



The Value of Tribal Ecological Knowledge (TEK) for Environmental Health Sciences and Biomedical Research Workshop

December 3-4, 2015

Natcher Auditorium
National Institutes of Health
Bethesda, Maryland

Co-sponsored by

National Institute on Minority Health and Health Disparities • Office of Behavioral and Social Sciences Research
National Institute of Diabetes and Digestive and Kidney Diseases • National Institute of General Medical Sciences
National Institute on Drug Abuse



**THE VALUE OF TRIBAL ECOLOGICAL KNOWLEDGE (TEK)
FOR THE ENVIRONMENTAL HEALTH SCIENCES AND BIOMEDICAL RESEARCH**

WORKSHOP

DECEMBER 2, 2015

NATIONAL MUSEUM OF THE AMERICAN INDIAN, WASHINGTON DC

DECEMBER 3-4, 2015

NATIONAL INSTITUTES OF HEALTH, BETHESDA MD

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OVERVIEW

Theme

This workshop will explore the contributions that Native American (NA), Alaskan Native (AN) and Native Hawaiian (NH) tribal communities bring to the research enterprise. This workshop is intended for those with an interest in research with NA/AN/NH communities, academic investigators, federal staff and members of tribal communities to give them the opportunity to contribute to the desired dialogue.

The workshop is focused on the value of Tribal Ecological Knowledge (TEK) for environmental health sciences (EHS) and biomedical research. The term TEK denotes "traditional knowledge [that], like Western science, is based on accumulation of observation. It is knowledge that is transmitted through generations, practice in how tribes carry out resource use practices, and beliefs about how people fit into ecosystems" (Berkes, 2000). The term is widely used by tribal communities to denote a range of factors affecting Native health from an indigenous perspective. We propose that TEK is a culturally appropriate form of community-engaged research that could benefit biomedical research focused on environmental factors affecting health, and may also be a way to increase trust and mutual respect in tribal-academic partnership. In addition, we believe that TEK is an example of citizen science, which we would like to highlight due to the increased attention to citizen science as a viable element of research among researchers and federal agencies.

Workshop Goals

The workshop organizers believe that hosting a workshop around the theme of TEK will raise awareness of the importance of this type of contribution to research and garner input from those with expertise in TEK to identify the optimal ways to incorporate it into research.

The workshop is organized to achieve specific goals. These are

- To explore ways to improve trust in academic-tribal research and promote cultural sensitivity by respecting and valuing tribal ecological knowledge
- To identify methods for incorporating community-acquired data and local indigenous knowledge into environmental health and biomedical research studies
- To consider ethical approaches for tribal specific data collection and community engagement in tribal communities, and
- To build capacity to respond to long term and immediate disaster events on tribal lands.

Sponsors

The workshop is sponsored by the National Institute of Environmental Health Sciences. The workshop organizers are grateful for additional support that is provided by the Smithsonian Institution, Indian Health Service, Centers for Disease Control and Prevention/Agency for Toxic Substances and Disease Registry, and by National Institutes of Health Institutes and Centers including

- National Institute of Diabetes, Digestive and Kidney Diseases (NIDDK)
- National Institute on Drug Abuse (NIDA)
- National Institute of General Medical Sciences (NIGMS)
- National Institute on Minority Health and Health Disparities (NIMHD)
- Office of Behavioral and Social Sciences Research (OBSSR)

WORKSHOP AGENDA

**THE VALUE OF TRIBAL ECOLOGICAL KNOWLEDGE (TEK)
FOR ENVIRONMENTAL HEALTH AND BIOMEDICAL SCIENCES
DECEMBER 2-4, 2015**

December 2, 2015

Smithsonian National Museum of the American Indian, Washington, DC

TRAINING SESSIONS (Room 4018/4019)

- 2:30 NIH Disaster Research Protocol - **Aubrey Miller, National Institute of Environmental Health Sciences (NIEHS) Office of the Director**
- 3:00 Emergency Response Safety Training - **Chip Hughes, Sharon Beard, NIEHS Worker Education & Training Program**
- 5:00 *TRAININGS ADJOURN*

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OPENING REMARKS

Symma Finn, NIEHS, Moderator

- 8:30 Welcome
- 8:35 Ceremonial Blessing - **Tom Belt (Western Band of Cherokee), Western Carolina University**
- 8:40 Opening Remarks – Purpose of Meeting - **Symma Finn, NIEHS**
- 8:50 NIH Commitment to Research with Tribal Communities - **Linda Birnbaum, Director, NIEHS**

I. WHAT IS TEK?

Gwyneira Isaacs, Smithsonian Institution, Moderator

- 9:10 Overview of TEK - **Stewart Hill (Cree), University of Manitoba**
- 9:40 Exploring the Interface of Indigenous Traditional Knowledge and the Health Sciences - **Joseph P. Gone (Gros Ventre), University of Michigan**
- 10:10 *BREAK*

II. SOCIAL ENVIRONMENTS AND THE HEALTH OF NATIVE PEOPLES

Michael Spittel, OBSSR, Moderator

- 10:30 Rethinking Approaches to Substance Abuse Treatment for Native Youth: Inclusion of Traditional Knowledge - **Lisa Lefler, Western Caroline University (WCU)**
- 11:00 TEK and Language: How Knowledge is Shaped by Word Choice - **Tom Belt (Cherokee), WCU**
- 11:30 Lost at Home: The Psychosocial Consequences of the Exxon Valdez Oil Spill - **Spero Manson, (Pembina), University of Colorado**

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III. ENVIRONMENTAL EXPOSURES and REPRODUCTIVE HEALTH *Jennie Joe, University of Arizona, Moderator*

- 12:00 Woman is the First Environment - **Katsi Cook (Mohawk Akwesasne), Novo Foundation**
- 12:30 Inupiat Concerns to Oil and Gas development and Health, Culture, and Research - **Rosemary Ahtuanguak (Inupiaq)**
- 1:00 *LUNCH AND POSTER SESSION*

IV. ENVIRONMENTAL EXPOSURES and HEALTH OUTCOMES *Dorothy Castille, NIMHD, Moderator*

- 2:30 Indoor air quality interventions with American Indian communities: Creating culturally adapted intervention methods and educational tools - **Annie Belcourt (Blackfeet and Hidatsa), University of Montana**
- 3:00 Cancer Risk from Exposure to Uranium among the Navajo - **Jani Ingram (Navajo), Northern Arizona University**
- 3:30 Community-based Cumulative Risk Assessment of Exposure to Waterborne Contaminants on the Crow Reservation - **Myra Lefthand (Crow), Mari Eggers and John Doyle (Crow)**
- 4:00 Tribal Citizen Science: Environmental Health Research in American Indian Communities - **Elizabeth Hoover, Brown University**
- 4:30 **CLOSING REMARKS DAY 1 – Sally Darney, *Environmental Health Perspectives Journal***
- 4:40 *DAY 1 ADJOURNS*

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8:25 Welcome - **Symma Finn**

V. TEK AND CLIMATE CHANGE – Case Studies

Carl Hill, NIA, Moderator

8:30 Climate Change Adaptation: Indigenous Knowledges and Exercises of Indigenuity - **Dan Wildcat, Haskell Indian Nation University**

9:00 The Challenges of Cultural and Environmental Health Restoration in a Changing Climate - **Mary Arquette, (Akwesasne Mohawk), Haudenosaunee Environmental Task Force**

9:30 The Value of Traditional Knowledge in Climate Change Planning - **Michael Durglo, Jr. (Confederated Salish and Kootenai Tribes)**

10:00 *BREAK*

VI. GLOBAL CONTAMINANTS and HEALTH OUTCOMES

Pam Miller, ACAT, Moderator

10:20 Community Health Perspectives: Traditional Knowledge about Health - **Vi Waghyyi (St. Lawrence Island Yupik, Native Village of Savoonga Tribal Member), Alaska Community Action Against Toxins**

10:50 Global Migration of Environmental Contaminants and Human Disease - **David Carpenter, University at Albany - SUNY**

