Climate change-driven loss of cultural heritage in developed countries

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Climate change-driven loss of cultural heritage in developed countries

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This document presents preliminary findings derived from a review of the literature on climate change-driven loss of cultural heritage's intangible values in developed countries. The goal of the document is to elicit comments from scientists working in this area. In the fourth quarter of 2021, a version of the document integrating the comments received will be submitted to an international refereed journal.

Section 1: background and research question

It is generally acknowledged that, in addition to its instrumental value, cultural heritage has a major intrinsic value that deserves dedicated stewardship.[1, 2] Stewardship strategies have to consider global warming, because the impacts of climate change affect cultural heritage (Adger *et al.*, 2013). Indeed, some climate-change impacts lead to irreversible loss of cultural heritage (Pearson, Jackson and McNamara, 2021), and loss levels are expected to increase in the near future (Mechler *et al.*, 2020).

Climate change-driven loss (Box 1) has to be "coped with", for two reasons (Barnett *et al.*, 2016). First, loss brings about social problems, ranging from reduced social cohesion to impaired mental health, among others. Second, loss is an ethical issue, because (a) it distributes unevenly within and between generations, and (b) there is no causal link between those who cause loss and those who suffer from it. At present, mechanisms to cope with loss are poorly understood (ibid), partly because both society and public policy tend to overlook certain types of losses.[3, 4]

Box 1: Climate-change impacts and loss

Climate change results in three types of impacts:

- *Avoided impacts*. These are the impacts that, through adaptation measures, we manage to prevent. For example, wetland restoration is an adaptation measure that helps prevent coastal erosion due to rising sea levels.
- *Un-avoided impacts that arise because adaptation measures are insufficient or ineffective*. These impacts are referred to as damages. Damages are reparable, provided that sufficient funding is available. Examples of damages include destroyed public infrastructure, and reduced harvests, among other issues.
- *Un-avoided impacts that arise because adaptation limits have been exceeded*. **These impacts are referred to as losses**. Losses are irreparable. Examples of losses include the loss of biodiversity, the loss of cultural heritage and sense of place, and the loss of indigenous knowledge and lifestyles, among other issues.

Mechanisms to cope with climate change-driven loss of intangible values can be studied within the conceptual framework provided by the notion of solastalgia (Albrecht *et al.*, 2007), namely the distress communities and individuals may feel when faced with the negative impacts of global environmental change. Against this background, studies of coping mechanisms should meet three criteria (Galway *et al.*, 2019). First, have a focus on actual losses, as opposed to likely-future losses. Second, provide data on what intrinsic values are perceived to constitute loss, by whom, and why. Third, provide data on the mechanisms that communities and individuals develop to cope with loss.

Focusing on climate change-driven loss of cultural heritage's intangible values in developed countries, my research question is "focusing on the peer-reviewed literature, what can be learnt from the studies that meet these three criteria?" Secondary research questions include:

- are there any climatic drivers of loss that are more prominent than others?
- are there any types of cultural-heritage losses that are more prominent than others?
- is there a pattern in the mechanisms that communities and individual adopt to deal with loss?

Section 2: methods

The peer-reviewed literature was screened following a two-pronged approach. First, all documents that cite a seminal journal article by Adger and colleagues (Adger *et al.*, 2013) were screened. Second, all document cited in a recent journal article by Pearson and colleagues (Pearson, Jackson and McNamara, 2021) were screened. The same inclusion and exclusion criteria applied for both screenings (Box 2).

Box 2: Inclusion and exclusion criteria

Inclusion criteria:

- The document reports on actual (as opposed to likely-future) climate change-driven loss of cultural heritage's intrinsic values.
- The document explicitly identifies what intrinsic values are perceived to constitute loss, by whom, and why.
- The document focuses on "developed economies" (as defined by the United Nations' Department of Economic and Social Affairs).

Exclusion criteria:

- Climatic changes are not the main driver of loss.
- Loss is not necessarily unavoidable.

Initially, a further inclusion criterion was considered, namely the provision of data on the mechanisms that communities and individuals develop to cope with loss. However, in light of the limited number of documents that would meet this criterion, the criterion was finally not applied in the screening process.

