

REDUCING CLIMATE AND OTHER RISKS THROUGH NATURE-AIDED AND
FAITH-BASED EXPERIENCES BY PERUVIAN TERRACE FARMERS

Kashyapa A. S. YAPA
1626, Juan de Lavalle, Riobamba, Ecuador
e-mail: kyapa@yahoo.com

ABSTRACT

Terraced landscapes and irrigation systems help the Andean farmer partially write-off certain climatic risks. To predict climatic events he uses nature-based indicators. His harvest still face the risk of being wiped out by a severe frost or a plague. Hoping to reduce all such farming risks, he performs rituals to appease the deities of Andean cosmovision, expecting them to reciprocate and bring him a decent harvest. We present a summary of these ancestral practices, collected through extensive on-field interviews of expert farmers from central and southern Peruvian Andes.

Keywords: Andean agriculture, climatic risks, bioindicators, plant diseases, plagues, rituals, ancestral knowledge

RIDUZIONE DI RISCHI CLIMATICI E DI ALTRO TIPO CON METODI NATURALI
E APPROCCI BASATI SU ESPERIENZE RELIGIOSE PRATICATI DA AGRICOLTORI
PERUVIANI SU COLTIVAZIONI A TERRAZZA

SINTESI

Terrazzamenti e irrigazione sul loro lotti aiutano il contadino andino per rimuovere parzialmente determinati rischi climatici. Lui usa gli indicatori della natura per predire eventi meteorologici. La sua raccolta è ancora soggetta ad essere spazzata via da un gelo duro o parassiti. Sperando di ridurre i rischi agricoli, si esibisce in rituali per placare gli dei della creenza andina, sicuri che, in cambio, essi permetteranno di avere un buon raccolto. Presentiamo una sintesi di queste antiche pratiche, riportata in ampie discussioni con esperti nel campo dell'agricoltura andina del Perù centrale e meridionale.

Parole chiave: agricoltura andina, rischi climatici, bioindicators, fitopatie, piaghe, rituali, conoscenze ancestrali

INTRODUCTION

The Andean climate varies significantly as one ascends its steep hills. However, the elevation alone cannot define the climate of an Andean farm plot. Over 5000 km long and over 5000 m high Andean range, consisting of several parallel chains, encompasses a substantial fertile and arable landscape where many millions make a living out of agriculture. This mountain range separates extensive masses of humid air from both the Amazon basin and the Pacific Ocean, but inserts a narrow, bone-dry desert between these two, setting up a very complicated weather system. Finding a geographical niche in the Andes with a regular, annual rainfall pattern is nearly impossible. The variation of temperature is a bit more predictable, even though extreme hot or cold fronts may appear abruptly, bringing frost or hail storms at any time.

The Andean farmer has learned to survive in this harsh climate, cultivating many different products at as many different ecological niches as he can gain access to (Murra, 1972). This practice does not reduce the risk of loss in each plot, but avoids the total loss of food and seeds and provides him with a cushion to survive until the next harvest.

Wherever possible, he also attempts to modify his farming landscape, by preparing terraces, for example. A bench terrace with a stone facing would help him control the frost at macro and micro levels (Denevan, 2001). On one hand, the cold air descending the slope would be broken-up by the stairs-like terracing. On a micro level, the heat absorbed by the stone wall during the day warms up the air around the plants during a freezing night. In addition, a terrace reduces soil erosion to a minimum; helps infiltrate the rain or irrigation water; and maintains the moisture longer in soil.

Irrigation water, if available full time, would provide another layer of protection against unpredictable weather: keeping the furrows full of water reduces the damaging effects of a short frost attack on young plants; sprinklers could wash ice-laced leaves before a bright sun would burn them. On the Andean Pacific flank, where yearly rainfall could be less than 50 mm, irrigation water acts as farmer's lifeblood. Even in other areas, if the rains come late, irrigation could save at least a part of the production.