11:20 Title TBD - **Jamie Donatuto, Larry Campbell (Swinomish)**

11:50 *LUNCH AND POSTER SESSION*

VII. INCORPORATING TEK in a VARIETY OF SETTINGS

Annabelle Allison, CDC, Moderator

1:20 Responsibilities towards Indigenous Knowledge in a Global Context - **Gwyneira Isaacs, Smithsonian National Museum of Natural History**

1:40 A Museum of Living Cultures: Appreciating the Survival of Native Culture at the NMAI - **Jose Barreiro (Taino), Smithsonian National Museum of the American Indian**

2:10 Tribally Driven Environmental Health Research: Highlights from the Native American Research Centers for Health (NARCH) Program - **Mose Herne (Mohawk), Indian Health Service (IHS)**

VIII. MODERATED DISCUSSION

Mose Herne, IHS, Moderator

2:30 Discussion with All Participants

3:40 TEK and Environmental Health Sciences: Opportunities and Challenges - **Gwen Collman, NIEHS, Jennie Joe, University of Arizona**

4:10 Closing Remarks and Acknowledgements - **Birnbaum and Finn, NIEHS**

4:15 Closing Benediction

4:25 *WORKSHOP ADJOURNS*

SPEAKER BIOGRAPHIES BY SESSION

Opening Remarks

Symma Finn, Ph.D., Program Officer, National Institute of Environmental Health Sciences (NIEHS), National Institutes of Health received her Ph.D. in medical and linguistic anthropology from the University of Florida for her research to quantify patient empowerment in a rare genetic disease community. She has a M.A. from the University of Miami in environmental anthropology for her research on the anthropological aspects of ecosystem management. She joined the Division of Extramural Research and Training at NIEHS in December 2011 after concluding an American Association for the Advancement of Science (AAAS) Policy Fellowship in the NIH Office of Science Policy/Office of Biotechnology Activities. At NIEHS, Symma administers social and behavioral research and develops new areas of interest in communications, environmental health literacy and community engaged environmental health disparities research. She is a program officer on the newly-funded NIH-EPA Centers of Excellence for Environmental Health Disparities Research, and oversees communications and community engagement activities for the Deepwater Horizon Research Consortium, Breast Cancer and the Environment Research Program, Partnerships for Environmental Public Health, and in other programs that deal with health disparities, environmental justice, public education and communications. She is point of contact for Tribal Activities at NIEHS and a strong advocate of equity in community-academic partnerships and cultural sensitivity when working with tribal communities and other racial/ethnic communities.

Linda Birnbaum, Ph.D., Director, National Institute of Environmental Health Sciences. Dr. Birnbaum became the Director of NIEHS and the National Toxicology Program (NTP) on January 18, 2009. In these roles Birnbaum oversees federal funding for biomedical research to discover how the environment influences human health and disease. A native of New Jersey, Dr. Birnbaum received her M.S. and Ph.D. in microbiology from the University of Illinois at Urbana-Champaign. She has spent most of her career as a federal scientist and is the first toxicologist and the first woman to lead the NIEHS and the NTP. Dr. Birnbaum has received numerous awards and recognitions, including being elected to the Institute of Medicine of the National Academies, in October 2010, one of the highest honors in the fields of medicine and health. Birnbaum's own research and many of her publications focus on the pharmacokinetic behavior of environmental chemicals; mechanisms of actions of toxicants, including endocrine disruption; and linking of real-world exposures to health effects. Birnbaum also finds time to mentor the next generation of environmental health scientists. For example, she serves as an adjunct professor in the Gillings School of Global Public Health, the Curriculum in Toxicology, and the Department of Environmental Sciences and Engineering at the University of North Carolina at Chapel Hill, as well as in the Integrated Toxicology Program at Duke University. Dr. Birnbaum is known for her strong commitment to addressing tribal environmental health disparities and has made a number of site visits to tribal communities to understand local issues from the tribal perspective.

I. What is TEK

Stewart Hill (Cree), University of Manitoba. Stewart is an Ininiw (Cree) from God's Lake First Nation undertaking his PhD studies at the Natural Resources Institute of the University of Manitoba made possible by the mandate of the CREATE H2O program beginning in September 2013. His proposed research is to develop source water protection plans for his community of God's Lake First Nation and their sister communities of Bunibonibee Cree Nation and Manto Sipi Cree Nation. Stewart grew up in God's Lake and speaks his language fluently. Stewart earned his Master of Natural Resources

Management degree from the University of Manitoba Natural Resources Institute in 1993 and also holds a Bachelor of Science degree from Brandon University with a major in Environmental Science and a minor in Botany. Upon completing his Master's degree in 1993, Stewart spent 20 years working in the service of First Nations in the areas of natural resources research, environmental management, treaty land entitlement, community self-government consultations, Swampy Cree cultural and historical research, environmental assessments, First Nations engagement in the resource development sector, and traditional area land use planning. He has a deep appreciation and understanding for the value of applying the traditional knowledge of Indigenous people to modern environmental and natural resources management regimes.

Joseph P. Gone, Ph.D. (Gros Ventre), University of Michigan. In the effort to remedy American Indian mental health disparities, clinical-community psychologist Joseph P. Gone explores the disquieting disconnect between local construals of wellness and distress within indigenous settings on the one hand and professional conventions governing clinical practice in mental health services on the other hand. A citizen of the Gros Ventre tribal nation of Montana, he has undertaken collaborative research partnerships in a handful of reservation and urban Indigenous communities in the United States and Canada. Through these projects, Gone has attended to the distinctive cultural psychologies of tribal communities to identify local concepts of wellness and distress; uncovered the principles and logics of Native therapeutic traditions relative to conventional psychosocial interventions; considered the relevance of Indigenous traditional knowledges for evaluating intervention outcomes; and reimagined the clinical enterprise from the perspectives of Indigenous community members. A graduate of Harvard College and the University of Illinois, Gone has taught in the Departments of Psychology (Clinical Area) and American Culture (Native American Studies) at the University of Michigan for over a decade, where he has published more than 50 articles and chapters pertaining to the cultural psychology of indigenous community mental health. A recipient of several fellowships and two early career awards for emerging leadership in his fields, Gone received the 2013 Stanley Sue Award for Distinguished Contributions to Diversity in Clinical Psychology from Division 12 of the American Psychological Association. In 2014, he was named a Fellow of the John Simon Guggenheim Memorial Foundation.

II. Social Environments and the Health of Native Peoples

Lisa Lefler, Ph.D., Western Carolina University. Dr. Lefler serves as Director, Culturally Based Native Health Programs, at Western Carolina University. Lisa is a Medical Anthropologist and founder and Executive Director of the Center for Native Health, Inc., a non-profit social science and education research center. Lisa organized the first workshop of its kind on the East Coast to bring in elders from across the country to dialogue about the Native Science worldview and how it can create positive paradigm shifts in how we approach health, environmental, and wellness concerns. She is a member of the tribal cultural IRB for the EBCI and has organized several sessions at regional and national meetings of anthropologists, which included Native partners to discuss issues of conducting research in Indian country. Lisa is a Consulting Scholar to the Center for Native American and Indigenous Research at the American Philosophical Society in Philadelphia.

Tom Belt (Cherokee Nation), Cherokee Language Program Coordinator, Western Carolina University. Tom is working to create a state-of-the-art Cherokee language program at the university level. He teaches the first four semesters of Cherokee language and he co-teaches courses on Cherokee grammar and Cherokee language literature. Mr. Belt, a citizen of the Cherokee Nation of Oklahoma, is a fluent Cherokee speaker and works closely with speakers from the Eastern Band of Cherokee Indians to produce culturally-based Cherokee language learning material. Before joining the Cherokee Language

Program, Mr. Belt worked as a counselor's aide in a local treatment center for native youths with chemical dependencies. He attended the Universities of Oklahoma and Colorado and taught the Cherokee language at the Cherokee elementary school in Cherokee, NC. Mr. Belt has also served as a consultant to various cultural archives and to various indigenous language programs in public schools and on the post-secondary level. Tom is a Consulting Scholar to the Center for Native American and Indigenous Research at the American Philosophical Society in Philadelphia.

