intrusion.[109] The Intergovernmental Panel on Climate Change predicted a 0.70 metre rise in sea levels by 2070,[110] which will cause significant landscape changes.

Saltwater incursions into Kakadu's unique freshwater wetlands pose a great risk for this unique landscape. Threats to Kakadu include:

- Changes in salinity would result in changes to bacterial communities, which would result in flow on effects for Kakadu's aquatic ecosystems[111]
- Rising sea levels change the distribution of mangroves and increase the spread[112]
- Increasing saltwater would change freshwater habitats into saltwater, putting pressure on animal populations dependent on freshwater ecosystems, for example, waterbirds[113]
- Rising sea levels would affect the survival of freshwater animals, such as fish and invertebrates.[114]

The fish fauna found in Kakadu's estuaries, catchments and rivers of Kakadu also contribute unique biodiversity value to the region. Kakadu contains a moderately distinct composition of fish species compared to the rest of the Northern Territory, including one third of the total fish biodiversity from estuaries, and one quarter of the teleost fish diversity from freshwater, estuarine and marine waters.[115] The South Alligator River has also been identified as among the most species rich of basins in Australia.[116] These river and estuarine environments are important to supporting other connected ecosystems, providing food webs which sustain other flora and fauna throughout Kakadu.[117]

This incredible richness in biodiversity is partly the result of Kakadu's position in Northern Australia – Kakadu is one of the least impacted areas across the continent, with limited accessibility leaving it relatively untouched.[118] Today, Kakadu is one of the few places in Australia to have seen limited extinctions of flora and fauna and it[119] is one of Australia's only estuarine systems to contain the catchments of its rivers within its boundaries, helping to protect the richness of freshwater species from the impacts of agricultural activity.[120] At the same time, this diversity has been identified as potentially vulnerable to the impacts of climate change, due to the predicted transformation of freshwater habitats into saline environments over time.[121]

Ecosystem services

An ecosystem consists of all living and non-living entities in a specific setting. Kakadu's unique natural ecosystem holds value to humans, as well as other systems. Kakadu preserves the greatest variety of ecosystems on the Australia continent,[122] and performs important environmental and ecological functions.

The ecosystems of Kakadu include wetlands, savannah woodlands, open forest, floodplains, mangroves, tidal mudflats, coastal areas and monsoon forests.[123]

A particularly important aspect of Kakadu is its wetlands. Ramsar lists Kakadu as a Wetland of International Importance.[124] There are a number of forces that interact with each other in a wetland ecosystem, including:

- Rainfall, temperature and evaporation
- Water balance, flooding and inundation
- Topography, soils, sedimentation processes and erosion
- Primary production, decomposition and carbon cycle
- Biological processes such as reproduction, migration, predation, succession, disease and infestation[125]

These interactions provide direct benefits and indirect benefits to Kakadu. Ecosystem processes support threatened fauna and endemic species, as well as maintain the Kakadu's unique global biodiversity.[126]

7.3 Offering landscapes of arresting beauty

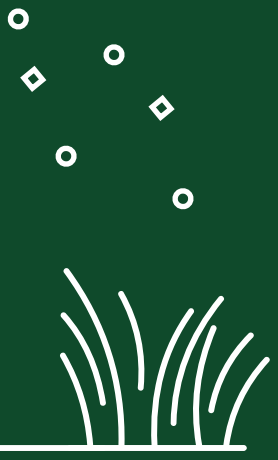
Besides containing a unique and rare ecosystem unlike anywhere else in the world, Kakadu's abundant wildlife and contrasting landscapes offer visitors with scenes of exceptional natural beauty. The ancient red escarpment, one of Kakadu's most famous features, continues unbroken for hundreds of kilometres, offering breathtaking views over the millennia-old rocky plateau beneath. Natural plunge pools and billabongs are hidden beneath waterfalls, with historical tracks winding their ways through to shady creeks and rainforest. Twin Falls, another of Kakadu's key features, drop over 220 metres to the beach below. While the economics value of this amazing natural beauty is difficult, if not impossible to quantify, it is nonetheless important for Australians and the world to appreciate.[127]

Invasion of Gamba Grass

While Kakadu's isolation has allowed it to survive many of the usual biodiversity threats often brought about by new species introduced through colonisation, scientists have recently identified an emerging pest which poses a significant threat to Kakadu's ecosystems.[128] Gamba Grass is a transformer weed, a pest which invades a landscape by taking over the surrounding vegetation, destroying the region's biodiversity.[129] The greater density and height of the Grass compared to native grasses can also amplify the threat and effects of bushfires, leading to fires which are 12 times as intense, and burn nine times higher, than native grass fires in the early dry season.[130] By reaching into tree canopies, Gamba Grass fires can destroy trees and other wildlife which usually survive native grassfires. Further, Gamba Grass produces more greenhouse gas emissions when burnt than native grasses.

Originally introduced in the Northern Territory in the 1930s to feed cattle, scientists only realised that the grass posed a threat in the 1990s, and declared a weed in 2008.[131] 1.5 million hectares of land are already affected by the Grass, which exists in isolated pockets around Darwin, Katherine, and Litchfield National Park, as well as interstate in Queensland and Western Australia. While the Northern Territory Government now gives out free herbicide to help tackle the pest, removing the weed can still cost pastoralists significant time and labour.

However, ecologists have noted the urgency of addressing the threat now with more aggressive containment methods in order to avoid even greater environmental repercussions, including to the biodiversity of Kakadu.[132] The economic consequences of ignoring the threat are also significant, in 2013, Setterfield et al estimated that the invasion of Gamba Grass in the Batchelor region in the Northern Territory increased the costs of fire-fighting by 30 times between 2007 and 2010.[133] Moreover, cultural impacts could also be felt by Kakadu's Traditional Owners, as an invasion of the Grass can destroy traditional foods and restrict access to sacred sites.[134]



Appendix A: **Economic contribution studies**

Economic contribution studies are intended to quantify measures such as value added, exports, imports and employment associated with a given industry or firm, in an historical reference year. The economic contribution is a measure of the value of production by a firm or industry.

A.1. Value added

Value added is the most appropriate measure of an industry's/company's economic contribution to gross domestic product (GDP) at the national level, or gross state product (GSP) at the state level.

The value added of each industry in the value chain can be added without the risk of double counting across industries caused by including the value added by other industries earlier in the production chain.

Other measures, such as total revenue or total exports, may be easier to estimate than value added but they 'double count'. That is, they overstate the contribution of a company to economic activity because they include, for example, the value added by external firms supplying inputs or the value added by other industries.

