THE NATIONAL CENTER FOR SCIENCE AND CIVIC ENGAGEMENT

Presents A Free VIRTUAL CONFERENCE AND SHOWCASE
Connecting Indigenous and Western Knowledge
To mark the conclusion of the Wm. M. Keck funded project "Transcending Barriers to Success: Connecting Indigenous and Western Knowledge," the National Center for Science and Civic Engagement will host an on-line conference to feature work done by the project partners, and to highlight other initiatives and efforts taking place to advance inquiry, research, and education that honor indigenous knowledge, and connect indigenous, local, and "Western" knowledge systems, in order to work towards effective and equitable solutions for the important and contested issues of our time. For more information on the project go to http://ncsce.net/transcending-barriers-to-success/
All presentations will be on Zoom: https://stonybrook.zoom.us/j/94488855811
This program may be revised and updated.

Friday, April 23
(all times Eastern Daylight Time)

2:30 Welcome and Introduction
Eliza J. Reilly, NCSCE Executive Director and Faculty Leaders of "Transcending Barriers to Success."

3:00 Panel: Co-constructing curriculum materials with local iwi (tribes): A Braided Rivers Approach
Moderator: Sara Tolbert, Te Whare Wānanga University of Canterbury, Aotearoa New Zealand (sara.tolbert@canterbury.ac.nz)
Presenters: Sriparna Saha, Angus Macfarlane, Ben Kennedy - University of Canterbury; Sylvia Tapuke, Kaiārahi Partnerships Advisor, SCION, and Kelvin Tapuke, Iwi Consultant - ECLIPSE

Questions are often raised around what it means to integrate Indigenous knowledge systems with integrity, particularly given that Western science systems have rarely intersected with Indigenous knowledge systems, and science has often been conducted in ways that have exploited or marginalized Indigenous communities. In this panel presentation, we will share some insights from our work on the co-construction of a digital educational resource on caldera volcanoes in Aotearoa, New Zealand which braids together both local Māori knowledge and geological science. This research is rooted in the He Awa Wiria framework (Macfarlane, Macfarlane, & Gillon, 2015) which highlights the collaborative benefits of attending to Indigenous and western practices and knowledge in science.

Also known as the Braided Rivers approach (the rivers a metaphor for the two knowledge systems), the framework suggests that both knowledge streams start at the same place and continue beside each other. Much like rivers, these knowledge streams come together on the riverbed, thus creating space for learning but at times they move away from each other and are distinctly unique.

This panel will share lessons learned from the engagement process between scientists, academics, local iwi and stakeholders in the process of relationship building. We will also discuss how following authentic cultural protocols are instrumental in building trust and long term mutual collaborative research relationships.

3:30 Break

3:45 Poster: Integrating Traditional Ecological Knowledge and Scientific Ecological Knowledge in a Samoan Conservation Center

Presenters: Rebeka Greenall, Brigham Young University **(rebeka.frome@gmail.com;** Liz Bailey, BYU; (liz_bailey@byu.edu); Richard Gill, BYU (richard_gill@byu.edu)

To advance inquiry, research, and education that honors and connects indigenous and "Western" knowledge systems, we are integrating Traditional Ecological Knowledge (TEK) and Scientific Ecological Knowledge (SEK) in a science learning center in Savai'i, Samoa. In collaboration with the environmental committee of the village of Saipipi, we are building a conservation center near an existing Marine Protected Area that the community has created to aid in local reef restoration efforts. We aim to achieve the following goals with this center: 1) provide community education to support conservation efforts; 2) increase science interest and participation for local youth; and 3) increase appreciation of TEK and its contribution to science among visitors. The center will be fitted with educational displays that integrate TEK and SEK to provide information about ecosystems, climate change, and conservation efforts. The TEK will be represented in three domains throughout the center. First, Alagaupu are proverbs that capture collected wisdom. Secondly, legends will provide narratives that teach principles important to the culture and local environment. Finally, practices and applications of TEK will be taught in conjunction with SEK. Once the center is complete, we will assess community engagement and learning when retractable TEK banners are visible versus hidden. This integration model and data on its effectiveness will inform others wishing to use TEK in informal environmental science education. We hope the center will be a gathering place of community learning that will weave together tradition, culture, TEK, and SEK in a beautiful, conservation-focused setting.

