Article

Conservation and Co-Management of Rock Art in National Parks: An Australian Case Study

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Abstract: Using rock art conservation as a focus, this paper outlines the levels of legislated protection afforded to designated natural and cultural areas/sites in Australia and describes the co-management approach adopted in 1998 in relation to Mutawintji National Park in western New South Wales. The park encompasses four different protection categories: a Historic Site, a Nature Reserve, a National Park, and a State Conservation Area. Known for more than a century, the Historic Site is a major area of rock art containing Aboriginal engravings, paintings and stencils. Management of the Historic Site is a key concern, given the tourist interest and associated potential for accelerated deterioration of cultural heritage. The Mutawintji Plan of Management pointed to the importance of Mutawintji for Aboriginal people to connect with the country, and the co-management model encouraged tourism development as a means of providing employment opportunities as Aboriginal guides. No special legislative requirements in relation to rock art conservation, beyond those already in existence, were applied to the co-management system. Using field knowledge involving rock art research and early guide training programs at Mutawintji and literature sources, this paper suggests possible future approaches to rock art conservation in the Mutawintji Lands.

Keywords: Aboriginal heritage; co-management; protected areas; heritage status; Mutawintji

1. Introduction—Protected Areas and Conservation

‘Heritage preservation will always involve contestation’ [1]. This contentious pattern often begins with disagreement about what is to be preserved and continues through to the process of how a particular place or item is to be managed. Globally, the ‘Safeguarding’ or ‘measures aimed at ensuring the viability of the intangible cultural heritage’ is one of the key purposes of the Convention for the Safeguarding of the Intangible Cultural Heritage [2].

Management plans for World Heritage properties should be well integrated into planning arrangements at national, regional and local levels [3]. Thus, an initial heritage designation requires the approval of an authority, whether at the local community, local council, state, national, or international level. The degree of official protection largely determines the practical management of these places/sites, thereby directly affecting their rate of conservation or deterioration. Among these uncertainties, rock art can be especially vulnerable. In addition to legislated protection and suitable management, rock art requires appropriate funding to support active conservation planning and implementation. As a form of protected area management, co-management of national parks involving government authorities and communities has been considered or adopted in various countries, including the U.S.A. [4], South Africa [5], and Indonesia [6]. Such co-management arrangements have had variable success from the perspectives of both participants and observers.

National parks encompass areas deemed important for their natural and/or cultural heritage, and such places are managed worldwide for the conservation and public enjoyment of these attributes. Internationally recognised classifications of protected areas, such
as national parks, include those of UNESCO and the International Union for Conservation of Nature (IUCN). These classifications influence the approaches and effectiveness of actions taken to conserve any rock art present within their boundaries. The UNESCO and IUCN classifications are complementary, with UNESCO focusing on natural and cultural attributes and the IUCN on natural landscapes only. In the latter’s guidelines for classifying and protecting natural areas, the highest order of protection is afforded to Strict Nature Reserves (Category Ia) and Wilderness Areas (Category Ib), with national parks being classified as Category II. Lower categories are assigned to Natural Monuments or Features (III), Habitat/Species Management Areas (IV), Protected Landscapes/Seascapes (V), and Protected Areas with Sustainable Use of Natural Resources (VI) [7]. Once applied to specific areas, considerable variations become apparent between and within different countries and local jurisdictions both in designating categories of protection and in the management approaches and strategies adopted when establishing and maintaining such areas.

Here, we elaborate on one case in Australia, a country where extensive areas are classified as protected areas, including internationally known rock art sites. Moreover, Australia was one of the pioneers in designating certain areas as National Parks in 1879. The novel aspect of this research paper is to evaluate the positive economic and social returns to local Indigenous stakeholders and the impact of visitors’ damage on rock art located within a designated national park. This paper will first consider the context of heritage protection in Australia and the management of rock art conservation within protected areas before focusing on Mutawintji National Park in New South Wales (NSW). This national park is an example of continuity and change in approaches to rock art conservation accompanying the introduction of a co-management system.