However, a three to four days long frost, a hailstorm, a heavy rainfall or a lasting drought could still destroy the farmer's entire food production, leaving nothing even for seeds. Apart from these, a farmer family faces many other uncertainties. A farmer never knows how many seeds she planted would germinate. Plagues and plant diseases may attack not just one plot, but a whole region. An accident at work or any other health problem of a family member could incur heavy financial burdens, causing difficulties in organizing the farm work at precise occasions. Yet, the greatest risk of farming lies in

the selling price of the marketable harvest, as intermediaries control it completely.

How would you add a layer of safety to a farmer's life, engulfed in so much uncertainty? In rural Peruvian indigenous communities, farming is practically a collective activity. A farmer may possess a few hectares of arable land in total, but that is usually the sum of many small patches of land, spread out over various ecological niches in and around the village, each surrounded by the plots of her neighbors. A hailstorm or a plague attack would affect not just a couple of farmers but almost everybody in the community. Hence, she can summon the collective wisdom of her neighbors to reduce the risk of such incidents, or to minimize the damage from them. This vast pool of resources, enriched over generations of shared farming experiences in the same locality, incorporates observational knowledge of nature-based indicators and ritualistic appeals to deities for help.

INVESTIGATIVE METHODOLOGY

This paper summarizes certain aspects of ancestral agricultural expertise, collected from small, rural farmers in central and southern Peruvian Andes. *Asociación Andina Cusichaca*, a Peruvian NGO, gathered these testimonies as a part of a project sponsored by the Peruvian Ministry of Agriculture and the Interamerican Development Bank. This project intended to promote ancestral agricultural practices among young *campesinos* (farmers) through a field school where the testimonies of expert farmers would form a teaching tool.

Since the colonization of the Americas, the authorities have suppressed and condemned ancestral practices and knowledge systems of the farmers, because farming in the colony had a new meaning: that is, producing wealth for the hierarchy. The independence did not change the attitude towards farming, only it changed the oppressors. Over the last few decades, this oppression took a new form: in the name of modernization, government technical extension officers began to impose upon the farmers "green revolution recipes" while continuing to condemn ancestral practices. This long history of subjugation caused the loss of a good part of this ancestral knowledge. The farmers who still practiced it had no incentive to reveal that information. Gaining their confidence was the key to access this treasure.

However, the vast coverage area of this particular project and the short time period allocated for field visits made it very difficult for our research teams to gain the confidence of the farmers. Besides, we wanted them to not just provide the information, but also be directly involved in running the agricultural field school. We proposed to the Ministry that the school should be conducted not by technical officers, but by expert farmers themselves, in their own farm lots. Because of time and budget constraints in reaching remote municipal districts, picked by the Ministry of Agriculture, we also

requested that its extension officers accompany us on our field visits. When Ministry officials presented us to large gatherings of village farmers, we did not collect the testimonies in public. Instead, we asked them to name a group of expert farmers, with an aptitude towards teaching the young, irrespective of their level of formal education. We wanted that group to take us on a short tour of agricultural fields, so that we can collect testimonies on site.

Even though the farmers received us with trepidation, being a part of a government program, the idea of using farmers as teachers in this school apparently coincided with their own thinking, and we won their confidence right away. Besides, the technical personal with strong farming backgrounds who led our research teams could quickly put the farmers at ease, greeting them the traditional way, and in their own languages. Having at least one female member in each team also facilitated gathering information from women.

The interviews were of semi-structured nature, which allowed us to modify the questions depending on the expertise of a particular informant. It helped maintain the fluidity of the conversation and permitted us to press for more details only when the situation warranted.

USE OF BIOINDICATORS TO PREDICT THE WEATHER AND THE HARVEST

The farmers use their observational and memorizing skills to interpret nature-based indicators and predict local weather patterns during the coming agricultural campaign. The scientific method, that uses historical trends of measured values of weather components, is too unreliable to forecast weather beyond a few days because of the interdependency among many of these components. Thus, even the most experienced meteorologist, armed with the state-of-art equipment, would not dare attempt an agricultural-campaign-long prediction.