4:00 Panel: Educating for/with People and Place: Local Indigenous Knowledges and Science as Praxis

Moderators: Sara Tolbert (sara.tolbert@canterbury.ac.nz), Te Whare Wānanga o Waitaha University of Canterbury
Presenters: Pouroto Ngaropo (Iramoko Marae, Te Tawera, Whakatane, Aotearoa New Zealand); Valerie Shirley (Diné [Navajo]) and Jeremy Garcia (Hopi), University of Arizona, Amanda Holmes (Kanien'kehá ka [Mohawk]), Independent scholar, Tucson, AZ, Tenzin Sonam, Emory University, Atlanta, GA, Paulina Griñó, Universidad de O'Higgins, Santiago, Chile, Helen Mora, Te Aratai/Linwood College, Kay-Lee Jones , Te Whare Wānanga , Waitaha University of Canterbury, Michael Elmes and Ingrid Shockey, Worcester Polytechnic Institute.

In this panel, we bring together a variety of projects across international contexts to critically reflect on the role of place, power, and people in science and education within Indigenous contexts: Valerie Shirley (Diné [Navajo]) and Jeremy Garcia (Hopi) discuss confronting environmental injustices in Indigenous communities. Amanda Holmes (Kanien'kehá:ka [Mohawk]) shares stories of Elder intergenerational praxis, language, and knowledge woven in place.Tenzin Sonam (Tibet), describes the development of a sustainable science education in Tibetan Buddhist monasteries, and reflects on the experiences of both Monastics and Western Educators. Paulina Griñó, Santiago, Chile, discusses

conceptualizing relationships between scie nce and Indigenous knowledge in Latin American schools. Kay-Lee Jones shares her experiences in leading a bilingual teacher education program for speakers/teachers of Te Red Māori in Aotearoa New Zealand.
https://www.youtube.com/watch?v=AwxyCV_7evA
Sara Tolbert and Helen Mora describe their efforts to integrate local knowledge and Māori knowledge in school science as tauiwi (non-Māori) science educators. Michael Elmes and Ingrid Shockey consider how we prepare US-based STEM students to partner with indigenous thinking and communities, and talk about their experiences with international project-based learning and collaborative engagement with Māori partners over the past several years.

5:30 Recorded Presentation: **When global sustainability goals meet local actions: A case study and lessons learned exploring multidimensional well-being in the Pacific Islands**
Presenters: Pua'ala Pascua, Eleanor Sterling, Center for Biodiversity and Conservation, American Museum of Natural History (sterling@amnh.org)
https://www.youtube.com/watch?v=_kzcTnsGmu0

The successful implementation of global sustainability policies and strategies ultimately relies on locally meaningful actions. Global goals, such as the UN Sustainable Development Goals (SDGs), can create cascading impacts across decision-making levels and have immediate implications on local markets and economies through the direction of financial resources and through shaping priorities and actions for achieving progress. Thus, understanding how global sustainability measures intersect with values, priorities, and perceptions of multidimensional well-being across local, regional, and global decision-making levels is of critical importance. We present findings from an analysis that compared the SDGs with a set of regionally-derived dimensions of well-being as identified through a multi-year, multi-partner collaborative research project transcending western and Indigenous epistemologies. Our analysis demonstrates that there are overlaps but also significant gaps between Pacific-Island conceptions of well-being and the globally-derived SDGs. In particular, we found a disproportionate emphasis on monetary progress in the SDGs and limited to no representation of dimensions found to be central to well-being in the Pacific, including Indigenous and local knowledge and the connections between and across people and place. While our exploration centered on the Pacific, we anticipate the results from this analysis, together with highlights from our complementary efforts, have broad applicability in sustainability and resource management around the world. Building on our work, we provide a series of overarching recommendations for aligning place-based values and global sustainability initiatives in an effort to equitably achieve long-term sustainability goals.

