



Umax Jakañataki – Water is Life

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ABSTRACT

For Andean people, economic, spiritual and social life, are inextricably tied to land and water (**Figure 1**). The Aymara of Chile are a small geographically isolated minority who are struggling to maintain their sustainable traditional systems of irrigation water distribution, agriculture, and pastoralism in one of the most arid regions of our world, the Atacama Desert (**Figure 2**). Together we explore the ethnoecological dimensions of the conflict between externally imposed unsustainable development and the Aymara Marka (Nation) sensitive cultural and natural resource base. The Aymara people are proactively engaged in protecting their sacred resources from further toxic mining, water pollution, diversion and appropriation, international highway development, landfills, hydroelectric and geothermal development, desecration of their natural and cultural properties, and introduction of GMOs into their organic sustainable agricultural and agropastoral systems in the most impoverished province of Chile, highland Parinacota (**Figure 3**).

Key Words: Aymara, water, earth, life, Andes, land, sustainable, sacred, resources, development



Figure 2: Desertic Plateau

Through USAID and the International Cooperative Biodiversity Group Project, we conducted participatory social and environmental impact and needs assessment with the Aymara people in the Andes of northern Chile along the UNESCO-designated World Heritage Qhapaq Ñan - Andean Road System and within the UNESCO International Biosphere Reserve – Parque Nacional Lauca in an attempt to understand Aymara perspectives on externally imposed unsustainable development within their sacred homeland. Our work is about giving voice to the Aymara people (**Figure 4**). The findings, based on Aymara knowledge are to aid in understanding Aymara needs and respecting and appreciating their cosmological vision – “jaqin uraqpachat amuyupa.” Jaqin Uraqpachat Amuyupa is the Aymara cosmological vision - Aymara people’s thinking about the world (Justino Llanque-Chana, personal communication, 26 April 2002).

We are partnering with Coordinadora Aymara de Defensa de los Recursos Naturales, Arica y Parinacota, Chile in direct response to the



Figure 3: Jallalla Suma Pachamama



Figure 4: Fiesta de San Andres, Pachama

preferences and concerns of the Aymar Marka, which is to safeguard their watersheds from further contamination by the spoil from mining activities (**Figure 5**). “Chile public water agencies have conducted studies on the water but they are very biased. We can contribute to its improvement and know the origin of the contamination and require the Chilean state to generate mitigation measures.” – Coordinadora Aymara de Defensa de los Recursos Naturales, Arica y Parinacota (CADRN).

CONVOCATORIA FEBRERO 2018

Las organizaciones ambientales, sociales, indígenas invitan a **todos los interesados** a:

a) Realizar una reunión **VIA SKYPE** con el encargado Gianfranco Pincetti Zuñiga sobre el “Estudio de calidad de aguas en la región de Arica y Parinacota: extensión de la contaminación de arsénico afectando a áreas remotas del norte Chile” a realizarse el **VIERNES 23 de FEBRERO a las 18:30 horas** en la sede del Colegio de Profesores ubicado en 18 de Septiembre N° 1230, al lado del SAPU, esquina Chiloé (Al frente de la Universidad Santo Tomas).

CONVOCAN Junta de Vigilancia del Río LLUTA, Comunidades Indígenas de SOCOROMA, MULLURI, SAN FERNANDO DE TACORA, PARINACOTA CHUCUYO, LUPICA, APR Comunidad de BELEN, Organización Ambiental SALVEMOS CHINCHORRO, Parlamento Pueblo Quilana Aymara, COSOC Ambiental, Coordinadora Aymara Defensa de los Recursos Naturales.

Hacemos un llamado a colaborar en este PROCESO DE DEFENSA DE LOS DERECHOS DE LOS PUEBLOS INDÍGENAS, DEL MEDIO AMBIENTE Y DE LA CALIDAD DE AGUA EN NUESTRA REGION.
Se ruega puntualidad y colaboración a la difusión de esta invitación.