Yet, the Andean farmer's bag of tools has several advantages over that of the meteorologist. She has access to a wealth of information, handed down to her by past generations, on what happened to agricultural production as a whole (not how individual elements in weather equations varied), analyzed using specific signals from a large set of indicators. All those observations would have originated from the exact region over which the prediction is made, while the meteorologist is forced to extrapolate his data from many distant points. The farmer's set of indicators involves daily observable celestial

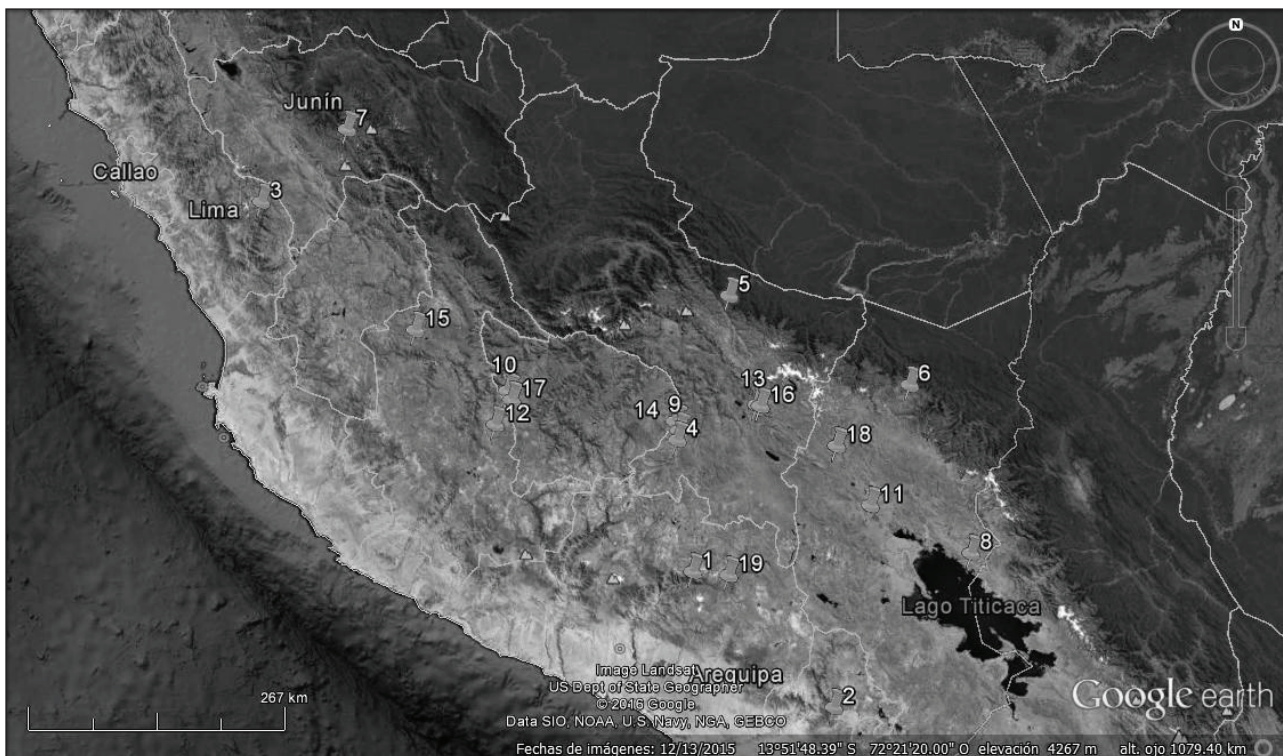


Figure 1: Map of the Peruvian communities mentioned in the paper

1. Cabanaconde, 2. Cambrune, 3. Carania, 4. Ccoyo, 5. Challabamba, 6. Coasa, 7. Comas, 8. Conima, 9. Lutto, 10. Paico, 11. Pucará, 12. Qarwarasu, 13. Queromarca, 14. Quiñota, 15. Quispillacta, 16. Raqchi, 17. Soras, 18. Urquhararapampa, 19. Yanque.



Figure 2: Ritual for mountain deity in Apu Qarwarasu (Courtesy of Mr. Adripino Jayo, Ayacucho, Peru).

elements, certain climatic phenomena and many types of animals and plants, including the crops themselves.

"If rain falls slowly throughout the day on the 8th of March, we can expect a good potato production during the agricultural season starting in September. Heavy rains on that day may signal floods. Similar weather on March 19 will confirm that prediction. If a mist engulfs the hill slopes on the 19th, plots in the slopes would yield better harvests than those in the plains" (CHUYMA ARU, 2007, 32 & 34). Conima, Moho Dist., Puno, Puno¹.