1.1. Protected Areas in Australia

Combining the UNESCO and IUCN listings in Australia, the total extent of terrestrial protected areas exceeds 169 million hectares or about 22% of the country’s land mass. Of this protected area, nature reserves constitute 9.3%, wilderness areas 2.3%, and national parks 23.2% [8]. National parks represent ‘large natural or near natural areas set aside to protect large-scale ecological processes . . .’, with the primary management objectives being ‘to protect natural biodiversity, . . . underlying ecological structure and supporting environmental processes, and . . . promote education and recreation.’ [7] (p. 1). At the state level in Australia, specific areas with important examples of rock art can be given formal protection by being designated at the IUCN level as a Historic Site (disregarding locally specific terminology). Such sites may extend over relatively small areas, such as at Mount Grenfell in NSW [9], or over wider areas as part of a National Park, such as at Mutawintji National Park in NSW [10].

The process of gaining the highest form of international recognition—the UNESCO World Heritage Listing—requires a proposal being put forward to UNESCO by a national government [11]. In Australia’s case, such proposals are usually focused on the Australian National Heritage list, which includes 120 items of mixed provenance, comprising mainly urban (built) environments, relics of early European settlement, fossil sites, some sites of significant Aboriginal occupation, and seven rock art sites [12]. Individual states within the country have their own heritage lists, thus creating a hierarchy of levels of protection from World Heritage to Australian National Heritage to state-designated sites of varying categories. Apart from World Heritage and national listings, state laws govern the criteria and category of any areas within their jurisdiction. In NSW, for example, there are 12 categories of protection, ranging from a World Heritage Listing through to wilderness areas and state nature reserves, where biodiversity has priority over recreation, and then to state conservation areas, where mining is allowed [13]. The three categories of protected areas—World Heritage, Australian National Heritage, and State-Protected Areas—determine the management approaches required for the conservation of attributes within the various designated groups.
Cultural heritage is defined by UNESCO as ‘... intangible cultural heritage (ICH) embedded into cultural, and natural heritage artefacts, sites or monuments ... and cave paintings’ [14]. Australia, as well as possessing striking landscapes and interesting historical sites/artefacts, has a rich Indigenous heritage, which includes some individual archaeological sites with evidence of Aboriginal occupation dating from 65,000 BP [15], scarred trees [16], and rock engravings and paintings [17,18]. This Indigenous heritage has been recognised at a global scale by UNESCO, and at national and state levels in places designated as ‘heritage’ or ‘protected areas’. Many of the best-preserved rock engravings and paintings are found in the more remote parts of the country, with Kakadu National Park being included on the World Heritage List [19], mainly for its rock art sites. The Uluru-Kata Tjuta and Blue Mountains National Parks, although having major rock art sites, appear on the list primarily for other reasons [20], as the UNESCO-based criteria include combinations of natural and human-made landscapes. The highest level of protection accompanies a World Heritage listing, which imposes requirements on national governments to maintain the attributes for which the area or item has been listed. Australia has a total of 20 World Heritage sites, of which 12 are ‘natural’ heritage (e.g., Great Barrier Reef), 4 are ‘cultural’ (e.g., Sydney Opera House), and 4 are ‘mixed’ (e.g., Kakadu National Park) [19].

The hierarchy of the levels of protection in Australia affords considerable authority to state-based jurisdictions, and this may delay opportunities for World Heritage listing. In Western Australia, for example, the now heavily industrialised Burrup Peninsula in the Dampier Archipelago has a wealth of rock engravings, the significance of which was recognised in the Dampier Archaeological Project report of 1987 [21] preceding industrial development in the region. Although groups have long advocated for World Heritage nomination of this area [22–24], described as having ‘Australia’s greatest collection of petroglyphs’, it was finally placed on the Australian National Heritage list in 2007 [25,25,26]. However, it was only in 2023 that the official World Heritage Listing process was finally commenced and nomination of the Murujuga Cultural Landscape (Burrup Peninsula) was submitted to the UNESCO World Heritage Committee [27].

