Name of the case study	Cape Dorset – From nomadic hunters to international art sensations – Nunavut, Canada [Transformation]					
What about this case makes it interesting? How does this case contribute to understanding of resilience and/or regime shifts in the Arctic?	Inuit demonstrate resilience and adaptability during transformation in the social-ecological system they are a part of. Inuit artists leverage art making as a way to communicate ecological change and traditional ecological knowledge to both local youth and global decision makers- effectively enhancing resilience for the Inuit of Cape Dorset (1, 2). The Inuit of Cape Dorset Canada are navigating a transformation from nomadic hunters to international art sensations (3). During this broad transformation occurring over the past sixty years, the Inuit of Cape Dorset demonstrate resilience to systematic colonization and repression of their language and culture as well as dramatic ecological changes in sea ice vital to Inuit food security and well-being (4). This case narrows in on the role of art and art making in Cape Dorset (5), as a way to bridge knowledge between generations and cultures and to nurture resilience during change and transformation.					
Template completed by: *Main contributor	Kaitlyn Rathwell*, University of Waterloo Derek Armitage, University of Waterloo		**Key references: Cite in the text using (1), (2), (3) etc. and provide a reference list at the bottom of the template.** (1) Rathwell, K., and D. Armitage. 2016. The role of art and artistic processes in bridging knowledge systems about social-ecological change: An empirical examination with Inuit artists from Nunavut, Canada. *Ecology and Society* 21(2):21. (2) Johnson, N. 2014. Thinking through affect: Inuit knowledge on the tundra and in global environmental politics. *Journal of Political Ecology* 21:161-177. (3) Coward Wight, D. 2012. *Creation and transformation defining moments in Inuit art*. D&M Publishers Inc. and Douglas & McIntyre and Winnipeg Art Gallery, Vancouver, British Colombia, Canada.				
Reviewed by (name and affiliation)						
Category (mark with X)	**Resilience/ Adaptability**		**Loss of resilience**		**Transformation**	
	X				X	
Case study details:	**Country**	**Place**	**Scale – space**	**Scale – time**	**Sector(s)**	**Other (e.g. disturbance)**

	Canada	Cape Dorset	Regional, global	Meta transformation (5000BC to 2015); sea ice change and art (2000-2015)	Food security (from hunting to co-op economy); sea ice for hunting, ecological regime shift; economic and social globalization	

Drivers (mark with X in appropriate boxes)	**Climate**	**Geopolitical**	**Mineral/ oil extraction & infrastructure**	**Tourism**	**Shipping**	**Biological invasion**	**Rapid demographic change**	**Other:** ***state here***
	X (sea ice loss)			X				Economic – global art markets drive (to some extent) what artists make.

	Biophysical	**Social**
1. Basic description of coupled social-ecological system in focus (What are the key components and stake holders) If possible draw a systems diagram or conceptual map of the case – this can be a series of diagrams to capture different periods in the case and the drivers/ actors/	a) What types of ecosystem(s) and other major biophysical features are present? Sea ice b) How are the case boundaries defined in terms of ecosystems or biophysical characteristics?	c) Who are the key groups of people in this case? Inuit artists, Inuit youth, art co-op as bridging organization; global politicians; Canadian politicians (during settlement and creation of art co-op) d) What kinds of livelihoods are important in the system? Hunting, art making e) What institutions are key to this case? If possible, define what scale it addresses. A formal institution is the art co-op (all the rules for art making and selling)

events that characterize the period.		f) How are the case's boundaries socially defined, and how do these social boundaries relate to biophysical boundaries? Cape Dorset is a small remote community (pop 1400), however, global drivers both ecological (climate change) and social (globalization of Inuit art) have an impact on the lives and well-being of people in Cape Dorset.