2.1 Screening of the documents that cite the 2013 article by Adger and colleagues

In 2013, Adger and colleagues published an article that, for the first time, had as it primary objective to lay out the linkages between the impacts of climate change and culture (Adger *et al.*, 2013). Its publication preceded by a few months the establishment of the so-called Warsaw International Mechanism for loss and damage associated with climate change impacts, under the United Nations Framework Convention on Climate Change, which spurred scholarship on climate change-driven loss. As such, it seems sensible to assume that most of the documents that meet the above inclusion criteria will cite the 2013 article by Adger and colleagues.

A search performed in Scopus on 11 March 2021 yielded 568 documents, as per the following breakdowns:

- language: English (560), Spanish (4), Czech (1), German (1) and Portuguese (1);
- type of document: Article (419), review (65), book chapter (47), book (9), note (8), conference paper (7), editorial (7), short survey (4) and letter (2).

With the exception of the two "letters" (see the second bullet point above), the remaining 566 documents were screened. Unless a read of the abstract clearly suggested that the document

should be discarded, each document was read in its entirety. This process yielded ten documents (the documents numbered [1] to [10] in Annex 1) that met all inclusion criteria.

Individually for each of these ten documents, all references listed in the document under consideration were studied (a process referred to as backward snowballing). In addition, all documents citing the document under consideration were also studied (a process referred to as forward snowballing). This dual process yielded one additional document (the document numbered [11] in Annex 1), which in one of the documents referenced in document [8].

2.2 Screening of the documents cited in the 2021 article by Pearson and colleagues

In 2021, Pearson and colleagues published a review of the literature on climate change-driven loss of cultural heritage and indigenous knowledge (Pearson, Jackson and McNamara, 2021). All documents cited were screened against the inclusion and exclusion criteria introduced above, initially through a read of the abstract followed, as relevant, by a study of the full document.

This screening yielded three additional documents (the documents numbered [12] to [14] in Annex 1). Through backward and forward snowballing (see above), no additional documents were identified that met all the inclusion criteria.

2.3 Summary of the screening process

Fourteen documents were identified that met all inclusion criteria (Annex 1). To trace these documents, as many as 2,257 documents were screened, as per the following breakdown:

- documents that cite the 2013 article by Adger and colleagues: 566
- documents cited in the 2021 article by Pearson and colleagues: 131
- documents cited in the documents that met all inclusion criteria: 1,216
- documents citing the documents that met all inclusion criteria: 344

Section 3: preliminary findings

Fourteen documents met all inclusion criteria. Annex 1 provides full references for each of the documents analysed. Table 1 (pages 13–14 in Annex 2) gives context on the research reported in each of the fourteen articles.

Table 2 (page 15 in Annex 2) presents the key drivers of loss, and the main cultural-heritage elements that are affected by climate change-driven loss. Salient points include:

- Warmer temperatures is the main driver of loss, followed by changes in precipitation patterns and intensity.
- Half of the documents analysed refer to "indigenous knowledge". The everyday lives of indigenous communities are more sensitive to changes in the biophysical environment. As a result, climate change-driven loss is more pronounced among these communities, which arguable explains the relative abundance of studies focused on them. Among the remaining seven documents, "culturally important places and landscapes" is the most common aspect of cultural heritage being lost to climate change, ahead of "built and other tangible heritage", and "traditions and religious rites".

Table 3 (pages 16–19 in Annex 2) synthesises why loss matters. "Identity"-related issues stand out as the main reason why loss affects communities and individuals. Interestingly, the split between non-indigenous and indigenous communities is only observed with regard to the element labelled "ways of living": all other elements appear to be relevant to both types of communities. Finally, it is worth noting that a given loss may matter to different people for different reasons, thus suggesting that different mechanisms to cope with loss might be needed.

Table 4 (page 20 in Annex 2) presents information on the extent to which loss could have been prevented. For example, losses associated with changing ice conditions (due to warmer temperatures) cannot be prevented, because ambient air temperature cannot be "managed". Conversely, the cultural-heritage losses brought about by wildfires (also related to warmer temperatures) can be prevented, at least to some degree, through better forest management. The issue is relevant with regard to three out of the fourteen documents analysed. In all three cases, approaches to prevent loss are discussed, if only succinctly.