In NSW, the historical implementation of protected area management began in 1879 with the creation of Australia’s first National Park, called simply ‘National Park’ (later Royal National Park), near Sydney. Administered by the state government and trustees, the park was intended to provide a healthy recreational environment for an urban population living in overcrowded and polluted conditions. Environmental conservation was championed from the 1920s and culminated in the establishment of the state’s National Parks and Wildlife Service (NPWS) in 1967. From this time forward, the state’s National Parks were administered by the NPWS, and conservation was afforded equal importance with recreation and other objectives. Co-management of protected areas was implemented more widely following the Native Title Act 1993, which detailed the rights of traditional Aboriginal custodians to land. The Mutawintji lands were the first in NSW to be jointly managed by Aboriginal owners and NSW NPWS [28].

1.2. Rock Art Management in Protected Areas

Rock art deteriorates over time due to natural biophysical processes and human activities, both direct and indirect. Long-term natural deterioration of rock art is to be expected on rock surfaces that continue to undergo weathering and destabilisation from exposure to atmospheric elements and endemic or introduced flora and fauna. Often, only minor interventions to decrease the rate of these processes are possible—for example, by re-directing water flow away from vulnerable painted rock surfaces or erecting barriers to prevent access by sharp-hooved or large animals (DD—personal observation). The physical conservation of valuable open-air cultural heritage items on rock surfaces thus poses challenges for management. Physical processes are accelerated by direct and deliberate human interventions such as vandalism [29], the illegal removal of engraved stones (Figure 1), the unchecked construction of roads or buildings, and unsupervised over-visitation. In such cases, an approach of benign neglect by relevant individuals or organisations needs to be
replaced by active management. In other situations, damage to rock art can occur through 
apparently indirect mechanisms such as establishing polluting industries close to rock art 
sites, thus leading to increased rates of rock surface weathering [30,31]. Since the World 
Heritage nomination of the Murajuga Cultural Landscape, the Australian government 
has limited future industrial approvals to one new plant [32,33] and instigated a rock art 
monitoring program [34,35]. The conflict between mining/industrial uses and rock art 
conservation has not yet arisen at Mutawintji.

![Light-coloured surface exposed by illegal removal of rock](image-1)

**Figure 1.** Light-coloured surface exposed by illegal removal of rock (right-hand side) at Mutawintji. Varnished engraved rock surface remains on left (source: D.D.).

Of the legislatively protected areas in NSW, this overview will focus on approaches 
adopted in Mutawintji National Park, an area which incorporates four different protection 
categories under a joint management philosophy involving Aboriginal owners and NPWS. 
Attention will be directed towards actions taken to conserve Aboriginal rock art in the face 
of challenges from modern demands for tourism and Aboriginal aspirations for ‘living 
on country’.

2. Mutawintji: Rock Art, Conservation, and Management

2.1. Mutawintji National Park

Mutawintji National Park is located in arid to semiarid country about 1150 km from 
Sydney and, although remote, has long been recognised as an important site for rock art [36]. In 1927, an area of 486 ha was declared a ‘Reserve for Preservation of Native Flora 
and Fauna, Caves and Aboriginal Carvings and Drawings’ at a location then known as 
Mootwingee. The pecked and abraded engravings were estimated conservatively to exceed 
2500 individual motifs [37]. The original reserve, now known as the Historic Site within 
Mutawintji National Park, is dominated by a major linear outcrop of variable but mainly 
coarse-grained quartzitic sandstone and conglomerate, within which near-permanent water 
holes represent a significant resource.

In 1983, a blockade of the area by Aboriginal groups began a process that led to 
legislative changes in 1991 and 1996, culminating in formal ownership of the park being 
transferred to the Mutawintji Local Aboriginal Land Council in 1998 [28,38]. Mutawintji 
National Park consists of four areas under different protection designations: the Historic Site 
(or Main Engraving Site—486 ha), the Nature Reserve (for conservation of the endangered 
yellow-footed rock wallaby—6688 ha), and the National Park (approximately 61,800 ha). 
The land covered by the original Mutawintji Lease Agreement, at that time about 69,000 ha, 
was extended by a further 57,000 ha in 2019 when the state government purchased adjacent 
land as a State Conservation Area [39,40]. This latter designation of a conservation area 
does not preclude future mining activities [41]. As conservation is deemed to be an integral 
component of managing protected areas, these different designations require complex 
site-based management systems capable of incorporating suitable approaches for diverse 
levels and forms of protection.
2.2. Rock Art Management