Arica, Febrero del 2018.-

El medio ambiente solo tiene una sola oportunidad para defenderse, en cambio las empresas mineras tienen muchas oportunidades para presentar su proyecto



Figure 5: 5a. Convocatoria - Defensa de los Derechos de los Pueblos Indígenas, del Medio Ambiente y de la Calidad de Agua en Nuestra Región

“An important issue is in relation to water in Arica y Parinacota, a special region with five watersheds and the only hydrographic basin in the highlands (**Figure 6**). Pollution of the Rio Lluta and Lauca River basin is increasing each year. This endangers the entire watershed, biodiversity, and quality of traditional agricultural projects of the Aymara communities. Our goal is to make a study or analysis of the waters of these basins. The results will allow us to know the sources of contamination and the water quality. This can project to tourism with special interest in the region; having knowledge of our water from an Aymara cosmological vision and



Figure 6: Qutaqutani

technical vision of the importance of water quality... Public water agencies and mining companies always say that mining will not pollute the water. We can do something deeper, accompanied by a process of education of the culture of water with full participation of the community.” – Coordinadora Aymara de Defensa de los Recursos Naturales, Arica y Parinacota (CADRN).

“We thank you for the support and we continue resisting the mining intervention. I hope the Pachamama continues to give me the wisdom to face this situation. Jikisinkama munat kullaka (until we meet again dear sister) Amy.” - Richard Antonio Fernandez Chavez, Coordinadora Aymara de Defensa de los Recursos Naturales, Arica y Parinacota (CADRN).

The subsistence of the Aymara people depends on *uma* – water, the rains and snow, the source of all life (**Figure 7**). The Aymara know each and every

“Water is everything, for us it is as important as the earth.”

—AYMAR AWATIRI (PASTORALIST)

source of water within their territory and all are used for religious and practical purposes. Aymara ritual performances associated with water are absolutely necessary to attract all the bounties of nature and to ensure their entitlement to resources. *Phuju* (springs) are the source from which animals

emerged from the innermost part of the earth to the surface (**Figure 8**). The spring deity is *Samiri*, “breath of life.” *Samiri* encompasses springs, bofedales (wetlands) lagunas, rivers, small lakes, and streams and is revered as the generator of life and strength for animals. Springs are the creation place of animals and a vital life force remains localized there. Springs are where the llamas are born and where their *illa*, (image) is reflected in which magical virtue is attributed. Highland springs are considered as the center of each community and the source that encourages the unity of people and supernatural forces within the Aymara reciprocal system. Deities travel along watercourses and rivers and distribute land and *juqhu* (bofedales boglands) to each family.

Springs and mountains are associated with raising animals (**Figure 9**). Mountains are the source of irrigation waters for parched fields and pastures, to which the mountain spirits are connected in a most



Figure 7: Umax Jakañataki



Figure 8: Phuju, springs are the creation place of animals

intimate way. Springs, the source of animal life are considered the center of equilibrium of the Aymara community. Although the water resources in the region are scarce, the greatest difficulties lie in the chemical constituents of the water for drinking and irrigation due to natural and anthropic factors that are responsible for the high levels of arsenic, boron, and fluoride in the waters of the valleys, particularly the Lluta Valley, Chaca, and Camarones.



Figure 9: Wallatiri

The sustainable management, availability and quality of water resources for domestic, agricultural and industrial consumption are essential to ensure the subsistence livelihoods of the Aymar Marka (**Figure 10**) and the perpetuity of fossil water, a non-renewable natural resource with a very slow



Figure 10: Aymar yapuchiri, Azapa Valley

rate of recharge. In recent years, various studies promoted by the Chilean government through the Ministries of Public Works and Agriculture, Research Centers such as Laboratorio de Investigaciones Medioambientales de Zonas Áridas (LIMZA), Centro de Investigaciones del Hombre en el Desierto (CIHDE), Centro Nacional de Investigación para la Gestión Integrada de Desastres Naturales (CIGIDEN), CEDEON, the Aymar Marka, the Departamento de Medio Ambiente del Colegio Médico - Department of Environment of the Medical College, the Universidad de Chile, Presidente Dr. Andrei Tchernitchen, among others have served to establish regional priorities that include the improvement of water quality amid the high levels of arsenic, boron and other toxic elements. They also work to improve resource management through the development of APR, Chile, i.e. Agua Potable Rural, services that are provided in territorial areas classified as rural or agricultural in accordance with the respective instruments of territorial planning, such as The Regulatory Plan. APR is the Diffusion Program of Chile's Rural Potable Water, hydrogeological, and environmental issues and reservoirs.



Figure 11: Copaquilla spring

“We are defending the watersheds – the source of life, from its birth in the Andes to its mouth in the sea.”