Spero Manson, Ph.D., (Pembina), University of Colorado. Dr. Manson is Distinguished Professor of Public Health and Psychiatry, directs the Centers for American Indian and Alaska Native Health, and serves as Associate Dean of Research in the CO School of Public Health at the University of Colorado Denver's Anschutz Medical Center. His programs include 10 national centers, totaling \$63 million in sponsored research, program development, training, and collaboration with 250 Native communities, spanning rural, reservation, urban, and village settings across the country. Dr. Manson has published 200 articles on the assessment, epidemiology, treatment, and prevention of physical, alcohol, drug, as well as mental health problems over the developmental life span of Native people. His numerous awards include the APHA's prestigious Rema Lapouse Mental Health Epidemiology Award (1998), 3 special recognition awards from the Indian Health Service (1996, 2004, 2011), election to the Institute of Medicine (2002); 2 Distinguished Mentor Awards from the Gerontological Society of America (2006; 2007), the AAMCs' Nickens Award (2006); the George Foster Award for Excellence from the Society for Medical Anthropology (2006), and NIH's Health Disparities Award for Excellence (2008). Dr. Manson is widely acknowledged as one of the nation's leading authorities in regard to Indian and Native health.

III. Environmental Exposures and Reproductive Health

Katsi Cook, Program Director, NoVo Foundation, Indigenous Communities Program. Unleashing the potential that exists within the North American Indigenous world is the impetus behind Katsi Cook's life's work. After decades of connecting people, purpose and initiatives, Katsi is currently Program Director for Indigenous Communities at NoVo Foundation where she has been charged with designing and operationalizing a program to support the leadership of Indigenous Girls and Women in North America. Founded by Jennifer and Peter Buffet, NoVo Foundation is a philanthropic organization dedicated to catalyzing a transformation in global society, moving from a culture of domination and exploitation to one of collaboration and partnership, investing in women and girls as the primary agents of change. In addition, Katsi is a Research Associate at the National Museum of Natural History (2014-2017) and an elder, co-founding Aboriginal midwife of the National Aboriginal Council of Midwives in Canada. In her home community of Akwesasne, Katsi is a founding member of Konon:kwe Council. Konon:kwe (go-NOON-gweh) is a Mohawk word meaning "all feminine beings" or "all women." Konon:kwe Council is a group of leader women from the Mohawk community of Akwesasne, which straddles the banks of the St. Lawrence River near Cornwall, Ontario. With Kahnistensera ("Mother Law") as its foundational principle, Konon:kwe Council exists to reconstruct the power of our Haudenosaunee origins through collaborative approaches to the care, empowerment and transformation of a traumatized Indigenous community (Akwesasne).

Rosemary Ahtuanguaruak (Inupiaq), is an Inupiaq activist and tribal leader, working to protect our oceans. She is a graduate of the University of Washington Medex Northwest Physician Assistant Program. She has lived 24 years in Nuiqsut participating in local community meetings related to oil and gas development. She works as a tribal liaison with Alaska Wilderness League on an environmental justice grant for the Alaska Outer Continental Shelf. Rosemary is a former mayor of Nuiqsut and has served on the board and as treasurer of the Inupiat Community of the Arctic Slope, the regional tribal

government, as co-chair for the North Slope Federal Subsistence Board Regional Advisory Council, and as an executive council member of the Alaska Inter-Tribal Council. She received the 2009 Voice of the Wild Award from the Alaska Wilderness League. She is a founding board member of REDOIL (Resisting Environmental Destruction on Indigenous Lands).

IV. Environmental Exposures and Health Outcomes

Annie Belcourt (Hidatsa, Blackfeet, and Chippewa), University of Montana. Dr. Belcourt (Otter Woman-Mandan, Hidatsa, Blackfeet, and Chippewa) is an American Indian Associate Professor at the University of Montana with appointments in Pharmacy Practice and Public Health. Her Doctoral degree is in clinical psychology and she has worked as a clinician with combat veterans, Native Americans, and a diverse clientele in both hospital and outpatient settings. Her research has focused on post traumatic stress impacts upon health within American Indian communities. She has recently worked to develop and implement interventions aimed at improving environmental health for Native communities experiencing exposure to environmental risks. She is currently a Harvard TH Chan School of Public Health JPB Environmental Health Fellow.

Jani Ingram (Navajo), Northern Arizona University. Jani C. Ingram, Ph. D. is a Professor in the Chemistry and Biochemistry Department at NAU where she investigates environmental contaminants with respect to their impact on health. A major part of her research is focused on characterizing uranium contamination in water and soil as well as some preliminary work in the area of plants and livestock. A critical aspect of her research is to foster collaborations with the Navajo community and leaders to build trust, obtain access to field samples and gain insights into their health concerns. Recruiting Navajo and other Native American students to work with her as a Navajo principal investigator on the project and building an interdisciplinary, collaborative team of scientists with expertise in analytical chemistry, geoscience, cancer biology, and social sciences are also important to her research. She has published 40 peer-reviewed articles and has been or am currently funded by the National Cancer Institute National, the National Institute of General Medicine Sciences, and the National Science Foundation. She is a member of the Navajo Nation (born to the Náneesht' ézhi clan) and is involved in outreach activities for Native American students in undergraduate and graduate research. She has mentored over 100 research students, many of whom are Native American. She is the director of the Bridges to Baccalaureate program and serves as the director of the Training Program for the Native American Cancer Prevention Program. Nationally, she has served as a counselor for the Council on Undergraduate Research.

Myra Lefthand (Crow). Myra Lefthand (Crow) is a Community Health Educator at the Crow/Northern Cheyenne Hospital, Crow Agency, MT. She is of the Bad War Deeds clan and child of the Big Lodge clan of the Crow Nation, and is a fluent speaker of the Crow language. She has been working for Indian Health and has over 30 years of experience in the health field. She is a co-founder of the Crow Environmental Health Steering Committee, and has been helping to guide the Committee's research on local water quality for more than ten years. Myra received her Masters in Social Work from the University of Utah, Salt Lake City, UT. She lives on the Crow Reservation and is a mom of one daughter, three grandchildren and two great grandchildren.

Mari Eggers, Ph.D., Montana State University. Mari is an environmental health research scientist at Montana State University Bozeman (MSU) and an affiliate of Little Big Horn College (LBHC), the Tribal College for the Crow Reservation. She taught biology, ecology, environmental science and human geography at LBHC for ten years, where she and her family lived. In 2004 Crow Tribal members

recruited her to work with them on addressing water contamination and related health issues on the Reservation. She and her colleagues formed the Crow Environmental Health Steering Committee and spent the next ten years conducting community-based risk assessments of exposure to waterborne contaminants in domestic, cultural and recreational water sources. Testing of home well water and springs as well as community education and risk mitigation efforts continue. Eggers and CEHSC, MSU and LBHC colleagues, are now also conducting a spatial analysis of groundwater contaminants, investigating health effects from exposure to heavy metals in home well water and researching current and projected climate change impacts on Crow Reservation water resources. More than 25 Crow science majors and graduate students have contributed to these research projects and been mentored by the team. Eggers coordinates a minority graduate fellowship program for Montana State University Bozeman (MSU), works on improving the MSU transfer process for Montana Tribal college STEM students and serves on the External Advisory Board for the University of Wyoming's EPScOR program. She has an M.A. from Stanford University (social theory) and an M.S. in Ecology and a PhD in environmental health from MSU.

John Doyle (Crow) was born and raised in Crow Agency on the Crow Reservation in southcentral Montana, and continues to live there today. He is a Crow Tribal member, and served his community as a County Commissioner and member of the Health Board for 24 years. He has served as the volunteer Co-Director of the Apsaalooke [Crow] Water and Wastewater Authority for the past 15 years; in that capacity he has overseen a nearly complete overhaul and renovation of Crow Agency's water and wastewater infrastructure, raising more than \$20 million for this work. Doyle is a founding member of the Crow Environmental Health Steering Committee (CEHSC), and in this capacity has helped guide community-based risk assessments of exposure to waterborne contaminants in domestic, cultural and recreational water sources over the past decade. Doyle is currently Co-PI of the team's EPA grant and a project lead for their NIEHS/EPA grant. He oversees continued testing of home well water and springs as well as community education and risk mitigation efforts in the Crow Reservation community. Doyle and colleagues on the CEHSC, and at Montana State University Bozeman and Little Big Horn College, are now also conducting a spatial analysis of groundwater contaminants, investigating health effects from exposure to heavy metals in home well water and researching current and projected climate change impacts on Crow Reservation water resources. Doyle mentors Crow student interns on the project and serves on the Advisory Board for a water quality after school program for children on the Reservation.