2.2.1. Managing Rock Art before Co-Management (Pre-1990s)

Rock art in NSW is protected under legislation as part of the state’s cultural heritage, whether or not the sites are located within a National Park or other protected area. Rather than long-term natural deterioration, a major concern of park management throughout the state is immediate visitor damage. Travel to remote areas like Mutawintji was limited in the past due to transport considerations, but this passive technical restraint no longer provides satisfactory protection. In the pre-1998 period, NPWS aimed to provide access to the Main Engraving Site only through pre-booked tours conducted by a park ranger or a designated guide from a local tour company. The group size was ideally limited to 12 people, and some co-managed training was provided for guides from Broken Hill in the 1990s; participation of Aboriginal people in this training was actively encouraged. Guided tours were seen as benefitting the tourist experience by providing education while simultaneously contributing to rock art preservation through the relatively informal supervision of visitor behaviour. In addition, a Visitor Centre was built, and print and visual information about Aboriginal history, the rock art, and the Park was generally made available.

Visitor impacts require other specific management responses, as people walking within a protected area will adversely affect the survival of beneath-footsfall vegetation as well as lead to soil compaction (clays) or disruption (sands). The resulting changes contribute to soil erosion and dust generation. Pedestrian impacts from people or feral animals are especially important on ground surfaces, where walking may disturb stone tool assemblages or where engraved rock is exposed on pathways. Management responses included installation of (i) raised metal pathways over areas with stone tools and flakes; (ii) a single chain barrier to protect engravings on pathway edges; (iii) a viewing platform at the Main Engraving Site to prevent visitors from walking over engraved rock surfaces; and (iv) a goat reduction program, as sharp-hooved goats damage engraved rocks, add to erosion on walking trails, adversely impact native vegetation, and compete with native animals for feed and water.

Direct management attempts to conserve the rock art involved two additional methods, both later abandoned.

1) High-pressure water jets were used to remove surface soil and vegetation from extensive outcrops with engraved surfaces. Without an anchor, the engraved sandstone slabs began migrating downslope and accumulating at the base of the slope—an unintended outcome that was later rectified by cementing smaller stones together to create a stable surface and then embedding metal rods to ‘pin’ some of the engraved blocks in place (Figure 2).

2) Acrylic cement was used in an experiment to ‘glue’ thin engraved rock fragments together. The acrylic broke into gravel-sized pieces during the hot summers, and its use was subsequently discontinued (Figure 3).

Both physical interventions were well-intentioned but predictably unsuccessful, requiring rectification or abandonment.
2.2.2. The Co-Management Transition (1990s)

Co-management, or joint management, commenced in NSW at Mutawintji in the late 1990s, gathered pace in the 2000s and is a continuing process in the state [42], with 19 consultative Regional Aboriginal Workshops being held from November 2022 to March 2023 [43]. Currently, about 2.3 million ha (30%) of National Park areas in the state are co-managed [43]. This management system recognises Aboriginal ownership, including that of the Mutawintji Lands, with the Lands remaining within the National Parks system under a lease arrangement [38].

Extensive discussions were held during the 1990s to establish the new co-management process. An issue receiving considerable attention was the provision of employment...
opportunities compatible with the objectives of a National Park, including a detailed examination of the potential for Indigenous-run tourism activities [44]. Following the formal transfer of land ownership to the Mutawintji Local Aboriginal Land Council, several matters of concern to its members were discussed and addressed. Two culturally sensitive sites were closed to tourists [45], the camping ground was relocated, and walking paths deemed too close to sensitive sites were re-aligned. These changes have remained in place. The removal of the viewing platform at the Historic Site was considered, but it was decided that the visually intrusive structure was still the best (imperfect) option available for protecting the engravings while allowing for visitation. A key priority of the Board of Management was that of Aboriginal employment and training, especially in relation to the accreditation of guides [28]. It was estimated that approximately 8000 tourists visited the area annually at that time [28]; there has been no official update on this figure.