A.2. Measuring the economic contribution

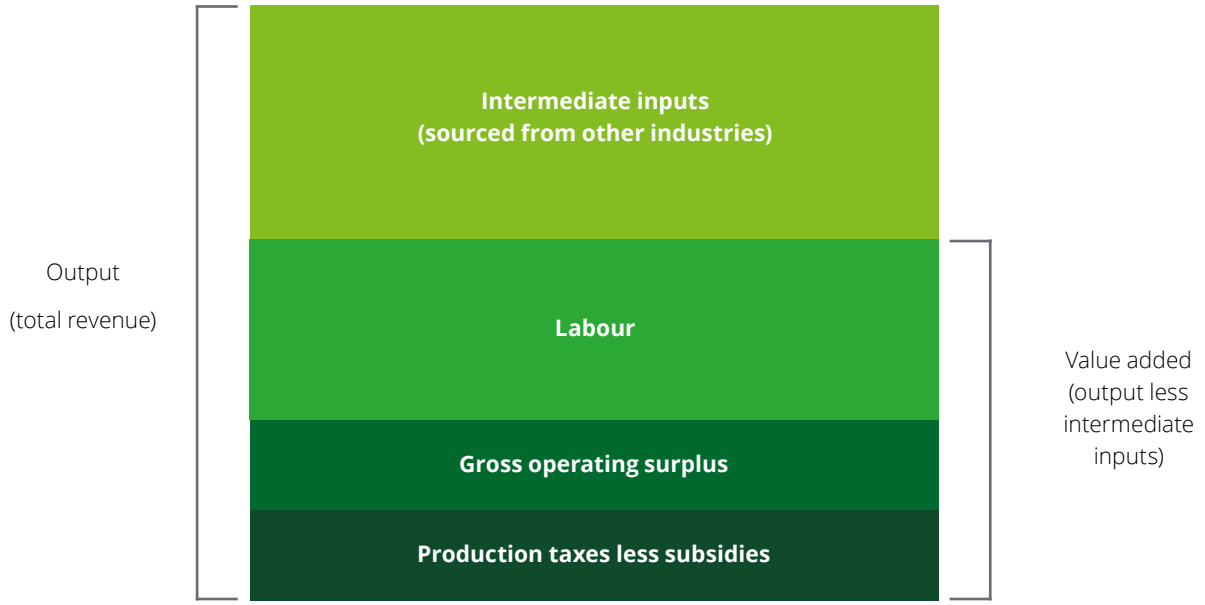
There are several commonly used measures of economic activity, each of which describes a different aspect of an industry's economic contribution:

- Value added measures the value of output (i.e. goods and services) generated by the entity's factors of production (i.e. labour and capital) as measured in the income to those factors of production. The sum of value added across all entities in the economy equals gross domestic product. Given the relationship to GDP, the value added measure can be thought of as the increased contribution to welfare.

Value added is the sum of:

- Gross operating surplus (GOS) – GOS represents the value of income generated by the entity's direct capital inputs, generally measured as the earnings before interest, tax, depreciation and amortisation (EBITDA)
- Tax on production less subsidy provided for production – this generally includes company taxes and taxes on employment. Note: Given the returns to capital before tax (EBITDA) are calculated, company tax is not included or this would double count that tax
- Labour income is a subcomponent of value added. It represents the value of output generated by the entity's direct labour inputs, as measured by the income to labour
- Gross output measures the total value of the goods and services supplied by the entity. This is a broader measure than value added because it is an addition to the value added generated by the entity. It also includes the value of intermediate inputs used by the entity that flow from value added generated by other entities
- Employment is a fundamentally different measure of activity from those above. It measures the number of workers employed by the entity, rather than the value of the workers' output.

Figure A.1: Economic activity accounting framework



Note: Figure A.1 shows the accounting framework used to evaluate economic activity, along with the components that make up gross output. Gross output is the sum of value added and the value of intermediate inputs. Value added can be calculated directly by adding the payments to the primary factors of production, labour (i.e. salaries) and capital (i.e. gross operating surplus (GOS), or profit), as well as production taxes less subsidies. The value of intermediate inputs can also be calculated directly by adding up expenses related to non-primary factor inputs.

A.3. Direct and indirect contributions

The direct economic contribution is a representation of the flow from labour and capital in the company.

The indirect economic contribution is a measure of the demand for goods and services produced in other sectors as a result of demand generated by Kakadu. Estimation of the indirect economic contribution is undertaken in an input-output (IO) framework using Australian Bureau of Statistics input-output tables that report the inputs and outputs of specific sectors of the economy (ABS 2010).

The total economic contribution to the economy is the sum of the direct and indirect economic contributions.

A.4. Limitations of economic contribution studies

While describing the geographic origin of production inputs may be a guide to a firm's linkages with the local economy, it should be recognised that these are the type of normal industry linkages that characterise all economic activities.

Unless there is significant unused capacity in the economy (such as unemployed labour) there is only a weak relationship between a firm's economic contribution as measured by value added (or other static aggregates) and the welfare or living standard of the community. Indeed, the use of labour and capital by demand created from the industry comes at an opportunity cost as it may reduce the amount of resources available to spend on other economic activities.

This is not to say that the economic contribution, including employment, is not important. As stated by the Productivity Commission in the context of Australia's gambling industries[135]:

> Value added, trade and job creation arguments need to be considered in the context of the economy as a whole … income from trade uses real resources, which could have been employed to generate benefits elsewhere. These arguments do not mean that jobs, trade and activity are unimportant in an economy. To the contrary they are critical to people's well-being. However, any particular industry's contribution to these benefits is much smaller than might at first be thought, because substitute industries could produce similar, though not equal gains.

In a fundamental sense, economic contribution studies are simply historical accounting exercises. No 'what-if', or counterfactual inferences – such as 'what would happen to living standards if the firm disappeared?' – should be drawn from them.

The analysis – as discussed in the report – relies on a national input-output table modelling framework and there are some limitations in this modelling framework. The analysis assumes that goods and services provided to the sector are produced by factors of production that are located completely within the state or region defined and that income flows do not leak to other states or territories.

The IO framework and the derivation of the multipliers also assume that the relevant economic activity takes place within an unconstrained environment. That is, an increase in economic activity in one area of the economy does not increase prices and subsequently crowd out economic activity in another area of the economy. As a result, the modelled total and indirect contribution can be regarded as an upper-bound estimate of the contribution made by the supply of intermediate inputs.

Similarly, the IO framework does not account for further flow-on benefits as captured in a more dynamic modelling environment like the CGE model.

