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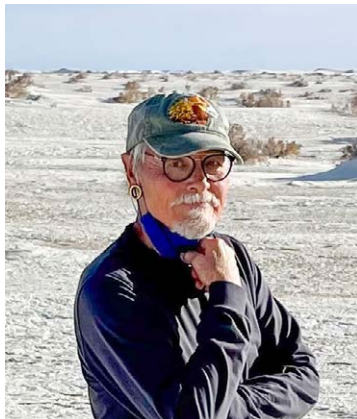
# editorial column:

## Welcome to the Second Issue of Indigenous Studies and Cultural Diversity

**Joe WATKINS** 

Editor-in-Chief

Indigenous Studies and Cultural Diversity Journal



Welcome to the second issue of *Indigenous Studies and Cultural Diversity*. We hope you are reading this because you like the articles we featured in our initial issue and that you are here for more articles exploring Indigenous issues in the contemporary world. If this is your first glimpse of our journal, we hope you like what we have to offer.

As with any enterprise, our first issue helped us learn what it takes to begin a new journal. We have learned from the experiences of many of our colleagues who have worked with other journals and have taken some of their suggestions.

One of the things we grappled with was whether to standardize the

spellings and punctuation to a single specific style, or a regional one. For the first issue, we decided to allow our authors to write in the style most comfortable to them, and so you might have noticed the presences or absence of the Oxford comma within a series of three or more items; you might have also noticed additional letters in words like “behaviour” or “programme.” We have decided that, in this and future articles, we will be using the Oxford comma for clarity, and will also use standardized American English spellings. We know that many word processing programs spell checking options include checking text in either British English or American English (as well as other languages, of course). We’re uncertain whether the grammar check portion of word processing programs will flag any missing Oxford commas, but we will check into that.

Another issue we encountered during the production of our first issue related to the adaptation of a particular publication and citation style. Again, we were rather free in allowances during our first issue, but we have chosen to go forward and request that our authors utilize the APA Style Guide, currently in its 7<sup>th</sup> Edition. Information on specific aspects of the APA Style is available online for those not familiar with it, and it will take me a bit to unlearn the style I have been using for decades based on the Society for American Archaeology Publication Style Guide, but I will adapt. Change is good, right?

We also wish to encourage our authors to write in a more accessible style, one that is relatively free of specialized language and jargon. We are hoping that Indigenous readers will better understand our insights and perspectives if we do not write to academic peers in academic language. This is not to say our authors should “dumb down” their writing by any means; rather we believe that our ideas should be available to the widest audience possible, and the use of specialized language serves to segregate rather than integrate different people and different levels of understanding. Thankfully, we did not encounter much jargon in the writings of our initial group of authors.

We look forward to your continued exploration of the diverse perspectives presented in our journal, and we welcome your feedback as we strive to enhance the accessibility and impact of Indigenous Studies and Cultural Diversity. Thank you for being a part of this intellectual and cultural dialogue.

# Communicating Cultural Heritage Values and Empowering Source Communities by Redefining Museum Objects in North America and Taiwan

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## Abstract

Inclusive and ethical stewardship of movable cultural heritage in museums and repositories is especially important with items that are subject to repatriation procedures. Collaborative partnerships between Indigenous communities and cultural heritage stewards can offer creative methods to resolve issues surrounding safety, security, preservation, and ritual treatment of these items. There is a strong global need for cross-boundary comparative studies to identify common challenges and innovative, inclusive strategies that transcend the variable legal landscape. In this paper, we describe case studies from California, USA and southern Taiwan that overcame potentially conflicting situations and successfully crafted Indigenous-led solutions to local problems. The outcomes were revitalization and reconnection of communities with their movable cultural heritage, as well as a transferable ethos and methods for Indigenous-centered strategies.

## Introduction: Museum Collecting as De-Contextualization

In many contemporary societies, museums are specialized institutions that manage and care for material heritage. Archaeological and ethnographic artifacts preserved in museums are considered to have special cultural and historical importance for humankind and have strong potential to

revitalize communities and engage museum visitors (Shen, 2018). However, museum collections by definition exist outside their original contexts. Preserved collections have been moved across geographical boundaries as a consequence of human agency and spatial–temporal interactions. Thus, the United Nations Educational, Scientific and Cultural Organization (UNESCO) has adopted the combined term “movable heritage” regarding museum collections in order to stress the diverse, mobile, and migrated characteristics of these objects (UNESCO, 2016).

For those communities where movable heritage originated (hereafter, source communities), removal from original contexts can be problematic to the integrity of cultural heritage such as tangible archaeological and ethnographic items. In this article we define cultural heritage broadly as a legacy of physical artifacts and intangible attributes of a group or society that are transferred from past generations, maintained in the present, and bestowed for the benefit of future generations (*sensu* Royal Ontario Museum Cultural Heritage Working Group, 2018). Thus, the heritage generated by a community remains connected to that source community. Many studies suggest that heritage often acts as a fixed anchor to generate memory (Lambek, 1996). By extension, heritage promotes a sense of belonging and constructs identity (Bloch, 1977), and produces influential social agencies or political–economic powers in the contemporary world (Appadurai, 1981). The meaning or value of heritage is dynamic and flexible in accordance with the ways that people engage with, re-work, appropriate, and contest it (Bender, 1998; Cuno, 2008, 2012; Rowlands & Tilley, 2006).

Nowhere is this more true than for Indigenous peoples engaging with cultural heritage within a colonized geopolitical arena (Watkins & Nicholas, 2014). Although individual case studies of museum-Indigenous collaboration are becoming more common (Nicholas, 2022), comparative case studies are rare. Scholars and experts on all sides of this collaborative nexus are hopeful that community-based initiatives can challenge - and ideally transform - colonial structures in the research process without compromising the integrity of archaeological, anthropological, and historical studies (Nicholas, 2022; Varutti, 2012).

Cross-comparisons can highlight areas of divergence, affirm successful strategies, and focus on shared challenges useful to all parties, especially given the compelling need for information sharing and collaborative action among museums at a global level (Alsford & Hu, 2018). In this paper, we compare case studies from two areas traditionally inhabited by diverse Indigenous societies: the state of California, and the island of Taiwan. Despite major differences in histories, cultures, and legal frameworks, these places and peoples have in common a colonized past, a tradition of scholarly work and museums related to Indigenous cultures, and continuing calls from Indigenous communities for active re-contextualization of cultural heritage. We selected these two cases for their innovative approaches to problems that initially appeared to be destined for long-term conflicts. The objective is to frame the case studies in a way that highlights outgoing journeys of cultural items, identifies challenges to their recontextualization, and sets forth original, effective, mutually agreed-upon strategies used for involving Indigenous communities in greater control over movable heritage in museums.

## **Outgoing Journeys: From Source Community to Museum**

Movable heritage that is managed in museums as displayable material artifacts exists within a complex, multi-faceted matrix of values that links today's life in meaningful ways with the past (Chen, 2018; Smith et al., 2010). However, the actual movements of “movable heritage,” especially Indigenous heritage, from their countries of origin to museums are frequently embedded in imbalanced power relations or colonial invasions. Most Indigenous communities have experienced serious political, economic, social, and cultural threats due to the strong influences of external powers during the long process of colonization and globalization. Since the 19th century, thousands of Indigenous artifacts have been collected and accumulated in museums, often without the consent of the source communities, and treated and exhibited as exotic curiosities with little or no interpretive context (King, 2013).

With the advent of scientific archaeology, movable Indigenous heritage has been broadly re-interpreted as evidence of cultural evolution or as ethnological specimens for material culture studies. Therefore, de-contextualization has continued despite changing museum missions and objectives. Today, movable heritage that becomes displaced from its original context can take different pathways to a museum, whether through inadvertent discovery, research excavations, donations, theft, purchase, or other processes. Thus, the issues involved with Indigenous connections and rights regarding movable heritage in museums extend to present-day acquisitions.

Since the 1960s, movements for Indigenous rights and cultural revival have gradually emerged, developed, and expanded in many parts of the world. Various claims to custody or title lead to critical debates over Indigenous rights on cultural heritage, including issues of Indigenous heritage stored and displayed in museums. These debates are influencing the legal spheres in which Indigenous communities, museums, cultural heritage specialists operate today.

## **Legal Landscapes of Movable Heritage: Taiwan and the United States**

Differing perspectives toward Indigenous heritage in Taiwan and the United States flow from the historic chronology, political setting, objectives, and scope of national laws. In Taiwan, perspectives toward Indigenous heritage have shifted since the 1980s following related global movements on Indigenous rights and cultural revival. The previously rigid policy of cultural assimilation has shifted toward embracing multiculturalism. In 1982, Taiwan's first version of the Cultural Heritage Preservation Act was promulgated as official guidelines for heritage designation, registration, and preservation. Several revisions have occurred within the past 40 years, and the latest revised Cultural Heritage Preservation Act in Taiwan was passed and publicly promulgated in 2016. This newly revised version classifies heritage items into two major categories: “tangible” and “intangible” heritage.

Artifacts preserved in museums are often recognized and designated as tangible heritage under

the category of “antiquities.” These artifacts can be further designated into three levels, namely, “general antiquities,” “important antiquities,” and “national treasures,” based on importance and value. To date, four Indigenous Taiwanese artifacts are registered as “national treasures” (among approximately 300 total) and are preserved in museums.

In the United States, original culture groups are called “American Indian” or “Native American” in congressionally enacted laws and regulations (Native Hawai’ian or Inuit and Yupik peoples of Alaska are not specifically named in older laws). For the purposes of this paper, the term ‘Indigenous American’ and ‘Native Californian’ will be used except in the case of certain laws. The United States government began efforts to protect movable Indigenous American cultural heritage in 1906 with the Antiquities Act, intended to deter the looting of ‘antiquities’ from Indigenous sites and impose a process of governmental permits to professionalize archaeological excavations. In 1979 the Archeological Resources Protection Act (1979) strengthened protections and penalties to protect movable Indigenous heritage from desecration and illegal trafficking. Federal Regulation 36 CFR Part 79 establishes professional standards for management of museum objects and associated records under federal care, or in museums that receive federal funds or permits. The new NAGPRA rule, published December 2023, adds further requirements for museums such as obtaining permission from Indigenous descendant communities in order to place artifacts on exhibit (<https://www.federalregister.gov/documents/2023/12/13/2023-27040/native-american-graves-protection-and-repatriation-act-systematic-processes-for-disposition-or>). These changes strengthen Indigenous agency in the placement, treatment, exhibit, and public communication regarding cultural items in American museums.

Unlike Taiwan, movable heritage in U.S. museums is not usually ranked in significance, although locations of origin may be nominated to the National Register of Historic Places. This implies that associated museum objects contribute to the characteristics that define a national level of significance. The requirement for Indigenous consultation in the management of movable cultural heritage is phrased as “should” in 36 CFR Part 79, thus making it discretionary for museums or repositories subject to that law. A major shift occurred in 1991 with the Native American Graves Protection and Repatriation Act (hereafter, NAGPRA), which established that human remains, movable Indigenous heritage items from burial contexts, sacred items, and objects of cultural patrimony must go through a consultative process with potentially associated Indigenous American groups in order to determine the most likely descendants and a process for long-term stewardship (usually ending in transfer of custody to a group or groups). NAGPRA governs both ‘discovery’ situations in the field and items in museum collections (25 U.S.C. §§ 3001 and 43 C.F.R. § 10.2).

There are interesting contrasts between chronologies and sociopolitical arenas of movable heritage protection of Taiwan and the United States. The U. S. government made relatively early efforts to protect movable Indigenous heritage, yet success has been uneven due to uneven funding, the lack of penalties for violations, and most importantly, discretionary involvement for Indigenous peoples until the 1980s. A special subset of movable heritage covered by the NAGPRA law (human remains, funerary objects, sacred objects, and objects of cultural patrimony) is subject to more stringent and prescribed consultation requirements. By contrast, Taiwan’s protective mandates



were enacted somewhat later, but are flexible and potentially more inclusive.

## **Native California: Context and Case Study**

The first case we discuss is the repatriation of a large archaeological collection at California State University Sacramento (Sacramento State) in central California under NAGPRA. Native California (the term preferred by Indigenous Californians) has a rich ethnographic and archaeological legacy, beginning with Western Stemmed Tradition immigrants before 11,000 years ago. Native Californian communities adapted quickly to coastal, desert, forest, and mountain ecosystems. At the time of Euro-American contact, more than 100 distinct language groups existed, and in some areas, populations were dense. Spanish entry at 1542 and colonization resulted in missionization of Native Californian communities, enslavement and forced labor, and waves of epidemic disease. A cycle of conflict and migration de-populated most Native Californian communities, and with Mexican Independence the rancheros began extensive cattle-raising and the marketing of beef and hides. This introduced a horrific depopulating epidemic among Native Californians in the 1830s. Caucasian-Americans pushed into the territory for extraction of furs, leading to the Cahuenga Capitulation of 1847 and United States control. By the gold discoveries of 1849, the Native Californian population was reduced to c.100,000.

The University of California was founded in 1868, heralding an era of ethnographic documentation of Native Californians (Chartkoff & Chartkoff, 1984; Moratto, 2014). The infant science of archaeology was practiced on Native Californian cultural sites, often illegally by amateurs, and while items excavated under the auspices of universities and museums were housed in repositories or placed on exhibit, most Native items likely ended up in private garages and attics.

With the explosive post-WWII growth of urban areas and agricultural development of the Central and San Joaquin Valleys, highway construction frequently resulted in discoveries of Native communities and burial grounds (Moratto, 2014). Community colleges grew to serve veterans and other working-class students, including archaeology programs. Passage of the National Historic Preservation Act in 1966 required developers to evaluate the impacts of federally funded or permitted projects upon cultural heritage sites, ushering in the cultural resources management era and an urgent need for curation space. The passage of NAGPRA in 1991 requires American institutions to consult with Indigenous Americans about the proper disposition of human remains, grave goods, sacred objects, and objects of cultural patrimony (25 U.S.C. §§ 3001 and 43 C.F.R. § 10.2).

## **Outward journey: From ancient cemeteries to Sacramento State University**

Since its founding in 1947 Sacramento State University has accumulated a large collection of movable heritage resulting from donations, salvage archaeology projects for highways and other

urban development, and anthropological research. In 1995, the university began a general inventory to identify movable heritage items that were subject to that law, including human remains, funerary objects, sacred objects, and objects of cultural patrimony.

More than 3,000 years ago, ancestral Native Californians buried their dead in a well-drained terrace of the San Joaquin Valley. The burial ground was abandoned; then more than 1,000 years later, new burials were added, in some cases intruding into the earlier burial ground. Women, men, and children were often wrapped in tule reed mats and buried with their belongings from life, including ornaments, musical instruments, and tools and weapons. The soil was highly stable, preserving organic items for thousands of years. More than 1,000 individuals are estimated to have been buried at Site CA-SJO-91 (Smithsonian nomenclature).

In the late 1960s, construction on a major highway through the San Joaquin Valley destroyed a major section of the cemetery, and looters began to excavate by night. Concerned local citizens contacted Sacramento State University archaeologists, who negotiated a temporary halt to construction activities for rapid salvage excavations funded by the California Department of Transportation (Caltrans) and conducted by Dr. Jerry J. Johnson and a University team (Johnson, 1971). The resulting collection, curated at the Sacramento State Anthropology Department, included the remains of nearly 1,000 individuals along with associated and unassociated funerary objects, totaling thousands of items.

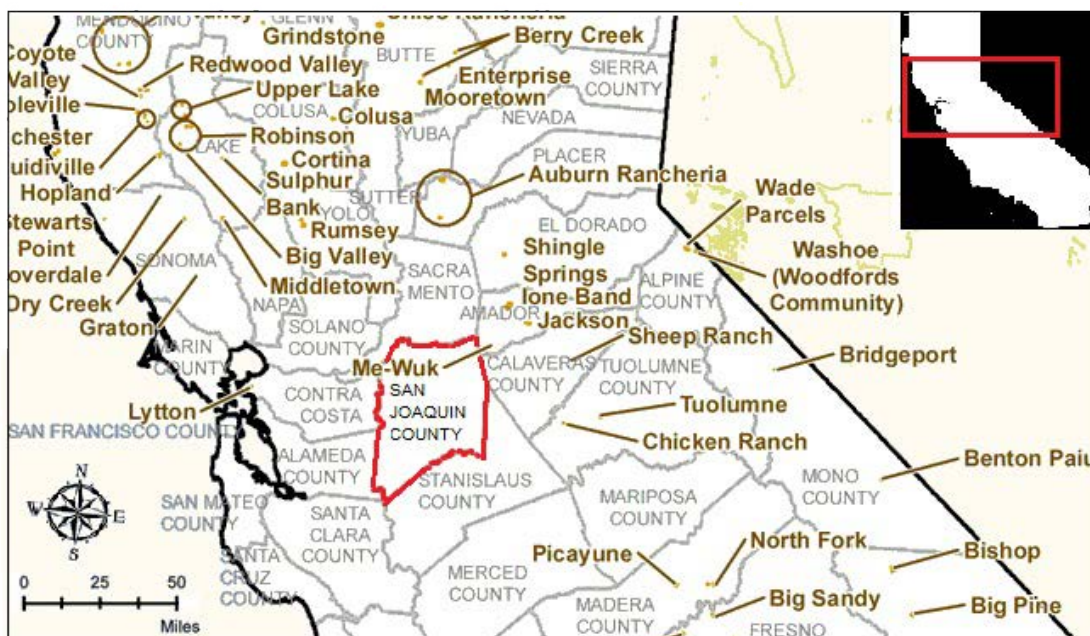


Figure 1. Native Californian Groups Traditionally Associated with the Area of Site SJO-91.