2.2.3. Co-Management and Rock Art

Prior to co-management, the state had legislation dealing with rock art protection and consultation with local Aboriginal people about all Aboriginal sites, and this remained. The new co-management structure developed for Mutawintji recognised the Mutawintji Local Aboriginal Land Council as the trustee for the freehold owners of the Mutawintji Lands, which were leased back to the state government for their joint management with NSW NPWS. This major change altered the nature and extent of Aboriginal involvement in Park management, allowing for modification to existing policies and protocols ‘under the care, control and management of a Board of Management, which comprises a majority of Aboriginal members’ [38]. The Board is responsible for both long-term and day-to-day management of the Park (Table 1).

The Board has emphasised the important role of Aboriginal employment in managing the Park and its visitors through the training of Aboriginal field officers and tour guides and the development of Aboriginal commercial enterprises. Establishing tourism in National Parks in remote areas in many parts of the world has challenges, including a limited number of potential guides, who will mostly require training before employment as accredited tour leaders [46,47]. At Mutawintji National Park, officers are employees of the NSW state government, and employment opportunities for Aboriginal field officer positions are advertised by the Mutawintji Local Aboriginal Land Council and on the state government website [48]. In 2016, a Tourism Officer was appointed by park management and tasked with increasing visitation by developing walking tours and other activities of interest to tourists while simultaneously increasing the potential for Aboriginal employment as tour guides [46,49]. Building a tourism enterprise that will provide employment opportunities at Mutawintji also requires on-site training from traditional owners and guides, which is essential for learning about Aboriginal history, traditions and caring for country [50]. The co-management model has thus recognised the importance of Indigenous tour guides in the role categories outlined by Howard et al. [51], namely, by acting as leaders (accompanying groups to restricted sites), teachers (explaining the Aboriginal cultural history and the site), mediators (between Western and Aboriginal cultures), and interpreters of the environment (especially the Aboriginal perspective of caring for the country).

| Table 1. Stakeholders of the Mutawintji co-management plan. |
|-----------------|-----------------|-----------------|-----------------|
| **Entity**      | **Structure**   | **Role**        | **Remarks**     |
| Board           | The Chair       | The Board is    | instigated      |
|                 | (Aboriginal)    | responsible for | training of     |
|                 | 9 of 13 members | all day-to-day  | Aboriginal      |
|                 | are Aboriginal  | and long-term   | field officers  |
|                 |                 | planning and    | and tour guides;|
|                 |                 | management      | encouraged      |
|                 |                 |                 | development     |
|                 |                 |                 | of Aboriginal   |
|                 |                 |                 | commercial      |
|                 |                 |                 | enterprises     |


3. Tourism and Rock Art Conservation

The development of tourism in places where fragile heritage is a unique attraction creates potential conflict between rock art conservation and increased visitor numbers. State policies in NSW have long encouraged managers to promote tourism for economic reasons [53], although Parks Australia noted ‘the natural link between tourism and conservation’ [54] (p. 2). This link is not always apparent in relation to rock art, where financial returns from tourist activities may not always be directed towards conservation. In addition, unregulated visitation at sensitive open-air sites can lead to relatively rapid deterioration of rock art through deliberate acts of vandalism or through ignorance of actions which cause...
damage, like wetting rock surfaces to obtain clearer images of engravings, not wearing soft-soled shoes when walking over accessible engraved rock surfaces, or disturbing dusty ground to view cave paintings. Making heritage places attractive to tourists also involves managing visitor impacts by creating built features (Table 2), instituting processes to control movement (access), and potentially modifying undesirable behaviours (e.g., littering, touching paintings or engraved surfaces). Appropriate supervised access involves small group size to prevent individuals from wandering, deliberately or otherwise, from the main group, with extra attention given to any group that includes young children. A key component in rock art tourism is the presence of a knowledgeable guide who is able to provide a meaningful experience for visitors. The need to protect heritage places while allowing for tourism has long been recognised as requiring special care and planning to minimise adverse outcomes (e.g., [55–57]).

Table 2. Impacts of visitors in Mutawintji National Park.