2. Timeline Draw a timeline of *key* events/ developments to the case. Points to include: Make clear the period of time over which the change is being considered. Provide a brief description of event/ actors, and ecological impacts. Mark particularly significant events with *. Consider both biophysical and social dimensions. Additional points that can be considered: Is it possible to identify periods of change from one type of system to another, transformations? Identify disturbances	• Forced settlement • Development of an informal art market in Cape Dorset, and promoted by key individuals in the southern Canada (1948-1955). James Houston is described as an innovator and leader in the Inuit art movement. The natural artistic talent of Inuit impressed him; small ivory tools were embellished with hunting scenes and exchanged as gifts with southerners such as Houston. Houston both facilitated local art making in Inuit communities, and at the same time developed a receiving economy in the south of Canada and beyond. He did this by using a select group of influential art curators, art museum boards and influential professors (some coming from Vienna to Winnipeg). He published key works about Inuit art in Canadian Art magazine and created the rhetoric of 'modern primitivism' through which the rest of the world started to admire Inuit artworks. * Montreal hand craft Guild in 1949 first showcased Inuit art in the south – it was a big hit. From that the government decided to implement art making co-ops as a social economic program. *1953 Winnipeg art gallery exhibits Inuit art for the first time (3). • Despite interest in the artistic talents of the Inuit, marginalization and oppression of Inuit people and their culture was a reality in Canada. For example, residential schooling and religion prohibited people to speak in Inuktitut or to sing traditional songs or throat singing. Yet the social and economic innovation around art making provided an opportunity for artists to embed and reflect their culture via artworks. The artists describe the importance of their works, which helps teach younger generations traditional knowledge that they might not otherwise be exposed too. • 1998 Inter-Government Negotiating Committee Toward a Global Convention on Persistent Organic Pollutants (POPs) met for the first time in Montreal. Sheila Watt-Cloutier brings carving and presents it to the delegation. The Inuit carving of a woman and child sits at the negotiating table during the meetings. The carving is attributed to bringing the 'human' dimensions of POPs into the room and the successful meeting outcomes for local Inuit (2). 2010 Carvings of global warming and climate change made and shared by Inuit (1). For example, Jaco Ishulutaq's Global Warming on display at Royal Ontario Museum, as part of 'Carbon 14: Climate is culture' exhibit, in Toronto in 2012. Artworks reflect a cultural response to climate change; demonstrating an intimate and detailed knowledge about environmental change, as well as the emotions, beliefs and values that color how that change is experienced (6). • Currently - many people do both artwork and hunting (or clam digging, berry picking etc.). In fact, these activities are complementary with artists reflecting their lived experience in artworks.

or events that challenged, built, or reduced resilience or adaptive capacity in the system.		
3. Disturbances What are the key disturbances in the system (present and past)	a) Have there been major biophysical disturbances that are relevant for the case? Rapidly Changing ice impacts: Hunting as access to traditional hunting routes are lost, as well as safety and identity. Warmer temperatures and changing currents mean there is now uncertainty around ice routes that were once safe. Changes in food web – char to turbot The types of ice, the areas of ice, the dynamics of the ice, wind, animals, plants, landslides, glaciers. Interview participants describe no longer being able to read the stars or wind. Specifics to ice change can be found here (4).	b) Have there been major social disturbances that are relevant for the case? Colonization, globalization, systematic suppression of Inuit culture, language and values. Forced settlement and dislocation via residential schools are two examples of external pressures on Inuit knowledge and culture; Quotas and limits on hunting; Having an income generating job means hunters have less time to practice being on the land; Inuit art, as an economic commodity was introduced to the communities; Art and art making in one way shows Cape Dorset Inuit traditional ecological knowledge through its change and uncertainty.
4. Drivers of change Clarify what impacts these drivers have on the SES and if these are direct or indirect	a) What are the key biophysical drivers of change? Climate change related changes: Increased air and sea temperatures;	b) What are the key social drivers of change? Colonization – forced settlement, dislocation, school system Globalization - both market impacts but also globalization generally e.g. Facebook, consumerism, Pepsi, drugs and alcohol are all driving social change.
5. Sources of adaptive capacity: What factors allow(ed) the system	a) Within the ecosystem?	b) Within society (e.g. people, social capital, management, institutions, infrastructure): People, knowledge and a culture of sharing (both food and