## Heritage negotiations and tribal expectations

In 2007, the College of Arts and Sciences received a request from a consortium of Native

Californian groups to discuss the university's progress in conducting inventories that are required by the NAGPRA law. Representatives from the Northern Valley Yokuts, the Tachi Yokuts, the Tubatulabals, and the Southern Sierra Miwoks determined in coordination with the Sacramento State Anthropology Department that the SJO-91 collection was highest priority because of its relatively complete and accurate catalog, and good physical condition. Caltrans held title to the land at the time of excavation and was willing to fund the full NAGPRA process from inventory to a determination of cultural affiliation and, potentially, repatriation.

Anthropologists at Sacramento State University initially determined that more than 20 Native Californian groups had lived in or near to the San Joaquin Valley before Euro-American contact. Those groups were invited to consult about the SJO-91 collection, and ultimately five tribes became closely involved with the NAGPRA consultations. Initial meetings and data searches did not yield evidence for definitive or exclusive affiliation of any Native Californian group to the SJO-91 collection. During initial meetings, it was agreed that there would be no photographs of the collection or repatriation actions, therefore none are provided in this discussion.

### **Breakthrough and homeward journey: Shared stewardship of the ancestors**

As discussions proceeded it became clear that repatriation of this particular collection was going to be complicated, as it was potentially linked with other very important concerns of Native Californians, including land tenure and water rights. Consultations over two years did not result in a clear determination of cultural affiliation, but the group persisted. In early 2009 the Native Californian tribes caucused at Sacramento State and during a lively discussion determined that the decision was being framed the wrong way. Rather than asking 'who owns the ancestors?' they maintained that 'where should the ancestors be laid to rest?' was the most important question. All groups agreed that the ancestral remains and associated funerary objects should be re-buried as closely as possible to their original resting place.

This was complicated, as the original area has been extensively developed and San Joaquin Valley continues to be heavily impacted with high demand for real estate. The Tachi Yokuts had worked in the past with the California Department of Fish and Game to re-bury a different collection within the boundaries of a state nature preserve. Although the preserve was not close to the original resting place of the SJO-91 cemetery, the tribes agreed that safety and integrity of the new burial ground was of top importance and the state nature preserve was selected.

With the location now agreed upon, the consequences of repatriation to one or the other tribe were largely the same. The consulting tribes were able to agree on two key breakthroughs: first, that the original cemetery had been located in the traditionally associated territories of the Southern Sierra Miwok and Northern Valley Yokuts. And second, that cultural interchange and movements over thousands of years meant that the people and grave goods were potentially affiliated with a number of local bands, tribes, and rancherias (see Table 1).

<b>Table 1. Native Californian Groups with Shared Group Identity and Likely Affiliation with the SJO-91 Collection</b>	
Buena Vista Rancheria of Me-Wuk Indians of California	Federally Recognized
California Valley Miwok Tribe, California	
Chicken Ranch Rancheria of Me-Wuk Indians of California	
Ione Band of Miwok Indians of California	
Jackson Rancheria of Me-Wuk Indians of California	
Picayune Rancheria of the Chukchansi Indians of California	
Santa Rosa Indian Community of the Santa Rosa Rancheria, California (also known as the Tachi Yokut Tribe)	
Shingle Springs Band of Miwok Indians	
Shingle Springs Rancheria (Verona Tract)	
Table Mountain Rancheria of California	
Tule River Indian Tribe of the Tule River Reservation, California	
Tuolumne Band of Me-Wuk Indians of the Tuolumne Rancheria of California	
United Auburn Indian Community of the Auburn Rancheria of California	
Wilton Rancheria, California	
The Southern Sierra Miwoks of California	Not Federally Recognized
Northern Valley Yokuts	

As the Southern Sierra Miwoks and the Northern Valley Yokuts are not currently recognized by the United States government, NAGPRA procedures did not permit the University to repatriate to those two groups. However, all parties agreed that the federally recognized tribes would accept repatriation of the SJO-91 collection on behalf of those groups, and this decision was documented with the National NAGPRA Program. The tribes coordinated with Caltrans and Sacramento State University to create culturally appropriate burial containers made of traditional materials for each ancient individual. In 2011, the Notice of Intent to Repatriate was published (National Park Service, 2011), and later that year, the carefully packaged remains were transported to their final resting place and re-buried in a ceremony attended by representatives from all associated Native groups, Caltrans, and the University.

## What we learned in California

The intersection between the legal requirements of the NAGPRA law and strong and consistent calls for action on the part of Native Californians provided the impetus for the University and Caltrans to obtain funding and take action. All parties were required to adapt to unforeseen circumstances. For example, at one meeting, several Native participants requested a viewing of human remains in order to pray and offer respects. The University Museum managers responded

quickly to arrange a viewing of the remains of one woman and one man. However, the proper materials for smudging, a form of prayer involving sage and tobacco smoke, were not available. A quick request of a passing student for a cigarette allowed the use of commercial tobacco for that occasion. Thereafter, the museum maintained a ready supply of small food and drink items, Native tobacco, sage leaves, matches, and abalone shells.

All had hoped for rapid and efficient repatriation, but the size and complexity of the collection and the contested geographic and cultural affiliation, led to a years-long process. The tribes considered this a learning opportunity and brought several younger members to assist in the detailed documentation of burial items. Elders explained the spiritual significance, craftsmanship, and function of these ancient objects to young tribal members, thus in the process of repatriation with intent to rebury for time immemorial, the tribes were able to show the next generation objects that they never would otherwise have seen.

The lack of clear cultural affiliation and the interests of various tribes in obtaining custody over the collection appeared, at first, to be an insoluble problem. As time and meetings resulted in no progress, some tribal members privately expressed the wish that the University would take responsibility for the decision. Yet once all consulting parties agreed that stewardship of the ancestors involved finding the correct resting place, the official cultural affiliation became less important than locating and agreeing upon that resting place. The agreement that the federally recognized tribes would act on behalf, and respect the wishes of, the non-federally recognized tribes in the repatriation process was a testament to the strong commitment and collaborative spirit to overcome all obstacles for appropriate spiritual restoration of the collection to a final resting place.

Finally, the reason that NAGPRA consultation was not initiated at California State University Sacramento until 2007 speaks to the need for personnel with specific job duties and responsibilities for consultation, a coordinated plan, and long-term institutional support. The recent updates to Cal NAGPRA (Cal. Health & Safety Code § 8012) in 2021 included the closure of procedural loopholes that allowed institutions to defer consultations and the addition of weight to traditional tribal knowledge as expert opinion, among other changes. It is expected that these measures, as well as the abovementioned new rule for National NAGPRA, will accelerate the rate of consultations, and broaden categories of items subject to the laws.

## **Taiwan: Context and Case Studies**

The history of Taiwan's current Indigenous communities extends back to at least 6,000 years with the arrival of Neolithic SE Chinese peoples (Liu, 2016). However, evidence suggests that *H. erectus*-affiliated populations were in the area by 30,000 years ago (Chang et al., 2015), and it's likely that Neolithic cultivators encountered Pre-Ceramic hunter-gatherers already occupying the island between 15,000 and 5,000 years ago (Hung et al., 2022). In Southern and Eastern Taiwan, Neolithic societies evolved into large communities characterized by extensive cultivation,

megaliths, jade ceremonial objects, and burial grounds with slate slab coffins. By the time of colonial contact, Taiwan's Indigenous languages probably numbered well over 30 (Blundell, 2011). Taiwan is topographically very diverse, with mountains rising from sea level to nearly 4,000 m. across a distance of only 145 km. The resulting ecosystem diversity influenced the high diversity of language and cultures, as well as variation in social organization. The Paiwan and Rukai societies occupied mountain/plain interfaces of the south, and are known for sedentized millet agriculture, extensive slate house communities (Chigiwa, 1960), and stratified societies of chiefly families and ancestral posts, ceramics, and other markers of social rank.

The long history of colonial occupations of Taiwan began with creation of Fort Zeelandia and a major trading port by the Dutch beginning in 1624. Spain had established a northern fort, but in 1642, they ceded to the Dutch. In its 38 years of occupation, the Dutch colonial government undermined and dismantled the Indigenous societies of Taiwan's southern and western coastal plains, subjecting them to forced labor and crippling taxation. With the advent of the Qing Dynasty in 1644, Ming Admiral Koxinga and his forces fled to Taiwan. After ousting the Dutch occupation forces, the Kingdom of Tungning largely continued Dutch practices. In 1683, the Qing Dynasty annexed Taiwan, extending its control to the western coast and plains and northeastern Taiwan over the next 200 years. The Qing government restricted Han migration to Taiwan primarily to males, and for the majority of its rule Taiwanese indigenous women frequently married Han (primarily Fujianese) men. The seizure and/or occupation of Indigenous lands by private citizens was discouraged although unevenly enforced (Barclay, 2018). Groups occupying coastal lands and those suitable for agriculture were affected early, and quickly became assimilated.

Following the Qing dynasty's defeat in the First Sino-Japanese War, Taiwan was ceded to the Empire of Japan with the Treaty of Shimonoseki in 1895. The Meiji Empire, desirous of the rich resources of mountain forests, forcibly re-located Indigenous populations. Unlike the Qing Dynasty, the Japanese administration also sought to re-educate Indigenous children, limit Indigenous languages, forbade head-hunting and traditional tattooing, and brought Indigenous leaders to Japan to introduce them to industrialized society. Indigenous societies lifeways and worldviews were profoundly impacted by Japanese governance, culminating in the drafting of males into the war effort from the 1930s to 1945.

With the establishment of a national university system, the first formal ethnology and archaeology of Taiwan were carried out by far-ranging Japanese field scholars (Nobayashi, 2022). Taihoku University in Taipei (now National Taiwan University) was developed as Taiwan's premier institution and the Museum was established in 1928. Their scholarly work formed the foundation of Taiwan's Indigenous anthropology today. With the ceding of Taiwan to the Allies in 1945, most Japanese citizens including scholars were forcibly deported.

The ousting of the Kuomintang by the Chinese Communist Party in 1949 resulted in mass migration of mainland Chinese, and the onset of a repressive and corrupt government. From 1952 to 1987, Taiwan's Indigenous societies endured the longest period of martial law in history, and a program of exploitation and repression under the White Terror. This was exacerbated by their

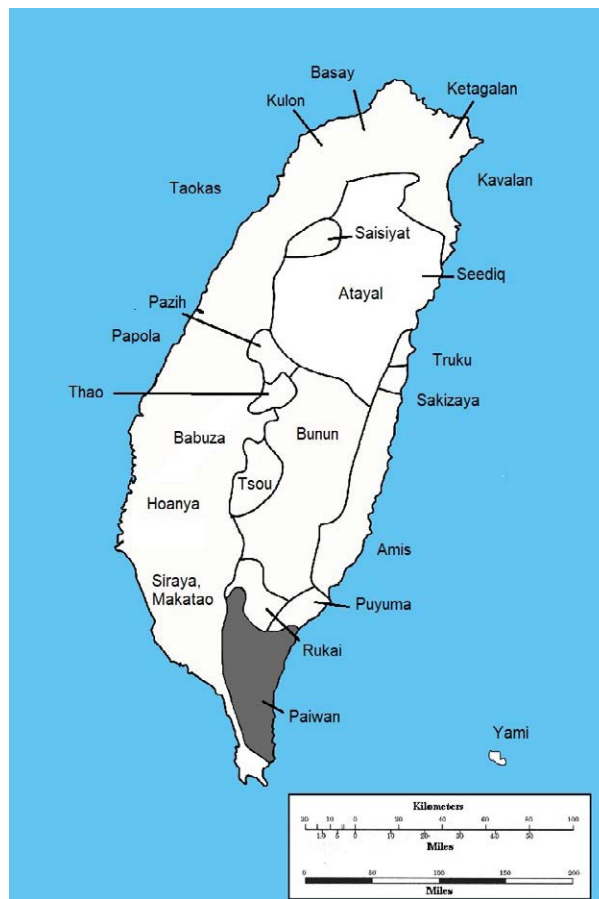


already-marginalized status (Barclay, 2018). With the lifting of martial law and establishment of a democratically elected government, Taiwan's Indigenous peoples have pursued recognition, self-determination, and sovereignty: the Government of Taiwan now recognizes certain rights of Indigenous Peoples through the State Law for Indigenous Peoples (2001), the Regulation Recognition of Indigenous Peoples (2002), the Fundamental Law of Indigenous Peoples (2005), and the Education for Indigenous Peoples Law (2004). For an excellent summary of the complexities of transfers of colonial power and effects upon Indigenous peoples of Taiwan, see Barclay (2018).

Indigenous communities continue to advocate for land tenure and are actively engaged with museums for repatriation of items held in Taiwan, Britain, Germany, the United States, Japan, and more (Alsford & Hu, 2018). Two Taiwan cases are discussed here: the first is the four-sided wooden post of Muakaikai from the Kaviyang Village, while the other concerns the double-sided stone post of Jupelan and Givruwan from the Vungalid Village. These two Paiwanese ancestral posts are preserved in the Museum of Anthropology of the National Taiwan University (NTU) in Taipei. The processes and effects of these two artifacts as national heritage present a unique model for Indigenous heritage-making in Taiwan. In contrast to other procedures for national treasures, the museum initiates negotiations with the source communities of related artifacts in the Indigenous villages. Although different agents engaged in the process of heritage making and negotiations had diversified motivations and expectations, the continuing dynamic interactions and movements illustrate local creativity and vitality. These Indigenous heritage projects show an increasing awareness of reviving cultural traditions and constructing local identities by representing and reproducing ancestral heritage among Indigenous communities in Taiwan. For this reason, these two cases address the challenges and opportunities of alternative repatriation and other types of work with Indigenous heritage with regard to Indigenous subjectivities, local negotiations, and empowerment of the source communities.

## **Outward journeys from tribal villages to the NTU Museum**

The Paiwan people, a hierarchical society among Indigenous groups in Taiwan, traditionally installed carved ancestral posts inside or in front of the chiefly houses as sacred objects and status symbols. These ancestral posts often have a carved human figure that represents one of the legendary ancestors or village founders in the chiefly family. The wooden and stone posts housed in the NTU Museum of Anthropology are carved on multiple sides and are among the most unique and significant material examples currently preserved. The museum was originally established in 1928 by Dr. Nenzo Utsurikawa (in Japanese, 移川子之藏), the Chair Professor of the Institute of Ethnology in the Imperial Taihoku University during the Japanese colonial period. As an anthropologist trained at Harvard University, Dr. Utsurikawa collected many items of Indigenous material culture during ethnological fieldwork in Indigenous villages. The two Paiwanese ancestral posts that are the subjects of this paper were accessioned into the museum in the early 1930s (MANTU, 2014).



**Figure 2.** *Map of Taiwan, showing the Paiwan Traditionally Associated Area.*

Museum documents indicate that the four-sided wooden post was purchased in 1932 from a Japanese private collector named Mizuno, who may have been an antique dealer; there is no further evidence regarding Mizuno’s acquisition of objects from the Indigenous villages. Nonetheless, historical records confirm that the post was originally erected in the Zingrur chief’s house at the old Kaviyang (which literally means “hand palm” in the Paiwanese language). Old Kaviyang was situated in a mountainous area and is one of the largest Paiwanese villages. The settlement has a long history, and the name can be traced in Dutch and Qing Dynasty documents to approximately 400 years ago.

At about the same time that the four-sided post made its journey to Taipei, Dr. Utsurikawa traveled to the old Kaviyang settlement to conduct his fieldwork in 1930 and 1931. He collected genealogical data of the Zingrur family and photographed the chief’s house and the village. The Government-General of Taiwan used Dr. Utsurikawa’s investigations as the basis to designate the Zingrur chief’s house in old Kaviyang as a historical monument on the national list in 1935, particularly due to impressive carvings. The Zingrur chief’s house was one of two Indigenous monuments recognized and appointed during the Japanese period. In 1936, Dr. Utsurikawa published an investigative report regarding the Zingrur chief family and Kaviyang village. These original field records strengthened the foundations for future anthropological studies and heritage



recollections in the source community.



**Figure 3.** *Dr. N. Utsurikawa, former head of Taihoku Imperial University’s Institute of Ethnology, c. 1930. Seated right, wearing kimono. Photograph in the public domain.*

The double-sided stone pillar was directly collected by Dr. Utsurikawa. Field records indicate that he found the pillar standing in the abandoned Aluvan village of the Paiwan people (an old settlement of the Vungalid community) in 1929. The stone pillar was originally erected in front of the Jialuvuan chief’s house and represented the leading status of the chiefly family as protector of the territory. Two ornate human figures carved on two sides of the pillar depict the first male and female ancestors of the Jialuvuan chiefly family. Dr. Utsurikawa travelled to the relocated Vungalid settlement and asked permission from Jupelan, the contemporary paramount chief of Jialulivak (renamed from Jialuvuan), to remove the stone post and transfer it to the university museum. With the aid of the local government and officials, Utsurikawa moved the tall and heavy stone pillar from the mountainous village to the museum in Taipei. A few months later, he published the account of finding the pillar in the first issue of *Southern Ethnology* (1931), the university’s anthropological journal.

### **Heritage negotiations and local expectations**

These two Indigenous ancestral posts with unique and beautiful carvings have been preserved and exhibited at the university museum in Taipei since the 1930s. They are only two of over 6,000 ethnographic specimens accessioned by the museum. Quietly standing in the gallery together with other displayed objects, these two posts were scarcely noticed by visitors. The neglected situation did not change until 2014 when the museum proposed a heritage project focused on nominating these two ancestral posts for recognition as “national treasures” under the Cultural Heritage Preservation Act. After the posts were successfully designated as national treasures, they

immediately became the focus of attraction in the museum.