<table>
<thead>
<tr>
<th>Direct Impacts</th>
<th>Comment</th>
<th>Response/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changed fire regime</td>
<td>Arson; Fire suppression</td>
<td>Management monitoring and responding</td>
</tr>
<tr>
<td>Importation of exotic species (plants, animals)</td>
<td>Weeds; Feral animals (e.g., goats)</td>
<td>Weed control; boundary fencing for feral animal exclusion</td>
</tr>
<tr>
<td>Litter, dumping of rubbish</td>
<td>Visitor behaviour—adverse actions partly avoidable</td>
<td>Provision of sufficient and clearly visible rubbish bins; regular removal of rubbish</td>
</tr>
<tr>
<td>Increased runoff from compacted surfaces (roads, walking tracks, etc.)</td>
<td>Human interventions impact biophysical environment and aesthetic of ‘nature’ for visitors</td>
<td>Careful positioning of hard surfaces to minimise runoff and aid visitor management</td>
</tr>
</tbody>
</table>

**Built environment**
- Information/visitor centre
- Signage
- Roads (paved, unpaved)
- Pathways—‘paved’ (natural stone)
- Walking trails—unpaved
- Fenced viewing points
- Barriers preventing touching
- Boardwalks, constructed steps
- Drainage (including dam wall built to pond extra water)
- Picnic areas
- Camping areas

**Tourism Promotional Activities**

NSW has actively encouraged Aboriginal tourism through the state, using policies such as the Aboriginal Tourism Action Plan 2013–2016 to deliver ‘tourism products and experiences’ in partnership with Aboriginal tourism operators [58]. This policy has involved Destination NSW, the state’s major government marketing arm, incorporating Indigenous art into programs such as Vivid Sydney, which reaches international audiences. The NPWS has always had informative and up-to-date websites about parks in NSW, including the Mutawintji National Park and its Historic Site [10,59]. Various government and non-government entities have links to the NSW NPWS site, e.g., the Central Darling Shire Council, the Darling River Run, and Away Tours. Other public exposure is provided in non-government tourist promotions and information for the Broken Hill region generally; for example, the Walkers Journal [60] and Outbackbeds [61] both feature Mutawintji on their websites. A recent rise in visitor numbers to the Broken Hill region reflected a COVID-
induced trend towards domestic travel, as Australians were prevented from travelling overseas for two years during the pandemic [62,63].

For Aboriginal co-managers at Mutawintji, the importance of the Lands incorporates both their cultural significance and their economic value through tourism and associated employment opportunities. However, the social value of transmitting appropriate cultural knowledge to local Aboriginal youth and other Aboriginal groups, as well as to tourists, is a central concern for management. The combination of social, cultural, and economic values is reflected in a Mutawintji cultural festival, which was held in 2022 [64], and, following this initial success, a second festival was held in 2023 [65]. The importance of cultural heritage values is recognised in the co-management model but has received further legislative attention since the Mutawintji co-management agreement. Following the proposal to develop new legislation to cover Aboriginal cultural heritage, a new ‘Aboriginal Cultural Heritage (Culture is Identity) Bill 2022’ was presented in state parliament in November 2022. The object of the bill is ‘to provide a modern framework for the recognition, protection, conservation and preservation of Aboriginal cultural heritage and recognise the fundamental importance of Aboriginal cultural heritage to Aboriginal people’ [66]. It is intended to draw together outdated and dispersed legislation into a single bill, along with strengthening protections.

4. Rock Art and Management: The Future

The Mutawintji Plan of Management recognised four main High-Priority Management Actions, one of which was ‘Valuing, Promoting, Learning and Teaching Wiimpatja Culture’ [28] (p. 94), and a sub-section relating to ‘Looking After Important Places’ [28] (p. 96). Among the objectives listed, such as renovating the Cultural Centre, approving tour operations in a previously restricted section of the park, repatriating cultural material, and constructing a museum, two objectives related specifically to conservation: ‘Undertake a staged program to document culturally important places and objects . . . and establish a regular monitoring program to stabilise and conserve sites or objects of significance being damaged or degraded’; and ‘Prepare a list of all known cultural objects . . . to allow their better protection, management and presentation.’ The progress of these Management Actions was to be reviewed annually, and a full review of the plan’s effectiveness was to be undertaken after about five years. This management structure thus incorporated recording and protecting the rock art—along with other physical evidence of prior Aboriginal and white settler occupation—followed by an assessment of actions. In practice, much attention relevant to rock art has been directed towards controlling tourist movements near publicly accessible cave paintings/stencils and near engravings within the Heritage Site.