6:00 Adjourn

Saturday, April 24

2:00 Salish Kootenai College and Community Partners
Moderator: Jonathon Richter, Director, Immersive Learning Research Network (jonathon@immersivelrn.org)

Welcome video by Montana Selis, Qulispe, and Kutenai people: a video with flag honor guard, drum circle, and Tony Inchashola - Chair of the Salish Culture Committee, with special address by elder Stephen SmallSalmon (30min)

2:30 Salish Kootenai College Tech4Good Solving Community Challenges Through Game Design, Culture, and Science: Tech4Good at Salish Kootenai College will present on their work with native game designers Native Teaching Aids and Selis, Qlispe and Kootenai tribal community experts in western Montana for three successive years on engaging 7 - 12th grade and tribal college students in collaborating on helping solve annual community challenges - "Food Sovereignty", "Water is Life!" and "Community Health" from 2016 - 2019 - co-creating myriad community points of engagements through seasonal game jams and media creation - culminating in card and board games, poster campaigns, science & technology fairs, and summer camps. Presenters will showcase the process, lessons learned, and products of these community challenge efforts to infuse cultural, scientific, and technology skills into compelling community-wide activities that honor elders and highlight local professionals as future-focused role models for inspired youth. (20min)

2:50 Salish Kootenai College Tech4Good Solving Community Challenges Through Game Design, Culture, and Science: Through a United States Department of Agriculture (USDA) National Institute of Food & Agriculture (NIFA) grant, Tech4Good at Salish Kootenai College (SKC) has had the opportunity to collaborate with the Confederated Salish and Kootenai Tribes' Natural Resource and Tribal Preservation Departments as well as the college's Extension Agency, Tribal Education, and local game developers' Native Teaching Aids to create a School-Garden Network to engage eleven (11) middle school and high school classrooms across the reservation to grow gardens, share work via multimedia, and situate their learning within local cultural traditions. During the pandemic, the network delivered 50 raised garden beds, seeds, and practical gardening curriculum to engage students and families at home. We also created a 12-month school calendar highlighting Healthy and Sustainable Diets and culturally important practices in collaboration with various artists, students, and faculty in the college's Digital Design Technologies Department. Through professional development and support from our partners, we're able to continue work with these inaugural classroom teachers and add a new cohort of teachers and students. Using garden cameras, 360-degree videos, and cooperation, Tech4Good will share their work, lessons learned, and initial outcomes of collaboration with the community through this project. (20min)

3:10 Invited Special Panel: Promises & Challenges of Technology-enhanced Indigenous Language & Culture: Jonathan Richter, Director Immersive Learning Research Network; Michele O'Brien, Angeline King, Indigenous Studies, Georgian College; Caroline Running Wolf, Michael Running Wolf (video: https://vimeo.com/348661163?fbclid=IwAR2wN_px7kZbEhSg1LJKY2Y3_Kocln-4p1GLeN3euKEc8GR1FnLU6obP-3U)

Salish Kootenai College's Tech4Good, the National Center for Science and Civic Engagement (NCSCE), and the Immersive Learning Research Network (iLRN) have been inspired by Indigenous Research Models, by putting the community as the focal point, main audience, and gauge for good research and design. SKC's Tech4Good and iLRN have reached out to a number of indigenous people and communities from around the world, fusing the use of engaging learning technologies with indigenous language and culture. Representatives from selected project partners and guests have agreed to share their perspectives on the promises and challenges integrating technology and indigenous culture and language. The goal of this session is to highlight and open discussion for future collaborations involving indigenous perspectives to amplify different cultural voices around the world. (40min)

3:45 Break

4:00 Panel: "Transcending Barriers to Success: Connecting Indigenous and Western Knowledge - The Hawai'i Experience 2017-20."

Moderator: Ulla Hasager (ulla@hawaii.edu)
Presenters: Members of the SENCER Hawaii Team
The Panel will provide an overview and reflection of the UH system's activity during the four years of the "Transcending Barriers" project. It will feature recorded Poster and Video Presentations from U Hawaii team members and other faculty.