Negotiations or agreements with Indigenous communities were not required in order to consider the museum artifact as a designated national treasure: Indigenous artifacts or other artifacts that have been institutionally accessioned into the custody of museums are frequently officially registered in the heritage list of Taiwan based upon experts' evaluations that use external standards and without consultation with source communities. In this case, the NTU Museum took a different strategy: to include Indigenous communities based on anthropological principles, concepts and understandings. In this way, various authorities and agencies dynamically interacted in the process of designating heritage. External authorities, such as museum curators, academic scholars, and officers from the Bureau of Cultural Heritage, actively promoted advocacy and mediation. From the Indigenous perspective, source communities expressed their internal considerations and expectations under particular local contexts.

In this attempt to understand Indigenous opinions and expectations, heritage negotiations for the two Paiwanese ancestral posts were officially initiated in 2014. The NTU Museum staff who aggregated artifact-related records actively contacted and visited the Kaviyang and Vungalid villages in Pingtung. Several tribal meetings discussed issues common to these two ancestral posts. The old home settlements were visited by the museum curators and village elders to understand the original living contexts of the artifacts. As with many other Indigenous villages, the Kaviyang and Vungalid villages had been forced to relocate several times between the 1940s and the 1950s by the Japanese colonial government. The traditional mountainous settlements were abandoned, and the old slate-stone houses with supported wooden posts were destroyed. Currently, Paiwan settlements of modern cement houses are typically located in low mountainous foothills.

For these reasons, most village members had lost many memories. They had never seen or heard of the four-sided or double-sided ancestral posts, absent from the villages for over 80 years. Therefore, both communities emphasized recollecting memories and identifying the role of the ancestral posts in the tribal negotiations. Only a few elders, particularly from the chiefly families have the position, status, and authority to recall the memories of their ancestors. These individuals traced family genealogies, cited legendary stories, and identified special features of the carved ancestral posts.

In the case of the four-sided post from the Kaviyang community, the carved figure has been identified as the female ancestor named Muakai (or addressed as “Muakaikai” in a highly respectful manner) after several long discussions during the tribal meetings. Muakai was the founder of the Zingrur chief's house based on the legends of the Kaviyang. An elder of the chiefly family who had entered the house during pre-relocation times remembered seeing the four-sided post standing on the house corner. In the other case, the carved figures on the double-sided post have been identified during discussions as the female ancestor Jepulan and the male ancestor Givuruan. These ancestors were the famous founding couple of the Jialuvuan family in the Vungalid community.

Another critical issue in discussions was willingness of the source communities to allow their ancestral posts to be designated as national treasures. The expectations of the source communities

toward future relations and interactions with the original ancestral posts was also discussed. Both communities generally expressed complex feelings regarding the heritization of their ancestral posts. On one hand, they were proud of presenting their traditional woodcarving achievements and ancestral wisdoms as national heritage. On the other hand, they regretted that the posts need to be preserved in the museum, primarily due to concerns that these 200- or 300-year old, delicate and perishable artifacts need a well-controlled environment to avoid further deterioration.

Nevertheless, during the general committee meeting of the Bureau of Cultural Heritage the Kaviyang and the Vungalid communities proudly agreed to participate in the heritage project. Representatives of the chiefly families and tribal councils traveled far from the Indigenous villages to attend the final committee meeting in Taipei, which was arranged by the Bureau of Cultural Heritage on March 25, 2015. Tribal representatives actively expressed support for the official designation of these ancestral posts to become “natural treasures.” The government officials and heritage committee members were deeply touched and impressed by the tribes’ dignity and sincerity. Thus, the four-sided Muakai post and the double-sided Jupelan and Givuruan posts were formally declared “national treasures” and registered in the national heritage list by the Bureau of Cultural Heritage in Taiwan (2008).

However, these two Indigenous communities expressed additional expectations concerning further heritage actions. The Kaviyang community asserted in the tribal meetings that the NTU Museum should not hold the right to keep the Muakai post without paying serious attention to stewardship responsibilities. The community agreed that the Muakai ancestral post should be treated as a precious daughter of the Zingrur chiefly family, to be married out of the village. They proposed that an appropriate traditional Paiwanese wedding ceremony should be held by the museum at NTU. This symbolic gesture would present the Muakai post as an Indigenous bride legitimately married to the museum and celebrate its new status as a national treasure in Taiwan.

Meanwhile, the Vungalid community did not initially ask the museum to organize a reciprocal event for the double-sided ancestral post of Jupelan and Givuruan. Making the journey back to the old abandoned Aluvuan settlement, where the post originally stood, was first proposed during the heritage negotiations. This old settlement had been assigned to be placed under the custody of another Paiwanese community about 100 years ago during the Japanese period. No Vungalid members had returned to the ancestral site since that time. Nevertheless, the Vungalid community undertook an approximately six-month return journey. Afterward, they related to the Museum that elders of the Jialulivak chiefly family dreamed that the ancestors residing in the stone post stated that they were sad to be left in the museum and wished to know the way home. Thus, new negotiations began. The traditional ceremony for bringing the ancestral spirit home, and a sworn siblings’ ceremony between the chiefly family association in the Vungalid community and the NTU Museum, were arranged thereafter.

### **The breakthroughs: Building new relations through an Indigenous wedding and sworn siblings’ ceremony**

Following the negotiation agreements in the Kaviyang tribal meetings, a unique wedding for the Mukaikai four-sided post was hosted at the NTU campus on September 12, 2015. Over 80 Indigenous community members traveled from the mountainous village to Taipei for the wedding arrangements. The wedding ceremony designed by the Kaviyang tribal associations aimed to advocate for Paiwanese cultural traditions and express local agencies on cultural revival. For example, a tall wooden swing, which is an extraordinary symbolic object for the chief family's wedding, was set up in front of the NTU Museum. Traditional ceramic pots, glass-beaded necklaces and bracelets, and eagle feathers, metal pans, pigs, Indigenous wine, and Paiwanese ritual food (i.e., *avai* and *cinavu*; millet and taro powder dumplings, respectively) were produced as betrothal gifts from the groom's side (i.e., NTU) to the bride's side (i.e., Kaviyang community).

Over 300 persons attended the wedding ceremony, including representatives and guests from the university and the Bureau of Culture Heritage, Indigenous legislators, and Indigenous Kaviyang community members. The first daughter of the current chief represented the symbolic bride of Muakai. The president of NTU represented the university to receive the symbolic bride. The Minister of Culture was the official representative to witness the marriage. The wedding ceremony with rich material symbols, beautiful singing and dancing, and colorful ritual costumes expressed sincere feelings and pride toward the Paiwanese traditional culture. The entire wedding process was planned to highlight the status of Muakai as the first female chief in the Zingrur family and emphasize the cultural identity of the Kaviyang community. In addition, a special episode was arranged by the tribal associations to magnify the status of the bride in the wedding. When two tribal supervisors checked the betrothal gifts offered by NTU to the bride's family, they commented that the mountain hawk–eagle feather with seven zigzag patterns was inappropriately offered to the Zingrur family: for a paramount chief's family, the eagle feather should have nine zigzag patterns rather than seven. Consequently, the NTU president was reprimanded and an additional metal wok prepared beforehand was immediately offered by the NTU president to the Zingrur family as a compensation for the mistake. This meticulous episode shocked and amused the invited guests. Many people were confronted with a need to rethink different cultural values on social status by observing this intentionally arranged episode.

In the other case, a grand ceremony to call ancestral spirits and making sworn siblings was arranged for the double-sided ancestral post of Jupelan and Givuruwan on October 15, 2016 at the NTU Museum. The event was mainly organized by the Jialulivak and Luviliv families in the Vungalid community. Approximately 160 Indigenous villagers traveled to Taipei to participate in this ceremony. In contrast to many Paiwanese communities that have converted to Christianity, the Vungalid community maintains traditional beliefs in the Paiwanese ancestral spirits and uses a traditional female spirit medium (Pulingaw) to communicate with ancestral spirits. Thus, this ritual was led by a senior Paiwanese Pulingaw, who invoked the ancestral spirits and asked permission from the ancestors to conjoin the university museum with the Jialulivak (Jialuvuan) chiefly family as sworn brothers. The male ritual hosts placed ritual grass as protections against evil for the museum gallery. In front of the double-sided post, the female Pulingaw chanted ritual songs and offered a pig, wine, and millet cakes to the ancestral spirits. For the first time, the museum allowed

animals, plants, and food and drinks inside the gallery.

With the ancestors' permission, the first son of the current chief acted as representative of the Jialulivak (Jialuvuan) chiefly family in the Vungalid community. Meanwhile, the dean of the College of Liberal Arts represented the NTU Museum in the sworn brothers' ceremony. The Minister of Culture and Dean of Academic Affairs of NTU were official witnesses to the sworn oaths. All representatives used Paiwanese wooden double-cups to drink millet wine and shared millet cakes to symbolize the constructed bodily bindings via liquid and food. In addition, two sets of prepared Paiwanese traditional costumes were exchanged between the Jialulivak family and the museum as gifts for the sworn brothers.

These two national treasures ceremonies were fascinating stories reported in many major news media outlets and attracted the attention of the general public in Taiwan. The idea of making heritage identification via traditional ceremonies demonstrates the creativity and vitality of contemporary Indigenous communities in Taiwan. However, these ceremonies are not merely recreational or symbolic performances. Rather, these events are authentic rituals to build long-term relationships between the museum and the two Indigenous communities. Messages of cultural recognition and proliferation were repeatedly transmitted throughout the rituals. Both ceremonies were concluded with a banquet. In the convivial banquet, all participants shared Paiwanese avai, cinavu, and millet wine. Special kin bonds between the two relative parties were built and affirmed by sitting, eating, and drinking together.



**Figure 4.** *Building New Relations through Wedding Ceremony.* In this image, the representative of the Chieftain family presents traditional pottery to Muakai, while the president of National Taiwan University, Pan-Chyr Yang, receives it, during the wedding ceremony. Photo 20150912-110627, provided courtesy of the Department of Anthropology, National Taiwan University.





*Figure 5. Building New Relations through Sworn Siblings' Ceremony. In this image, the representative of the Chieftain family and the Dean of the College of Liberal Art, National Taiwan University, Jo-shui Chen, who is also representing the museum, are drinking together during the Sworn Siblings' Ceremony. Photo DSC6666, provided courtesy of the Department of Anthropology, National Taiwan University.*

## What we learned in Taiwan

Reconstructed relationships between the museum collections and their source communities were not built merely via the ceremonies. Programs to reproduce the ancestral posts were also proposed during the early heritage negotiations. Both the Kaviyang and Vungalid communities proposed making duplicates of the ancestral posts preserved in the museum. Given that the communities felt that the delicate condition and preservation considerations for the national treasures would prevent them from going back to the village, they wish to have scale reproductions placed around in the village to remember and commemorate their ancestors forever.

Most members of the Kaviyang community converted to the Catholic religion long ago and are now strong Christian believers. When the tribal council decided to reproduce a new four-sided Muakai post, they consulted with the Catholic priest of the village church. The priest positively responded and highly supported the community's desire to revive Indigenous traditions by remembering ancestors. To avoid offending the church, the tribal council did not invite a traditional spirit medium to call for the ancestral spirit. Instead, they prayed and spoke to the Muakai post. These actions fused Indigenous and Christian concepts of the spirits. The project of carving a new Muakai post was assigned to a young carver living in the village.

The NTU Museum and Bureau of Cultural Heritage provided funding for the carving. The original post was made from a wood of a long-leaf Chinkapin. However, finding a precisely similar suitable wood is difficult at present. Eventually, a large trunk of red cedar tree was used to reproduce the Muakai post. Although the reproduced Muakai post is not a precise copy of the original piece in

the museum, all of the distinctive features of the original post (e.g., six fingers and circles on knees) have been represented. At present, the newly reproduced Muakai post is located in the living room of the Zingrur chief's house, beside the statue of the Virgin Mary. For those family members, the Muakai post is treated as a grandmother living with them. Every child entering the house makes a bow to Muakai. Every time family members dress up for ceremonies, they place a beautiful headdress on Muakai's head to show respect.

In the Vungalid community, the project of reproducing the double-sided stone post was assigned to an Indigenous stone carver living in Dahou village. A huge piece of sandstone similar to the original piece was used. At present, the reproduced double-sided post of Jupelan and Givuruwan has been placed outdoors at the center of the Vungalid ritual ground. Another grand traditional ceremony was held in the village ritual ground to erect the reproduced post. The spirit medium (Pulingaw) explained that the reproduced post is a new domestic arrangement for the ancestral spirits, which were called and subsequently traveled home from the Taipei Museum to attend rituals in the village.

The heritage projects for these two Paiwanese ancestral posts continue to develop and expand beyond the original expectations of the museum and government heritage bureau. Generating from the preserved material heritage in the museum, significant Paiwanese ceremonies and reproduced posts have been realized. Further movements and interactions are in continuous development: for example, the Kaviyang tribal council are considering the reconstruction of a traditional style ancestral house, so that the Zingrur chiefly family can place the reproduced Muakai post within. The Vungalid community is now seriously devoted to the revival of spiritual fortune balls in the Maleveq ceremony, which had been banned approximately 80 years ago during the Japanese colonial period. The revived Maleveq ceremony is planned to be held on the ritual ground where the reproduced double-sided ancestral post stands. A multi-lingual film has been released to commemorate these processes (Su, 2018).

In summary, these two ancestral posts are serving as the “sites of memories.” In the processes of designating national treasures and the continuing heritage movement, the ancestral memories embody the connection between past and present. Various groups of people have generated actions connected to and surrounding the posts.

## **Conclusion: Regenerating Spirit and Reviving Culture**

These case studies from two very different settings highlighted outgoing journeys of cultural items, identified challenges to their recontextualization, and described original, effective, mutually agreed-upon strategies to involve Indigenous communities in greater control over movable heritage. This comparison clearly shows that the vitality and identity of the contemporary Indigenous community should be priority concerns in the stewardship and management of Indigenous material heritage, globally. Collaborative solutions for sovereignty over movable heritage, particularly legacy collections like those mentioned here, will only grow in significance to source communities

with rising global conflict, migration, and climate-induced disasters (Giletycz et al. 2021).

In comparison with Taiwan, the United States NAGPRA law provides powerful legal requirements and procedures for repatriation of a special class of human remains and objects such as burial items, sacred items, and collectively owned cultural items. At the time of this writing, museums and government agencies are responding to the new rule for national NAGPRA which broadens scopes and definitions of categories of items subject to the statute. Yet enforcement-based requirements provide a ‘basement’ rather than a ‘ceiling’, and strict adherence could have the unintended consequence of inhibiting creativity, flexibility, and empathy in implementation (Yu, 2008). Plans of Action and Memoranda of Agreement are useful instruments that can include customized procedures and be enacted in lieu of standard NAGPRA requirements.

Although Taiwan has no law like NAGPRA, the designation of Indigenous museum objects as National Treasures elevates their importance to national levels. The lack of stringent requirements does not compel museums to act; yet this also offers substantial flexibility for parties to work together toward highly innovative strategies for re-contextualizing museum objects and bringing them home: physically, spiritually, or both. Local agencies and vitalities should be valued highly compared with national or international standards, although in fact the two are complementary: national standards provide a rigid framework that local knowledge can build on. In our view, a process to address Indigenous objects that are not designated as national treasures, yet are still of vital importance, should be pursued in Taiwan.

These stories of homeward journeys, from repatriation in the United States and national treasure ceremonies in Taiwan, demonstrate that contemporary Indigenous communities possess cultural wisdom and creative strategies that invigorate ancestral heritage, transmit cultural traditions, and restore sites of memories. From these perspectives, material heritage in the form of archaeological and ethnographic items have agency that enlivens contemporary Indigenous communities. The spirits or agencies embedded in material heritage are rekindled and disseminated through various transformative methods. Moreover, these two cases mark significant milestones in the transformation of rethinking and redefining museum collections as Indigenous heritage.

In conclusion, we affirm that heritage-making projects should aim to empower the source communities. The growth of Indigenous museums and Indigenous museum experts are one way to make this a reality (King, 2013; Wang, 2019), and locating museums and offices in source communities is a highly effective way to rejuvenate contextual values (Toronto Declaration, Royal Ontario Museum Cultural Heritage Working Group, 2018). Direct and committed engagement between museums and Indigenous source communities can create highly innovative strategies to re-contextualize and revitalize museum objects, even under different legal frameworks. Such goals can transform heritage making into a process that will empower source communities, serving as an active channel to revive and transmit culture and build enduring relationships between heritage stewards on the museum side and heritage keepers on the Indigenous side. We respectfully offer this information as a contribution to efforts for self-determination of Indigenous peoples over movable cultural heritage, upholding laws governing the protection of movable heritage, and building lasting



relationships of mutual trust and respect between museums and Indigenous peoples.

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# Maritime Technologies and Coastal Identities: Seafaring and Social Complexity in Indigenous California and Hokkaido

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## Abstract

Complex watercraft were central to the functioning of many Indigenous coastal and island communities around the world. These communities, however, are often assumed to be small-scale bounded social entities adapted to local ecosystems, especially in comparison to land-based agricultural societies, states, and empires. In this paper we seek to understand how regional interactions helped create and sustain systems of Indigenous social and cultural diversity by taking a fresh and comparative look at the “active” role played by local boat-building traditions in the networks and social dynamics of Indigenous coastal communities. We argue that one critical yet often overlooked aspect of the use of watercraft is the capacity for advanced boat technologies to have “transformative” impacts on local communities by creating new kinds of social relations and networking opportunities. In this paper we undertake a comparative analysis of two Indigenous boat-building traditions, one in southern California and the other in Northeast Asia. We examine how innovation in maritime watercraft technology contributed to the formation of wide-ranging interaction spheres where participation by Indigenous communities helped shape the history of the wider region. We suggest that innovations in boat technologies led to positive-feedback loops of social intensification which significantly contributed to the historical trajectories of both world regions.