A.5. Input-output analysis

Input-output tables are required to account for the intermediate flows between sectors. These tables measure the direct economic activity of every sector in the economy at the national level. Importantly, these tables allow intermediate inputs to be further broken down by source. These detailed intermediate flows can be used to derive the total change in economic activity associated with a given direct change in activity for a given sector.

A widely used measure of the spill-over of activity from one sector to another is captured by the ratio of the total to direct change in economic activity. The resulting estimate is typically referred to as 'the multiplier'. A multiplier greater than one implies some indirect activity, with higher multipliers indicating relatively larger indirect and total activity flowing from a given level of direct activity.

The input-output matrix used for Australia is derived from the Australian Bureau of Statistics Input-Output Tables. The industry classification used for input-output tables is based on ANZSIC, with 111 sectors in the modelling framework.

Appendix B: **Economic contribution**

B.1. Data source

Table B.1 provides a list of summary data used to assess the economic contribution of Kakadu.

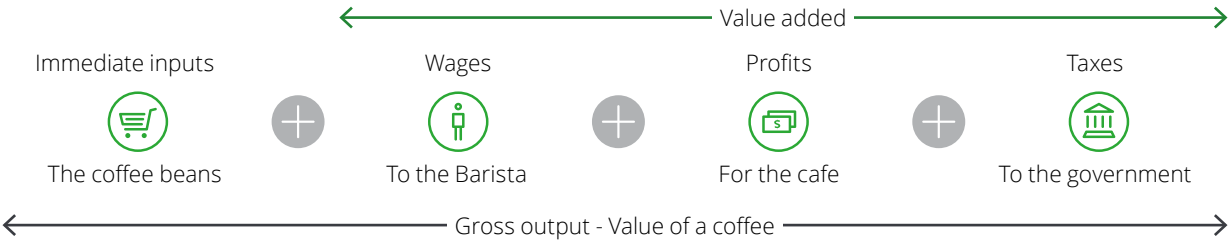
Table B.1: Sources of data to measure the economic contribution

Data type	Data source
Visitors to Kakadu	Vehicle counter data provided by Parks Australia
Visitor nights and average expenditure per visitor night	National Visitors Survey (NVS) and the International Visitors Survey (IVS)

B.2. Economic contribution of tourism activities

If we take a simple example of a coffee purchased. The direct value added to the economy is calculated by summing wages to the barista, profits to the coffee shop and production taxes (less subsidies) paid to the government. Gross output – or the amount paid for the coffee – is this value added, plus the intermediate inputs (coffee beans, milk). The indirect value added to the economy comes from these intermediate inputs.

Figure 7.1: Economic activity accounting framework – making a cup of coffee



Overall, tourism in Kakadu adds $136 million in value added to the Australian economy and 1,188 full-time jobs. The economic contribution of Kakadu to the Australian economy is presented in Table B.2.

Table B.2: Economic contribution of Kakadu National Park, 2018

Data type	Data source
Consumption ($)	$201.7
Direct output ($)	$135.7
Value added ($ millions)	
Direct ($)	$69.0
Indirect ($)	$67.5
Total value added	**$136.4**
Employment (FTE)	
Direct	728
Indirect	460
Total employment	**1,188**

Source: Deloitte Estimates

Appendix C: **Literature review**

C.1. Literature review framework

The literature framework was structured to build an understanding of the literature, theories and concepts that underpin the valuation of environmental assets, the total economic framework and non-market valuation techniques.

The literature review framework was limited to the specific scope of this study, which is the valuation of Kakadu within a total economic valuation framework.

The literature search returned a substantial amount of domestic and international studies that assisted in the framing of the methodology for measuring the total economic value of Kakadu. The following section provides a condensed overview of the key literature as it related to Kakadu and outlines the relevance to conducting a total economic valuation of Kakadu. Many other studies are referenced throughout the report itself.

C.2. Studies valuing Kakadu National Park

This section summarises some of the key literature.

Knapman, Stanley and Lea (1990) offer one of the earliest full economic impact studies of the value of tourism to Kakadu, following the first economic assessment undertaken by the Senate Standing Committee on the Environment, Recreation, and the Arts in 1988. The tourism impact assessment finds that the proportion of expenditure in Kakadu's regional industries is approximately 22.5 per cent, such that the existence of Kakadu causes expenditure to increase by $22.50 for every $1,000 of expenditure. Given the contemporary uncertainty surrounding Kakadu's future uses for tourism, mining, or conservation purposes, the study is primarily aimed at comparing the interlinkages between tourism and mining in the regional economy, and further calculates a range of scenarios, including the impacts on tourism caused by higher and lower levels of mining activity.[136]

The study by Carlsen, Wilks and Imber (1994) on behalf of the Resource Assessment Commission is an example of an application of the contingent valuation method to the Kakadu Conservation Zone (KCZ), a 50 square kilometre area surrounded by the Kakadu, but initially excluded from its original listing. The purpose of the study was to assess the impacts of potential mining operations on the environmental and cultural values of the KCZ, as well as Kakadu more generally. The authors presented participants with two scenarios of potential damage to the area caused by proposed mining activities. Using the conservative estimate from the minor impact scenario, they estimate Australians' total value for preserving the KCZ was $435 million, compared to the estimated $102 million value of the proposed mining activity.[137]

Buckley (2004) offers a different approach to tourism in Kakadu, estimating the economic impact of Kakadu's World Heritage listing on visitor numbers. Despite a lack of international visitor data prior to 1982, Buckley uses historical visitor data to conclude that World Heritage designation offers significant increases in number of international visitors to tourism sites, with the proportion of international visitors increasing from 10 per cent in 1982 to 50 per cent in 2000.[138]

Tremblay (2008) also undertook an economic assessment of the value of tourism to Kakadu, using the Carlsen and Wood approach of economic attribution and substitution. Tremblay refined the approach previously undertaken by other tourism studies by distinguishing between international, interstate, and intra-Territory visitors, finding average expenditures for each group of $134.45 for interstate day visitors, $116.93 for overseas day visitors, and $115.56 for intra-territory day visitors. Using an average attribution ratio of 88.8 per cent, and an average substitution figure of 16.2 per cent, Tremblay concluded that Kakadu contributes $8.28 million to tourism expenditure in the Northern Territory, and a further $15.79 million for the Top End.[139]

Appendix D:
Primary research and results

The following section presents the full results of the survey.
It is important to note results may not add to 100% due to rounding.

D.1. General

Table D.1: What gender do you identify as?

Male	47%
Female	53%
Other	0.1%
Prefer not to say	0%

Table D.2: What is your age?

18 – 24	6%
25 – 34	24%
35 – 44	22%
45 – 54	16%
55 – 64	16%
65 – 74	12%
75 or over	5%

Table D.3: Which country do you live in?