In addition, Table 4 (page 20 in Annex 2) presents mechanisms to cope with loss. Three of the documents report on seasonally recurrent loss – of wildfires, wildflower blooms, and snowy winters, respectively. Recurrence call for some kind of proactive strategy – namely, a strategy that helps the community prepare for the loss that is likely to occur in the following season. Only one of the three documents concerned reports on such proactive approach, which takes the form of a forum through which a "shared vision" for the community is articulated and challenges discussed. Reactive approaches are relevant to all fourteen documents. Yet, only seven of them report on reactive mechanisms to cope with loss. These mechanisms appear to take two forms: dealing with grief, by embracing loss and celebrating one's cultural heritage; and dealing with practical matters, by adapting one's life to the new reality brought about by loss.

Section 4: discussion

Informed by the research question spelled out in Section 1, and through the review method introduced in Section 2, this document reports on the evidence included in peer-reviewed articles that, directly or indirectly, document climate change-driven loss of cultural heritage in developed countries. A number of discussion points emerge from the findings sketched in Section 3 and Annex 2:

- In spite of the efforts devoted to identifying relevant studies (Section 2), only fourteen cases (Annex 1) could be found. A 2015 book chapter by Jurt and colleagues (Jurt *et al.*, 2015) meets the inclusion criteria, but could not be traced using the method described in Section 2. How many more documents that meet the inclusion criteria could not be traced is unknown, though the number is likely to be small, as the number of documents screened was rather large (Section 2.3). Therefore, it appears clear that more empirical research is need. Most importantly, future data collection efforts should strive to research the mechanisms that communities and individuals adopt to cope with loss, which appear to exist, but remain under-researched and under-reported. This research gap prevents the development of public policy in the area of climate change-driven loss of cultural heritage's intangible values.
- The mechanisms to cope with climate change-driven loss of cultural heritage's intangible values can be studied within the conceptual framework provided by the notion of solastalgia (Albrecht *et al.*, 2007). Building off this conceptual framework, and benefiting from much needed additional empirical evidence, it should be possible to develop an analytical framework that describes the interlinkages between what is lost, the socio-economic and cultural background of those who experience loss, and the coping mechanisms adopted by those who experience loss. Such a framework should draw on knowledge from multiple disciplines, as grief associated with loss is a phenomenon that obviously transcends the residual impacts of climate change. For example, medical research highlights that, contrary to the prevailing mind-set in Western societies, grief need not be a one-off process one has to quickly put behind himself (Cacciatore and Rubin, 2015).

Endnotes

[1] Cultural heritage encompasses (a) material heritage, such as buildings, historic sites and artefacts; (b) immaterial heritage, such as traditions, social practices, rituals and knowledge; and (c) natural sites, namely culturally important landmarks and landscapes. Arguably, material heritage has traditionally received more attention from the viewpoints of both research and public policy.

[2] Cultural heritage has an instrumental value, for example through tourism-related income. Not least, cultural heritage has an intangible value, in that it helps communities develop a sense of belonging, linking past, present and future. In doing so, cultural heritage helps increase social cohesion.

[3] In this context, "loss" refers to being dispossessed from what we value – what we deem indispensable for our wellbeing and for which we find no possible substitute, notably people and living creatures, objects, places, experiences and opportunities (Tschakert *et al.*, 2017).

[4] Some of the things we value, such as health, safety and relative freedom, are at the heart of public policy(Barnett *et al.*, 2016). However, many other things we value are overlooked by public policy, because they escape standard decision-making metrics (ibid). Examples of the latter range from landscapes, cultural manifestations and biodiversity, to personal belongings and daily practices (ibid).

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Annex 2: summary of findings