"If Pleiades (a cluster of stars) appear bigger and brighter early in the morning of June 24th, a good harvest will accompany us" (AAC, 2015, 8). Coasa Dist., Carabaya, Puno.

"If *Laqu* (an algae - *Spirogira*) appears with a lot of flowers, we can expect a good year" (CEPROSI, 2009, 42). Queramarca, Tinta Dist., Canchis, Cusco.

"If the fields are covered with the bluish Tankar flower, the *haba* beans (*Vicia faba*) will yield a good harvest" (AAC, 2015, 9). Pinchollo, Cabanaconde Dist., Caylloma, Arequipa.

"When the *zorro* (fox - *Lycolapex Inca*) cries out with a clear voice, he signals a bad year for potatoes. If he cries as if his mouth is full of food, a good season can be expected" (AAC, 2015, 9). Yanque Dist., Caylloma, Arequipa.

The village wise men interpret and compare hundreds of such signals to understand not just the weather, but also which crops will yield better harvests and where. Since not all the signals appear before land preparation time, they keep watch on them until the planting time. Some signals also indicate whether to plant earlier or later in the season to reduce climatic-anomaly-related losses.

1 The testimonies are attributed to the whole community when several experts from the same place were consulted. The location is given in the order: community, district, province and region, based on Peruvian political administrative system. If a location is given starting with the name of the district, the experts reside in the district capital. To precisely locate an address, use the listings of Peruvian political divisions.

"We watch the weather on the first three days of the month of August. If clouds or rains appear on the very first day, early season planting will produce better results" (AAC, 2015, 39). Quiñota Dist., Chumbivilcas, Cusco.

USE OF RITUALS TO PREDICT HARVESTS AND TO PROTECT CROPS

A few communities still maintain ritualistic crop trials that help them decide what crop to plant and when.

"On a special day in September, we ritually plant all types of crops at a sacred site near the spring that feeds our canals. That site is divided into three equal parts, each representing a particular planting season (early, normal or late). A year later, all the local authorities take part in the ceremony to harvest the crops at that location. The results of this trial allow everybody in the province to decide which crop to grow and at what planting season, in order to maximize the harvest in the year to come" (AAC, 2015, 10). Lutto, Llusco Dist., Chumbivilcas, Cusco.

When severe weather conditions threaten every family's food stocks, the community acts together, seeking help through rituals to save the agricultural campaign.

"When the rains get too late, the elders used to bring out the remains of our ancestors from the caves, and hang them by the bridge. Rains follow soon after" (AAC, 2015, 21). Comas Dist., Concepción, Junín.

"If a drought persists, we visit a remote spring, plead for help from our deities and bring that spring water to the community in special pots. We then ceremoniously marry that water off to an unnamed bride in the community. At the end of the ritual, we offer food to a group of small kids, and the rains come" (Chambi, Chambi, 1995, 64). Conima, Moho Dist., Puno, Puno.

"To cultivate, we depend entirely on rains. Every year, we visit a virgin lake with a gift package (black guinea pig and other things). As we bring that water to the community, the first rains accompany us. If not, we repeat the trip. If we get too much rain, we plead the deities to put a stop to it, by ceremoniously tightening a sacred cord around that pot of water." (AAC, 2015, 47). Coasa Dist., Carabaya, Puno.

Occurrence of heavy frost or hailstorms also forces farmers to perform rituals to appease or frighten these climatic phenomena, thus hoping to reduce damages to the crops. To establish a way to communicate with these phenomena, the farmers weave a story, converting them to humans, but with special powers.

"*Chicchi*, *Huayra*, and *Ccasa* were three lazy brothers, who lied to their mother and showed a neighbor's plot as the one where they worked on. She got into trouble with the neighbor while harvesting there. Back at home, she poured her fury on them, converting them to frost, wind and hail" (AAC, 2015, 71). Mr. Quintin Flores H., Ccoyo, Santo Tomás Dist., Chumbivilcas, Cusco.