5:15 Presentation: Meaning and Management of Fisheries in Samoan Bioregion
Presenter: Bob Franco, Kapi'olani CC, Universityof Hawaii

The American Sāmoa fisheries bioregion, an eco-political unit integrating ecological and cultural relationship…determined by geography, ecosystem, indigenous culture, and environmental history, (Caminero-Santangelo, 2011), includes Tutuila, Manu'a (Ofu, Olosega, and Ta'u), Rose Atoll and Swains Islands. In pre-colonial times, this bioregion extended westward to the western islands of Upolu, Manona, Apolima and Savai'i. Today, fishing activity drives human and monetary mobility connecting the entire Sāmoan bioregion. Earlier collaborative research by the two authors (1989, 1996) and published in Pacific Science in July 2013, examined practices of pelagic fishermen and the mechanics of localized customary exchange and made patently clear the ongoing social and cultural importance of fishing and seafood to Samoan villages. Four concepts provide context for management –relevant human dimension of this bioregion: effort triggers, fish flow, customary exchange, and tradition, while five customary cultural values are amplified in the earlier research: fa'alavelave, tautua, fesoasoani, toonai, and fa'ataualofa. These values are embedded in the relationships between tautai (master fishermen), matai (chiefs) and 'aiga (families). Since 2000, impactful changes in the American Sāmoan bioregion include: the decreasing participation of of Samoan 'alia catamarans and the increasing participation of larger vessels, the establishment of the National Marine Sanctuary of American Sāmoa, ongoing debates about a Large Vessel Protected Area and minimum wage standards for cannery workers. Poblete's framing (2020) of canned tuna as American Samoa's "mono-crop," analogous to sugar in other colonized island places, provides a wider colonial and context for this analysis.

5:45 Recorded Presentation: Farming Practices as Funds of Knowledge for Multilingual Learners
Presenters: Laura Liu (lbliu@iu.edu), Taylor Russell, Indiana-Purdue University Columbus
https://youtu.be/tV_FQSlyul4

This study builds on research exploring the preparation of teachers to integrate diverse funds of knowledge into curricula and instruction. Funds of knowledge is described as the knowledge students bring from their families and home communities to the classroom, and that can be used to enhance family engagement, concept and skill development, curricular relevancy, and positive learning environments (González, Moll, & Amanti, 2005; Moll et al., 1992). Funds of knowledge may include home language use, family values and traditions, caregiving practices, family roles and responsibilities, family professional knowledge, among other traits (González et al., 2005). Research has demonstrated the value of learning from farming practices as funds of knowledge that may be integrated into K-12 curricula and instruction (e.g., Harper, 2016). This study examines farming practices, experiences, and knowledge as valuable funds of knowledge that may be integrated into elementary curricula and instruction to support the learning of students in culturally and linguistically diverse classrooms. This grounded theory (Strauss & Corbin, 1998) qualitative inquiry (Merriam & Tisdell, 2015) included four participants with U.S. and international farming experience. Interviews invited participant reflections on connections between culture and farming practices, in the U.S. and international regions where participants farmed. Constant comparative analysis (Merriam & Tisdell, 2015) identified thematic categories and sub-categories across interviews. Findings demonstrated contrasts between U.S. and

international regions: automated vs. manual labor, individual vs. social farming practices, institutional vs. personalized attitudes toward land, climate impact on food production, and ethical considerations. Findings informed elementary curricula and instruction. A poster of this project is also available at:

6:00 Adjourn

Sunday, April 25

2:00 Weaving Indigenous Knowledge into Best Practices in Western STEM Education: A Panel Discussion with Video Presentations from CSU Humboldt
Presenters Cutcha Risling Baldy, H. Eve Robinson, Felicity Cross, David Marshall, Karley Rojas, Buddhika Madurapperuma, and Amy Sprowles