to adapt to disturbances in the past and present? Give a brief assessment of recent or on-going changes (+/-/0 = increasing/ reducing/ not affecting adaptive capacity)		knowledge). Family networks are maintained through spirit names and are relied upon for social security (like child care) and food security (sharing the catch) This case emphasizes how artists and artistic processes enhance adaptive capacity by embedding knowledge into artworks and sharing knowledge via artworks and art making (1): • Art making for economic security in their communities and for therapeutic healing properties. Art making is described as a way to let go of the baggage from the social/cultural shocks of colonization, displacement and continued marginalization • Strengthening existing knowledge, traditional ways, and Inuit culture are emphasized by artists as an important reason for making art. For example, Madeline describes embedding the amautiq into her artworks about transformation. The amautiq and ulu are important for the female Inuit identity, for supporting women in nurturing and supporting a family through change and uncertainty. Symbols can help maintain strong sense of identity even while communities undergo change, such as changes in sea ice • Maintaining continuity of knowledge systems over time creates a legacy of knowledge and artists use art to help maintain this legacy. Artists can facilitate social memory and social change with their artworks • Learning art practice at home by watching family members is a sustainable way to enhance networks of

		knowledge sharing and the artist identity via art making in the community. For example, successful artists are trained at home embedded in a family legacy and art practice • KR organized and facilitated a collaborative mural process with Inuit youth, elders and artists in Pangnirtung (1). We used games and storytelling to share memories of the 'old' and the 'new' and elders described journeys on the sea ice. Imagery created during the storytelling was transferred onto a canvas mural using printmaking, traditional sewing and skin stretching techniques. Community capacity for self-organization was evident during the mural process. For example, taking the mobile mural between peoples' homes and the print shop depending on the materials and art techniques we were working on • Leveraging imagery for enhanced learning –especially for younger generations is one way to bridge knowledge systems and enhance capacity for learning. We observed opportunities for multi-dimensional learning during the collaborative mural process. For example, when Eddie Perrier describes opportunities to learn how to draw glaciers and at the same time to learn about how glaciers in the region have changed due to climate change • Sharing knowledge via artworks is demonstrated to build and increase opportunity for learning. Learning across generations is particularly important in an Inuit context where elders' knowledge about how to survive on the land can help younger generations with adaptation to change (1)

		• Learning about changing environments from artists can help with monitoring and sense making, and are an example of iterative approaches to learning and management of changing environments. Using art making to record and share perspectives of a changing environment (e.g. paintings of glaciers as they melt in Pangnirtung fjord) enhances resilience by helping to monitor and make sense of changes. Sense making and monitoring allow for adaptive and innovative behavioral change that allows the overall system to maintain function and structure • Art making provides a particular venue for knowledge co-production. Learning between knowledge systems and generations allows for knowledge co-production. Knowledge co-production is a special kind of learning for adaptation because it allows for hybrid forms of knowing to emerge • Also, the artworks themselves function as boundary objects that demonstrate moving through social networks and influencing governance decisions (see reference (2)). The artwork brought to light the human side of persistent organic pollutants and is credited with shifting the outcomes of the meeting in favor of local Inuit health
The next two sections break down the information in Section I. While it is not necessary to fill these sections, if you have additional information pertinent to specific rows below feel free to enter the material.		