An effective conservation policy requires information about what is to be conserved (an inventory), along with the current condition of inventoried items [67–69]. At extensive sites with a wealth of examples, such recording is time-consuming, financially costly, and demands knowledgeable field workers. This inventory/condition information also needs to include noting the presence of less-obvious engravings, such as those on some walking track surfaces in Mutawintji. In addition to preserving evidence of the past, this information is important for interpreting engravings/stencils/paintings in relation to the entire site or landscape. Given the financial constraints facing many park managers, detailed recording and condition assessments could initially be directed towards visitation areas, along with continued general monitoring of ‘non-visitation’ areas where people or livestock may gain uncontrolled access (a special concern in remote locations).

Weathering of rock surfaces is a normal process about which there has been debate in the conservation context, both within and between various stakeholder groups [70]. Some paintings are known to have age-distinct laying, indicating re-painting over several thousand years (e.g., [71]). Other sites may be closed by traditional owners for cultural reasons, and the condition and management of these sites can only be assessed by those permitted to have access. As noted by Whitley [70], the approach to preservation is far from unanimous among stakeholders, even between those of apparently similar cultural
backgrounds. In addition, the beliefs of individuals and groups within these backgrounds may change over time. An immediate and separate difficulty for management is that rock surfaces are the ‘canvas’ on which engravings, stencils, and paintings are manufactured, and if the rock weathers at an accelerated rate, heritage loss also escalates. In the absence of a conservation policy, and whether or not existing rock art is reworked by traditional owners, uncontrolled or poorly managed tourist visitation will unnecessarily accelerate previous weathering rates.

The sustainability of rock art tourism requires the site to be physically, socially, and economically sustainable for its continued success. Physical sustainability involves ‘caring for country’ and ensuring that preventable damage is minimised. Social sustainability requires active involvement of all parties within the co-management model, in addition to community engagement, which is a concern for rock art tourism generally (e.g., [72–75]. Combined with cultural and local social sustainability is the economic sustainability of tourism activities, which may demand critical levels of visitation for economic benefits to accrue to local communities. Despite visitors providing local communities with an additional source of income or employment [76], low participation rates (visitation) may also negatively impact the sustainable development of tourism [77]. A more market-oriented approach to the development of rock art tourism has been proposed [78], but the economics of visitation need to be balanced with social and cultural norms that protect heritage from accelerated deterioration. Under the co-management model, visits by Aboriginal groups to ‘connect with country’ [79] may not produce financial returns but are desirable for cultural reasons and are of major importance for Aboriginal co-managers.

Increasing visitors’ knowledge about rock art may contribute to a higher level of engagement, which may, in turn, lead to a reduction in potentially harmful behaviours. Weaver and Lawton [80] proposed that the relationship between parks and visitors was historically one of ‘parks for visitors’, followed by the current ‘parks with visitors’ approach. The aspirational future approach would be for ‘parks and visitors’ in which motivated visitors would participate in park enhancement and create a symbiosis between parks and visitors. At Mutawintji, it could be argued that Aboriginal ‘caring for country’ achieves the idealised ‘parks and visitors’ state, but Aboriginal owners are ‘on country’ and, by definition, not visitors. Reaching a state of mass participation of a highly motivated tourist cohort would seem unlikely. However, Aboriginal guides are important in transmitting appropriate knowledge and explanations that could assist in a broader shift towards less-damaging tourist behaviours.

Co-management at Mutawintji has been a recognition of broad cultural and social values within the context of heritage conservation—as an approach, it is not necessarily a panacea for the conservation of rock art generally. ‘Rock art is in peril because of development pressures, graffiti/vandalism, poor tourist management, and natural impacts.’ [81], (p. 3). These risks become more pressing with the knowledge that rock art, once lost, cannot be regained. In the past, Aboriginal people responsible for paintings and engravings engaged in re-touching or re-working images [82], and radiocarbon dating has established that some painting styles in the Australian Kimberley region continued for several thousand years between 17,000 and 13,000 years ago [18]. The main threats to rock art, as noted by Agnew et al. [81], are summarised below in relation to examples used in this paper.