—COORDINADORA AYMARA DE DEFENSA DE LOS RECURSOS NATURALES, ARICA Y PARINACOTA, CHILE

The present project titled, “Water Quality Study in the Region of Arica and Parinacota: Extension of Arsenic Contamination Affecting Remote Areas of Northern Chile” seeks to provide basic information on the chemical constituents and quality of water, with a special focus on arsenic, which is considered highly harmful to health, even in low concentrations. The emphasis of this study is to evaluate the chemical quality of water for consumption, primarily from subterranean



Figure 12: Aymar yapuchiri

sources including natural springs and superficial channels (**Figure 11**). For this investigation, interaction with rural communities, predominantly Aymara, are fundamental since the perspectives of the people, their intimate knowledge of the area and other relevant information will be utilized in defining sites for measuring parameters in the field and water sampling. In addition, open fora will be held to disseminate information on the subject of water quality and to listen to the perceptions and local experiences concerning this topic.

The results of the research project will be shared with communities and local authorities as well as contributing to the preparation of scientific articles with international impact. The project objectives are to study water quality parameters in the field (in situ) and to collect samples in order to determine the extent of arsenic contamination in the water used for drinking and agriculture (**Figure 12**). This will contribute to the chemical database for the waters of the region to contrast previous results and to evaluate possible changes in the natural systems.



Figure 13: Borax mining Salar de Suriri

Specific objectives of this investigation are to collect samples (multi-elements and stable isotopes of water) and the measurement of parameters in situ, including the estimation in the field of the total arsenic concentration. The focus is on groundwater and secondly, surface water according to availability and access. The arsenic level in groundwater will be recorded, where possible.

An important objective is to convene and engage the rural communities in an informative discussion titled “Chemical Quality of Water for Human Consumption: Importance, Advances and Risks Associated with Pollutants in the Region of Arica y Parinacota.” The samples will be analyzed (major, minor, traces and stable isotopes) to obtain a geochemical characterization of the Lluta Valley River basin and the main basins of the Region. This work will determine the possible influence of human activities, especially mining (**Figure 13**) on the quality of the water, with a focus on water used for drinking. The results will be compared with previous studies to evaluate the evolution of the chemical quality of the water.

Validated data will be utilized for the study of the geochemical evolution of waters through

geochemical modeling using The Geochemist’s Work Bench (GWB) software: <https://www.gwb.com>. The Geochemist’s Workbench is the standard for geochemical modeling in aqueous systems. It is used to create Eh-pH diagrams, calculate speciation in solution, trace reaction paths, model reactive transport in flowing groundwater, etc. A map will be created to indicate the distribution of arsenic concentrations in the areas studied.

The hypothesis is that arsenic contamination and other metals present in the region is largely due to geographical factors such as the presence of highly reactive volcanic minerals in the headwaters of the rivers and is accentuated by mining activity development in the region. The predominant conditions in the extreme north are the scarce development of aquifers, relatively shallow groundwater, high salinity, and possibly high boron, fluoride, and iron content. Arsenic concentrations are expected to be higher in surface waters with an influence of thermal waters at the head of the valleys.

The collaborators in this significant study include Coordinadora Aymara de Defensa de los Recursos Naturales; Arica y Parinacota with Aymara Community Coordinator Richard Antonio Fernandez Chavez; The University of Manchester, United Kingdom; Professor David Polya, specialist in the study of arsenic in Asia; Dr. Laura Richards, Associate Researcher and specialist in the study of arsenic in Asia; The University of Chile, Santiago with Dr. Linda Daniele, specialist in hydrogeology and hydrogeochemistry; Giselle Placencia, a student studying hot springs in Huasco and Pica; and a field assistant to be determined. This list of collaborators will be expanded, as more local collaborators join this important initiative.

“It is important to hear the concerns of our community. We must be able to decide our future equitably.”

— AYMAR YAPUCHIRI (AGRICULTURIST)



Figure 14: Chunkara pastoralists and artisans



Figure 15: Judith Bustamante and nephew, Puxtiri

Development in the Andes must consider the individual and collective needs of the Aymara people and their Nation, in their terms. Environmental transformation must be grounded in a careful understanding of the Aymara and their way of life. Our collaborative partnership with the Aymar Marka attempts to contribute to that understanding (**Figure 14**).

Aymara people are knowledgeable experts who are on the frontlines of climate change. They live in a closely defined reciprocal relationship with nature therefore disruption of the inherent homeostasis

in their way of life is critical. We must listen to these teachers and stewards of the environment, which sustains all life. Integrity of the environment and the health, safety, and welfare of the human community shall at all times be placed above any sectoral or private interests (**Figure 15**). Aymara people have the right to the conservation and protection of their environment and the productive capacity of their lands, territories, and resources. Sustainable, equitable development meets the needs of the present without compromising the ability of future generations to meet their own needs (**Figure 16**). It necessitates meeting the basic needs of all and extending and ensuring equitable opportunities to satisfy their aspirations for a better life.