Elizabeth Hoover, Ph.D., Brown University. Elizabeth Hoover is Assistant Professor of American Studies and Ethnic Studies. She received her BA at Williams College in 2001, an MA in Museum Studies at Brown in 2003 and PhD in Anthropology at Brown University in 2010. Her dissertation covered Local Food Production and Community Illness Narratives: Responses to Environmental Contamination in the Mohawk Community of Akwesasne. She currently teaches courses and conducts research in the areas of environmental justice in American Indian communities, indigenous food movements, and community engagement. Her recent publications include "Cultural and health implications of fish advisories in a Native American community", "Indigenous Peoples of North America: Environmental Exposures and Reproductive Justice" and "Social Science Collaboration with Environmental Health" based on a recent workshop held at Northeastern University in 2015.

V. TEK and Climate Change

Dan Wildcat, Ph.D., Haskell Indian Nation University. Daniel Wildcat, Ph.D., is a professor at Haskell Indian Nations University in Lawrence, Kansas, and an accomplished scholar who writes on indigenous knowledge, technology, environment, and education. He is also co-director of the Haskell Environmental

Research Studies Center, which he founded with colleagues from the Center for Hazardous Substance Research at Kansas State University. A Yuchi member of the Muscogee Nation of Oklahoma, Dr. Wildcat is the coauthor, with Vine Deloria, Jr., of *Power and Place: Indian Education in America* (Fulcrum, 2001), and coeditor, with Steve Pavlik, of *Destroying Dogma: Vine Deloria, Jr., and His Influence on American Society* (Fulcrum, 2006). Known for his commitment to environmental defense and cultural diversity, Dr. Wildcat has been honored by the Kansas City organization The Future Is Now with the Heart Peace Award. His newest book, *Red Alert! Saving the Planet with Indigenous Knowledge* will be released later this year

Mary Arquette (Akwesasne Mohawk), Haudenosaunee Environmental Task Force. Mary Arquette is a Mohawk of the Wolf Clan who resides in Ahkwesáhsne with her husband David and 3 children. She holds a Doctor of Veterinary Medicine and a PhD in Environmental Toxicology from Cornell University. Mary currently works for the St. Regis Mohawk Tribe's Cultural Restoration Program as a teacher of adult apprentices in the area of Horticulture and Traditional Foods. Before returning to work at the Natural Resource Damage Program, Mary served at the Ahkwesáhsne Freedom School for many years, helping develop programs to restore traditional cultural practices taught to students in grades 7 to 12 at a Mohawk language immersion school. She co-wrote the Rotinonhsón:ni food guide, a computerized program that includes nutritional values, recipes, food preparation instructions, ceremonial uses and Mohawk names for traditional foods and medicines. In addition to being a lifelong student of the Mohawk language, she has worked in a variety of jobs including as a veterinarian, an assistant to New York State's Wildlife Pathologist, a research assistant in toxicology/pathology, an administrative assistant for the St. Regis Mohawk Tribe's Natural Resource Damage Program, a lecturer in Native American Studies, an assistant professor of environmental studies, a principal investigator of several scientific and Mohawk language research grants and an office manager, cook, gardener and kindergarten teacher for a Mohawk immersion school.

Michael Durglo, Jr., (Confederated Salish and Kootenai Tribes). Mike received his BS in Environmental Science from Salish Kootenai College in 2002. He is currently the Environmental Protection Division Manager for the Confederated Salish and Kootenai Tribes and is the Climate Change Planning Coordinator. Mike has worked for the Tribes for over 30 years in different capacities including Wildlife Conservation Officer, Tribal Councilman, Wetland Conservation Coordinator, and Regulatory Specialist. He serves as the Chairman on the Region 8 Tribal Operations Committee and is the Region 8 representative on the National Tribal Science Council.

VI. Global Contaminants and Health Outcomes

Viola (“Vi”) Waghiyi (Native Village of Savoonga Tribal Member), Environmental Health and Justice Program Director, Alaska Community Action on Toxics. Vi is a St. Lawrence Island Yupik mother and grandmother who was born in Savoonga on St. Lawrence Island, Alaska. She was hired in 2002 to assist with the St. Lawrence Island environmental health and justice project. She became the ACAT Project Coordinator in 2004 supervising research staff on St. Lawrence Island. In 2005, Vi became the Environmental Health and Justice Community Coordinator, and in 2009, Program Director to share responsibilities with the executive director for all of ACAT’s efforts. In 2010, Vi was awarded the Environmental Achievement Award in recognition of valuable contributions to environmental excellence in Alaska by the Alaska Native Tribal Health Consortium. In 2012, leaders of Savoonga presented Vi with a certificate of appreciation “for the dedication and devoted service as an Ambassador of St. Lawrence Island for protecting our health and human rights.” She serves as a National Advisory Environmental Health Sciences Council member to the NIEHS where she provides a community perspective. Vi is

sought out repeatedly to speak at national and international meetings about ACAT's work and the story of her people, the Yupik of St. Lawrence Island, and their fight for clean air, clean water and toxic free foods. For the past several years, Vi's efforts have included strengthening regulation of chemicals at the state, national and international levels. She is a leader of the Global Indigenous Peoples Caucus to the Stockholm Convention in Geneva, Switzerland. Her advocacy work has expanded to include human rights for environmental health and justice for Arctic Indigenous Peoples of Alaska and of the North at the United Nations level.

David Carpenter, Ph.D., University of Albany. David O. Carpenter is a public health physician whose major research interest is the study of human disease resulting from exposure to environmental contaminants. He has worked in several different Native communities, and has learned from these communities the importance of traditional knowledge. He has focused especially on routes of exposure to environmental chemicals, including consumption of fish and marine mammals as well as breathing contaminated air, and the diseases resulting from exposure to polychlorinated biphenyls and other persistent organic pollutants.

Rita Blumenstein, Ph.D., (Yupik). Grandmother Rita Pitka Blumenstein serves as the first certified tribal doctor in the state of Alaska. She believes her name, "Tail End Clearing of the Pathway to the Light" reflects her mission to heal. She is a Yup'ik mother, grandmother, great grandmother, wife, aunt, sister, friend, tribal elder. Her early education came from studying with her mother, aunts and village elders. Because of this unique education, she intimately understands the traditional ways and beliefs of her people. Well known as a traditional healer, teacher, and artist, she has spent over forty years investigating, producing, and passing on many aspects of Alaska Native culture such as song, drumming, skin sewing, basketry, storytelling, and use of plants for dyes and medicinal purposes. She has traveled and taught in 167 countries - Alaska Native plant medicine, basket weaving, songs and dances, leading cultural issue classes where she instructs on the "talking circle."

VII. Incorporating TEK in a Variety of Settings

Gwyneira Isaac, Ph.D., Curator of North American Ethnology, National Museum of Natural History, Smithsonian Institution. Her research investigates the dynamics of and intersections between culturally specific knowledge systems. Central to this study is her fieldwork and ethnography of a tribal museum in the Pueblo of Zuni, New Mexico, where she examined challenges faced by Zunis operating between Zuni and Euro-American approaches to knowledge. Currently, her collaborative work at the Smithsonian as part of the *Recovering Voices* initiative has created a methodological platform focused on the applied synthesis of research, as a means to integrate knowledge that is co-produced through interdisciplinary and collaborative research projects.