**Key Words:** *Innovation, Technology, Watercraft, Trade, Indigenous societies, Hunter-Gatherers*

*“The first man in this world said that all the world is a canoe, for we are all one, and that which we finish now is a canoe”*

*-Fernando Librado Kitsepawit, on the launching of a newly built tomol in 1912, quoted in Hudson et al (1978)*

## Introduction

Technological innovation is a powerful dialectic process that drives – and is driven by – societal transformations. In turn, this historical process shapes the deeper cultural trajectories of cultures and societies (Schiffer, 2011; Jordan, 2015; Frieman, 2021). Throughout human history, Indigenous cultures have often been at the forefront of major technological developments. However, in numerous histories and ethnographies that are typically written by outsiders, this capacity for innovation is glossed over in favor of more static accounts of “traditional” communities who reproduce ancestral practices. Maritime-oriented Indigenous societies provide one of the clearest examples of the dialectical role of technological innovation in shaping social-historical trajectories, as the capacity for people to leave dry land, exploit maritime environments, and connect with distant cultures is largely dependent on the successful development of new technological skills and practices.

Chief among these material interventions is the boat, which has allowed humans to exploit new resources and travel to new locations throughout the Late Pleistocene and possibly before (Cassidy et al, 2022). One critical and often overlooked aspect of the use of watercraft is the transformative ability of boats to amplify the impacts of social connections with distant places by allowing for longer, larger, and more frequent interactions. In this paper we emphasize Indigenous contributions to the history of watercraft innovation and explore how the development of new forms of watercraft technology in different areas of the North Pacific served to greatly transform the scale and character of previously localized interaction networks, embedding emergent Indigenous identities into wider political-economic systems with wide-reaching local and regional consequences.

Our analysis aims to present a preliminary – and in many ways “exploratory” – analysis. The goal is to highlight deeper research potentials, both regional and comparative, which lie beyond the scope of this paper. We compare and contrast examples of Indigenous seafaring technologies from two different hunter-fisher-forager societies situated on opposite sides of the North Pacific: the Chumash of southern California, and recent and historical cultures from Hokkaido, Sakhalin, and the Sea of Okhotsk, including the Ainu and antecedent cultural formations. Each case-study highlights striking similarities in the technologies used to construct new kinds of sewn-plank boats, which offered larger and more sea-worthy vessels and enabled the expansion of maritime networks and open-ocean travel within emergent “World Systems” (Fitzhugh et al., 2016; Hudson, 2004; Wallerstein, 1974).

These emerging insights contradict traditional narratives of hunter-gatherer locality and



boundedness and highlight the need for new work on the transformative potentials of maritime technological innovations. We conclude that the innovation of the sewn-plank boat technology in both regions created new opportunities for voyaging, but also greatly expanded the ability of emergent local leaders to exploit trading and raiding voyages to increasingly distant locations for their own socio-political agendas. The combination of sea-based trading and raiding can be viewed as a form of Indigenous Maritime Mode of Production, similar to the social formations seen in Bronze Age Japan and Scandinavia (Hudson, 2022; Ling et al., 2018). Across both Northeast Asia and the interior of western North America, the historical trajectories of many sedentary and agricultural populations were affected by these intensive maritime exchanges, showing the degree to which hunter-fisher-foragers from the “unruly peripheries” of the North Pacific Rim could engage and interact – often on their own terms – with a diverse suite of neighboring cultures, including complex agrarian societies that had emerged over previous millennia.

## **Indigenous Watercraft and Technological Innovation**

Indigenous maritime technologies carried ancient settlers to all corners of the globe and allowed for the exploitation of a wide range of different environmental regions. Various forms of watercraft such as the hide boat, plank boat, reed boat, and various forms of composite log boats were all innovated at different points of time by Indigenous communities to meet various environmental and social challenges. These boats were often accompanied by a range of sailing and fishing technologies that allowed for highly efficient mastery of maritime resources and environments. In many cases, more recent sea-faring traditions – including those of Europe – have frequently adopted and appropriated Indigenous traits, technologies, and naming conventions. For example, the modern kayaks used around the world are based on boats used by Inuit, Yup’ik, and Aluet peoples, and circular shell fishhooks based on Polynesian and Pacific North American examples have recently become popular among modern sports fishers (McKenzie, 2007; Promjinda et al., 2008). Understanding the history of human adaptations to island and coastal environments thus requires an examination of Indigenous contributions to maritime technological traditions.

The scale, diversity, and legacies of Indigenous seafaring skills, technologies, and marine-based lifeways are often underemphasized in broader narratives of world history, which typically highlight European voyages of discovery and maritime expansion. Within these dominant narratives, Indigeneity can be defined in terms of the emergent and asymmetric relationships that emerge between colonial powers and local communities who become politically and culturally marginalized (Béteille, 1998; Karlsson, 2003; Watkins, 2005). For example, when we think of historical ships of colonization, the standard narratives depict the galleons and caravels of European powers rather than the double-hulled canoes that carried Polynesian settlers across nearly half of our planet’s surface area. Thankfully, recent scholarship has started to challenge this unfortunate trend by acknowledging the huge impact that Indigenous maritime innovations had on both regional and global histories.

Moreover, there is a growing appreciation of how riverine- and marine-based societies



engaged in regional interaction networks. Writing about early 19<sup>th</sup> century North America, Hämäläinen (2008) has shown that the Comanche were understood both by themselves and their neighbors as an expansive imperial power that extracted tribute from other Indigenous groups as well as Euro-American states. Likewise, Bassi (2016) has argued that the Wayuu and Cuna people of coastal Columbia used a combination of diplomacy, trade, and the threat of conflict to form a cosmopolitan Indigenous society that dominated sections of the Caribbean during the late 18<sup>th</sup> century. These examples show that Indigenous people were hardly historical bystanders to periods of ancient globalization, but instead were active participants in global interactions who often engaged with non-Indigenous states and empires on a peer-to-peer basis. In this paper we seek to contribute to this growing body of scholarship by showing how technological innovation allowed two Indigenous maritime communities to affect the histories of their respective regions and adjacent areas.

To address these imbalances, this paper seeks to explore how Indigenous communities generated innovations that shaped their historical trajectories as well as their capacities to engage with neighboring societies and surrounding regions. Specifically, we focus on sewn plank boats such as the Chumash *tomol*, the Ainu *itaomacip*, or the Tongva *ti'at*. These boats represented considerable sifts in maritime technology compared to the dugout, birch-bark and reed boats that typically preceded them. By sewing wooden planks together and caulking the seams and drill holes with resin, ancient people were able to construct new kinds of vessels that had larger capacities and improved sea faring capabilities. Although dugouts and reed boats are often highly seaworthy, the V-shaped hull of the plank canoe confers a major advantage in terms of speed, allowing for much longer and more efficient voyages (Cassidy, 2021; Fauvelle, 2011; Fauvelle, 2014). These improvements came at a “cost” – inherently more complex construction techniques require significantly higher investments in terms of labor, the sourcing, preparing and integration of diverse materials, manipulation of social networks to acquire these resources, plus the acquisition, mastery and sustained teaching of the skills and knowledge required to evolve and maintain viable inter-generational traditions (Jordan, 2015).

Once equipped with larger vessels, individuals, kin groups or other social collectives would have been able to harness the potential of the new maritime technologies for a wide array of initial and more emergent strategies and opportunities. In numerous contexts, these historical dynamics frequently meant that ownership of plank-built vessels – and their broader socio-political potentials – was controlled and manipulated by aspiring individuals or interest groups who were able to muster the skills and resources required to build, crew, and exploit the vessels’ broader affordances. Sponsorship of increasingly skilled and elaborate boat construction by wealthy patrons may thus have provided an important mechanism through which elites could nurture and then consolidate political power in early maritime societies. We present two case-studies – set in southern California and Hokkaido – to examine the extent to which innovation of sewn-plank vessels was associated with the formation of new kinds of societies, in which long-range maritime interactions became pivotal to the emergence of larger maritime socio-political systems, which in turn, enabled new kinds of elite identities to be negotiated.

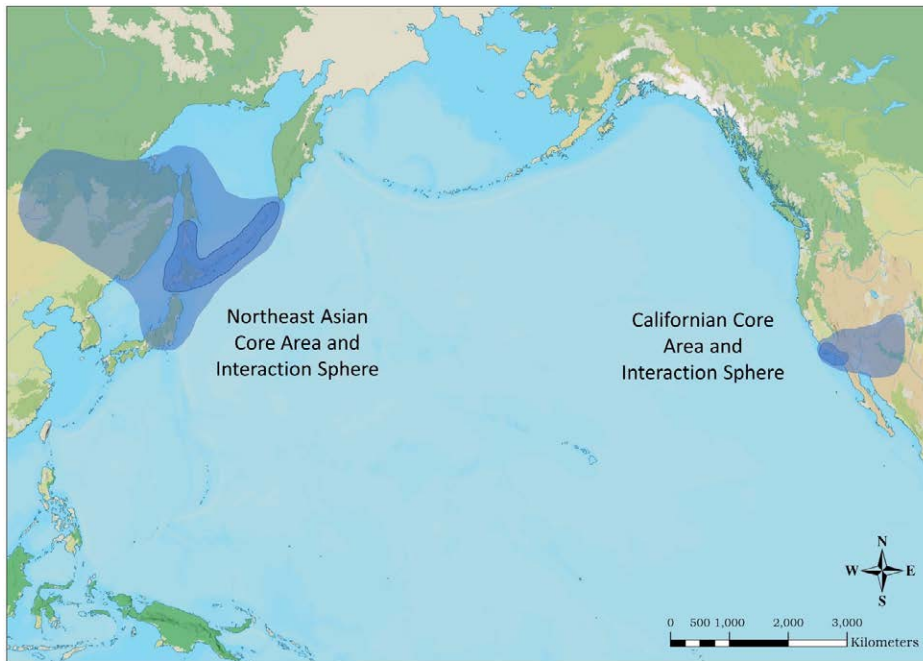


Figure 1. Map of North Pacific Rim showing location of the core areas for the Chumash, Tongva, and Ainu case-studies as well as major areas of interaction. These boundaries should be considered open ended as many interactions reached far beyond the regions depicted here.

## Comparative Analysis of North Pacific Sewn-Plank Watercraft

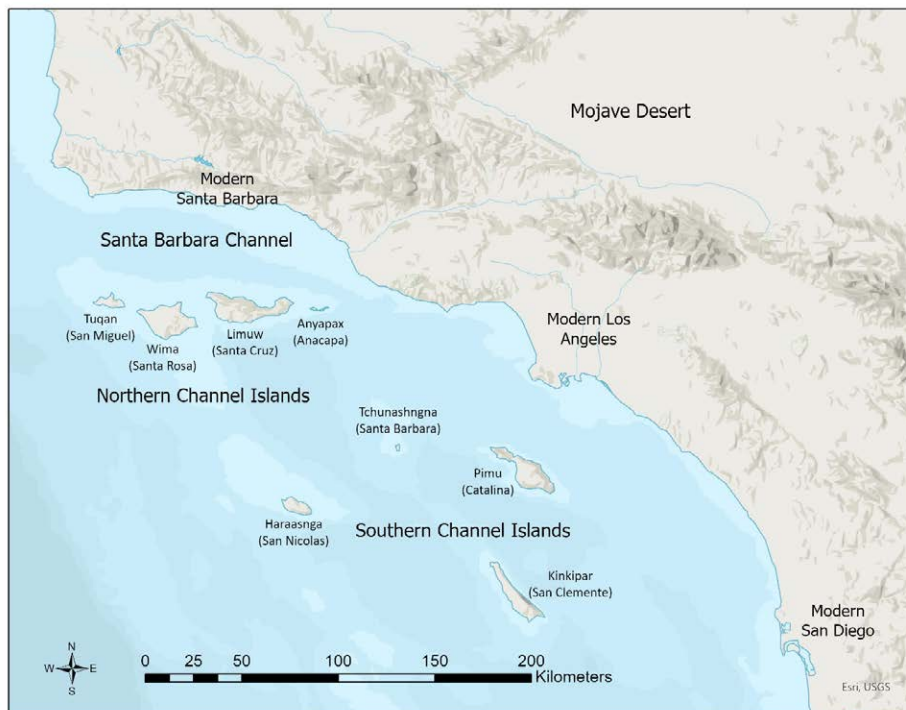


Figure 2. Map showing California's Channel Islands with Chumash, Tongva, and European place

names.

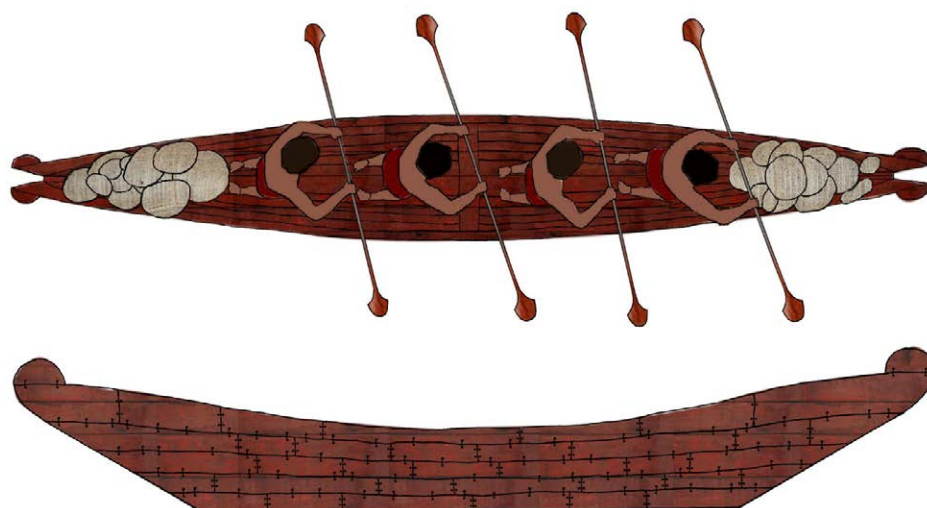
## Case-Study 1: Chumash Sewn-Plank Boat Traditions in Southern California

For maritime societies few items are as important as the boat. From Scandinavia to the North Pacific, both modern and ancient seafaring people have depended on reliable watercraft for their livelihood and often organize many aspects of their political, social, and ritual lives around canoes and canoe symbolism (Ling et al., 2020). In southern California, the Chumash referred to the plank canoe (*tomol* in Chumash, or *Ti'at* in Tongva) as the “house of the sea” and considered it the most important item that any individual could possess. No one could become a chief without owning a plank canoe, and the knowledge involved in building a plank canoe was a closely guarded secret available only to members of the elite brotherhood of the *tomol* (Hudson et al., 1978). In modern times, plank canoes have become important symbols of contemporary Indigenous organizations. In the past several decades, both Chumash and Tongva tribal members have built and regularly paddle plank canoes into the waters of southern California.

Plank canoes were used by two different groups in southern California, the Chumash and the Tongva. Chumash territory includes the Northern Channel Islands (see Figure 2) and the area roughly corresponding to modern day Santa Barbara and Ventura counties, while Tongva lands include the southern Channel Islands and modern-day Los Angeles County. The Chumash word for a plank canoe was *tomol*, while in Tongva a plank canoe was called a *ti'at*. During the Late and Historical periods (circa 1300 to 1804 CE), both groups lived in sedentary villages that contained many hundreds of individuals, with a few major villages having populations over one thousand (Gamble, 2008; Johnson, 1988). These population levels were supported through hunting, fishing, and gathering in rich marine and terrestrial environments (Fauvelle & Somerville, 2021a, 2021b). The Chumash were politically organized into hierarchical territorial polities with hereditary chiefs often controlling multiple settlements. Trade was a major focus of Chumash elites, with craft specialists producing millions of shell beads which were exchanged throughout southern California and used as money in day-to-day transactions (Fauvelle, 2024; Gamble, 2020). The hierarchical nature of Chumash political and economic organization has led many scholars to consider them as one of the ancient world's most complex hunter-gatherer societies (Arnold, 2001; Arnold et al., 2016; Fauvelle, 2013; Gamble, 2008).

The southern Californian plank canoe was one of the most advanced watercrafts ever built in pre-colonial North America, equaled only in terms of speed and cargo capacity by the “great canoes” build from massive cedar logs on Pacific Northwest Coast (Ames, 2002). Most of what we know about the plank canoe comes from Fernando Librado Kitsepawit, a Chumash man who built a plank canoe for the American ethnographer J.P. Herrington in 1912 (Hudson et al., 1978). Librado Kitsepawit listed the materials needed to build the plank canoe, including pine or redwood logs split into boards, milkweed rope to sew the boards together, and a resinous asphaltum (bitumen) and

pine pitch mixture known as yop for caulking and waterproofing the ship. As described by Librado Kitsepawit, the largest canoes could be up to 9 meters long and could carry over a dozen people, although smaller canoes (circa 4 to 5 meters) with smaller crews were more common (Gamble, 2002; Hudson et al., 1978). Librado Kitsepawit noted that the asphaltum required to waterproof the canoe could not be found on the Channel Islands, meaning that islanders needed to acquire canoe construction materials through trade with the mainland (Fauvelle, 2011, 2014; Fauvelle & Perry 2019, 2023; Hudson et al., 1978). Due to the high-value materials and intensive labor needed to construct a *tomol*, plank canoes were one of the most expensive items in the material culture of Chumash society (Fauvelle, 2011, 2014). It is estimated that over 500 labor hours went into the construction of each plank canoe (Fagan, 2004; Hudson et al., 1978). These costs made *tomol* ownership out of reach for the average family and restricted their use to high-status elites and chiefs (Arnold, 2001; Hudson et al., 1978).