The Humboldt State University TBS work is grounded in collaborations between the College of Natural Resources and Sciences; the Department of Native American Studies; the HSU Indian Natural Resources, Sciences and Engineering + Diversity in STEM program (INRSEP+); the HSU Native American Center for Academic Excellence (ITEPP); the HSU Council of Native American Faculty and Staff; and the Native peoples of our region. Our ultimate goal is to develop a shared vision of how HSU can better support STEM success for Native American students at our institution. During this hour, we will share highlights of some of our past, current, and future work, with an emphasis on weaving TEK and Indigenous Knowledge into two nationally recognized best practices in Westerm STEM education: learning communities for first-time STEM students and undergraduate research projects that weave TEK and Indigenous knowledge with STEM.

Recorded Presentation: Humboldt County Unmanned Aircraft Systems Youth Education Program **https://youtu.be/2tkM1PumIyM**
Presenter: Felicity Cross (ac561@humboldt.edu), David Marshall, (David.Marshall@humboldt.edu)
This presentation by a student of environmental engineering who is a member of the Yurok tribe, describes a summer outreach program for Native American youth that provides drone pilot training leading to an FAA Drone pilot's license. The course incorporates multiple applications of drones for building on existing indigenous knowledge and supporting environmental advocacy and protection, including Klamath river restoration, which is of critical historic, material, and cultural relevance to indigenous communities in the area.

Recorded Presentation: **Ethnobotanical Index and Native Plant 'Agroecosystem' Models in Humboldt County Bioregions** **https://youtu.be/z9FxBEeb3H0**
Moderator: Karley Rojas, Humboldt State University (kr228@humboldt.edu)
Presenters: Dr. Buddhika Madurapperuma- Humboldt State University: bdm280@humboldt.edu, Prof. Craig Benson- Humboldt State University: csb3@humboldt.edu

This presentation discusses Traditional Ecological Knowledge (TEK) in a futurist orientation as applied to local food systems, relating to Western Knowledge and the discipline of 'agroecology'. The project elucidated is an Index of Ethnobotanical Knowledge in the published literature that pertains to the Tolowa, Yurok, Karok, Hupa, and Wiyot tribes, whose traditional lands are encompassed by what is now the North Coast California bioregion. The Index includes a literature review, as well as research of plant ecosystem characteristics. If this information is used, it will be with the consent and communication of these tribes to create a database for their exclusive access, to make published/databased TEK accessible to its communities of origin in a consolidated form. This will serve for restitution of knowledge, under community oversight. The protocol and format of the database will be decided in a feedback relationship with these communities.

3:00 Panel: Climate Change Camp at Iḷisaġvik College, Utqiagvik, Alaska
Moderator: Linda Nicholas-Figueroa, Iḷisaġvik College

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Presenters: Elder (possible panelist – David Leavitt Jr.), Student (possible panelist – Justina Peterson. Camp Instructors,Timothy Lindstrom, timothy.lindstrom@wisc.edu and Cathy Middlecamp, chmiddle@wisc.edu, both from University of Wisconsin-Madison

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Village Elders, Scientists, Teachers, Students. In Utqiagvik, Alaska, 250 miles north of the Arctic Circle, we all have gathered at Iḷisaġvik College to learn about climate change in the north. The tundra, the shoreline and sea, the town and its life support systems, the research centers and weather station, the cultural center, and the campus classrooms and labs have been places to learn. In fact, Iḷisaġvik means "A Place to Learn" in the Inupiaq language. This panel presentation will introduce listeners to the place, its people, and the effects of climate change. We will tell stories of teaching and learning in the Arctic from the perspectives of instructors, students, and Inupiaq Elders. These stories will describe our efforts to integrate wisdom from both indigenous and western science as we strive toward a more inclusive understanding of climate change and seek collaborative responses that acknowledge and honor both knowledge systems.

Our team was larger than those named on the panel, and included Larry Duffy (University of Alaska Fairbanks) and Bob Rabin (NOAA). We gratefully acknowledge their contributions to the climate change camp.

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4:00 Private meeting for principals from "Transcending Barriers to Success: Connecting Indigenous and Western Knowledge."

6:00 Adjourn