"When the frost comes, we keep a cooked *chuño* (freeze-dried potato) dish on the stove. Frost stops at this prepared food and does not steal our crops" (AAC, 2015, 72). Coasa Dist., Carabaya, Puno.

"When the hail clouds gather overhead, we send up a powerful fire cracker. The horse that carries hail on its back gets scared and runs away" (AAC, 2015, 73). Quispillacta, Chuschi Dist., Cangallo, Ayacucho.

COHABITING WITH PLAGUES AND DISEASES

Andean farmer treats diseases or plagues not as an attack on her particular plot, but as an issue to be dealt with the community as a whole. First, she tries to understand why they suddenly appear in-force in her community. A commonly occurring disease is treated as just another neighbor: its resurgence could be the punishment for a wrong committed by some people in the community. Experienced elders deliberate as to why this neighbor (disease) got angry and what would correct the wrong. A ritual allows them to establish a conversation with it, plead guilty on behalf of the offenders, and reinforce everybody's commitment to live in harmony with all the neighbors. Once you accept the guilt, you also accept the punishment (the crop lost). The farmers then try to appease the offended neighbor with gifts or a feast to minimize further damage (Machaca, Machaca, 1994).

"Once my pigs started dying young. Splitting lips prevented them from eating. In my sleep, the disease appeared as a neighbor pleading for food. I killed a big animal, offered every neighbor a fat piece of meat, and the problem disappeared" (Machaca, Machaca, 1994, 67). Mrs. María Machaca, Quispillacta, Chuschi Dist., Cangallo, Ayacucho.

A rare pest or a plague is treated as a visitor to the community, trying to establish a foothold there or looking for a refuge. Instead of launching a wholesale attack against the visitor, the community performs a ritual, creating an opportunity to hear his needs. They try to satisfy him offering what they can, and then ask him to leave, without causing much damage (Machaca, Machaca, 1994).

"In 1991-92 an army of insects attacked our *haba* beans very bad. We organized a big send-off feast, and asked each farmer to gather about 30 of those insects. We loaded them onto a well-decorated raft and floated them off in Lake Titicaca, with a lot of food. Our *habas* recovered" (Chambi, Chambi, 1995, 57). Mr. Pedro Mamani M., Conima, Moho Dist., Puno, Puno.

CEREMONIES TO ENSURE A SUCCESSFUL AGRICULTURAL CAMPAIGN

Rituals and feasts are not limited to such special circumstances. From the time the Andean farmer prepares the plot until the harvest is stored, she converses continuously with her deities and tries to placate them through celebrations.

"*Pachamama* (mother earth) is a living person. We owe her a lot for all that we receive. For every farm activity, we should get her permission and keep her content, so that we can work with no accidents. You may spread a lot of fertilizer in the plot, but if you offer *pachamama* nothing, there is no guarantee that you will have a good harvest" (AAC, 2015, 28). Mrs. Martina Mamani A., Raqchi, San Pedro Dist., Canchis, Cusco.

"Each deity has her mission. One is in charge of the harvest; another brings us light but constant rain, without ruining the land; the wind has its own deity. The one that provides water for irrigation is the most powerful of all" (Chambi, Chambi, 1995, 61). Mr. Félix Apaza Q. & Mrs. Eugenia Pacoricona A., Conima, Moho Dist., Puno, Puno.

"Before preparing the land, we ask an elder to put together an *ofrenda* (gift package): coca leaves, incense,

cereals of various colors, an animal fetus, chicha drink, etc. He invokes the deities offering the gift, pleads them to give us a good harvest and ceremoniously places the offer in a special niche in the plot" (AAC, 2015, 28). Mrs. Elsa Cárdenas C., Pinchollo, Cabanaconde Dist., Caylloma, Arequipa.

"The spirits of the wind could be sleeping under the rocks that you may want to use for the terrace wall. So, to avoid accidents, get permission from them first. If people were buried in your land in the past, you must placate the ancestors with a gift and they will help you succeed in your work" (AAC, 2015, 29). Mrs. Martina Mamani A., Raqchi, San Pedro Dist., Canchis, Cusco.