Jose' Barreiro Ph.D. (Taino), Assistant Director for Research, Smithsonian Institution National Museum of the American Indian. A scholar of American Indian policy and the contemporary Native experience, Barreiro is a pioneering figure in Native American journalism and publishing. He helped establish the American Indian Program at Cornell University, serving as associate director and editor-in-chief of Akwe:kon Press and the journal *Native Americas* throughout the 1980s and '90s. In 2000, he joined the staff of *Indian Country Today* as senior editor. He continues to serve as a member of the editorial board of *Kacike: The Journal of Caribbean Amerindian History and Anthropology*. Barreiro's publications include *Native American Expressive Culture* (1994), a special edition of the *Akwe:kon Journal* produced for the opening of NMAI's George Gustav Heye Center in New York; the novel *The Indian Chronicles* (1993), and such scholarly books such as *View from the Shore: American Indian Perspectives on the*

Quincentenary (1990), Indian Roots of American Democracy (1992), Chiapas: Challenging History (1994), Panchito: Cacique de Montaña (2001); and, most recently, America Is Indian Country (2005), which he edited with Tim Johnson. Jose is a member of the Taino Nation of the Antilles, Barreiro received his Ph.D. in American Studies from the State University of New York at Buffalo.

Mose Herne, M.S., M.P.H. (Haudenosaunee -Mohawk), Director of the Division of Planning, Evaluation, and Research, Indian Health Service. Mose is a member of the Akwesasne Mohawk Nation (Turtle Clan) . He previously led the Division of Behavioral Health at the Indian Health Service and has a broad range of experience, including serving as Public Health Director for a local health department in New York State, working in clinical behavioral health positions with the Veterans Health Administration and Indian Health Service, and holding academic positions in psychology and behavioral sciences at Boston University and Fitchburg State College. He completed his undergraduate work in psychology and neurobiology at Clarkson University, his master's degree in neuroscience at Brandeis University, and his Master of Public Health degree in environmental health science at Boston University. His research interests include social and physical environmental determinants of health among environmental justice communities. Mose is also a Gulf War and U.S. Navy submarine veteran and currently resides in North Potomac, Maryland, with his wife Anne and their son, Jack.

Gwen Collman, Ph.D., Director, Division of Extramural Research and Training, NIEHS. Gwen Collman is director of the NIEHS Division of Extramural Research and Training where she leads approximately 60 professional staff in areas of scientific program administration, peer review, and the management and administration of about 1,500 active grants each year. She directs scientific activities in the environmental health sciences and training and career development. Prior to her current role, Collman served in program development and management, beginning in 1992 as a member, then as Chief of the Susceptibility and Population Health Branch. During this time, she directed research on the role of genetic and environmental factors on the development of human disease, from animal models of genetic susceptibility to population studies focusing on etiology and intervention. She was responsible for building the NIEHS grant portfolio in environmental and molecular epidemiology, and developed several complex multidisciplinary research programs including the NIEHS Breast Cancer and the Environment Research Centers Program, the NIEHS/EPA Centers for Children's Environmental Health and Disease Prevention, and the Genes, Environment and Health Initiative. Also, under her guidance, a team created a vision for the Partnerships for Environmental Public Health programs for the next decade. In recognition of her achievements, she is the recipient of numerous NIEHS Merit Awards, two NIH Director's Awards, and the DHHS Secretary's Award for Distinguished Service. Collman received a Ph.D. in Environmental Epidemiology from the University of North Carolina School of Public Health where she was awarded the 2009 H.A. Tyroler Distinguished Alumni Award.

Jennie R. Joe, Ph.D., M.P.H., M.A., (Dine'), Professor Emerita, University of Arizona College of Medicine, Department of Family and Community Medicine. Jennie began her academic career at the University of California, Los Angeles and later moved to Arizona to direct the University of Arizona's College of Medicine's Native American Research and Training Center. In additions, she also held an affiliated faculty position with the University's American Indian Studies. She retired in 2012, but continues to be involved in programs/studies related to Indian health and has been completing her work with several national and international committees, including the Canadian Institute for Aboriginal Peoples' Health, the Institute of Medicine, National Heart, Lung, and Blood Institute, etc. She currently serves on a committee organized by the National Library of Medicine.

POSTER ABSTRACTS

The Indigenous Education Institute

Dr. David Begay and Dr. Nancy C. Maryboy, Indigenous Education Institute

The Indigenous Education Institute is a 25 year old non-profit organization with an all Indigenous board. IEI focuses on the preservation and contemporary application of traditional Indigenous knowledge, including Tribal Ecological Knowledge. The goals of the Institute were developed to provide awareness of the importance of cultural and linguistic diversity in the world today. Traditional knowledge can provide greater sustainability with stewardship of the earth and cosmos, leading to harmonious, balanced health outcomes into the future, enhancing recognition of Indigenous science, in juxtaposition with western science, through processes that respect the honor and integrity of both ways of knowing.

The following collaborative projects are some of the major research partnership activities that will be featured on the IEI poster.

In partnership with Oregon Museum of Science and Industry and four tribal communities, IEI developed **Roots of Wisdom** exhibit that tells Native stories through tribal elders and youth from diverse Native American and Hawaiian cultures, using traditional ecological knowledge in conjunction with cutting-edge science to successfully address some of pressing issues today, including restoration of waterways and sustainable food supplies, solving health problems and reviving cultural ways of life.

For the **Indigenous Worldviews in Informal Science Education** (I-WISE) funded by NSF, IEI in collaboration with University of Hawaii, is convening two conferences aimed at the convergent margins of Native and Western science in the fields of informal STEM learning. Written results of the conferences will be used toward advancing the informal science education field.

IEI works with the **Navajo Birth Cohort Study**, a Multi-agency, prospective study to assess pregnancy outcomes and child development in relation to uranium mine and tailing waste exposures among Navajo mother-infant pairs. The study protocol and statistics, as well as identification of metals of most concern on the Navajo Nation, will be mentioned in the poster. The role of IEI is to provide a bridge between multi-agency scientists and local Navajo communities, building authentic collaborations, providing meaningful translations, and assisting in community reports. This includes reports back to Navajo chapters on air, soil and water testing, and measuring mine site radiation levels. In addition, IEI provides professional development training and tribal government liaisons with Navajo Nation and Laguna Pueblo.

Developing Indigenous Health Indicators for Coast Salish Communities

Larry Campbell and Jamie Donatuto, Swinomish Indian Tribal Community

The Indigenous Health Indicators (IHI) are a set of community-scale, non-physical aspects of health that are integral to Coast Salish health and wellbeing. The IHI reflect deep connections between humans, the local environment and spirituality. IHI provide a template for resource-based communities to tailor in order to suit their own unique connections and health priorities, which are not otherwise included in conventional health assessments. Indicators include aspects such as self-determination, natural resources security, and cultural use. IHI can be used in a variety of contexts, such as more accurate evaluations of health impacts due to contamination events, development projects, and climate change.

Development of a Digital Storytelling Model at the Great Lakes Native American Research Center for Health (NARCH)

Matthew Dellinger, PhD¹; Brian Jackson, MS²; Amy Poupart²

¹ Institute for Health and Society, Medical College of Wisconsin; ² Great Lakes Inter-Tribal Council

Intro: Programs seeking to improve health face the unique challenge of generating and disseminating knowledge while honoring indigenous perspectives. Indigenous perspectives add value to scientific inquiry when the two are appropriately integrated. Digital storytelling methods are sometimes referred to as “decolonized” since information is produced in a culturally-congruent manner. The term “decolonized”, acknowledges to indigenous populations that the underlying assumptions informing the research are open to their “ways of knowing”. Through the NIH-funded Great Lakes Native American Research Center for Health (GLNARCH) we have expanded the Digital Storytelling model to a method of inquiry that is compatible with indigenous perspectives.

Methods: During the summer of 2010, ten GLNARCH interns were interviewed and filmed for participation in a promotional video. The process was structured as a documentary production. During the editing and transcription process, interviewer responses were noted for relevance to tribal critical race theory and cultural compatibility theory. In 2015 a new process began to record GLNARCH Program Coordinator, Mr. Brian Jackson’s story as an Ojibwe health professional. The film (currently under production) highlights Mr. Jackson’s journey by blending the digital storytelling model and a traditional documentary.