**Figure 3.** *Chumash tomol design. Drawing by Mikael Fauvelle*

Based on an analysis of canoe planks, drills, and caulking plugs, Gamble (2002) has argued that fully formed *tomols* were in use in the Chumash area by at least 600 CE. It is possible that prototype or composite canoes may have existed before this, and woodworking tools from the Early Holocene on San Clemente Island suggest that some form of advanced boatbuilding may have occurred during the Early Holocene (Cassidy et al., 2004). Nonetheless, it is clear that by the mid first millennium CE southern Californian mariners were making long-distance trading voyages in plank canoes. This timing corresponds well with increases in regional social and economic complexity. Unequal grave good distributions in burials from the late first millennium BCE give some evidence for early social ranking (Gamble et al., 2001), but these inequalities increase during the second half of the first millennium CE, leading way to the formation of fully fledged territorial chiefdoms by sometime after 1150 CE (Arnold, 1995, 2001). It is highly likely that the innovation of the plank canoe went hand in hand with these political and economic transformations, placing a fast and reliable, yet highly costly, watercraft into the hands of the political elite (Fauvelle, 2011).

As we shall see below, these transformations affected areas far beyond coastal California, with island goods procured by chiefly *tomol* owners reaching markets across much of the American west (Smith & Fauvelle, 2015).

## Case-Study 2: Ainu Sewn-Plank Boats in Hokkaido, Sakhalin, and the Kurils

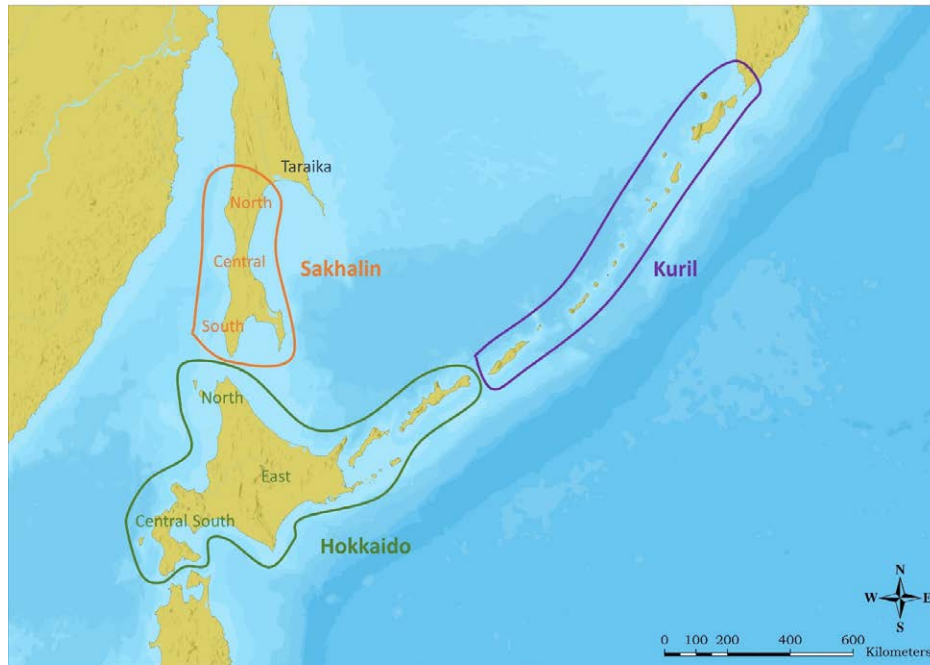
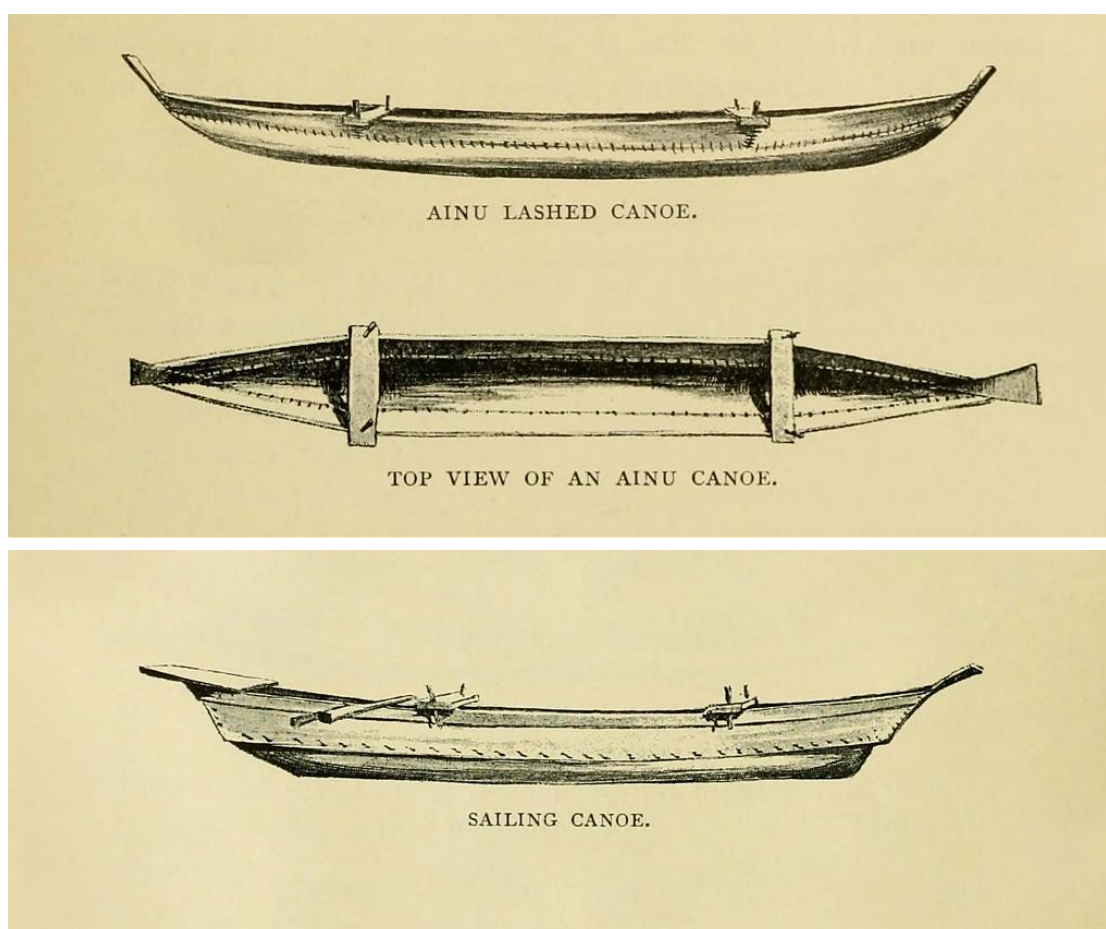


Figure 4. Northeast Asia Location Map – historical locations of Ainu languages and dialects [ca. 1945; (Zgusta, 2015)]

Sewn boats were also used on the other side of the Pacific by mariners in Hokkaido, Sakhalin, and the Kurils. Boat technologies have an extended history across the Japanese archipelago, and indeed across Maritime Northeast Asia and the Pacific Rim more generally (Cassidy et al., 2022), with very early indirect evidence for ancient seafaring skills extending back to the Palaeolithic dispersal of *Homo sapiens* into the Ryukus and palaeo Honshu (now Kyushu, Shikoku, and Honshu) and from there into Hokkaido. Somewhat later, dugout canoes of varying scales are frequently recorded in Jōmon contexts, and their use may have seen increased use in the Late and Final Jomon as part of the intensification of long-distance exchange networks. Evidence of composite plank boats being used alongside dugout canoes appears during the following Yayoi Period (CE 250-710) (Habu, 2010). Further North, in Hokkaido, Sakhalin, and the Kurils, the Ainu peoples recorded in historic and ethnographic sources, used a wide range of wooden and bark vessel types and technologies (Fitzhugh & Luukkanen, 2019). While some types of dugout canoes and plank boats are seen in ethnographic records on the Nivkh, Ul'chi, Nanai, and Evenki (Levin & Potapov, 1961), the Ainu have peculiar types that cannot be seen among the surrounding groups.



In Hokkaido, the Ainu employed different boat types and constructions for different purposes. These included “Yarchip” (*yarcip*)<sup>1</sup> expedient elm bark canoes (Fitzhugh & Luukkanen, 2019) used in lakes and rivers. In addition, more robust dugout canoes, called “chip” (*cip*), which were paddled or punted, were also used for inland waters. The Ainu also used built-up versions of dugouts called “mochips” (*mocip*) which consisted of hollowed-out tree trunks with extender planks stitched down each side (Landor, 2012). Finally, larger “*itaomacip*” sewn-plank boats were built in two basic variants (see below). It is assumed that these sewn-plank composite boats evolved, via initial use of extender planks, from the older and original dugout canoe tradition. However, each of the boats occupied a different functional and social “niche” and so the Ainu made and used the different types and used them in different contexts, rather than one replacing the other over time.



**Figure 5.** *Top – Late 19<sup>th</sup> C diagram of a traditional Ainu sewn-plank (lash-planked) canoe; Bottom – example of a larger Ainu sailing canoe, with possible Japanese influences*

*Source: Landor, 2012/1893: pp. 37- 39. Public domain image. It should be noted that sewn-plank boats were not exclusively used by the Ainu, but similar technologies were also shared across the Sea of Japan (Tezuka, 1998).*

The largest *itaomacip* boats were built explicitly for seafaring purposes – they were used mainly for trading voyages as well as to hunt sea mammals in the open ocean (Ohtsuka, 1999). The term *itaomacip* (or in Ainu *ita-oma-cip*) describes a “boat with a board”. However, the Ainu *itaomacip* uses particular construction techniques, which are unique to Hokkaido and have not been recorded in other regions of Japan. The planks are sewn with whale beard (baleen) and other vine plant cordage. These ocean-going vessels were built in two different formats (Landor, 2001/1893). The smaller and more traditional lashed plank canoes were made of nine sections of wood lashed together. A partial dug-out canoe section formed the concave bottom of the boat. To this were added the side pieces, three planks on each side, sewn together and caulked, and set at an angle of about 170°. Finally, two more pieces of wood were set at the prow and stern, meeting the side planks at right angles. Overall, these canoes were typically 10 to 15 feet long and around 3 to 3½ feet. For structure and rigidity, two cross pieces were lashed horizontally. These laths both strengthened the boat structure but also projected outside the edges of the vessel to provide anchor points for oars. A larger variant – called a “sailing canoe” may have had some Japanese elements incorporated.



**Figure 6.** Early depiction of the larger variants of the Ainu sewn plank boat technology in northern Japan. Kodama TEIRYO (painted ca 1751-64). Title “Scenes of the Ezo Fishing Grounds” (Public domain work of art from Wikimedia Commons)

The deeper historical origin of both these larger sewn-plank boats is rather unclear. The tradition may date back to the beginning of the Okhotsk Period (circa CE 500-1000), when there is evidence that maritime focused societies on the Okhotsk Sea began participating in long-distancing seafaring (Yamaura, 1999). Rock art from this period, depicting rowing crews on long boats, bears a remarkable similarity to depictions found throughout Bronze Age Scandinavia (Yamaura, 1998). As in California, the adaptation of sewn plank canoes in northeast Asia appears to correlate with increased regional interaction, with the Okhotsk culture from Hokkaido conducting raiding and trading voyages south to Honshu and northwards into the circum Sea of Okhotsk and Lower Amur River. Raiding via sea provides one point of difference between these two case studies, as it was an apparently much more important activity in Northeast Asia than in precontact California, where most documented warfare took place via land routes (Gamble, 2008; Hudson 2022).

Whatever their precise origins, the Ainu continued to use these unique sewn-plank boats for marine hunting and fishing well into the 20<sup>th</sup> century, with a lively boat-building tradition continuing today among Ainu communities dwelling on the island of Hokkaido (Ohtsuka, 1999).



Modern reconstructions of the Ainu *itaomacip* are based on both Indigenous traditions as well as detailed drawings of boat construction found made by Shimanojo Murakami in the early 19<sup>th</sup> century (Murakami et al., 1990/1823; Ohtsuka, 1999). In addition, pictographic representations of 19<sup>th</sup> to early 20<sup>th</sup> century Ainu log and plank boats can be found as small carvings on Ainu ikupasuy prayer sticks, where there are hundreds of examples of the sticks and frequent depiction of these boats, often with accompanying images of large fish and marine mammals (Fitzhugh & Luukkanen, 2019).

One detailed description of the *itaomacip* boat-building tradition can be based on analysis of a modern replica built by Ainu craftspeople for the 1989 World Congress of Indigenous People and described by Ohtsuka (1999). The core of the *itaomacip* was made from massive *katsura* (*Ceridiphyllum* sp.) tree logs, which were dug out and expanded by filling the cavity with boiling water heated with hot stones. The sides were then raised using drilled boards split from pine wood and tied together with hemp rope. Planks were tightly bound to prevent leakage, and it is unclear to what degree the ship was caulked. Both pine pitch and mineral bitumen, however, were used historically as a waterproofing material in the Sea of Okhotsk (Deryugin et al., 2018). The dugout core and sewn plank sides of the *itaomacip* proved to be a highly seaworthy design that allowed Ainu seafarers to trade far and wide across the often stormy, frigid, and fog-bound waters of the Sea of Okhotsk.

In general, then, the impact of watercraft innovation in northeast Asia can be seen in the history of emergent political complexity with growing integration of Sakhalin, Hokkaido, and the Kuril Islands into the Northeast Asian “World System”, which is in many ways similar to the developments we have noted for the Chumash and Tongva. Although we do not know exactly when the first *itaomacip* was built, it is clear that by around 500 CE the ancient inhabitants of the region were engaging in long-distance seafaring and intensive hunting of pelagic fish and sea mammals (Yamaura, 1999). Such extensive maritime activity likely required advanced watercraft designs such as sewn plank boats. The Okhotsk culture spread across the wider region between 400 and 1000 CE and was characterized by sedentary villages with large pit houses, a maritime focused economy, and widespread trading and raiding networks that reached into Honshu Japan as well as mainland Asia (Yamaura, 1998, 1999). These characteristics compare well to the complex hunter-gatherer chiefdoms of southern California and the Pacific Northwest. While the Okhotsk phenomena was distinct from what would later become the Ainu culture, it is likely that many of the maritime traditions and technologies that would characterize coastal Ainu society had antecedents during this time.

## Comparative Analysis: Chumash and Ainu Sewn-Plank Boat Traditions

Table 1. Social and Technological Comparison of Sewn Canoes

	Tomol/Ti'at	Itaomacip
<b>Boat Design</b>		
Sewn Planks	Yes	Yes
V-shaped hull	Yes	Yes
Dugout core	No	Yes
Sails	No	Sometimes
<b>Boat Building</b>		
Specialized and Esoteric Knowledge	Yes	Possible
High-Value Materials	Yes	Yes
Launching Rituals	Yes	Yes
Heat treating wood	No	Yes
<b>Boats and Society</b>		
Elite Sponsorship	Yes	Yes
Long-distance trade	Yes	Yes
Use of trade currency	Yes	Possible
<b>Contemporary Culture</b>		
Symbol of Revitalization	Yes	Yes
Regular Voyages	Yes	Sometimes

### Design Elements

Several similarities and differences between the Californian and Hokkaido traditions can be highlighted. First, both the southern California *tomol* and Ainu *itaomacip* share the use of sewn-plank technology to construct larger and faster craft than would have been possible using a single dugout log. Both designs, of course, would have required considerable technical knowledge and investment in labor time and materials, likely requiring construction specialists and potentially elite sponsorship in order to build. In terms of design features, however, the *itaomacip* retained the central use of a dugout core, while the *tomol* and *ti'at* had evolved into a new design space and were entirely built from planks. This may have made them lighter but created new costs as the southern Californian plank canoe seems to have required much larger amounts of pitch for caulking and waterproofing the seams between the planks. Another cost may have been structural weakness which may have limited *tomol* vessel length, while *itaomacip* could be built in larger proportions – the vessel constructed in 1989 was 13.5 meters in length (Ohtsuka, 1999), which would make it several meters longer than the largest known *tomols*. Finally, another key difference is that the larger Ainu sailing boats of the *itaomacip* often made use of a double sprit sail, which was an unknown technology in North America.

## Transformative Socio-Economic Capacities of Advanced Watercraft

### Trajectory 1: Chumash watercraft in the emergent Western North America “World System”

As outlined in the Introduction, sewn canoes represent important technological achievements

that emerged from – and further shaped – local culture-historical trajectories. In both regions, the use of these vessels coincides with increases in socio-political complexity, with more technically complex canoe designs leading to greater chiefly involvement in sponsoring canoe construction. Coupled with the increased ability to engage in sea-going trading, these developments led to higher degrees of social stratification, increased sedentism, and the formation of chiefdom-like societies. The details of these changes are better understood in California, in part due to our better understanding of the chronology of boat innovation in that area (Arnold, 1995; Fauvelle, 2011; Gamble, 2002). Importantly, these transformations were not limited to the immediate regions surrounding southern California. On the contrary, the *Tomol* voyages conducted by entrepreneurial elites on both sides of the California Bight were part of new inter-regional connections that spanned Western North America, including land-based agricultural societies who have traditionally been considered as more “complex” than the hunter-fisher-forager canoe users who we have focused on in this paper.