(i) Of the risks identified, the natural impacts of weathering on rock and painted surfaces are the least amenable to modification, as most surfaces are exposed to rain, wind, sunlight, dust, and endemic and exotic flora and fauna. Understanding the nature of weathering processes operating on surfaces in different environments and situations is important before any management interventions are contemplated. Researchers, monitoring, and funding are required to meet this complex goal.

(ii) The effects of development pressures from mining, industrial plants, infrastructure, and urbanisation can be partly constrained by legislation but only assuming a sympathetic political climate and sufficient counter-pressures to development proposals.
The history of gaining protection for the Murujuga Cultural Landscape is instructive, as protection status at various levels has been competing with industrial development, with the state government being the decision-maker.

(iii) Especially in remote areas lacking adequate supervision, graffiti, vandalism, and theft of transportable items are difficult to control, despite attempts to deter such behaviour through education. Even signage indicating the heritage value of a remote site may attract adverse attention at times when harmful public responses cannot be prevented—e.g., shooting at signs and engravings near remote mining or industrial sites. Legislating larger penalties for those individuals/instrumentalities/companies violating protection status is a necessary policy beginning but does not solve the problem—funding for enforcement of regulations is a larger issue.

(iv) The risk of poor tourist management is a concern, but improving the effectiveness of management provides some hope for improvement. In the absence of legislative or planning support, rock art sites rapidly become endangered when subjected to high visitation rates [83]. Inadequate management may result from unskilled staff, too few officers for the tasks required, insufficient funding, or a combination of these factors. Nevertheless, competent and knowledgeable management can provide an opportunity for reducing damage to rock art. Co-management with long-term strategic planning and a strong monitoring component [84] could combine effectively with short-term responses to specific issues and thereby contribute to risk reduction. Allied with monitoring rock art is the need to record site management histories [85], which encourage review, evaluation, and strategic planning [86]. Continuing reassessments of the effectiveness of any management plan is important, allowing for re-evaluation of actions undertaken, providing an impetus for adaptive management approaches, and removing an often-tempting inclination to view a previous plan as necessarily meeting the needs of the future.

5. Conclusions

Although established to meet cultural concerns, co-management at Mutawintji can also be viewed as contributing to the ‘parks and visitors’ ideal, in that Aboriginal owners are using their Indigenous heritage to provide financial returns and employment for their communities while simultaneously enriching tourists’ experiences within a national park. Enhancing such positive beginnings can only be achieved if the physical and environmental fabric of the protected lands is managed sustainably in the circumstances of funding uncertainty, the difficulties accompanying remote locations, and the pressures on management personnel from a major enlargement of the park. Apart from developing mechanisms for controlling guided group sizes and increasing skill development (e.g., guide training, monitoring of rock art conditions, and biodiversity management), sustainable tourism at Mutawintji and other rock art heritage sites involves a unified management and community approach in the following ways:

(a) Developing a strategic plan for conservation of the site’s rock art;
(b) Identifying damaging agents and instigating programs to protect the art from people/animals/vegetation and natural accelerated deterioration;
(c) Monitoring and recording rock art conditions and changes at the general site level and on specific rock surfaces; and
(d) Implementing and recording management actions in response to the strategic conservation plan.

Mutawintji National Park was the first National Park in the state to implement a co-management model with majority Aboriginal control. Beyond its purely on-site managerial functions, the board has undertaken an important role in facilitating Aboriginal connection to the country, which has extended beyond local communities. The long-term impact of co-management in relation to the specific task of rock art conservation remains uncertain.
Author Contributions: Conceptualization: D.D. and F.A.; investigation, D.D.; writing—original draft preparation, D.D.; writing—reviewing and editing, D.D. and F.A. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Data Availability Statement: No new data were created.

Conflicts of Interest: The authors declare no conflict of interest.

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