Results Unique themes (narratives) emerged when using the documentary filmmaking style. For example, GLNARCH interns expressed strong narratives that illustrate: 1) networking and support, 2) “helping my people”, 3) self-determination, and 4) validation/enhanced participation in education. The first phase of Mr. Jackson’s story (interview and preliminary filming) is complete. By participating as the “talent” in a documentary film he identified elements of fatherhood, inter-generational respect, familial duty, and resilience from cultural tradition. Currently, Mr. Jackson is evaluating these themes to develop a script of his personal narrative for the final film. The promotional video and some student-created content are published at Youtube: <https://www.youtube.com/channel/UCh5yC0KZyhfx0qHCvVsk0Zg>

Discussion: A unique strength of this approach is the sense of empowerment a documentary atmosphere provides to the storytellers. Through this platform, they undergo a unique form of positive self-reflection. In filmmaking, the thematic outlines and footnotes are used to support a larger goal of communicating through aesthetic. In the GLNARCH filmmaking process, these notes and transcripts provide knowledge that researchers can use to further scientific inquiry. The nature of this knowledge is: 1) participatory, 2) culturally-responsive, and 3) compatible across disciplines. We further hypothesize that the film medium can be molded to both yield and deliver important health information to the community. Documentary filmmaking has long been used to promote various narratives from around the world. To our knowledge, this is the first attempt, and step, at codifying a method of scientific inquiry using the documentary filming process.

Tribal land-use, exposure pathways, and the importance of fate and transport of environmental metals.

Cherie DeVore, Carlyle Ducheneaux, Brenda Veit, Johanna Blake, Fenton Bowers, Claudia Roldan, Abdul-Mehdi Ali, José M. Cerrato, Melissa Gonzales, and Johnnye Lewis. Center for Native EH Equity.

The Cheyenne River Sioux Tribe has identified flood plain deposition of arsenic ranging from 21-221 ppm in a flood plain of the Cheyenne River. From the 1870's to 1980's millions of tons of mine waste was released into this river from the Homestake Gold Mine in the Black Hills. To evaluate risk, the tribe has documented land-use and cultural practices leading to exposure via ingestion, inhalation, and dermal contact with vegetation in the area, making it critical to understand how arsenic and other metals move from sediment into plant material. A similar situation exists at Laguna Pueblo where waste from the world's largest open pit uranium mine has accumulated for decades in sediments of Rio Paguete that runs through the Pueblo. These are specific examples from two of the 161,000 abandoned hard-rock mines (>4000 of which are uranium (U) mines) in the Western US, the majority of which are in states with the highest percentage of Native American tribal population in the country. Preliminary data from Cheyenne River samples, and more extensive analysis from Laguna highlight efforts of the Native EH Equity Center to understand and predict how chemical interactions and mobility of these metals will result in risks related to traditional land use and ceremonial practices of the tribes. In Cheyenne River sediment and plant samples, preliminary data showing increased arsenic in grass and tree roots within contaminated sediments in the winter. These studies will continue in the coming year, and results will be shared with USEPA for use in their site risk assessment for the tribe. In Laguna, elevated U concentrations (710 µg/L) in surface water below the mine significantly decrease (5.77 µg/L) downstream at a reservoir five km below the mine. Although U concentrations in stream water are high, there is limited accumulation in co-located stream bed and bank sediments. Possible contributors to these observations, suggested by our research, include the formation of aqueous complexes with carbonate and calcium as well as chemical incorporation of U to stream bed sediments in a wetland area 5 km below the mine. Paralleling our Cheyenne River findings, tree roots growing in areas of contamination along Rio Paguete also show increased uranium. The results from Laguna suggest that metals such as U and Pb can be uptaken by Salt cedar plants, primarily in the root system. Our study contributes to better understand the fate and transport of metals in surface water and sediments close to the mine waste, which is essential to determine human health implications resulting from exposure to these metals in neighboring communities based on traditional land use.

Currently, EPA risk methodology does not consider uptake of arsenic into plants, and addresses these risks only as uncertainty. The examples cited illustrate the ways in which the academic tribal partnerships of Native EH Equity are working to integrate the best TEK with the best science in ways that improve our understanding of risks and prevention strategies to improve health.

Collaborative Research Center for American Indian Health

AJ Elliott, ER White Hat, J Angal, V Grey Owl, S Puumala, & D Baete Kenyon, Sanford Research

The Collaborative Research Center for American Indian Health (CRCAIH) was established in September 2012 as a unifying structure to bring together tribal communities and health researchers across South Dakota, North Dakota and Minnesota to address American Indian/Alaskan Native (AI/AN) health disparities. This Transdisciplinary Research Center supports numerous multi-year and pilot research projects, as well as providing core resources to the region. All CRCAIH resources and activities revolve around the central aim of assisting tribes with establishing and advancing their own research infrastructures and agendas, as well as answering important questions concerning AI/AN health research. CRCAIH is comprised of three services divisions (administrative, community engagement and innovation, research projects) and three technical cores (culture, science and bioethics, regulatory, and methodology). This presentation will describe the overarching vision and structure of CRCAIH, as well as accomplishments and lessons learned in the first two years.

Center for Native American Environmental Health Equity Research (Native EH Equity)

Melissa Gonzales, Johnnye Lewis, Debra MacKenzie, Jose Cerrato, Chis Shuey, Laurie Hudson, Eszter Erdei, Deborah Keil, Yolanda Barney, John Doyle, Carlyle Ducheneaux, Marcia O’Leary, David Begay, Mari Eggers, Clarita Lefthand Begay, Vanessa de la Rosa, Joe Hoover, Lucia Rodriguez Freire, University of New Mexico

Nearly half of the Native American population of the United States lives in 13 western states where there are an estimated 161,000 abandoned hardrock mines, more than 4,000 of which are abandoned uranium mines. Because of their reliance on natural resources to maintain traditional diets, lifestyles, customs and languages, these tribal communities have direct and frequent contact with metal mixtures from unremediated mine sites, creating exposures through multiple pathways, including inhalation, drinking water, and ingestion of food sources either directly or indirectly contaminated by migration of the wastes. Exacerbating these exposures are disparities in infrastructure, especially drinking water supplies and unique social determinants of health including poverty in rural and isolated locations. The Center for Native American Environmental Health Equity Research is a NIH-funded collaboration of researchers from the University of New Mexico College of Pharmacy, School of Medicine, School of Engineering and Earth and Planetary Sciences, the Universities of Washington and Montana State, Southwest Research & Information Center, Missouri Breaks; and partners from Native American tribes including Navajo, Crow, Cheyenne River Sioux, and Pacific NW Coast tribes including Micah and Nisqually. This expert team will study the exposure of Native American communities to metal mixtures from abandoned mine sites, as well as provide training, mentoring and community workshops on Environmental Health in collaboration with Tribal Colleges throughout the Western US. The Center also strives to build native research capacity, the understanding of data, and interpretation and use of biomedical results across communities, as well as to develop a framework that characterizes the unique exposure pathways and defines health from a perspective not only reflective of tribal perceptions, but ultimately useful in informing regulatory decision-making.

Understanding the Gold King Mine Spill: Center for Native American Environmental Health Equity Research Investigations to Inform Risk

Joseph Hoover, Johnnye Lewis and University of New Mexico Center for Native EH Equity Research

On August 5, 2015 approximately 3 million gallons of mixed heavy metal liquid waste was released into Cement Creek from the Gold King Mine in Southwestern Colorado. Several days later the liquid flowed into the San Juan River, a critical agriculture and livestock water source for Navajo in the Four Corners area. The occurrence of the Gold King Mine spill is indicative of the potential for releases from the 161,000 abandoned hardrock mines in the western United States and the potential threats to ecological and human health in the rural and Native American communities in which they occur. For the San Juan River, abandoned mines as well as uranium mill tailings cells occur at multiple points, and have posed a concern for release of metals for decades

The Center for Native American Environmental Health Equity Research plans to work with the New Mexico Environment Department, Navajo colleagues and others in the affected communities in New Mexico to identify potential exposure pathways for future use of the San Juan, and to understand the geochemical, microbiological, and mineralogic properties of the metals and the river to develop a comprehensive understanding of potential risks that remain for communities along the river. The Center is looking at the long-term needs to understand 1) where the metals originally released have deposited; 2) what form they are in; and 3) under what conditions they will be likely to be remobilized into air and water and become available for exposure.