"On the day of planting, men offer coca leaves and flowers to *pachamama* (mother earth), but do not intervene anymore. The women select three pairs of big and well-formed *ispallas* (seeds), energize them with coca leaves, flowers and other sacred items, and then begin planting with those" (Chambi, Chambi, 1995, 56). Mr. Felix Apaza Q. & Mrs. Eugenia Pacaricona A., Conima, Moho Dist., Puno, Puno.

"Ceremonial activities on the day of planting end in a game: one participant acts as the seed-stealing *zorino* (*Conepatus chinga suffocans* - Molina's Hog-Nosed Skunk) while others try to throw corn powder to make him go blind" (AAC, 2015, 39). Comas Dist., Concepción, Junín.

"Before harvesting, we welcome the new corn in the field itself, burning incense with aromatic herbs, so that it goes into the storage full of energy" (CEPROSI, 2009, 89). Queramarca, Tinta Dist., Canchis, Cusco.

"On January 20th, our community organizes a ceremony, so that the remnants from the last harvest of potatoes can meet the first pickings of the new crop and transfer them the responsibility of feeding the farmer family. Since ancient times, what we now call Carnival has been an event to celebrate the flowering of crops and the arrival of new farm products" (AAC, 2015, 81). Mr. Zenón Gómel A., Pucará Dist., Ayaviri, Puno.

"Twin corn cobs have a special place in the ceremonies. When we dry the corn seeds, we place those twin cobs in the middle, adorned with a crown made of *molle* (*Schinus molle* - Peruvian pepper) branches, accompanied by incense and herbs" (AAC, 2015, 83). Cambrune, Carumas Dist., Mariscal Cáceres, Moquegua.

"Ancestral practice tells us to select seeds during the waxing moon" (AAC, 2015, 83). Mr. Toribio Huilca Y., Challabamba Dist., Paucartambo, Cusco.

"The woman carries the sole responsibility of selecting the seeds. The man should not even enter the storage room" (AAC, 2015, 83). Carania Dist., Yauyos, Lima.

"In the past, *troje* (corn storage container) was organized very carefully. You put heavy rocks at the bottom and place flower-decorated twin corn cobs around them. On one side sits a decorated pot containing grains of all types and colors, and on the other side, a bottle of wine. The newly harvested cobs go on top of all that.



Figure 3: Ceremony for Pachamama (mother earth) in Soras Dist., Sucre, Ayacucho (Courtesy of AAC, Lima).

Rats never entered that container” (AAC, 2015, 87). Mrs. Flora Chuquicondori A., Cabanaconde Dist., Caylloma, Arequipa.

DISCUSSION

Farming practices based on bioindicators and rituals, such as those discussed above, have been probed and accepted as valid by generations of agricultural experimenters. These complement a myriad of technological practices (to be discussed in a separate paper in the future) adapted to local conditions. Their success in producing nutritious food in sufficient quantities under harsh Andean environment needs no more proof than the fact that such agriculture survived over five centuries of culturally and politically adverse systems of government.

These cultural practices vary from region to region, as well as from village to village. Each household continues to use these, along with hundreds of other secrets it inherited from the past. Generally, details of these processes are not disclosed in public. Some farmers fear losing the benefits of the rituals if explained to outsiders. Others fear that the “civilized” would laugh at them (van Kessel, 1997).

Juan van Kessel (1997) summarized the cosmovision of Andean farmers that gave rise to these ritual practices. Its pillars are: 1) complementarity: that no living being is completely self-sufficient and everybody needs the help of the neighbors to survive; and 2) reciprocity: such help

needs to be mutual and no one should expect to receive and receive without giving away anything. As Mrs. Martina Mamani from Raqchi explains, *Pachamama* (mother earth) represents the good neighbor that helps reduce the risks in a farmer’s life. The package of *ofrenda* (gift package) the farmer offers to the deities at the beginning of the campaign symbolically represents her willingness to share the benefits she expects to receive from her plot. That willingness is affirmed through many food feasts she offers to her neighbors and to local children, at various stages of the farming calendar during the year.