Other archaeological data include shell beads produced primarily on Santa Cruz Island in southern California were one of the most widely circulated trade goods in pre-colonial North America (Smith & Fauvelle, 2015). During the historic period, these beads were often used as money, facilitating everyday transactions, and serving as a unit of account for debts (Fauvelle, 2024; Gamble, 2020). In the Chumash region, hundreds of highly standardized *Olivella biplicata* cupped beads were strung on threads and measured to set lengths to denote various values. Over the course of the late period, millions of these beads were produced on Santa Cruz Island and exchanged across western North America (Smith & Fauvelle, 2015; Zappia, 2014). These beads were used as money as far afield as the American Southwest, where the Zuni referred to strings of *Olivella* shells as *hishi* and used different lengths of bead strings to conduct exchanges (Frisbie, 1974). California shell even reached as far as the Mississippi region, with 13,948 *Olivella dama* shells from the Pacific Ocean being found at the Sprio Mounds site in Oklahoma, a distance of over 1,800 km from the closest Californian coasts (Kozuch 2002). These interactions took place on the borders and peripheries of complex state-level polities, including the Mississippian world of the mid-west and Mesoamerican states of Central Mexico, that were increasingly interconnected during the period of the Medieval Warm Period between 800 and 1300 CE (Pauketat, 2023; Smith & Fauvelle, 2022). Given the magnitude of this exchange and the distances involved, it should be clear that shell bead production by Indigenous Californians impacted the economies of societies far beyond their immediate neighbors.

Shell beads made in coastal California were being traded across the American West from the Early Holocene and onwards (Fitzgerald et al., 2005). Production and exchange of beads increased drastically towards the end of the millennium CE when the production of shell beads became dominated by highly specialized artisans working on Santa Cruz Island (Arnold & Graesch, 2001). This raises the question of why bead production became concentrated on the islands when *Olivella* shells are found widely across the mainland coasts. One possible answer brings us back to the innovation of the sewn plank canoe. Of all the materials needed for *tomol* manufacture, only the planks themselves could be readily found on the islands (Fauvelle, 2011, 2013; Hudson et al., 1978).

This means that islanders depended on cross-channel trade to acquire the bitumen and milkweed needed to build and maintain their canoes. As Fauvelle has argued elsewhere (Fauvelle, 2011, 2012, 2013, 2014; Fauvelle et al., 2017), it is likely that islanders intensified the production of shell beads after 500 CE in order to alleviate trade asymmetries caused in the increasing importance of boat building. By the Late Period (circa 1300 CE), highly skilled bead specialists on the islands had cornered the market for bead production, making Santa Cruz Island in particular the “mint” for shell money traded across the wider region.

We can thus trace a direct line from the innovation of the plank canoe on the coast of California to the increasing importance of shell money across wide regions of western North America. Not only was the plank canoe necessary to carry out the trade that carried millions of shell beads from the Islands to the mainland, but the need by Chumash islanders to finance plank canoes also drove the intensification of the island bead industry. These developments had important implications across the American West. As discussed by Smith and Fauvelle (2015), shell beads were one component of an intensive interaction sphere which linked the political economies of both California and the Southwest. As shell beads flowed east, important goods such as textiles and ceramics flowed west, linking the prestige exchange networks of both regions. Indigenous seafaring on the Channel Islands, therefore, was just the first step in a wide-reaching exchange network that impacted historical trajectories across much of the continent.

*Trajectory 2: Ainu watercraft in the emergent Northeast Asia “World System”*

Strikingly similar dynamics can be identified in Maritime Northeast Asia (see Fitzhugh, 2022, pp. 404-412 for an extended discussion). First, the innovation of sewn-plank watercraft probably grew out of long-term trends towards increased inter-regional trade and exchange networks that had started to impact Hokkaido in the late and Final Jōmon and draw it into larger maritime interaction spheres. The Epi-Jōmon, Satsumon, and especially Okhotsk Cultures involved increased maritime trading and raiding by coastal people across Hokkaido, Sakhalin and the circum Sea of Okhotsk, and into the Lower Amur. There would have been powerful drivers for innovation within existing vessel traditions, resulting in larger and more seaworthy watercraft that enabled different actors and communities to extend their range across northeast Asia. In turn, these new technological and voyaging capacities created new niches for Indigenous communities as traders and intermediaries, with furs, kelp and dried salmon moving from Hokkaido down to Honshu. Simultaneously, a wide range of exotic goods were not only channeled from Honshu into Hokkaido, but also from the Amur River down Sakhalin and into Hokkaido and Honshu. Links with the Kurils, Kamchatka, northern Okhotsk Sea shores and even Chukotka may also have played a role (Amano, 1978; c.f. Hudson, 2004; Yamaura, 1999).

Other archaeological lines of evidence find parallels with the use of abalone shell currency beads in California. In Rebun, shell bracelets from Okinawa and shell bead production workshops in the Epi-Jōmon, hint at more formalized trade networks emerging around this time (Hudson, 2021). Abalone shells from Rebun Island may also have functioned as a trade currency across from Okinawa to Hokkaido, although these trade shells were not as formalized as in the California case-

study (Hudson, 2022). Ocean-going vessels were not only used for trade, however, as groups from the sea of Okhotsk also disrupted shipping and trading routes through piracy and mainland raids, the result of which can be seen in the construction of fortresses in the Amur River area (Yamaura, 1999). Although these societies had smaller populations and were more loosely integrated than their agricultural neighbors, mobile watercraft technologies amplified their ability to affect the political economic and security situation of greater northeast Asia.

Some historical documents show that the Ainu plank boat, *itaomacip*, played active roles, when the Ainu extended the range of their subsistence and commercial activities. The Ainu occupied the southern part of Sakhalin by the 13<sup>th</sup> century (Nakamura, 2014) and migrated to Kuril Islands in the 16<sup>th</sup> century after a century or more of unpopulated period (Fitzhugh, 2019; Fitzhugh et al., 2016). The first encounter between the Mongolian and Ainu warriors on Sakhalin is recorded in 1264. At the end of the 13<sup>th</sup> and the beginning of the 14<sup>th</sup> century the Ainu often fought against Mongolians in Sakhalin and even advanced into the continental side. One can guess that the Ainu used plank boats to cross the La Perouse Strait (from Hokkaido to Sakhalin) and Tatar Strait (from Sakhalin to the continent), though, unfortunately, there is no concrete evidence on the boats Ainu used to advance to Sakhalin.

Archaeological evidence of a sustained Ainu presence can be found on the Kuril Islands and even in Kamchatka Peninsula. Russian Cossacks, who conducted exploration and conquest of Chukotka and Kamchatka in the 17<sup>th</sup> century, witnessed the Ainu living at the southern end of Kamchatka. When I. Kozyrevsky and D. Antsiferov landed on Shumshu Island (the first island from Kamchatka) and encountered Kuril Ainu in 1711 and 13, they met an Ainu who had come from Iturup (Etorofu) Island (Akizuki & Abe, 1968; Znamenskii, 1929). Ethnographic records written by S. P. Krasheninnikov and J. G. Georgi show us how enthusiastically the Kuril Ainu conducted the voyage along the islands, and how they deeply depended on the trade and exchange with the Hokkaido Ainu. Their ethnography reveals that commodities from Honshu and Hokkaido, e.g., clothes made of cotton and silk, knives, pots and other iron products, accessories (may be, they were glass beads), lacquerware, tobacco, and other daily utensils, supported to maintain the Ainu culture of the Kuril Islanders in the 18<sup>th</sup> century (Georgi, 1777; Krasheninnikov, 1949). Certainly, both Kuril Ainu and Hokkaido Ainu boarded on the *itaomacip* to go trading as well as hunting sea mammals and fishing big fish.

Some excavated wood vessels found at the archeological sites in Akkeshi Town and Tomakomai City, are considered as a bottom part of the *itaomacip*<sup>2</sup>. At a glance, they seem to be simple dug-out boats. However, one can see some small holes on the upper part of both sides of the boat and understand that some pieces of board were sewn onto the body with a cord, which passed through the holes. Boards and oars were also excavated. According to a preliminary analysis by AMS-<sup>14</sup>C dating, a boat excavated at a site near Akkeshi Town is presumed to be constructed as early as the mid-17<sup>th</sup> century or later (Paleo Labo Co., 2020). This means that the boat was used almost at the same times when the Russians began to contact the Ainu on the Kuril Islands. At that time Hokkaido Ainu were still active to set sails to various regions including Matsumae, northern part of Honshu, and Kuril Islands to engage in the trade, because the Matsumae clan still did not have

enough power and authority to subdue the Ainu. The *Akkeshi kotan* (*kotan* means a village in Ainu language) was a regional center for the Ainu in the eastern Hokkaido and southern Kuril Islands in the 18<sup>th</sup> and 19<sup>th</sup> centuries. For example, Ikotoi, who was a chief of this *kotan* in the late 18<sup>th</sup> century, had much authority over the people of these regions and had kinship ties with chief families in Kunashiri and Iturup Islands (Matsumae, 2015/1790; Mogami 1972/1790). He supported some Japanese explorers including Tokunai Mogami to conduct field research in Kunashiri, Iturup, and Urup Islands, launching his own ship (Mogami, 1972/1790).

There are many records and much evidence on the *itaomacip* of the Hokkaido Ainu in historical documents, pictures, archeological findings, and museum collections. For example, in an ethnography (*Ezo seikei zusetsu*) written, drawn, and edited by Shimanojō Murakami, Rinzō Mamiya, and Teisuke Murakami, a process of making *itaomacip* is clearly described in sentences and depicted in illustrations from a rite for cutting trees to sailing into the ocean (Murakami et al., 1990/1823). These descriptions and depictions tell us how the Ainu people construct the plank boat and how they properly used some kinds of boats and ships for fishing, hunting, and trading. When they would go to Matsumae to participate in the ceremony for meeting the lords of Matsumae, they constructed a larger ship named *uymam cip*, which had special decoration at the bow.

On the contrary, there is little evidence on the boats and ships of the Kuril Ainu. However, some real models seen in a collection of Peter the Great Museum of Anthropology and Ethnography Russian Academy of Sciences in St. Petersburg, Russia, are the precious examples of the *itaomacip* of the Kuril Ainu. Three items (No. 809-10, 809-14, and 809-22) were registered as a museum collection in 1840. No. 809-10 is a large model, which is more than 1m long and which is made of some planks sewn by baleen strings. It represents an ocean-going ship because it has a mast, ropes for setting sails, and five pairs of oars. No. 809-22 is a similar ocean-going-boat. No. 809-14 is a model of a dugout boat with sewn planks. These three models were collected in the expedition of the Russian fleet led by I. G. Voznesensky along the Kuril Islands in 1839 (Sokolov, 2014; SPb-Ainu Project, 1998). This fact means that the Kuril Ainu used some kinds of *itaomacip* to engage in hunting, fishing, and trading in the mid-19<sup>th</sup> century.

The Ainu *itaomacip* has long been a main transportation tool for moving on the river and ocean, which vitalized intercourse and exchange of the people, extended commercial areas, and promoted regional political integration. More research on the timing and technological development of watercraft innovation in northeast Asia is certain to expand our understanding of the reach of Indigenous maritime systems in the region.



## Conclusions: Research Outlook

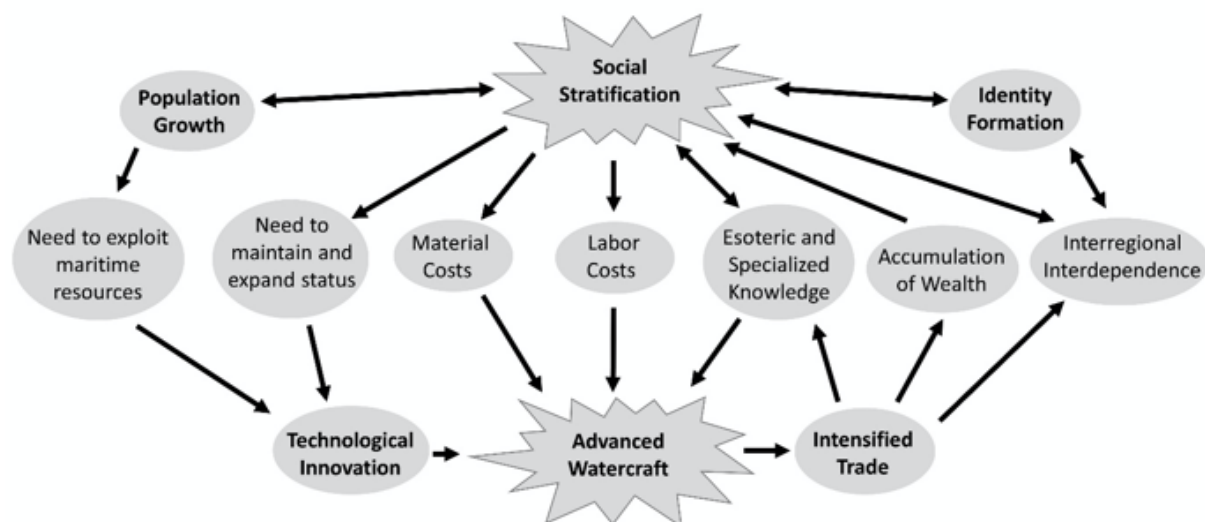


Figure 7. Flow chart depicting the dialectic process of maritime socio-technological innovation

We started by arguing that boats provide an excellent example of the capacity for new kinds of technology to transform societies and shape historical trajectories. These transformations had both local and more wide-spread effects, as seen in how the ancient people of the Sea of Okhotsk and California’s islands and coasts clearly influenced, and were influenced by, more traditionally complex societies in their greater interaction spheres in Japan, northeast Asia, and the American Southwest, and even the wider Mesoamerican world of which the Southwest was a part (see Figure 7). In this sense, these Indigenous societies can be considered as the “unruly peripheries” of complex and emergent “World Systems”; dynamos of social change and innovation existing on the edges of traditional hierarchies and regional power structures. The maritime nature of both societies was a central component in the ability of these regions to influence their neighbors. Innovation in watercraft technology directly impacted the ability of these island and coastal societies to carry out trading, raiding, and other interactions across wide-ranging seascapes. Without sewn plank canoes, these changes are unlikely to have been possible, showing how technological innovation in Pacific maritime cultures had the ability to transform historical trajectories with global implications.

In contemporary debate, the transformative role of watercraft remains heavily under researched among many coastal Indigenous communities because colonial programs and research and “rescue” documentation still tend to portray them as communities descended from static cultural entities that contained particular constellations of traits and traditions, with each local cultural separate and distinct from neighboring ones. In turn, these ethnic and tribal typologies and inventories were imported into state and federal legislation, which continued to treat local Indigenous communities as backward, traditional, and isolated cultural entities. The role of long-range networks, emerging socio-political niches, and the structured interactions between

“differently-organized others” remains poorly understood across the North Pacific, as does the vast geographic reach and transformative local power or emerging “World Systems” (Fitzhugh, 2022). Analysis of the role of watercraft in emergent inter-regional networks and identities immediately raises questions about other archaeological and historical phenomena including currencies, trade networks, and political strategies. Ultimately, the origins of Chumash, Ainu and other maritime and indeed terrestrially-oriented Indigenous peoples may be better understood as a process of dynamic long-range interaction rather than pristine and timeless isolation.

Looking to the future, the history and evolution of boat designs, and analysis and documentation of their complex and multi-faceted socio-political roles are not only pertinent to academic research and debates. The skills, knowledge, practice, and deeper cultural significance of these sewn-plank vessels are also a critical form of cultural heritage and indeed, a kind of “Traditional Ecological Knowledge” to contemporary Indigenous and descendent communities in both California and northern Japan (Table 1). In California, reconstruction of Chumash and Tongva plank canoes began in the 1970s and voyages in plank canoes from the mainland coast to the Channel Islands are now regularly organized by local Indigenous communities. Artistic representations of the plank canoe are also common in public places throughout southern California indicating its importance as a symbol of local history. In Hokkaido, local boat-building traditions were revived in the late 1980s and voyages on sewn canoes have also become an important part of local cultural identity and heritage (Ohtsuka, 1999). In researching the deeper history of these unique vessels, we hope to contribute to understanding, appreciation, and indeed the future reproduction of these vibrant craft traditions.

#### Footnotes:

1 In English language literature, the Ainu boats are often spelled with an h, as in *Yarchip*. Here we use the more accurate Ainu spelling of *cip*.

2 These boats excavated at a site near Akkeshi are now exhibited in the National Ainu Museum in Shiraoi Town and Maritime Museum in Akkeshi Town, while those found at the site near Tomakomai are displayed in Tomakomai City Museum. The boat in the Akkeshi Museum includes the bottom dugout portion with clearly visible drilled holes for sewing on planks.

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# Insights from Early Career Researcher Representatives at the Sustainability Research & Innovation Congress 2022 Asia Spotlight Event

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## Editor's Introduction

Dear Readers:

The following report provides information about presentations and actions that took place at the Sustainability Research & Innovation Congress 2022 Asia Spotlight Event (SRI-ASE 2022). We were approached as an outlet for the report by its authors based on our aim of publishing “research papers on the global and regional issues of Indigenous peoples” on topics related to “human ecology and global health” and “policy.” We agree with the report’s authors that the items

discussed here have implications for Indigenous communities in that governmental policies often impact Indigenous and minority communities disproportionately than majority communities. The publication of this report is just one way we at the Indigenous Studies and Cultural Diversity journal are committed to providing information of use to researchers and Indigenous communities.