In an initial effort to understand these issues, the UNM METALS team through the Center for Native American Environmental Health Equity Research began collection of sediment samples on August 17 and 18. Analyses of geochemical and microbiological properties of these sediments are in progress to determine binding and mobility characteristics of the metals. We will also be working to determine potential mobilization in air of windblown metals in the floodplains, the associated particle sizes, and mixtures to be considered.

Our Stories Our Way: Creation of a Digital Story CKD Educational Intervention

Stacey Jolly¹, Marcia O'Leary² and Ashwini R. Sehgal³.

1 General Internal Medicine, Cleveland Clinic; 2 Missouri Breaks Industries Research Inc. and 3 Center for Reducing Health Disparities, MetroHealth Medical Center, Cleveland, OH

Background: Chronic Kidney Disease and End Stage Renal Disease disproportionately affects American Indian communities, yet there are few culturally appropriate educational interventions for this population.

Methods: Digital storytelling combines first person narrative with digital images and music and can be done with a community-based, learner-centered approach. With these digital tools, people create personal narratives that are powerfully compelling, emotionally engaging, and provide another view or perspective on a topic. We recruited 10 men and women with diverse life experiences related to health and kidney disease from an American Indian community to create digital stories. Each participant was mailed a pre-workshop information sheet about digital storytelling and were encouraged to bring pictures.

Results: We held a 3 ½ day digital story workshop with our partner nDigiDreams, LLC in Nov 2013 at a tribal college. Participants, their family members, and research staff worked together with the facilitators to create their personal digital story related to health and kidney disease in their words. A total of 10 digital stories were created. The process encompassed four areas: develop story idea, gather media such as pictures and music, record the voice parts/edit the digital story, and share or screen the digital stories among the group. Five stories about life on dialysis, having a kidney transplant, and making changes to control diabetes were selected to be in the final DVD.

Conclusions: We created a unique educational tool in the form of digital stories. The DVD has been used in an ongoing pilot observational educational trial looking at the impact on chronic kidney disease knowledge and health behaviors among American Indians.

Building a Trusting Network with Tribal Nations by Avoiding the Cultural Appropriation of Indigenous Knowledge Systems

Clarita Lefthand-Begay, PhD, American Indian Studies Department, University of Washington, Seattle, Washington, and Center for Native American Environmental Health Equity (Native (EH Equity) Research, University of New Mexico

Native Americans, the Indigenous peoples in North American, hold and retain knowledge systems that have been refined by their ancestors and families since time immemorial. Some European colonizers created a foundation of mistrust by systematically discouraging the intergenerational transmission of Indigenous knowledge systems (IKS). Nonetheless, Native peoples and Natives scholars are developing a strong resurgence of Native culture and epistemologies. In addition, western institutions, universities and corporations (i.e., pharmaceutical companies) are becoming increasingly interested in the utility of such IKS for a variety of reasons. Because of the historical legacies between colonizers and indigenous peoples, how these entities acquire and employ indigenous knowledge is concerning to indigenous citizens, and misuse of IKS may only widen this gap. It is therefore important to hear the voices of indigenous scholars and citizens who communicate their concerns in areas such as in indigenous research methodologies (IRM). In this poster, we will examine key notions discussed in the IRM literature, and highlight ethical and research guidelines developed by indigenous peoples across the globe. To do this we will review the literature about current IRM, guidelines and practices. Nationally, many tribal nations and institutions, such as the Navajo Nation and Tribal Colleges and Universities, have their own research review processes. These approval processes create guidelines for ethical research that uphold the values of these entities. These guidelines promote research that benefits community, builds capacity, promotes respect for tribal citizens, encourages the development of research partnerships and promotes the tribes' ownership and control of research data. Knowledge and wisdom held by tribes include decision-making frameworks for leaders and their social organizations, and are important for their self-determination, sustainability and wellbeing. The recognition and resurgence of indigenous knowledge systems is connected to self-determination, which includes a vision for improved human and environmental health. Therefore, it is important that the acquisition, transmission and storage of such knowledge is conducted by researchers in a manner that is grounded in the culture and ethics of these communities.

Responding to Community Requests: Outreach Programs to Address Tribal Community Questions.
Marti Lindsey, PhD, Outreach Director, Southwest Environmental Health Sciences Center (SWEHSC),
University of Arizona

Environmental quality is important to American Indian leaders and community members. The SWEHSC's bi-directional collaborative stance, for disseminating research results and addressing community questions through outreach, provides venues for sharing ideas about issues important to American Indian communities; environmental dust, arsenic in drinking water and the impact of solid waste on community health. The Gila River Indian Community (GRIC) with the Inter Tribal Council of Arizona (ITCA) asked the outreach group for assistance with development of educational materials and community engagement methods for their Community Action for a Renewed Environment (CARE) project funded by the EPA. Using outreach materials the CARE project reached over 900 members of the GRIC community via; (i) information walks about "Asthma and Allergies", "Diabetes and the Environment", and "Dangers of Pesticides and Household Chemicals", (ii) an information booklet about the five environmental issues important to the GRIC people, and (iii) presentations about the nature of toxicology, environmental health, and understanding risk. SWEHSC investigators provided information on; "Environmental Causes of Cancer", "Air Pollution and Human Health", "Environment and Genetics Interactions", and "Asthma, the Environment, and the National Children's Study." The risk ranking process showed the members were most interested in reducing the amount of solid waste in the community. As a result the outreach director assisted in writing grants to increase their curbside pick-up and recycling programs. As an outgrowth of the CARE project, the outreach director has presented at ITCA environmental working group meetings, with flyers developed for participants to use in community events, about; "Environmental Health Research Studies", "Principles of Community Engagement and Outreach Related to Environmental Problems", "Indoor Air Quality and Asthma Prevention Programs", "Water Quality and Environmental Public Health", "Risk Communication", "The Effects of Arsenic on Human Health", "Haboob Dust Storms and Human Health and most recently the Gold King Mine waste water spill." With advice from the SWEHSC Tribal Advisory Panel, the outreach group has conducted four "Youth Conferences for Health and the Environment", developed the Indigenous Stewards magazine, and created a model of Indigenous Environmental Health. With tribal partners, from ITCA, the Ak-Chin Indian Community and the Tohono O'odham Nation, the SWEHSC hosted the 2015 Tribal Forum, Tribal Stories of Health and the Environment: a forum to share how environmental exposures affect the health of tribal people, which was attended by over 100 representatives of eighteen American Indian communities in Arizona.

Study of environmental exposure to mixed metals on immune dysregulation and anti-nuclear antibody production in three different tribal communities

Debra MacKenzie, Eszter Erdei, Jennifer Ong, Curtis Miller and Johnnye Lewis

UNM College of Pharmacy-Pharmaceutical Sciences, Community Environmental Health Program
UNM Health Sciences Center, Albuquerque, New Mexico 87131

The high concentration of abandoned mine waste and rural nature of Tribal communities often brings community members into direct and frequent contact with low-level metal mixtures from un-remediated and abandoned mine sites, resulting in potentially toxic exposures occurring via inhalation, drinking water, and ingestion of food sources that are either directly or indirectly contaminated by wastes. The objective of our research project within the newly funded P50 Center for Native American Environmental Health Equity Research is to assess the relationship of metal exposures (determined through biomonitoring of blood and urine samples) with immunologic outcomes in individuals from three different Tribal communities exposed to legacy mine waste. The Navajo Nation currently has more than 500 abandoned uranium mines, the vast majority of which are unfenced, unsigned, and open to air and water transport of contaminated materials. These waste sites are in close-proximity to people's homes and are known to contain multiple heavy metals and metalloids, including uranium and arsenic. For more than a century, mining in the Black Hills has released contaminants including mercury and arsenic, into watersheds draining onto Cheyenne River Sioux (CRST) land. Additionally, several tons of airborne mercury is emitted from regional coal power plants making mercury virtually ubiquitous throughout the CRST reservation. In addition, arsenic is a major contaminant in water and sediment. Uranium mining affecting Crow Nation lands occurred in the Big Horn Mountains where runoff drains into the northerly flowing Big Horn River and specifically Yellowtail Lake. Testing on wells on the Crow Nation has identified uranium exceeding the maximum contaminant levels in 6.4% of wells, with manganese exceeding its secondary standard in 11.2%.