Australia	67%
New Zealand	8%
UK	8%
USA	8%
China	9%

D.2. International responses

Table D.4: When did you most recently visit Australia?

Within the past 6 months	38%
Within the past year	32%
Within the past 5 years	25%
Within the past 10 years	2%
Never	3%

Table D.5: Would you consider visiting Australia in the future?

Yes	100%
No	0%

Table D.6: What is your residential postcode?

hidState:

Australian Capital Territory	1%
Greater Adelaide	6%
Greater Brisbane	9%
Greater Darwin	9%
Greater Hobart	1%
Greater Melbourne	17%
Greater Perth	7%
Greater Sydney	18%
Rest of NSW	9%
Rest of Northern Territory	3%
Rest of Queensland	9%
Rest of SA	2%
Rest of Tasmania	1%
Rest of Victoria	5%
Rest of WA	1%

STATE1:

ACT	1%
NSW	27%
NT	13%
QLD	19%
SA	7%
TAS	2%
VIC	22%
WA	8%

AREA:

Metro	69%
Rural / Regional	31%

Table D.7: What is your approximate annual household income before tax (including pensions and benefits)?

Australia	
Nil income	1%
$1 to $20,000	6%
$20,001 to $40,000	16%
$40,001 to $60,000	16%
$60,001 to $80,000	12%
$80,001 to $100,000	14%
$100,001 to $150,000	16%
$150,001 to $200,000	7%
$200,001 to $250,000	3%
$250,001 to $300,000	1%
More than $300,000	1%
Prefer not to answer	8%

New Zealand	
Nil income	0%
$1 to $22,000	2%
$22,001 to $44,000	14%
$44,001 to $65,000	15%
$65,001 to $87,000	18%
$87,001 to $109,000	12%
$109,001 to $163,000	24%
$163,001 to $218,000	4%
$218,001 to $272,000	2%
$272,001 to $327,000	2%
More than $327,000	0%
Prefer not to answer	8%

United Kingdom	
Nil income	1%
£1 to £11,000	6%
£11,001 to £22,000	8%
£22,001 to £34,000	22%
£34,001 to £45,000	17%
£45,001 to £56,000	10%
£56,001 to £84,000	16%

United Kingdom	
£84,001 to £112,000	10%
£112,001 to £140,000	5%
£140,001 to £168,000	2%
More than £168,000	2%
Prefer not to answer	1%

United States	
Nil income	1%
$1 to $15,000	4%
$15,001 to $30,000	3%
$30,001 to $45,000	7%
$45,001 to $59,000	6%
$59,001 to $74,000	11%
$74,001 to $111,000	24%
$111,001 to $148,000	13%
$148,001 to $185,000	12%
$185,001 to $223,000	7%
More than $223,000	8%
Prefer not to answer	5%

China	
Nil income	0%
¥1 to ¥99,000	1%
¥99,001 to ¥198,000	4%
¥198,001 to ¥297,000	10%
¥297,001 to ¥395,000	14%
¥395,001 to ¥494,000	15%
¥494,001 to ¥741,000	20%
¥741,001 to ¥988,000	11%
¥988,001 to ¥1,235,000	6%
¥1,235,001 to ¥1,483,000	8%
More than ¥1,483,000	12%
Prefer not to answer	0%

Table D.8: Is the potential to visit national parks as a holiday destination a factor in deciding which country you may visit in the future?

No	30%
Yes	70%

Table 7.3: How recently have you visited the Northern Territory?

Within the past year	23%
Within the past 3 years	22%
Within the past 5 years	11%
More than 5 years ago	15%
Never	30%

D.3. Users

Table D.9: How recently have you visited Kakadu National Park?

Within the past year	26%
Within the past 3 years	27%
Within the past 5 years	12%
More than 5 years ago	8%
Never	26%

Table D.10: How often do you visit Kakadu National Park?

More than five times per year	9%
Three to five times per year	15%
Once or twice a year	22%
I have visited at least once	54%

Table D.11: On your most recent visit, approximately how long did you spend in Australia away from home?

1 night	3%
2 nights	3%
3 nights	5%
4 nights	5%
5 nights	6%
6 nights	6%
7 nights	11%
8 nights	5%
9 nights	7%
10 nights	12%
11 nights	6%
12 nights	6%
13 nights	4%
14 nights	7%
More than 14 nights	15%

Table D.12: On your most recent visit, approximately how long did you spend in the Northern Territory away from home?

1 night	3%
2 nights	9%
3 nights	11%
4 nights	10%
5 nights	11%
6 nights	8%
7 nights	8%
8 nights	8%
9 nights	8%
10 nights	6%
11 nights	3%
12 nights	6%
13 nights	4%
14 nights	7%
More than 14 nights	15%

Table D.13: Was visiting Kakadu National Park the main purpose of your trip in the Northern Territory?

Yes	62%
No	38%

Table D.14: Did you extend your trip in the Northern Territory to visit Kakadu National Park?

Yes	27%
No	73%

Table D.15: How many persons (excluding yourself) were you paying for on this trip?

I did not pay for this trip	6%
I only paid for myself on this trip (including if you were reimbursed by someone else)	19%
One other person	37%
Two other people	20%
Three other people	12%
Four other people	3%
Five other people	3%
More than five others: (specify no. only)	0%

Table D.16: How many nights did you stay at Kakadu National Park specifically? This includes, for example, accommodation nearby.

0 night	6%
1 night	10%
2 nights	19%
3 nights	15%
4 nights	10%
5 nights	7%
6 nights	3%
7 nights	6%
8 nights	8%
9 nights	5%
10 nights	5%
11 nights	3%
12 nights	2%
13 nights	1%
14 nights	1%
More than 14 nights	1%

Table D.17: In overall terms, was the experience of the trip worth the cost?

Yes, at least as much as the cost	92%
No, less than the cost	8%

Table D.18: If the same experience had cost the above (*1.25), would you still have visited?

Yes	60%
Yes, but I would not visit as frequently	33%
No	6%

Table D.19: If the same experience had cost the above (*1.5), would you still have visited?

Yes	43%
Yes, but I would not visit as frequently	36%
No	21%

Table D.20: If the same experience had cost the above (*1.1), would you still have visited?

Yes	44%
Yes, but I would not visit as frequently	32%
No	24%

Table D.21: Which of the following were reasons for your visit to Kakadu National Park?

Variety of flora and fauna	67%
Art sites and cultural heritage artefacts	65%
Major river systems and landforms	60%
Recreational fishing	21%
Other	6%

Table D.22: How unique are the sights and experiences at Kakadu National Park?