## **Joe WATKINS**

Editor-in-Chief

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## **Introduction**

The Sustainability Research & Innovation Congress 2022 Asia Spotlight Event (SRI-ASE 2022) was held virtually from June 21-24, 2022 and co-organized by Future Earth Global Secretariat Hubs in Asia based in Japan, Taipei, China, and South Asia, during the main sessions of the SRI 2022. SRI-ASE 2022 included over 70 speakers and more than 300 participants from within and outside the Asia region. The aim of the event was to provide space to reflect on inspiring research and discussions related to the themes: New Horizons, Different Ways of Knowing, Nexus Issues, and Cross-cutting Science and Innovation in Asia.

This report gives an overview of the event by sharing learnings and reflections captured and developed by Early Career Researcher Representatives who participated in speaker sessions, took notes, prepared summation of the event by theme (see table 1), and presented summaries at the Closing Plenary of the Asia Spotlight Event (ASE). The report brings these various themes together, spotlighting key issues on Sustainability and Innovation in Asia as presented at the four-day event. A breakdown of the themes is as follows:

### **1. New Horizons**

The theme “New Horizons” positioned innovation as a key driver for developing resilient strategies in the face of natural and human-made challenges. The event focused on emerging issues and trends that would shape the future, with an emphasis on sustainability. Two significant sub-themes, collective water resource management and the international response to the COVID-19 pandemic, garnered substantial attention. Discussions explored the post-COVID-19 world, often unheard voices in sustainability science, justice, equity, ethics, and inclusive financial mechanisms for growth and resiliency. The aim was to predict challenges and solutions, fostering a more prepared and resilient world. The theme encouraged diverse groups to come together, with the aspiration of forming coalitions and finding more effective solutions.

### **2. Different Ways of Knowing**

The theme “Different Ways of Knowing” delved into the diverse forms that knowledge can assume, seeking inclusive, open, and cross-disciplinary strategies to enhance its effectiveness in addressing large-scale issues. Emphasizing the versatility of knowledge, the theme recognized various ways of understanding, conceptualizing, and learning about the world. The focus was on fostering an inclusive approach to knowledge, broadening the spectrum of solutions for sustainable action. Exploration included indigenous/local community knowledge, equitable access to information and decision-making options, and transdisciplinary research. The theme highlighted the benefits of sharing knowledge in open forums as a clear path toward a more sustainable, resilient world.

### **3. Nexus Issues**

The theme “Nexus Issues” concentrated on the deteriorating stability of the climate and its increasing impacts on the environment and society. Emphasizing interrelated sustainability challenges, the theme called for collaboration between researchers, governments, and societies to enhance resilience amid adverse events. Discussions covered various critical intersections, including sustainable food systems and human wellbeing, resilience, adaptation, and addressing risk, evidence-based contributions to sustainable development goals (SDGs), narratives of progress, wealth, and well-being, as well as the nexus of water, food, energy, and society. The theme aimed to achieve these goals through the development of smart cities, data sharing, and the application of research to real-world problems.

### **4. Cross-cutting Asian Science and Innovation**

The theme “Cross-cutting Asian Science and Innovation” showcased the richness of science, innovation, and sustainability in Asia. It highlighted a spectrum of knowledge, from tested local solutions to advanced academic research. The theme recognized diverse local solutions, showcased academic innovation, took note of indigenous knowledge, emphasized cross-sector collaborations driven by science and innovation, and underscored sustainability as a catalyst for scientific advancements in Asia. The focus was on presenting the wealth of knowledge and innovation in the Asian region, ranging from grassroots solutions to cutting-edge academic research.

In conclusion of the report, the various reflections and learnings from the presentations made under the four themes were summarized with the aim of highlighting the challenges, successes, and gaps facing the Asian region as they relate to sustainability science and innovation. Finally, in consideration of the theme ‘different ways of knowing’ and with a focus on the diverse cultures of the Asian region, the report looked at the position of indigenous studies and cultural diversity amid these reflections and learnings.

**Table 1.** Sessions by theme at SRI ASE 2022

No.	Session Title(s)	Theme
1.	Innovativeness in industrialization cost of trust	New Horizons
2.	The human side of water research	New Horizons
3.	COVID-19 governance and migrant workers: hindsight, insight, and foresight	New Horizons
4.	Cryosphere science for sustainability	Nexus Issues
5.	Processing, management, explanation, and demonstration for the environmental open data	Different ways of Knowing
6.	Harnessing transdisciplinarity in sustainability research and education: Open thermodynamics systems framework	Different ways of Knowing
7.	Science & practice: Exploring ocean resilience and blue carbon initiatives	Different ways of Knowing
8.	Adapting the impacts of typhoons on coastal livelihoods and socio-ecosystems under climate changes	Nexus Issues
9.	An innovative future for GHG mitigation and sustainable development	Nexus Issues
10.	Online Synthesis Systems (OSS): a web-based knowledge integration system for Disaster risk reduction, Resilience, and Sustainability.	Nexus Issues
11.	Challenges in urban climate data management: transformation of cities for climate change mitigations and adaptation strategies	Nexus Issues
12.	When super storms devastate coastal areas: Science and policy innovations towards socio-ecological resilience	Nexus Issues
13.	Asian Regional Climate Modelling, Impact Assessment and Action	Cross-cutting (Nexus Issues)
14.	Climate change and sustainable development of the greater bay area	Cross-cutting (Nexus Issues)
15.	Air pollution climate change health effects	Cross-cutting (Nexus Issues)
16.	Resilience in the face of adversity - Building climate-smart agriculture systems	Cross-cutting (Nexus Issues)
17.	Spatial Data Infrastructure (SDI) for addressing Human-Nature Conflicts in the Sub-Saharan Africa Region	Cross-cutting

\*Submitted under the theme of 'Nexus Issues'. Discussed under the theme of 'Cross-cutting Asian Science and Innovation'.

## New Horizons

Three main topics were discussed under this theme: the human side of water research, governmental responses to COVID-19 as it pertained to migrant workers, and the industrial innovation cost of trust. These topics are still active areas of research which are closely related to sustainable development.

Climate change has impacted water security and deteriorated water quality, which calls for global efforts towards collectively managing our water resources. In the first topic, a diverse set of researchers working on issues of climate change, water, and health, held a discussion about the importance of making water research people centric. In the response to COVID-19, the vulnerabilities and crucial role of migrant workers in the global economy were exposed, in which governance played a crucial role. In the second topic, researchers focused on migrant workers in the Global South, and examined the impact of the COVID-19 pandemic on these workers. Innovation and the cost of trust are closely related to sustainable growth of the economy, and a holistic approach is needed to tackle this issue. In the last session, researchers highlighted cases from India to investigate further innovativeness in industrialization cost of trust.

This theme reveals that urbanization is not incompatible with water conservation. There is hope for a sustainable future, as demonstrated by: the success stories of the restoration of Bangalore

lakes in India; the community action in the rejuvenation of forests that recharge fresh springs in the Himalayas; and the translation of scientific knowledge on fluoride contamination to field interventions with the participation of the community. This theme also suggests that the immigration status and country of origin of migrant workers played an essential role in determining the extent of the impact of COVID-19. In addition, innovation and technology (such as artificial intelligence) should provide regenerative supply chains that deliver innovative solutions on a global scale, and technological innovation requires human intervention to make the building of trust more effective, efficient, and empathetic.

Several challenges were discussed under this theme. First, there is a need for governments and local organizations to strengthen and empower local knowledge as a key component of sustainability. This theme emphasizes that scientific knowledge is important and valuable, but that it should build on or complement local and indigenous knowledge and good practice. Also, a more inclusive approach is necessary with regard to the provision of health services to migrants, especially in the face of global challenges such as COVID-19. The challenge of leveraging technological innovation across diverse sectors, while also building and maintaining trust, was a key topic under discussion.

## **Discussion**

As the world becomes more urban and cities grow, the demand for clean and adequate water will also increase. As we reflect on future actions, we note that there is a need to strengthen and empower local knowledge as a key component of sustainability. This is clearly highlighted by the success stories mentioned above. Scientific knowledge is important and valuable, but it should build on or supplement local and indigenous knowledge and good practices.

The challenges faced by the migrant workers due to COVID-19 were very similar across various locations. It was clear that socioeconomic status, immigration status and country of origin played an essential role in determining the extent of the impact of COVID-19 on migrant workers. While it is of concern that challenges faced by migrant workers are similar, we note that this creates a platform for sharing adaptive and transformative policies for action focusing on migrant workers in foreign countries and those needing reintegration into their home countries. We also note that there is a need for a more inclusive approach to providing health services to migrants, especially in the face of global challenges like COVID-19.

Trust plays a very important role in family activities, economic business activities, and even social governance, and so it is crucial to build trust in individuals, communities, and institutions. With the advent of advanced technology, the opportunity for innovation in trust building is increasing through the integration of artificial intelligence, Design Thinking, and System Thinking approaches. We note that innovation and technology (e.g. artificial intelligence) should provide regenerative supply chains to deliver innovative solutions on a global scale. For example, consider the application of technological innovation to education systems to enable dynamic and resilient development. Moreover, technological innovation requires human intervention to make trust building more effective, efficient, and empathetic.



## Different Ways of Knowing

Three main topics were discussed in this theme, including the environmental open data, transdisciplinarity, and blue carbon (blue carbon refers to carbon fixation and emissions in coastal or oceanic environments). The speakers not only mentioned how governments and companies collected and used environmental open data but were also concerned with ethical issues such as data quality, safety, and privacy. The path towards transdisciplinary research, based on the path mono- to multi- to inter- and finally a fully holistic approach, was highlighted. Moreover, blue carbon was thought to be an important topic in Asian countries in particular due to their close proximity to the Pacific Ocean, which plays a crucial role in climate regulation and fishery.

On the issue of “Processing, Management, Explanation, and Demonstration for the Environmental Open Data”, there are several obstacles nowadays, including the gaps between the languages, repository formats, or the national policies among countries. Also, misused data may lead to misinterpretation of results. Undoubtedly, data quality, safety, and other ethical issues require more concern for public/environmental affairs. The trends of transdisciplinary studies or actions are inevitable nowadays, given the need to cover a wide range of topics and solve complex problems. In SRI-ASE 2022, several Korean graduate students participated in a session titled, “Harnessing Transdisciplinarity in Sustainability Research and Education: Open Thermodynamic Systems Framework” and shared their research using thermodynamic systems on pig farms, forests, grape astringency, and photosystems in plants. This indicated the importance of transdisciplinarity for modern research and education. In addition to academic research, practical actions are also crucial for world sustainability. The research groups from Taiwan shared their experiences on practical coral restoration in coastal areas in the session “Science & Practice: Exploring Ocean Resilience and Blue Carbon Initiatives”.

One of the key achievements for environmental open data is that free statistical data becomes available to everyone in Taiwan. This promoted the establishment of early warning systems for several natural disasters such as earthquakes, floods, or extreme heavy rain events. In South Korea, transdisciplinary works began to be promoted in colleges and universities. Graduate students from diverse disciplines (e.g., genetics/molecular biology, quantum physics, rural systems engineering, ecosystem ecology, global remote sensing) illustrated the importance of applying non-equilibrium thermodynamic systems modelling to understand the nature and cost of complex living systems and their sustainability. Transdisciplinary works were also discussed by the research groups from Taiwan, showing how they managed to restore corals in coastal regions with the cooperation from the company Delta Electronics Group, the National Museum of Natural Science, and coral research groups (Delta Electronics, 2022). This not only promotes transdisciplinary works but also the practical actions required to improve sustainability.

Several challenges were discussed, including the necessity of balancing approaches between the needs for data privacy and collection, and further strengthening of transdisciplinarity extending to broader fields such as business and technology. An additional challenge arises due to the fact that young scientists are often not able to engage in transdisciplinary works; to address this,

academic communities should provide more opportunities and support for young scientists to take part in transdisciplinary investigations. In addition, awareness of sustainability issues such as ocean conservation is still not discussed widely enough in public and among governments in Asian countries such as South Korea, the Philippines, or Taiwan.

Transdisciplinary issues are not only important for research, but also for practical actions and decision making. Therefore, scholars must find a way to evolve with science and advances in technology. In addition, the networks among scientists, stakeholders, the public, and governments need to be considered. The urgent and specific topics of sustainability for Asian regions need to be identified; this can be achieved in part by emphasizing more the importance of Future Earth Asian Hubs.

## Discussion

Promoting transdisciplinary research provides refreshing perspectives in understanding the nature and cost of complex living systems and their sustainability. Also, with increasing concern about climate change mitigation, the importance of environmental open data has become more and more apparent in regional modelling as opposed to the global scale. Given the differences in geographic, climatic, or cultural conditions, regional open databases are required to specify the effects and the consequences caused by climate change. Therefore, Future Earth Asian Hubs can promote data collection from Asian countries, e.g. governments, research institutes, or stakeholders, and provide the platform for data sharing between countries. Of course, data security and quality should be an area of focus in order to prevent misinterpretation.

Practical actions are the most direct way to promote sustainability. People in Asian countries, which are mainly located along the west Pacific Ocean, rely on the ocean for their livelihood, for reasons such as fishery, water resources, climate regulation, or recreational activities. Hence, the actions of coral restoration, which was discussed in this theme, are not only important for ocean blue carbon resilience, but also for Asian human welfare.

## Nexus Issues

Various topics were discussed under the theme “Nexus Issues”. Subjects ranging from impact analysis and adaptation requirements for typhoons and superstorms, threats of cryosphere services deterioration, the trade-offs between greenhouse gas (GHG) mitigation, and sustainable development goal (SDG)-related topics, were discussed.

Climate change will result in a deterioration of the basic function of the cryosphere, leading to effects such as glacier melting and permafrost thawing. Climate change also increases the magnitude and frequency of extreme events like typhoons and superstorms. The sessions under this theme focused on adaptation methods for these events and discussed different knowledge driven tools for disaster risk reduction, resilience, and sustainability. The need for climate-sensitive urban

design, smart cities, circular cities and cultural heritage reuse, solid waste management, city-port planning, and nature-based solutions were also highlighted.

The discussions under the theme “Nexus Issues” clearly showed that climate change mitigation measures like reducing GHGs and achieving SDG goals have certain trade-offs. For example, energy transition can have a negative impact on water-related SDGs (SDG6). It was also highlighted that there is a need for a fair division of climate change mitigation efforts. It was evident that various web-based knowledge integration systems are useful tools for disaster risk reduction, efficient city operation, resilience, and sustainability.

Disasters have long been fatal threats in human history. As a result of rapid growth in economics and urbanization, human society has recently become even more vulnerable in terms of the possible risks associated with disasters such as typhoons and superstorms. It is important to make the build-back process more resilient and sustainable. To achieve this, it is crucial to engage all stakeholders to formulate strategic responses.

The melting cryosphere impacts mid-latitude weather, arctic shipping routes, sea-level rise, and water towers, and leads to infrastructure issues related to permafrost thawing. Further, the cryosphere stores a globally significant amount of legacy pollutants. The melting cryosphere represents an increasing source of pollutants to the environment, adversely impacting ecosystems and biological health. From the urban planning perspective, solid waste management, re-use and creation of circular city models are of major importance.

It was emphasized that international transdisciplinary collaboration between stakeholders and innovations are essential for building a climate resilient society. Science policy innovations can change the collective behavior of people and disaster management outcomes. However, it is important to make scientific findings understandable not just to experts, but to all stakeholders involved in the processes. A common and easily recognized language is necessary.

## **Discussion**

Climate change has a severe impact on various environmental aspects of our life. Energy, water, and livelihood are all interlinked, and have trade-offs. Hence, studying them as a nexus theme is crucial. Although climate change is a global phenomenon, its impact and adaptation requirements are very local. The third pole cryosphere that is located in the Tibetan region is one of the most crucial water towers for large Asian rivers and related livelihood. However, this water tower is also one of the most vulnerable to climate change. Therefore, exploration of different local innovations and transdisciplinary study are key to building climate resilient societies. This makes the “Nexus Issues” theme in SRI-ASE 2022 vital and timely.

It is key to raise public awareness in different aspects of climate change adaptation. There are challenges in translating research into policies. One key issue is using a language that is easily understood by the public, which is particularly relevant in developing nations. Open-source tools and collaboration across different research, governments, and NGOs are crucial for climate

adaptation at the community level. Web-based knowledge integration system tools like the Online Synthesis Systems (OSS) are useful for Disaster risk reduction, Resilience and Sustainability, and urban planning. In addition to the system itself, “facilitators” for the tool play another key role in using the tool on site to solve stakeholders’ problems as a means of strengthening resilience. The system should be promoted under transdisciplinary cooperation with international scientific organizations, various on-site stakeholders, and UN/international agencies to support enhancement of syntheses for strengthening disaster resilience and promoting sustainable development.

There is also a need to strengthen our systematic and in-depth understanding of different environmental processes like the cryosphere-anthroposphere relationship. With a deteriorating cryosphere, water towers, and related functionality, we need to plan for building resilience in our society.

There is still room for improvement in action plans to build resilience into society through transdisciplinary collaboration. Along with the natural sciences, aspects including urban planning, human mental health, and the management of climate refugees should all be considered in the process of formulating solutions. Finally, science should expand from basic research towards practical application and the formation of policy.