Our overarching hypothesis is that environmental exposure to mixed metal contaminants within these three Tribal communities results in immune dysregulation and development of biomarkers of autoimmunity such as anti-nuclear antibodies (ANA). Our preliminary data shows a higher than expected overall rate of ANA detection in both the Navajo and CRST community members (Crow samples have not yet been tested). Preliminary studies using Navajo samples demonstrate that there are increased levels of inflammatory cytokines in individuals with higher levels of excreted urine uranium, indicating potential immune dysregulation related to exposure. The design of this study affords the use of the same research approaches on three different Native American Tribal populations. The unique but overlapping metal exposures within the communities will help us to identify the negative health impacts of specific metals or metal mixtures on immune outcomes related to biomarkers of autoimmunity and development of immune system alterations. The combination of population studies with controlled experimental animal models will increase our understanding of the mechanisms by which metal exposures alter immune function. This understanding is a crucial first step toward developing both risk reduction approaches and potential therapeutic strategies. A major goal and innovation of this study is that it will build a common database across three Tribal communities of exposure and immunologic parameters that have never been compiled but will be crucial to establishing commonalities and overlaps in exposures and health outcomes in these Tribal communities for which significant health disparities exist.

EPA STAR Research: Community-engaged Research Integrating TEK and Western Science

Cynthia McOliver, PHD MPH, US Environmental Protection Agency, Office of Research and Development, Sustainable and Healthy Communities Research Program National Center for Environmental Research

This poster highlights several case studies from tribal grants that exemplify the importance of community-engaged research, capacity building and cultural relevance underlined by tribal ecological knowledge. These projects have yielded data, tools, products, methods and knowledge that have enabled tribal communities to better define and reduce the health risks, protect natural resources, and encourage the ecological knowledge and tribal practices of protecting and preserving the earth for future generations. The projects were funded under the U.S. EPA National Center for Environmental Research Science to Achieve Results (STAR) program, which has provided extramural funding related to tribal health and sustainability for over ten years and across various media and exposure scenarios.

The Native TEACH Project: American Indian Environmental Health Stories

The Native TEACH team, including: Valerie Segrest, Leora Gansworth, Roger Fernandes, Tleena Ives, Jessica Porter, Elizabeth Campbell, Romajeon Thomas, Janice Brendible, Michelle Montgomery, Marilyn Hair, Jonathan Sharpe, Rose James, Kelly Edwards

The University of Washington Center for Ecogenetics and Environmental Health (UW-CEEH) Native TEACH Project began in 2009 as a collaboration with Northwest Indian College to understand human-environment interactions through the lens of tribal members' knowledge, beliefs, and understanding. Through community conversations, surveys, and focus groups with elders, tribal members, and college students, an environmental health story, *The Return*, was created. The story centers around three core themes of Native environmental health: Community, Wellness, and Inter-Relationship. In 2013, a comic book version of *The Return* was published. In another collaboration with the University of Arizona Southwest Environmental Health Sciences Center, UW-CEEH received an NIEHS Supplement Grant entitled *American Indian Environmental Health Stories*. Native American researchers from Washington state tribes held discussion groups with tribal members in seven rural and urban Indian communities on the topic *What does environmental health mean in our community?* Conversations captured the richness of sharing stories to build capacity and find solutions to environmental challenges out of a deep understanding of place. Products resulting from the 2014 Native TEACH project included an art show, a children's book, a digital story, calendar blog, and Facebook page. The University of Arizona published a Native Environmental Health magazine, *Indigenous Stewards*.

Partnerships for Environmental Public Health at NIEHS

Liam O'Fallon, Director, PEPH, National Institute of Environmental Health Sciences

The National Institute of Environmental Health Sciences (NIEHS) established the Partnerships for Environmental Public Health (PEPH) in 2008 as an integrative model to foster interactions among projects from different NIEHS-funded programs with a focus on community engagement and commitment to public health action. Through coordinated efforts, this network of grantees are able to come together around shared interests in research approaches, communication methods, training strategies, and evaluation methods. In addition it enables grantees to coalesce around common themes such as health outcomes, populations, environmental exposures, and collaborative partnerships. As an integrative program, PEPH has also promoted interactions among NIEHS program staff to explore crosscutting needs within DERT, make connections, and develop new initiatives.

PEPH has three central goals: (1) coordinate programs and projects that involve community-university partnerships; (2) develop and evaluate communication strategies; and (3) create and distribute materials that build upon and leverage the work many of our grantees are conducting to increase environmental health literacy. Since 2008, PEPH has been successful in establishing a network of grantees that discuss, learn from, and advance their common experiences, approaches, and materials related to environmental public health. As a network, PEPH facilitates the exploration and advancement of cross-cutting issues. Finally, PEPH has provided NIEHS staff with a roadmap for strategic program development.

Dialogue on the pros and cons of genetic research for Tribal communities

Marcia O'Leary, David Begay, Johnnye Lewis, Melissa Gonzales, University of New Mexico

The Center for Native EH Equity is developing a process of outreach to tribal members on genetic research in order to inform and begin a dialogue with communities to understand pros and cons, and how to both benefit from the pros and protect against the cons in a way that is consistent with the perspectives of the tribal population, and leaves the process within tribal control

Tribal communities have valid reasons to be wary of genetic research. The list of misdeeds is long and distinguished including but not limited to the misuse of samples by researchers working with the Havasupai tribe; the development of Taxol, a cancer drug which after being developed through Tribal knowledge and the native tree Pacific Yew was synthesized after all the trees had been destroyed; and the Iodine 131 Experiment in Alaska. Equally important is acknowledgement of the benefits and potential of research in American Indian communities. The precision medicine initiative which is aimed at making health care more accountable to and for the people it serves is an opportunity which builds on existing knowledge. From knowing responses and biological clearance to pharmaceutical products, to developing standards of care and interventions for medical conditions, to infant growth indicators - understanding requires data. The wellness of individuals depends on the wellness of communities. Tribal members are equally affected by epidemics as they are by government policies that reduce funding to entities that do not utilize the newest and the latest scientific queries. Genetic research at all levels of society has and is continuing to take place regardless of moratoriums and regulations. The development of educational methods, marketing techniques of grocery stores and fast foods, genetic research at teaching hospitals and investigators operating outside the borders of Tribal governments, the advance of seed companies and livestock genetics, mandatory genetic sampling as part of criminal arrests and the military samples as part of mortality forensics are examples of research taking place in the full view of Tribal communities. Many of these efforts are useful, some are unethical; nearly all will have economic, cultural and long term influences in the world we know. Understanding that health is contextual is critical to promoting better outcomes. Tribal communities have both an opportunity as well as an obligation to become partners in the dialogue on research.

By ensuring that tribal members are informed and understand accurately benefits and the hazards of genetic research, mechanisms for protection against the hazards can be evolved through informed discussions that allow tribes to control the process and protect their members from the pitfalls. The alternative poses the risk of limiting health care opportunities, and undermining the authority of tribal policies as unethical researchers learn to sidestep the process.

Alabama Fire College Workshop Safety Program

Kenny Oldfield, CIH, Director Workplace Safety Training Program, Alabama Fire College

The Workplace Safety Program of the Alabama Fire College receives funding through a cooperative agreement with the National Institute of Environmental Health Sciences to provide hazardous materials response training to two populations. This includes public sector responders in southeast United States and Native American tribes. This poster highlights the types of training available to Native American responders through relationships with the Native American Fish and Wildlife Society and the United South and Eastern Tribes.

Indigenous Intervention Science Model for Alaska Native Communities

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This poster describes process and outcomes of an indigenous, ecological model for intervention science. We describe how the development of a Yup'ik Alaska Native model of community intervention involved the translational of traditional cultural knowledge and practices into health interventions. Goals of the local indigenous model are to organize implementation of a community health intervention and intervention research/scientific inquiry using an approach consistent with the worldviews and traditional cultural practices of rural Yup'ik Alaska Native community members. Objectives are to test impact of a community-level, cultural intervention to prevent health disparities in suicide and alcohol use disorder among Yup'ik youth age 12-18 to establish an evidence base for its effectiveness.

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