Table 1: Background to the individual studies

Identifier	Context to the study	Region
[1]	The La Ronge area in Canada's northern Saskatchewan "has a long history of experience with wildfire". "[The] 2015 fire season was particularly severe and the scale of evacuations unprecedented". A "mandatory evacuation extended between 4 and 19 July". Among the 6,000 residents in La Ronge area, about three-quarters "identify as indigenous".	Saskatchewan, Canada
[2]	Climate change-driven sea-level rise threatens coastal wetlands and the indispensable ecosystem services they provide. A common wetland protection strategy involves "marsh migration into rural uplands". The document explores the impacts that such approach has on rural, low-lying communities on the United States' Chesapeake Bay.	Chesapeake Bay, United States of America
[3]	Increasing water temperatures in Arctic and sub-Arctic regions result in the decline of certain fish species. Not least, the flesh of the fish is "becoming softer, flakier and paler much faster than before", which forces fishermen to check their nets more often. Finally, warmer winters lead to less "predictable" ice conditions. Whereas most research on these issues focuses on Arctic communities, this document targets a sub-Arctic community, namely the Sahtú Got'ine fishers that live in Canada's Mackenzie river basin.	Northwest Territories, Canada
[4]	"Wildflower superblooms [...] are socially and culturally significant in [...] desert communities. They loom large in memory, shape regular seasonal activities and attachment to place, and feature in local conflicts over resource management and planning for sustainable futures." Climate change results in dryer winters, which reduces the frequency of superblooms.	California's Anza-Borrego desert, United States of America
[5]	Climate change is "affecting Bergen's identity". For example, Bergen's inhabitants lament the "increasing exceptionality [of cold, snowy winters]".	Bergen, Norway
[6]	In northern Finland's Saami homeland, the impacts of climate change threaten "palsa mire and fell ecosystems, in particular snowbeds, snow patches and mountain birch forests". Changes in the related ecosystems "erode cultural meanings, stories, memories and traditional knowledge attached to them and affect the nature-based traditional livelihoods"	Finnish Sápmi, Finland

Note: the "Identifier" in the left hand-side column corresponds to the numbering in Annex 1

Table 1: Background on the individual studies (continued)

Identifier	Context to the study	Region
[7]	In 2016 and 2017, mass coral bleaching occurred in Australia's Great Barrier Reef. A survey of 4,681 Australian and international visitors to the Great Barrier Reef, before and after the bleaching, captured changes in perceptions, including those related to the cultural value of the Reef.	Great Barrier Reef, Australia
[8]	In the context of Australia's Great Barrier Reef, both residents and tourists were asked about their feelings concerning coral bleaching and mortality in the Great Barrier Reef ecosystem	Great Barrier Reef, Australia
[9]	In the context of an applied research project, Australian indigenous rangers report on the state of aboriginal heritage sites in a number of Northern Territory locations	Northern Territory, Australia
[10]	Climate change-driven reduced snowpack makes the shallow roots of yellow cedar vulnerable to sudden cold weather and, as a result, over 20,000 hectares in southeast Alaska are affected by yellow-cedar decline	Alaska's Alexander Archipelago, United States of America
[11]	Compounding historical disadvantage suffered by Aboriginal communities in Australia, prolonged drought (i) has dried-up rivers, the shores of which were once meeting points, and (ii) has led to loss of habitat and wildlife, which has a negative impact on seasonal work by Aboriginal men.	New South Wales, Australia
[12]	For Alaska's native communities, village life revolves around subsistence activities, which form the basis for community cohesion, social identity, livelihoods and cultural events.	Alaska, United States of America
[13]	Whereas the cold and wet climate of the Arctic helped preserve archaeological sites, climate change, mainly through permafrost thaw and coastal erosion, is damaging and destroying many sties	Alaska, United States of America; northern Canada; Greenland; and northern Norway
[14]	Climate change is having negative impacts on the ability of Inuit communities to travel, hunt and fish, which threatens their traditional ways of life.	Nunatsiavut, Canada

Note: the “Identifier” in the left hand-side column corresponds to the numbering in Annex 1

Table 2: drivers of loss, relevant "cultural dimensions" and nature of what is lost

Identifier	Drivers of loss				Relevant "cultural dimension"				What constitutes loss?
	Temperature	*Rainfall*	*Sea-level rise*	*Other*	*Built and other tangible heritage*	*Culturally important places and landscapes*	*Traditions and religious rites*	*Indigenous knowledge*	
[1]	wildfires (associated with heatwaves)					primary			forested landscapes surrounding human settlements are burnt
[2]			rising water levels (that trigger man-assisted marsh migration to protect coastal ecosystems)			primary			coastal landscape is lost
					secondary				church is lost
							secondary		identity markers are lost
[3]	warmer water and ambient temperatures							primary	fewer fish species and reduced fish quality
								secondary	ice becomes "les predictable"
[4]		increasingly dryer winters				primary			spring wildflower "superblooms" occur less often
[5]	warmer winters						primary		cold winters with plenty of snow become rarer
[6]	warmer-than-average all-year-round	increased precipitation in autumn						primary	'biodiversity loss, changes in the physical landscape, changes in livelihoods, and changes in land-use
[7]	warmer ocean waters			ocean acidification		primary			coral reefs die out
[8]	warmer ocean water			ocean acidification		primary			coral reefs die out
[9]		cyclones		wind				primary	shell middens and earth mounds are lost
		floods							old paintings on stones are lost, and burial sites are lost
[10]	warmer winters							primary	yellow-cedar trees die out
[11]		drought						primary	natural habitats and wildlife are lost
									access to river banks is lost
[12]	warmer temperatures, leading to altered snow and sea-ice conditions			wildfires				primary	access to traditional subsistence food is lost
[13]	vegetation increase		coastal erosion	permafrost thaw	primary				archaeological sites are lost
[14]	warmer temperatures							primary	ancestral knowledge about both travel routes and weather conditions is lost