## **Cross-cutting Asian Science and Innovation**

The topics discussed under this theme included Asian regional climate modelling and impact assessment, climate change and sustainable development in the Greater Bay Area (GBA), and the air pollution-climate change-health nexus. The issues of building a climate-smart agricultural system and the data infrastructure for addressing society and nature as a whole were also key topics.

The first main focal point was global climate change, which affects regional climate, and can in turn affect the urban heat island in cities. In the future, there will be an increase in heatwave intensity, rising sea level, and increased rainfall under various shared socioeconomic pathway (SSP) scenarios. More frequent and intense typhoons could occur in Southern China, leading to higher chances of landslides and flooding. This issue is exacerbated by increased precipitation in urban areas owing to anthropogenic heat and polluted air. Regional climate models and observational studies have confirmed the trend of higher temperature and greater rainfall in the GBA.

The second focal point was addressing the health co-benefits of climate change and air pollution, and how to save lives in the face of these issues. Understanding the complex interactions between urban physical-chemistry systems and urban-growth drivers is critical to designing better adaptation and mitigation strategies. We also need to use top-down measurements to identify, constrain, and attribute air pollutant emissions. Moreover, urban design needs to consider the interactive effect on urban thermal environment and air quality to protect the health of citizens.

Recent findings have suggested that the new air quality guidelines (AQGs) will reduce fine particulate matter (PM<sub>2.5</sub>)-related deaths by nearly 80% compared to 2016 levels. The carbon

neutrality target offers an excellent opportunity to decrease the PM<sub>2.5</sub> levels close to the WHO AQGs through drops in fossil fuels consumption, reforestation, and urban sustainable development. Hence, climate change modelling needs to consider the AiR-Climate-Health (ARCH) nexus in the context of global warming. To tackle this issue, we need multi-perspective and integration programs by including science and politics, and raising community awareness. The entire community must aim to educate people about the importance of these issues and work together to make a critical report and policy recommendations.

The third point of discussion was addressing a smart agriculture system to tackle food and agriculture problems related to climate change. Global warming creates additional problems: firstly, rising temperature (associated with an increased frequency of damaging high-temperature events, increased temperature at night, and new pest and disease pressure); and secondly, uneven rainfall distribution patterns, drought, and salinity. New farming practices are needed. Smart agriculture systems can solve these problems by developing modern agriculture and food systems while working with the farmers to develop these practices. This consists of four approaches: natural resource management, crop production systems, enabling support systems, and livestock and fisheries. Regarding support systems, smart agriculture can build a simple system for the farmer to combine agriculture and poultry, making a local food system that collaborates networks that integrates sustainable food production, processing, distribution, consumption, and waste management.

Finally, data from multiple scales and sectors aid decision-based support. Interaction between stakeholders and scientists has been enhanced with advances in regional climate information systems. Stakeholders' experiences and perspectives will facilitate the co-exploration of regional climate model simulations. In this context, model results become more relevant, credible, and actionable, and thus promote appropriate responses. Therefore, object-oriented analysis will yield climate resilience actions such as smart agriculture systems, extreme event warning systems, and air pollution monitoring systems. However, in order to achieve these goals, the climate modelling process requires data from multiple scales and sectors, which means we need the collaboration of governments, organizations, and individuals to produce consistent databases.

## **Discussion**

Numerical modelling studies need to have data to validate and initialize the model. Remote sensing gives researchers data for areas that do not have direct observational measurement networks. However, coupling ocean and land surfaces via remote sensing remains difficult. These issues would need to be resolved in future studies of climate change and pollution. Better observational data through different innovative methods are needed to increase the accuracy and validity of modelling results. Open-source data and big data present great opportunities for climate resilience. These data can facilitate international collaboration and foster new research questions. In particular, data from smart city development approaches can be used to better understand the issues of climate change adaptation at individual levels. Besides, sectoral data provide a chance to verify regional climate model (RCM) results and reduce uncertainty.

The regional models offer great opportunities for improving object-oriented analysis by incorporating more regional factors and stakeholder experiences. However, regional models require more high-precision data to initialize, and data collection becomes vital at the beginning. For better data quality, researchers suggest uniform data standards, and that capacity building and regulatory systems are necessary. All these measures seem more practical with progress in Artificial Intelligence (AI) technology, but data privacy and fairness need to be fully considered.

Apart from understanding the physical mechanisms of climate change, interdisciplinary research needs to involve more public health researchers to address the health co-benefits of climate change adaptation. Public health researchers should work closely with climatologists to use more credible climate models to assess the health impacts of climate change. One particularly relevant example involves modelling the spread of COVID-19 considering changes in climatic conditions.

One further recommendation was the development of a global research community. Much research focuses on method and publication. However, given their distance from policymakers, there is often a lack of communication between these networks. In the future, we must redress the balance by making critical reports and policy recommendations, and sharing those reports. We must also develop public-private partnerships, digital transformation, consumer campaigns, and education.

## **Spotlighting key learnings and reflections from SRI-ASE 2022**

Key learnings and reflections of the report are summarized as follows:

### ***Data Usage and Collaboration***

The issue of data usage was a common area of focus across the four themes. International collaboration between all actors is necessary to ensure that the data is used to maximum effect and for maximum benefit. In order to foster this collaboration, an Asian database could be created to allow common usage of data. Although there may be issues with sharing certain types of data between countries, the benefits of using open-source platforms for improving cross-country and cross-disciplinary collaboration are clear.

Both open-source data and big data can be key in developing strategies for climate resilience, leading not only to participation from multiple actors, but also in leading towards new directions for research. The recent flourishing of the concept of smart cities, in particular, could open up avenues for understanding how individuals adapt to climate change.

Providing a means to share data between researchers, stakeholders, and government is crucial to help us adapt to a rapidly changing world. However, data usage is not the only area which could benefit from better communication; the question of how to bridge the communication gap between groups was discussed.



## **Integration and Quality of Data**

There are a number of issues that could arise when integrating data from various sources, including differences in language, repository formats, and national policies with regard to data-sharing. In addition to this, the possibility of misinterpreting or misusing data could lead to negative consequences.

Data verification should be conducted by multiple actors to ensure data integrity, security, and ethical compliance. Secure sharing platforms could be created to facilitate this, and governments should be in charge of this process, as they have the authority to enforce secure measures.

Data from observations is crucial to inform numerical models, which are in turn used when deciding appropriate climate policies. As such, experimental and simulated data must be of the best possible quality. In both areas, uniform data standards would help to improve the processing and interpretation of data for all actors, and to enforce best practices.

## **Local Actions and Innovations**

Modern knowledge and techniques are indispensable in developing sustainable strategies, but local and indigenous knowledge should also have a role to play. Governments should aim to strengthen and empower this type of knowledge and recognize its importance, not least because the policies that are implemented can have diverse and unique impacts on individuals, depending on their location. There will not be a singular solution to any of the nexus issues discussed that can be applied to all populations uniformly; only by giving a voice to local peoples can these issues be addressed in the most effective manner. A number of reports were given that emphasized the importance of local action and innovation, demonstrating how the participation of the community can not only help and inform policy, but also enforce it.

## ***Holistic Approach and Transdisciplinary Research***

Given the complex problems discussed during the event, transdisciplinarity was a key theme. Research teams must utilize knowledge across a broad range of fields in order to make their work more effective and thorough. Integrating knowledge from all of these research areas can be challenging, but through open collaboration and data-sharing, it can be made possible, and the benefits of a transdisciplinary approach by a number of research teams were demonstrated clearly during the event.

There can, however, be barriers which prevent cross-collaboration between researchers working in different fields. Cultural differences and diverse usage of technical terminology can prevent effective communication; additionally, young researchers are discouraged from working across multiple disciplines within the current system. Universities and other research institutions should embrace transdisciplinary research and encourage their staff and students to tackle big problems. In doing so, new perspectives and strategies could be developed and used to inform practical actions and policymakers, thereby maximizing the impact of research. This approach can

inform the avenues of research to pursue the correct methods to investigate these issues, interpret the results, and implement the findings.

A long-term approach is required to promote holistic, transdisciplinary research; attempts to attain this goal have, in the past, suffered due to differing opinions among communities. One path towards tackling a broad range of issues could be to invest more time and effort into Future Earth Asian Hubs, allowing improved collaboration, communication, and data collection and analysis between diverse groups.

## **Cryosphere and Climate Change**

Given the scale of climate change and its expected consequences for humanity and the planet, climate change was a major focus throughout the event. Asia, in particular, is expected to be vulnerable to a changing climate as a result of its large population, many of which live in coastal areas. A degrading cryosphere, which performs certain crucial hydrological functions such as water conservation and regulation and runoff recharge, has the potential to have enormous repercussions for the world.

Strategies are therefore needed to understand the impact of climate change on the environment and on society, to improve our methods for predicting the evolution of the cryosphere and the climate, and to become more resilient to change. As mentioned above, open-sourcing data and sharing it between many stakeholders in as many locations as possible, could lead to new innovations and strategies to be implemented from the local to the global level.

Additionally, the scale of the effects of climate change are wide-ranging. From the expected increase in extreme weather events, rising sea levels, and heat wave-related deaths at the individual level, the climate can affect many aspects of society and our lives. This explains the necessity of taking a transdisciplinary approach to studying climate change.

## **Typhoon Effects and Resilience**

Natural disasters such as typhoons and earthquakes have plagued Asia throughout recorded history, and these adverse events are expected to increase in frequency and severity as a result of climate change. The impact of these events is wide-ranging, from damaging ecosystems to endangering the life and property of billions. Therefore, a great deal of effort is required to increase resilience in the face of these events.

Some well-known consequences of climate change and the deterioration of the cryosphere are their impacts on extreme weather. Society as a whole must therefore become more adaptable in order to reduce the risks associated with these natural disasters and to become more resilient. Urban design can certainly play a part in achieving these goals, by striving to make buildings and cities more able to weather the storm. This is a particularly significant issue for ports and cities which lie on floodplains. Although these events are inevitable, governments and stakeholders must

work together to develop strategies that will help cities not only to mitigate the immediate risks to life, infrastructure, and the environment, it is equally important to focus on how to rebuild areas devastated by natural disasters.

Establishing and improving early warning systems requires not only open data, but also cooperation among scientists, governments, and companies. The Public Warning System (PWS) in Taiwan is connected to the central broadcast network, allowing messages warning of disasters such as earthquakes or floods to reach people as quickly as possible (Taiwan NFA, 2022). Other such systems are available in other countries, although they could be made more effective by developing smooth and fast lines of communication between systems. One further complication is introduced by the inherent uncertainty of these events; typhoons, for example, follow unpredictable routes. Even though the warning systems of typhoons have been established in Japan, Taiwan, Philippines, and Hong Kong (Hong Kong Observatory, 2022; JMA, 2022; PAGASA, 2022; Taiwan CWA, 2022), the more accurate route prediction still requires more research efforts. By dedicating more research efforts towards predicting the path that a typhoon will follow – using open-source data and advanced modelling – governments will be able to mitigate the adverse effects of these events as much as possible.

## **Conclusion & Recommendations**

SRI-ASE 2022 covered a broad range of topics across four themes, bringing together researchers and stakeholders from a variety of backgrounds. Given the issues that are currently facing Asia as a whole and are expected to arise in the near- and medium-term future, forums such as this are crucial to discuss these issues and potential strategies to tackle them.

Although topics ranging from the global response to the COVID-19 pandemic to crop resilience in the face of climate change were discussed during the event, a number of common themes were present throughout the event. One such example is the importance of cross-collaboration between researchers, stakeholders, and policymakers; providing ways in which these diverse groups can collate their findings can help to systematize the state-of-the-art in terms of observational and numerical data, and in turn to lead to the most effective implementation of policy to give rise to a more sustainable society.

Alongside this holistic approach to bringing together these groups, transdisciplinary studies were highlighted as having an ever-increasing significance in achieving our goals. Communication between groups is often hampered by differences in culture and methods, and the creation and fostering of transdisciplinary Asian hubs could allow for the best research across a range of fields to combine into the most fruitful policies. In order to achieve the goal of a fully holistic approach to address these issues, many discussions throughout the event called attention to the requirement for open-sourcing and sharing data as much as possible. Strategies which allow multiple actors to access and analyze data will help to mitigate the risks associated with data that comes from a variety of sources.

The application of these themes was discussed in the context of more specific issues, such as how we can build a society that is more resilient to change. The degradation of the climate has already led to adverse consequences across Asia in recent years, and the expected acceleration of these events necessitates the development of policies that take this into account. Topics from basic research using observational data and numerical modelling, to the creation of smart cities and resilient crops, were discussed during the event, once again underlining the value of forums such as this.

Several recommendations were made by the panels during SRI-ASE 2022, many of which touched on the themes of collaboration, innovation, and action, both at the local and the international level. The path from research to policy implementation is a key area that could be reinforced through the cooperation of Future Earth Asian hubs.

### **Significance for Indigenous Studies and Cultural Diversity**

The SRI-ASE 2022 report, centered on international collaboration and data usage, holds profound implications for Indigenous studies and cultural diversity. The emphasis on cross-country collaboration and open-source platforms aligns with the diverse and unique perspectives of Indigenous communities. Ethical considerations in data integration resonate strongly with the need to safeguard Indigenous heritage. The report advocates for the inclusion of local and Indigenous knowledge in policy development, recognizing the distinct impacts on individuals based on their cultural context.

In the realm of transdisciplinary research, the report underscores the importance of breaking down barriers between diverse fields, mirroring the call for interdisciplinary approaches in Indigenous studies. It promotes the embrace of transdisciplinary research within institutions, reflecting the need for a holistic understanding of Indigenous issues. The report's focus on climate change resilience directly correlates with the well-being of Indigenous peoples, especially those vulnerable to environmental shifts.

Highlighting vulnerabilities to natural disasters, the report calls for increased resilience and early warning systems, pertinent to safeguarding Indigenous communities. The holistic approach advocated in the report resonates with the multifaceted challenges faced by Indigenous peoples, emphasizing the need for inclusive strategies that address their daily experiences, lifestyles, and well-being. In conclusion, SRI-ASE 2022's recommendations and insights are pertinent to Indigenous studies and cultural diversity, providing a framework for collaborative, ethical, and inclusive approaches in addressing the global and regional issues faced by Indigenous communities.

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We would also like to acknowledge all the Session Presenters for SRI-ASE 2022. Their details can be found in the table below:

### Sessions Speakers, Affiliations and Titles at SRI ASE 2022

No.	Speaker Names	Session Title
1.	Dr Pranjai Kumar Phukan	Innovativeness in industrialization cost of trust
2.	Sunderrajan Krishnan, Siddharth Agarwal, Rashika Pullam Chetti, Harini Nagendra	The human side of water research
3.	Joon Kim, Edo Andriessse, Victor Owusu, Quynh Pham, Saikaew Thipakorn, Ananda Karunarathne, Jungwon Huh, Chandhit Sawangnate, Yoo Soon An	COVID-19 governance and migrant workers: hindsight, insight, and foresight
4.	Dahe Qin, Cunde Xiao, Shichang Kang, Tonghua Wu, Feiteng Wang, Bo Su	Cryosphere science for sustainability
5.	Ping-Yu Chang, Stephen Yang, Chin-Tung Thomas Cheng, Eliane Ubalijsoro	Processing, management, explanation, and demonstration for the environmental open data
6.	Joon Kim, Hyunyoung Yang, Huaize Feng, Solmoe Kang, Dongjun Im, Sunghoon Kim, Junsuk Lee	Harnessing transdisciplinarity in sustainability research and education: Open thermodynamics systems framework
7.	Yi Chieh Chan, Yang Chien Chang	Science & practice: Exploring ocean resilience and blue carbon initiatives
8.	Jyun-Long Chen, Takashi Torii, Yi Chang, Chin-Chang Hung, Kuo-Wei Yen, Chau-Ron Wu, Hsueh-Jung Lu, Hsiao-Chun Tseng, Ting-Chun Kuo	Adapting the impacts of typhoons on coastal livelihoods and socio-ecosystems under climate changes
9.	Kejun Jiang, Tatsuya Hanaoka, Heleen van Soest, Sha Yu, Chenmin He	An innovative future for GHG mitigation and sustainable development
10.	Yue-Gau Chen, Jian-Cheng Lee, Harou Hayashi, Wei-sen Li, Toshio Koike	Online Synthesis Systems (OSS): a web-based knowledge integration system for Disaster risk reduction, Resilience, and Sustainability.
11.	Maria Cerreta, Manabendra Nath Bandyopadhyay, Vidushi Bhattacharjee, Francesca Nocca, Kalpana Chaudhari, Arun Parwate, Bhairav Narkhede, Pasquale De Toro, Mario Losasso	Challenges in urban climate data management: transformation of cities for climate change mitigations and adaptation strategies
12.	Lourdes Cruz, Segundo Romero, Glenn Fernandez	When super storms devastate coastal areas: Science and policy innovations towards socio-ecological resilience
13.	Yaxing Du, Tong Zhu, Tianjun Zhou, ShuYu Wang, Fei Zheng	Asian Regional Climate Modelling, Impact Assessment and Action
14.	Si Zhang, Wenjie Dong	Climate change and sustainable development of the greater bay area
15.	Tong Zhu, Gregory Carmichael, Oksana Tarasova, Lidai Morawska, Wei Wan	Air pollution climate change health effects
16.	Gargi Rana, Ching-Cheng Chang, Ming-Chen Shih, Yinlong Xu	Resilience in the face of adversity - Building climate-smart agriculture systems
17.	Remi Chandran, Edward Phiri, Victor Kakenhi, Christian Vincenot, Akira Mukaida, Manabu Onuma	Spatial Data Infrastructure (SDI) for addressing Human-Nature Conflicts in the Sub-Saharan Africa Region

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