Understanding the *Jaqin Uraqpachat Amuyupa*, the Aymara cosmological vision and the cultural significance of Aymara sacred and ceremonial places, is essential for effectively assessing the social and environmental impacts of imposed development within the Aymara holy land. The dynamics and intricacies of Aymara traditional systems are seldom comprehended and respected, making it difficult to realize the gravity of the desecration of Aymara sacred resources, and the disequilibrium of the homeostasis in their way of life. The Aymara define themselves in terms of their cosmological universe and local geography. Their homeland is imbued with cultural significance and the meaning of places, lineages, history, oral tradition, and teachings that permeate their landscape. Their cosmological vision serves to keep our world in balance. The destruction of Aymara sacred resources and ceremonial places raises human rights and legal concerns, and violates the United Nations Declaration on the Rights of Indigenous Peoples.



Figure 16: Parinaquta Aymar tayka & wawa

FURTHER READING

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ABOUT THE AUTHORS



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Amy Eisenberg is an ethnoecologist, botanist, scientific artist, and organic sustainable agriculturist and agroforester who conducts collaborative research with indigenous peoples of Asia, the Pacific, South America, and North America. "Aymara Indian Perspectives on Development in the Andes" is her new book; a collaborative project with the Aymara people. She became an Associate Scholar with the Center for World Indigenous Studies in 2006 while serving as an International Expert at Jishou University's Research Institute of Anthropology and Ethnology in Xiangxi Autonomous Prefecture in Hunan with ethnic minority graduate students of China. She conducted participatory research with the Kam people of China through

the UN Permanent Forum on Indigenous Issues and UNESCO - Local and Indigenous Knowledge Systems. Photos of her work by professional photographer John Amato, RN can be viewed at: www.pbase.com/jamato8



Richard Antonio Fernandez Chavez

Richard Antonio Fernandez Chavez, from the Aymara people, fifth generation, comes from a modest family belonging to the Aymara community of Socoroma, located in the foothills of the commune of Putre, Arica y Parinacota region. He enters the University of Tarapacá in 2000, where he creates the Asociación de Estudiantes de Pueblos Originarios, and he is chosen Jilakata of the indigenous organization. He manages to obtain a space at the university to strengthen the cultural identity, as well as the creation of an Indigenous home called "Tupac Amaru" and a scholarship for indigenous students. Unfortunately, due to economic problems, he could not continue his career at the University. In 2004, he stands for the the Aymara

Communities for the Water Extraction project in the Altiplano, situation that threatens the subsistence of the Aymara communities, achieving the withdrawal of the government. In 2005 he was elected as Aymara councilor of the Arica commune of the National Council of Mallkus-T'allas of the Arica and Parinacota region, where he formed the Indigenous Law, Indigenous Women and Natural Resources committees. In 2007 he creates the Asociación Indígena Centro de Investigación de las Artes y Cultura de los Pueblos Originarios, which implements a training process for the Aymara community members regarding human rights, sectoral laws and historical, linguistic and cultural aspects of the Aymara people. In 2009 he creates the Aymara Coordinadora de Defensa de los Recursos Naturales whose purpose is to protect the subsistence resources of the Aymara communities, for the continuity of their existence against extractive projects, specifically miners, national and transnational capitals. In 2011, he enters the Faculty of Law of the Universidad Mayor de San Simón in Cochabamba, Bolivia, through the Andrés Bello Agreement, and with this academic training he provides advice to the communities on human rights issues of indigenous peoples, environment and in the coordination of territorial defense and its natural resources. He is currently preparing his thesis to practice advocacy.



John Amato

John Amato has been a professional photographer for over 35 years with skills ranging from documentation of collaborative research with minority cultures to scientific and natural history photography. John has worked with The Bureau of Applied Research in Anthropology Native American Cultural Resource Revitalization Program at The University of Arizona. John has published in various journals and books for higher learning and research studies. John has also worked in many remote areas through UNESCO-LINKS, UNPFII and UNDESA in China and through USAID and the International Cooperative Biodiversity Group project in northern Chile with the Aymara Nation.

John is also a registered nurse and has worked in cardiac critical care, ICU, trauma, ER and medivac. He has also taught and performed onsite medical care in China, Micronesia, Tibet and other localities. In Micronesia he set up an eye examination process and gave out glasses to correct vision and checked for cataracts. Diabetes and heart health have also been taught to the population at large.