II.1-8 SES, resilience and adaptive capacity		
	Biophysical	**Social**
II.1. Where do we find changes and resilience in the face of change?	a) Within nature	b) Within society
II.2. What are the system's key components?	a) Key Ecological components (e.g. lakes, coastal zones, caribou)	b) Actors in society (e.g. individuals, groups, public or private organizations)? How are people organised – by geography, livelihood, family, etc.?
II.3. What are the key linkages? E.g. ecosystem services, resource extraction. These linkages should exist. If there are not mutual links between social and ecological components the case is not a social-ecological system.	a) From nature to society (e.g. ecosystem services)	b) From society to nature – modifying nature, extracting resources (e.g. hunting, mining, water pollution)
II.4. What are key interactions?	a) What are the key ecological interactions within the case? b) What are the most important biophysical tele-connections to distant systems?	c) What collaborations, conflicts, or other key linkages exist between actors? d) Between local actors and distant actors? Via artworks (e.g. at museums) and via bridging

		organizations (Dorset fine arts in Toronto for example)
II.5. Culture	a) How is the relationship between society and nature viewed? The relationship between society and nature is viewed as interconnected. Transformation between humans and animals and between entities is a prominent theme in stories, myth and artworks (my 3rd manuscript for the PhD studies this in more detail) A strong tendency for Inuit artists to illuminate transformation speaks to a knowledge system with transformation as a central dynamic - connecting things and orienting people in relation to the cosmos. b) What meanings are attributed to nature and to interactions with nature?	c) What are key cultural features of relevance for the case? d) What are key cultural practices and beliefs related to nature?
II.6. Disturbance What are important types of stress & shock	a) Describe important biophysical or ecological shocks and stresses (e.g. floods, storms, etc).	b) Describe important social shock and stresses (e.g. austerity policies, changes in government policy, introduction of new technologies, etc)
II.7. What are key slow variables Changes that occur over decadal or longer time scales	a) What types of ecological processes (e.g. loss of permafrost, shifts in species composition) are driving important long-term changes in ecological structures and processes?	b) What types of slow social processes (e.g. aging, population growth, loss of language) are driving important changes in social institutions and behaviours?
II.8. Relationships with ecological regime shifts	a) Are ecological regime shifts driving further ecological change or pressure? b) Are external or internal ecological dynamics potentially or actually producing ecological regime shift(s)?	c) Can social stresses or major changes be attributed to ecological regime shifts? d) Are there specific social practices that might be contributing to ecological regime shifts

II.8 Regime shifts	**If a regime shift exists and is important to this case describe it below.** Please indicate whether the regime dynamics are well-established, contested, or speculative.	
II.8.a. Detailed description of alternate regime shifts A case study can contain more than one type of regime shift	Briefly describe the structure of each regime. What does each regime look like? What are differences in ecosystem structure and function? (e.g. permafrost loss, vegetation change)? How do the properties and behaviours of regimes differ? e.g. collapse of subsistence food sources, fundamental change in types of livelihoods, change in governance institutions, new actors with significant political power who transform decision making)	
II.8.b. Feedback mechanisms within the system that maintain each regime	Ecological feedback mechanisms	Social feedback mechanisms
II.8.c. What key changes drive regime shifts? Describe how these changes alter the state of the system or feedback processes.	a) Drivers of ecological regime shifts (either social or ecological). b) How do these changes alter biophysical feedback processes?	c) Drivers of social regime shifts (either social or ecological). d) How do these changes alter the social feedback processes?
II.8.d. Ecosystem services substantially impacted by regime shift	a) Changes in ecological processes that produce ecosystem services	b) Changes in demand for ecosystem services (market and non-market) c) Changes in the institutional context of ecosystem services e.g. changes in access and changes in how ecosystem services are valued as expressed by rules and regulations.
II.8.e. What is (+/-) impacted by changes in ecosystem services	a) Impacts from regime shift on ecological components	b) Impacts from regime shift on social actors

directly or indirectly		
II.8.f. Potential cascading effects	Describe, if any, the likelihood of potential ecological cascading effects to other SES	Describe, if any, the likelihood of potential social cascading effects to other SES
II.8.g. Where do actors intervene to alter regime shift dynamics and who can do the intervening?	Ecological oriented interventions	Socially oriented interventions

REFERENCES/ SOURCES CITED:

(1)	Rathwell, K., and D. Armitage. 2016. The role of art and artistic processes in bridging knowledge systems about social-ecological change: An empirical examination with Inuit artists from Nunavut, Canada. *Ecology and Society* 21(2):21.
(2)	Johnson, N. 2014. Thinking through affect: Inuit knowledge on the tundra and in global environmental politics. *Journal of Political Ecology* 21:161-177.
(3)	Coward Wight, D. 2012. *Creation and transformation defining moments in Inuit art*. D&M Publishers Inc. and Douglas & McIntyre and Winnipeg Art Gallery, Vancouver, British Colombia, Canada.
(4)	Laidler, G. and P. Elee. 2008. Human geographies of sea ice: freeze/thaw processes around Cape Dorset, Nunavut, Canada. *Polar Record* 44(1):51-76.
(5)	*Kinngait: Riding Light into the World*. 2010. [documentary] Directed by: Annette Mangaard. Bravo!, Canada.
(6)	Rathwell, K. *(In preparation).* Inuit artists and their artworks illuminate 'knowledge-practice-belief', values, and emotion about sea ice and climate change. For submission to *Arctic.*

GLOSSARY OF TERMS IN THE TEMPLATE

Actor	We use this term generally to look for individuals, groups, organisations, and so on that structure actions and/ or are stakeholders.
Adaptive capacity	Is the capacity of actors in the system to manage resilience in order to stay within a desired state during periods of change. This is related to the diversity in the system behind the provision of a function.
Disturbance	This refers to any disturbance to the system, regardless of scale, duration, intensity and frequency. See shock and stress.
Driver	Actor or process that directly or indirectly affects change in a social-ecological system. External means that the system in question (the scale being looked at) is unable to affect the driver in question – there is no feedback from the system to the driver.
Ecosystem services	The goods and services humans derive from ecosystems. These include: provisioning, regulating, cultural ecosystem services respectively.
Feedbacks	A change within a system that occurs in response to a driver, and that loops back to control the system. A feedback can help to maintain stability in a system (negative or balancing feedback), or it can speed up processes and change within the system (positive or enhancing feedback). Feedback processes play a very important role in determining system thresholds and in maintaining system resilience.
Institution	Here we refer to the humanly devised constraints that shape human interactions, such as rules, norms and laws. These can be formal or informal. Note that we are not referring here to institutions as organisations.
Regime shift	For complex systems, a substantial and enduring reorganization of the system, where the internal dynamics and the extent of feedbacks undergo change.
Resilience	This is a property, in this context of social-ecological systems. It relates to the capacity of a system to cope with disturbances and recover in such a way that they maintain their core function and identity. It also relates to the capacity to learn from and adapt to changing conditions, and when necessary, transform.
Shock	A sudden, unexpected disturbance. This kind of disturbance is often punctual, and has important impacts on large parts of the system.
Slow variable	When analysing complex system is often useful separating “fast” and “slow” variables. Fast variables often represent the primary concern of ecosystem users, for instance game or crop production. Slow variables shape the behaviour of fast ones but change slowly with respect to the overall dynamics of the system. Examples of slow variables might include permafrost thawing for a social-ecological system of Arctic hunters where the fast variable is game, or soil organic matter for an agricultural system where the fast variable is crop production.
Stress	This is a disturbance that has long persistence and often low intensity in impact.
Social-ecological system	This is an interwoven system of human societies and ecosystems. This concept emphasises that humans are part of nature and that these components function in interdependent ways. In the template identifying these interactions between the components aims to identify the processes and actors/ components that interact and particularly the feedbacks between the human-related

	components and the ecosystems/ biophysical components.
Stakeholder	See “actor”
Systems Diagram	This is using a diagram to illustrate the configuration of a system. This is done by defining its structure, function, and feedbacks. For a case there may be more than one diagram if the system changes in character (actors, processes, drivers, disturbances, feedbacks etc.) over time.
Timeline	The goal with the timeline is to capture important events – both punctual and over longer periods of time, identifying the causes of these events and the actors/ processes involved. This should be done chronologically and distinguishing events.