Sights and experiences are unique	64%
Sights and experiences are somewhat unique	32%
Identical to other sights and experiences	3%
Don't know	1%

Table D.23: Using a scale (1 to 5), with 1 being least satisfied and 5 very satisfied, please rate your experience of the following at Kakadu National Park

The quality of tour guide (if applicable)	Very dissatisfied	2%
	Dissatisfied	1%
	Neither dissatisfied	8%
	Satisfied	37%
	Very satisfied	39%
	N/A	13%
Quality of accommodation choice	Very dissatisfied	1%
	Dissatisfied	4%
	Neither dissatisfied	10%
	Satisfied	42%
	Very satisfied	37%
	N/A	6%
Quality of dining options	Very dissatisfied	1%
	Dissatisfied	3%
	Neither dissatisfied	17%
	Satisfied	41%
	Very satisfied	34%
	N/A	5%
Mobile connectivity	Very dissatisfied	2%
	Dissatisfied	7%
	Neither dissatisfied	22%
	Satisfied	34%
	Very satisfied	27%
	N/A	7%

Signage clarity	Very dissatisfied	2%
	Dissatisfied	7%
	Neither dissatisfied	22%
	Satisfied	34%
	Very satisfied	27%
	N/A	7%
Road quality	Very dissatisfied	1%
	Dissatisfied	3%
	Neither dissatisfied	16%
	Satisfied	45%
	Very satisfied	33%
	N/A	2%
Parking facilities	Very dissatisfied	1%
	Dissatisfied	3%
	Neither dissatisfied	16%
	Satisfied	45%
	Very satisfied	33%
	N/A	2%
Public rest room facilities	Very dissatisfied	1%
	Dissatisfied	3%
	Neither dissatisfied	18%
	Satisfied	44%
	Very satisfied	32%
	N/A	2%
Camping sites	Very dissatisfied	0%
	Dissatisfied	3%
	Neither dissatisfied	15%
	Satisfied	34%
	Very satisfied	32%
	N/A	15%
Nature and wildlife experiences	Very dissatisfied	1%
	Dissatisfied	1%
	Neither dissatisfied	8%
	Satisfied	33%
	Very satisfied	56%
	N/A	1%
Local community and cultural experiences	Very dissatisfied	1%
	Dissatisfied	2%
	Neither dissatisfied	10%
	Satisfied	38%
	Very satisfied	46%
	N/A	3%

Table D.24: On a scale of 1 to 5, where 1 is not at all likely and 5 is extremely likely, how likely are you to recommend a friend or family member to visit Kakadu National Park?

1 – Not at all likely	1%
2	2%
3	13%
4	43%
5 – Extremely likely	42%

Table D.25: Why do Australians think paying to protect Kakadu is worth it?

Future generations should be able to visit it	65%
It is morally and ethically right to protect it	56%
It is important for the planet	50%
It has important Aboriginal art sites and cultural heritage artefacts	58%
It is important for Aboriginal groups	48%
It is important for biodiversity	51%
Australia would not be the same without it	45%
It is important for tourism	54%
It is important for the region's economy	45%
The world would not be the same without it	32%
Other	1%
Don't know	1%

Table D.26: Would any of the following affect your likelihood of visiting Kakadu National Park in the future?

		Domestic	International
If Kakadu National Park was opened to mining	I would still visit	34%	43%
	I would be less likely to visit	35%	37%
	I definitely would not visit	30%	21%
If flora and fauna were harmed by invasive species (such as cane toads)	I would still visit	39%	41%
	I would be less likely to visit	42%	48%
	I definitely would not visit	19%	12%
If rock art was reduced by 50%	I would still visit	48%	41%
	I would be less likely to visit	35%	45%
	I definitely would not visit	18%	15%
If landforms and river systems were disrupted by climate change	I would still visit	45%	42%
	I would be less likely to visit	37%	40%
	I definitely would not visit	18%	18%
If fishing was banned	I would still visit	66%	71%
	I would be less likely to visit	20%	22%
	I definitely would not visit	14%	7%

Table D.27: How likely are you to visit Kakadu National Park in the future?

	Domestic	International
Very likely	31%	44%
Somewhat likely	43%	38%
Not at all likely	15%	12%
Don't know	11%	7%

Table D.28: Would you place a value on the option of being able to visit Kakadu National Park in the future? If in the alternative the park was not open to visits?

	Domestic	International
Yes, a significant amount (e.g. $100)	17%	36%
Yes, a small amount (e.g. $10)	41%	41%
No	19%	11%
Don't know	24%	13%

Table D.29: Do you agree/disagree with the following statements?

		Domestic	International
Kakadu National Park is an iconic Australian landmark	Strongly agree	51%	45%
	Agree	36%	41%
	Neutral	12%	12%
	Disagree	1%	2%
	Strongly disagree	0%	1%
Kakadu National Park contributes to Australia's national identity and international standing	Strongly agree	42%	35%
	Agree	38%	45%
	Neutral	17%	17%
	Disagree	3%	2%
	Strongly disagree	1%	1%
Kakadu National Park contributes to Australia's cultural identity	Strongly agree	43%	36%
	Agree	36%	47%
	Neutral	18%	15%
	Disagree	3%	1%
	Strongly disagree	1%	1%
Kakadu National Park is a unique experience and is not offered anywhere else in the world	Strongly agree	42%	38%
	Agree	35%	40%
	Neutral	18%	18%
	Disagree	3%	3%
	Strongly disagree	1%	1%

		Domestic	International
Kakadu National Park contributes to Australia's brand globally	Strongly agree	35%	30%
	Agree	41%	44%
	Neutral	20%	21%
	Disagree	3%	3%
	Strongly disagree	1%	2%
Kakadu National Park contributes to increasing international visitors in Australia	Strongly agree	36%	34%
	Agree	39%	44%
	Neutral	21%	18%
	Disagree	4%	3%
	Strongly disagree	1%	1%
Kakadu National Park is home to unique Aboriginal culture that can't be found anywhere else in Australia or the world	Strongly agree	42%	37%
	Agree	33%	41%
	Neutral	20%	18%
	Disagree	4%	2%
	Strongly disagree	1%	1%
Kakadu National Park is the leading national park in Australia	Strongly agree	31%	34%
	Agree	33%	37%
	Neutral	30%	26%
	Disagree	5%	2%
	Strongly disagree	1%	1%

Appendix E: **Social value**

E.1. Existence value

To find the existence value, we followed the modelling approach taken in Carson et al (1994). Domestic survey respondents were randomly assigned a value of either $5, $10 or $100 and were asked the following:

> Assuming a situation where Kakadu National Park is under threat and faces the risk of being removed from the UNESCO World Heritage List, would you be willing to pay [$5, $10 or $100] every year to preserve its status? While only allowing a simple yes or no as the response.