Note: the "Identifier" in the left hand-side column corresponds to the numbering in Annex 1

Table 3: what constitutes loss and why loss matters

Identifier	What constitutes loss?	Why does loss matter?							
		Sense of place	*Identity*	*Knowledge about the past*	*Religious spiritual and symbolic value*	*Non-religious spiritual and symbolic value*	*Social/community networks*	*Traditional knowledge*	*Ways of living*
[1]	forested landscapes surrounding human settlements are burnt	<u>After relocation</u>: "severance from connections and memories formed through interaction with place and surrounding environments"				<u>During relocation</u>: - for indigenous peoples, disconnection from "deep cultural, spiritual, and emotional ties to their traditional territories" - even if temporary, for indigenous peoples relocation can be "reminiscent of […] forced relocation due to assimilative policies of the past"	<u>During relocation</u>: loss is compounded by missing social networks		
[2]	Deal Island Peninsula communities: coastal landscape is lost	the landscape cements the communities' identity as "people who work the water"							
	Church members: church is lost				- physical and spiritual manifestation of resilience to racialized hardships - a "place to [celebrate] their faith and […] remember ancestors who furthered their perseverance"				
	Rural communities: identity markers are lost		"specific practices […] and other tangible and intangible identity markers"				kin networks help maintain "social resilience"		

Note: the “Identifier” in the left hand-side column corresponds to the numbering in Annex 1

Table 3: what constitutes loss and why loss matters (continued)

Identifier	What constitutes loss?	Why does loss matter?							
		Sense of place	*Identity*	*Knowledge about the past*	*Religious spiritual and symbolic value*	*Non-religious spiritual and symbolic value*	*Social/community networks*	*Traditional knowledge*	*Ways of living*
[3]	fewer fish species and reduced fish quality		teachings and stories that shape Sahtú Got'ine fishers' identity draw on all species of fish available in Great Bear Lake, some of which are being lost to climate change			the value attached to country food cannot be transferred to food bought in supermarkets			"due to warming water temperatures, the flesh [of the fish captured] is becoming softer, flakier and paler much faster than before"
	ice becomes "les predictable"							as knowledge about "new perceptions and experiences around current water and ice patterns" is passed to the younger generations, knowledge about the old ways of living is lost	setting the net in winter and/or travelling to the family cabin depends on the ability to "read the ice" and, since the ice is "becoming more unpredictable", traditional knowledge no longer serves
[4]	spring wildflower "superblooms" occur less often					superblooms become a way of marking decadal time, structuring memories, and invoking the past as a point of comparison for the present			
[5]	cold winters with plenty of snow become rarer		"now sports and play are central to Bergensers' culture, regularly appearing in public narratives, and their loss marks a stark change"						

Note: the "Identifier" in the left hand-side column corresponds to the numbering in Annex 1

Table 3: what constitutes loss and why loss matters (continued)

Identifier	What constitutes loss?	Why does loss matter?							
		Sense of place	*Identity*	*Knowledge about the past*	*Religious spiritual and symbolic value*	*Non-religious spiritual and symbolic value*	*Social/community networks*	*Traditional knowledge*	*Ways of living*
[6]	'biodiversity loss, changes in the physical landscape, changes in livelihoods, and changes in land-use		as ecosystems and landscapes change, "stories, memories and meanings […] change or fade away"					"terminology and practice-based knowledge" can no longer be transmitted to future generations traditional interpretations of nature cease to be accurate and useful, and thus are no longer transmitted to future generations	"possibilities of practicing *duodji*" (i.e. traditional handicrafts) are reduced
[7]	coral reefs die out								the Great Barrier Reef "supports a desirable and active way of life"
[8]	coral reefs die out	"the emotional and physical bond between person and place, which is influenced by experiences, emotions, memories, and interpretations; it often provides a reason for people to live in a specific area"	"the feeling of belonging to a place or social group with its own distinct culture and common social values and beliefs"						
[9]	shell middens and earth mounds are lost old paintings on stones are lost, and burial sites are lost	a site provides "connection to the land" and, for that reason, "[a] place to feel safe"	sites tell aboriginal communities "what to pain" sites represent the link among generations through which identity pride can be passed along		"[sites] were produced by "the ancestors" and many have corresponding Dreaming stories" sites "record [Australian aboriginal communities'] history"				sites tell the story of how previous generations lived off the land