According to van Kessel (1997), the *chacra* (farm) is the central platform through which the deities, nature and humans interact: communicating the needs and warnings to one another; and exchanging gifts and benefits. To make that conversation real, the Andean farmer tries to bring the deities and other beings down to her world, make them a part of her community. When faced with the threat of drought, Conima farmers make the water deity their *verno* (son-in-law) celebrating a community marriage ritual. That way, the help is guaranteed, as no son-in-law would let the relatives down, under a situation of hardship. The story that Mr. Quintin Flores of Ccoyo weaves to “humanize” the wind, frost and hail, paints them as mischievous village kids. They are not inherently bad, nor will steal from the neighbors, but are simply asking help to satisfy their needs. Gomel (1997) uses the same story while explaining how the contemporary farmers in his native Pucará



Figure 4: Preparation of an *ofrenda* (gift package) before planting corn, in Paico Dist., Sucre, Ayacucho (Courtesy of AAC, Lima).

area survive such climatic extreme events. The practices used to reduce the damages there vary somewhat from those in terraced farming regions, because Pucará District (in Ayaviri, Puno) tends to face very severe frost and hail attacks.

Enríquez Salas (1997) provides a list of climatic bioindicators used by the villagers of Urqhurarapampa (Nuñoa Dist., Melgar, Puno) in their agricultural practices. Being a native of the area, he could gather such information in full detail. The indicators in our list coincided with those of Urqhurarapampa, except for that of the *zorro* (*Lycalopex Inca* - South American fox). When its cry is clear and uninterrupted, these villagers interpret that the coming agricultural season would be productive, especially for potatoes, their number one product. They should know better, compared to the villagers from whom we gathered our data, in Yanque Dist, Caylloma, Arequipa, who specialize in corn.

Mr. Nestor Chambi P., born in the district of Moho, Puno, illustrates through testimonies (N. Chambi, 1997) the complete process of identifying plant plagues caused by insects, possible reasons for their occurrence, and rituals and other acts performed by the villagers there to reduce such damages. The information we gathered from various regions does not have the depth of the data from Moho, but the reasoning behind the rituals and the way they are performed generally agree.

CONCLUSION

Farming in the Andes is not just a simple exercise of fertilizing the land, planting and harvesting. Modern agricultural technologies have continuously suffered failures in the face of highly variable climatic conditions here. Over millennia, severe Andean weather has pushed the farmer to seek alliances with natural and divine forces to reduce the risks. She has developed a large set of bioindicators to predict long-term crop production, so that she can achieve a decent harvest manipulating many options of lands, crops and timeframes available to her. She should also appease the divine agents, in every step of the way to the harvest, because they expect her to reciprocate, not just receive the benefits.

Except for a pilot project on predicting weather using bioindicators, conducted in collaboration with the Batalas municipality of Bolivia, academic and government authorities continue to ignore that universities and technicians have a lot to learn from Andean farmers. Government extension officers should be trained to listen, grasp and complement farmers' technologies. Government agricultural institutions should help safeguard this ancestral knowledge and disseminate it among regions where such wisdom has been wiped out. With such support, the Andean farmer can retake the lead in provisioning the world with sane and safe food.

ZMANJŠEVANJE PODNEBNIH IN DRUGIH TVEGANJ PO IZKUŠNJAH PERUJSKIH TERASNIH KMETOVALCEV, KI TEMELJIJO NA NARAVNIH POJAVIH IN NA VEROVANJU

Kashyapa A. S. YAPA
1626, Juan de Lavalle, Riobamba, Ecuador
e-mail: kyapa@yahoo.com