If a respondent was willing to pay the assigned amount, the question would be asked again but the assigned amount would double [$10, $20, $200].

If they were not willing to pay the assigned amount, the question would be asked again but the amount assigned would half [$2.5, $5 or $50].

The original assigned amounts and the second round responses were used to assign an interval upper and lower bound where a respondent's willingness to pay would lie. These intervals in were then used to construct non-parametric (Kaplan-Meier) and parametric (Weibull) survival functions in order to calculate a median willingness to pay across the entire sample.

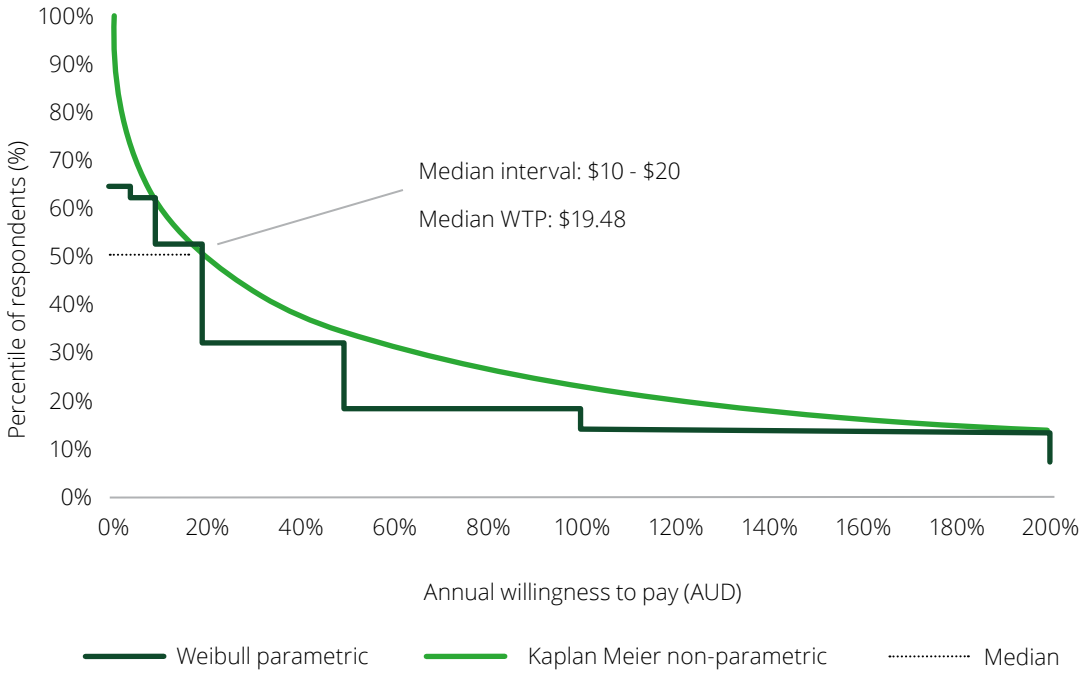
Table E.1: The interval WTP and their respective estimation results for both models

Interval		Kaplan Meier nonparametric	Weibull parametric
Lower bound	**Upper bound**	**Probability of being greater than the upper bound**	**Probability of being greater than the lower bound**
-∞	2.5	0.64	1
2.5	5	0.61	0.77
5	10	0.51	0.69
10	20	0.31	0.60
20	50	0.18	0.49
50	100	0.13	0.34
100	200	0.07	0.22
200	∞	0	0.12

Source: Deloitte Access Economics (2019)

Graphical representation can be seen below in Chart E.1.

Chart E.1: Annual willingness to pay to preserve Kakadu National Park on the UNESCO World Heritage List



Source: Deloitte Access Economics (2019)

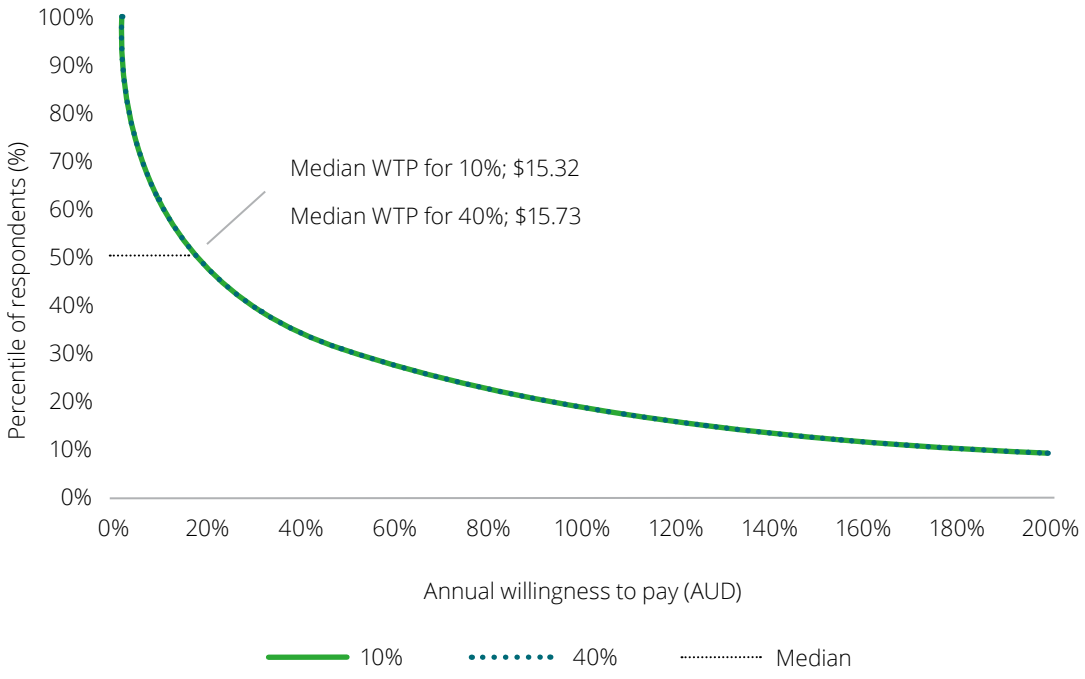
By multiplying the median willingness to pay of the Weibull parametric function ($19.48) by the population of working age Australians, it results in the aggregate annual willingness to pay, amounting $370 million. This was, in turn, used to find the 30 year net present value discounted at 3.7 per cent[140], equating to our estimation of the non-value of $3.05 billion. This procedure was repeated with the international survey responses, obtaining a median willingness to pay of $67.03.