Note: the "Identifier" in the left hand-side column corresponds to the numbering in Annex 1

Table 3: what constitutes loss and why loss matters (continued)

Identifier	What constitutes loss?	Why does loss matter?							
		Sense of place	*Identity*	*Knowledge about the past*	*Religious spiritual and symbolic value*	*Non-religious spiritual and symbolic value*	*Social/community networks*	*Traditional knowledge*	*Ways of living*
[10]	yellow-cedar trees die out		"remembering [and] communicating with ancestors" "perceiving trees as an avenue for retaining cultural identity" "markings of ancestors retained in bark structure"						
[11]	natural habitats and wildlife are lost		men's traditional roles are threatened						
	access to river banks is lost						traditional practices, especially among the elderly, are disrupted and made more difficult		
[12]	access to traditional subsistence food is lost		community cohesion and social identity revolve around subsistence food gathering						village cultural events revolve around subsistence food gathering
[13]	archaeological sites are lost			once the sites are destroyed, the knowledge that could have been gathered and the tangible heritage itself is gone for present and future generations					
[14]	ancestral knowledge about both travel routes and weather conditions is lost		the identity associated with "knowing the land" is eroded					connection with past generations (related to knowledge transmission) are severed	

Note: the “Identifier” in the left hand-side column corresponds to the numbering in Annex 1

Table 4: limits to adaptation and managing unavoidable loss

Identifier	What constitutes loss?	Limits to adaptation		Managing unavoidable loss	
		Hard vs. soft	*Approaches to prevent loss*	*Before loss occurs*	*After loss occurs*
[1]	forested landscapes surrounding human settlements are burnt	Soft	better wildfire prevention [implicit in the article]		"regain connection to burnt landscapes [by] spending time on the land -- finding beauty in the regeneration of the forest, or rock formations they had not noticed in the past"
[2]	Deal Island Peninsula communities: coastal landscape is lost	Soft	a management framework that integrates both ecological and, crucially, human concerns [explicit in the article		
	Church members: church is lost				
	Rural communities: identity markers are lost				
[3]	fewer fish species and reduced fish quality	Hard	n/a		check nets more often, to continue to have fresh fish
	ice becomes “less predictable”				learn to read the ice under the new conditions
[4]	spring wildflower "superblooms" occur less often	Hard	n/a	acting as a convenor, the Borrego Valley Stewardship Council helps articulate a "shared vision" for the community and promotes discussion about challenges ahead	
[5]	cold winters with plenty of snow become rarer	Hard	n/a		accept change and work toward reflecting it in both planning and local customs
[6]	'biodiversity loss, changes in the physical landscape, changes in livelihoods, and changes in land-use	Hard	n/a		adapt traditional knowledge to new realities, through "context-situated knowledge and learning"
[7]	coral reefs die out	Hard	n/a		
[8]	coral reefs die out	Hard	n/a		"To engage with loss and grieve as a community is to find strength and maturity"
[9]	shell middens and earth mounds are lost	Hard	n/a		
	old paintings on stones are lost, and burial sites are lost				
[10]	yellow-cedar trees die out	Soft	"piling snow at [the] base of yellow-cedar trees"		"Actively moving through a grief process in community, [by] mourning losses of live trees and/or unaffected forests"
[11]	natural habitats and wildlife are lost	Hard	n/a		"Aboriginal culture [is] being revitalised through the arts [and] painting, printing, photography, film, theatre, music and dance have all featured in artistic responses to prolonged drought"
	access to river banks is lost				
[12]	access to traditional subsistence food is lost	Hard	n/a		
[13]	archaeological sites are lost	Hard	n/a		
[14]	ancestral knowledge about both travel routes and weather conditions is lost	Hard	n/a		