POVZETEK

Zaradi težav, ki nastajajo pri ugotavljanju rednega letnega vremenskega vzorca na katerikoli lokaciji, je kmetovanje v Andih zelo tvegana dejavnost. Kmet lahko zmanjša del tega tveganja z uporabo terasiranih zemljišč in z namakanjem. Kljub temu je njegov pridelek še vedno izpostavljen skrajnim vremenskim razmeram. V tisočletnih obdobjih je perujski kmet zbral obsežno zbirko kazalcev, ki temeljijo na naravnih pojavih. Ti podatki kmetovalcem omogočajo napovedi, katere pridelke je potrebno gojiti na katerih lokacijah in v katerih letnih obdobjih, da bi dobili najboljše donose. Andska kozmovizija je pridelovalce naučila tudi, da božanskim silam ponudijo darila in v zameno pričakujejo vračilo, ki je preprečevanje negativnih učinkov vseh življenjskih negotovosti. Poleg tega izkušen kmet uporablja številne tehnološke pristope, ki so se na določenih lokacijah že v prejšnjih generacijah izkazale za učinkovite. S povečevanjem preseljevanja mladih ljudi s podeželja in državnimi spodbudami uporabe agrokemičnih sredstev pri kmetovanju je ogroženo ohranjanje znanja prednikov. Raziskava prinaša pregled samo na naravnih pojavih temelječih napovedi o postopkih kmetovanja in pregled obrednih verskih aktivnosti v kmetijstvu, ki so zbrani v obsežnih terenskih pričevanjih strokovnjakov v perujskih Andih. Metodologija zbiranja modrosti prednikov je potrjena s primerjavo naših podatkov z informacijami, ki so jih zbrali raziskovalci, ki so imeli dostop do bolj poglobljenega znanja na določenih lokacijah.

Ključne besede: andsko kmetijstvo, klimatska tveganja, bioindikatorji, bolezni rastlin, kuge, rituali, znanje prednikov

SOURCES AND BIBLIOGRAPHY

AAC – Asociación Andina Cusichaca (2015): Prácticas agrícolas ancestrales en andenes: guía para los alumnos de la escuela de andenes. Unpublished manuscript prepared for Ministry of Agriculture. Lima, Inter-american Development Bank.

CEPROSI – Centro de promoción de las sabidurías interculturales (2009): Saramama: la sagrada semilla del maíz. Cusco, SAQRA comunicaciones y cultura.

Chambi Pacoricona, N. (1997): La conversación con los insectos plagas para recuperar la armonía en la crianza de la chacra en el mundo aymara. In: van Kessel Brouwers, J. & H. L. Barros (eds.): *Manos sabias para criar la vida: Simposio Tecnología Tradicional Andina Actual del 49º Congreso Internacional de Americanistas*. Quito, Ecuador, 56–78.

Chambi P., N., Chambi, P. W. (1995): Ayllu y papas: cosmovisión, religiosidad y agricultura en Conima, Puno. Puno, Asociación Chuyma de Apoyo Rural (CHUYMA ARU).

CHUYMA ARU–Asociación Chuyma de Apoyo Rural (2007): Señas y secretos de crianza de la vida. Puno.

Denevan, W. M. (2001): *Cultivated landscapes of Native Amazonia and the Andes*. NY, Oxford University Press.

Enríquez Salas, P. (1997): El diálogo con las señas en la agricultura andina. In: Juan van Kessel, B. & H. L. Barros (eds.): *Manos sabias para criar la vida: Simposio Tecnología Tradicional Andina Actual del 49º Congreso Internacional de Americanistas*. Quito, Ecuador, 243–267.

Gomel Apaza, Z. P. (1997): Crianza del agua en la cultura Pukara contemporánea. In: van Kessel Brouwers, J. & H. L. Barros (eds.): *Manos sabias para criar la vida: Simposio Tecnología Tradicional Andina Actual del 49º Congreso Internacional de Americanistas*. Quito, Ecuador, 87–100.

Machaca, M. M., Machaca, M. M. (1994): Crianza Andina de la chacra en Quispillaccta: semillas, plagas y enfermedades. Huamanga, Ayacucho, Asociación Bartolomé Aripaylla.

Murra, J. V. (1972): El control vertical de un máximo de pisos ecológicos en la economía de las sociedades Andinas. In: Murra, J. V. (ed.): *Visita de la provincia de León de Huánuco en 1562*, Iñigo Ortiz de Zuñiga, visitador. Huánuco, Universidad Nacional Hermilio Valdizán, 2, 427–476.

van Kessel Brouwers, J. (1997): La tecnología simbólica en la producción agropecuaria andina. In: van Kessel Brouwers, J. & H. L. Barros (eds.): *Manos sabias para criar la vida: Simposio Tecnología Tradicional Andina Actual del 49º Congreso Internacional de Americanistas*. Quito, Ecuador, 33–55.