To test whether respondents have behaved rationally, the report includes a test of scalability by splitting the UNESCO into two listing values. The process explained above was repeated with response data from the following two survey questions:

- Assuming a situation where, unchecked, environmental threats reduced the amenity of Kakadu National Park by [10 and then question is repeated with 40] per cent, would you be willing to pay the [$5, $10 or $100] every year to prevent these threats?
- Assuming a situation where rock art in Kakadu was under threat and reduced the amenity of Kakadu National Park by [10 and then question is repeated with 40] per cent, would you be willing to pay [$5, $10 or $100] every year to prevent these threats?

One would expect that the median willingness to pay would be greater for the 40 per cent responses than the 10 per cent if responses were monotone. Chart E.2 shows the Weibull parametric function produced from the survival analysis for domestic respondents to the corresponding question on Kakadu rock art. Although there is a marginal difference between the two, the data appears to be monotone, with the median willingness to pay to prevent a 10 per cent reduction in amenities less than the 40 per cent estimation.

Chart E.2: Annual willingness to pay to prevent the amenity of Kakadu National Park rock art reducing by 10 and 40 per cent.



Source: Deloitte Access Economics (2019)

Appendix F: **Valuing the future and the discount rate**

F.1 Valuing the future and the discount rate

It is very difficult to 'discount' the future of the Kakadu. Some people find it impossible or simply wrong to 'discount' the future of something as important as Kakadu. But it is important to recognise intergenerational benefits and welfare in determining the total social and economic asset value. This raises the question of how future generations are valued relative to the present when it comes to Kakadu. How much value is attributed to those who are not even born yet? In comparing welfare, utility and benefits across generations, the discount rate needs to be determined.

F.1.1 Discount rate

A social rate of time preference approach is used to calculate the discount rate applied to determine the NPV social and economic asset value of Kakadu. This approach is based on the Ramsey discounting rule. It is broken down into two main components:

$$r = \delta + \eta g$$

The first is the rate of time preference (δ), or people's preference for consumption in the present compared with the future. If the number is positive, present benefit realisation is given a higher utility weighting than benefits realised in the future. If the time preference is zero, or close to zero, there is no discount placed on future consumption, which suggests that intergenerational utility is equally weighted. In the context of assessing the social and economic value of Kakadu, it is ethically appropriate to distribute welfare equally across generations. As such, a near-zero rate of time preference is appropriate and the report adopts a rate of 0.05 per cent. This is the same rate as the Garnaut Climate Change Review 2008 and similar to the Stern Review 2007 (Table F.1).

The second component includes the elasticity of the marginal utility of consumption (η) and the growth rate of the economy (g). The elasticity of marginal utility of consumption measures society's concern for equity in income distribution. Again, turning to the Garnaut Climate Change Review 2008, an elasticity of 1 is a common choice in literature and while there are differing views, we have adopted an elasticity of 1. The growth rate of the economy is assumed as the average annual GDP chain volume measures percentage change from 1987 to 2017, 5204.0 Australian System of National Accounts. It is important to note that when considering the environment, and potential depletions of natural capital from development, that GDP growth it not necessarily a good measure of this or of wellbeing. However, in the absence of an Australian net national welfare measure, a long-term economic growth rate is appropriate.

Using the social rate of time preference approach and the assumed parameters, a social discount rate of 3.7 per cent is produced. This discount rate applies to the total social and economic asset calculations over the selected time period.

Table F.1: Key social discount rates considered

Study	Valuation	Activity/asset measured	Discount Rate	Logic
Costanza et al. (2008)	Non-use	Ecosystem service – Hurricane protection	3%	No explicit reasoning, standard social rate.
United States Environmental Protection Agency	Environmental costs and benefits	General environment	2-3%	General guidance for natural capital future costs and benefits
Stern Review (2007)	Climate change review	Climate change damages	1.4%	Based on the Ramsey equation
Garnaut Review (2008)	Climate change review	Climate change damages	1.35-2.65%	Based on literature and Stern Review parameters

F.1.3. Sensitivity

The asset value of the Kakadu is sensitive to the discount rate and time period applied to its modelling.

Table F.2 presents a sensitivity analysis from applying different discount rates and time periods.

Table F.2 Sensitivity analysis

Discount rate	Time period	Social value
1.7%	30 years	$13.4 billion
7%	30 years	$6.5 billion
3.7%	50 years	$10.0 billion
3.7%	50 years	$12.2 billion

Appendix G: **Traditional Aboriginal Owner values of Kakadu**

For Aboriginal Traditional Owners of land within the Park, Kakadu is home in the most profound sense. It is the basis of each individual's life cycle: it is where ones' spirit emerges from the landscape to be born through a mother, it is where one is reared, nourished and taught throughout the life journey, and ultimately it is where one's spirit returns at the end of life.

Home entails identity, which for Kakadu Traditional Owners is prescribed as a birthright from having been born into either a *gunmogurrgurr* or *mowurrwurr* clan-based identity or a broader language identity in the west. Clan-based identities connect individuals and their families in lines of putative descent with the creation ancestors who shaped the world, gave it form and meaning, gave rise to the first people (from whom current people are descended), gave these people language, estates in land, laws to follow, and left their enduring spiritual essences at sacred places to be cared for by the descendants.

Traditional land ownership in Kakadu is vested in a series of loosely bounded yet discrete estates of land which form a mosaic of land interests across the Park. Complimentary affiliation results in each individual having ownership rights to land in their father's estate along with complimentary usage and managerial rights over land in their mother's estate, extending as ceremonial rights and responsibilities in their mother's mother's estate. These affiliations produce a complex network of rights and interests in land normally mediated through and by family connections and entitlements, which are ordained in traditional law and custom and maintained through the exercise of ritual knowledge and ceremonial performance.

In Kakadu, as is broadly the case for many other Aboriginal people, Traditional Owners are reared to understand the land, its resources, through a prism of personal rights and responsibilities in relation to the land. The Park affords Kakadu Traditional Owners and their kin the security of inalienable freehold land, levels of privacy at their outstations/homes, protection and registration of sacred sites, access to hunting/fishing grounds, and the right to restrict access or close areas to others. Living and/or working on or close to their estates enables the monitoring of these estates and sites, the upholding of cultural obligations and responsibilities, the educating of children, and the maintenance and transmission of cultural knowledge and practices.

Most Kakadu Traditional Owners engage in a hybrid economy which derives varying levels of sustenance from the Park via the hunting, harvesting and exchange of traditional and contemporary resources as well as income from employment, Park rents and concession monies, welfare and other sources. Resources used and derived from the Park are arguably quantifiable through research, surveys of hunting and collecting practices and detailed analysis of Park derived monetary income. Yet the complex social and economic systems which underpin Kakadu Traditional Owners connections to their lands are poorly understood, hard to quantify as 'value' and are therefore totally undervalued both in the intrinsic sense of representing a unique set of ancient and ongoing cultural practices, and in the sense of other potential values that they may hold for Traditional Owners, including some which may be mediated or marketed with outsiders.

Kakadu Traditional Owners command a rich knowledge system which maps country, society, history and resources in the finest and most precise detail, and preserves this knowledge in narrative, mythology, song, design and ritual. The commonly experienced manifestation of this knowledge system is the famous, spectacular and well-marketed rock art of Kakadu. Tangible and marketable as a tourism asset, the recording and promotion of this artwork has had the paradoxical effect of obscuring the producers of this art and their traditional knowledge systems. Since the inception of the Park, resources have been invested into biodiversity, rock-art and archaeological research. Whilst important, this research has been largely driven by non-Indigenous decision-making and by non-indigenous priorities and values of heritage and significance. Comparatively fewer resources have been geared towards indigenous cultural maintenance, ethnographic research or linguistic projects for this same period, during which numerous senior Traditional Owners (many of whom were themselves knowledgeable artists and site custodians) have passed away.

For Aboriginal people, sacred sites are constitutional elements of their cultural beliefs, practices and responsibilities. The protection and management of sacred sites in Kakadu in compliance with the Kakadu leases, Plans of Management, ALRA and NTASSA provides for the maintenance and recognition of cultural values, enhanced cultural esteem of Kakadu Traditional Owners and confidence in culturally appropriate use of the Park by staff and the public. Yet there are areas of the Park where sacred sites and other cultural values are still being recorded by NLC and AAPA with Kakadu Traditional Owners demonstrating that the Park remains not fully cognisant of, let alone managing, all of Kakadu's cultural assets.

The World Heritage status of Kakadu reflects this trend with it being inscribed on this prestigious list since 1981 for its natural and cultural values, yet not being inscribed for the more recently developed and appropriate sub-criteria from UNESCO of 'associative cultural landscape'.[141]

Economy of cultural values

The rights-based recognition of cultural values which has developed in Australia since the 1970s is demonstrated by the *Aboriginal Land Rights (Northern Territory) Act*, and since the 1990s via the recognition of Native Title rights, with both forms of legislation enabling Aboriginal people to re-acquire ownership and/or interests in their traditional estates and derive economic benefits from those estates. Similarly, the *Northern Territory Aboriginal Sacred Sites Act* ('NTASSA') and the *Commonwealth Aboriginal and Torres Strait Islander Heritage Protection Act* provide recognition that intangible Aboriginal cultural values are worthy of protection and can even override other public or private economic interests.

These processes have increasingly confirmed that Aboriginal cultural values are intrinsic to the health and welfare of Aboriginal people, whilst also being generative of economic benefit to Aboriginal people, and contributing to local, regional and national economies.[142] Understandings have grown around the intrinsic value of Aboriginal cultures and the benefits of Aboriginal individuals and communities being actively connected to and engaged with managing their traditional estates and strong attachment to traditional culture is now understood to be statistically associated with better outcomes across a diverse range of dimensions of socio-economic wellbeing.[143] Such interconnected and interdependent benefits are inclusive of:

- cultural maintenance, transmission, and esteem;
- employment and hybrid economies;
- increased education outcomes and skills development;
- enhanced health outcomes and major health-care cost savings for governments; and
- significant contributions to national biodiversity and conservation goals. [144]

For Indigenous businesses, the intrinsic knowledge contained within unique Indigenous cultures, and the immense opportunity associated with the use of Indigenous-owned and controlled lands, is also now understood as leverage which can contribute to commercial success.[145]

In Kakadu, the lease-back arrangements from Aboriginal land owners of the relevant Aboriginal Land Trusts to the Commonwealth attract rents payable to the land trusts as well as a percentage of all concession monies earned by the Park (entry fees, tour operator fees etc). These arrangements represent a form of quantification of cultural value, in that the rent and concession monies are paid as compensation to Aboriginal Traditional Owners for having the park on their land. Other aspects of the lease arrangements and plans of management further this quantification and compensatory system with limited efficacy by providing for the Board of Management, decision-making processes in conjunction with NLC, and the supposed protection of cultural values. Contradictions have plagued these systems especially in regard to less tangible aspects of Aboriginal cultural values which are difficult to quantify: identity, sacred sites and a sense of home as described above do not readily translate readily into Canberra spreadsheets.

Despite Kakadu's national and international profile, along with its World Heritage status and its established destination status and brand, the full economic potential of the Park for Traditional Owners has not been realised. Whilst presenting unique opportunities to ensure security and strength of cultural maintenance for Traditional Owners, and create enhanced tourism and other economic opportunities, Kakadu under the governance of its joint-management model developed in the late 1970s appears to have delivered limited benefit to Traditional Owners and not even come close to the often promoted 'win-win' imagery.[146]

The post-mining era in Kakadu will generate new challenges and opportunities. In 2020 the NLC is seeking to finalise the remaining Kakadu land claims and review the leasing arrangements. At the same time, the Jabiru township is being re-imagined by various stakeholders and especially by the Mirarr Traditional Owners towards a service centre for eco and cultural tourism. A recent workshop[147] attended by Kakadu and neighbouring Traditional Owners and rangers commenced a regional Indigenous knowledge forum which anticipates a future facility in Jabiru aimed at protecting Indigenous Cultural Intellectual Property rights and interests in the region. Such a collective will focus on developing and maximising the control of access to, use and economic potentials of indigenous knowledge systems across the region for engagement with biodiversity, archaeological, cultural and land management research projects as well as with ecologically and culturally focussed tourism.

Many opportunities are present and waiting to be realised. If Kakadu Traditional Owners are recognised and engaged with as lead partners, as land-owners and as custodians of the oldest continuing cultural and knowledge systems on Earth, then benefits can accrue from the most local to the broadest of levels. Recognition, promotion and respect for the intrinsic values of local Aboriginal cultural values can flow through to administrators, tourists and the general public, enhancing Kakadu Traditional Owners' esteem and pride, fostering and building relationships and opportunities for the teaching of non-indigenous people about cultural values, creating research, land management and business opportunities and meaningful economic opportunities and futures. The key shift is that Kakadu is not simply a Park or a World Heritage Property, rather it is home to a remarkable group of people who have so much to teach the rest of us if we cared to listen.

Prepared by Gareth Lewis on behalf of the Northern Land Council – April 2020

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