

WEBINAR REPORT

PACHAGRAMA: A BRIDGE BETWEEN ANDEAN AND WESTERN SCIENCES

PALOMA AGUILAR FORERO

DECODE TEAM

2025

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1. Webinar General Information

- Date and time: November 4, 2025, from 4 PM to 6 PM (Colombia Time).
- Speakers:
 - Budd Hall (co-director of the DECODE project and holder of the UNESCO Chair in Community Research and Social Responsibility in Higher Education)
 - Paloma Aguilar (regional coordinator of the DECODE project for Latin America)
 - María Quispe (executive director of PROSUCO)
 - Maria Ángela Dávila (Illustrator)
 - Bernabé (Yapuchiri)
 - Sindy Perdomo (University of Cauca)
- Number of attendees: Maximum number reached: 53 people. Minimum number: 42 people.



PACHAGRAMA: UN PUENTE ENTRE LAS CIENCIAS ANDINAS Y OCCIDENTALES

Este seminario presenta
Pachagrama – Un puente entre
las ciencias andinas y
occidentales, una iniciativa
desarrollada en Bolivia
mediante la colaboración entre
agricultores, investigadores y
organizaciones comunitarias.

Ciclo de seminarios DECODE



MAR. 4 DE NOV.



4:00PM

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Photograph 1. Event invitation flyer .

2. Webinar Overview

The purpose of this webinar is to present the main findings of a collaborative research project conducted in Bolivia between farmers, researchers, and community-based organizations. The webinar will highlight the progress that Pachagrama , a strategy for systematizing climate and ecosystem changes, has made for the community and for agricultural practices. Pachagrama has become a key resource for farmers.

The webinar aimed to facilitate knowledge sharing between researchers and various farmers and members of community organizations in Bolivia who have used the Pachagrama system in their territories. Additionally, participation from people outside the project was encouraged to raise awareness of the initiative and foster dialogue among people from different regions, highlighting currently relevant topics such as climate change, the validation of ancestral knowledge, and the revitalization of Indigenous languages.

2.1.Presentation of the agenda

This event was the second webinar held this semester, the result of a research project. The agenda, which includes the following points, is presented below:



The screenshot shows a Zoom webinar interface. At the top, there are several video thumbnails of participants: Dayanna Esther Rivera, paloma aguilar, CFGS Events and Admin..., Sindy Perdomo Campo, Budd Hall, and Humberto Camacho. Below the thumbnails is a blue banner with the text "WEBINAR LATINOAMERICANO PROYECTO DECODE". Underneath the banner is a white box titled "Agenda" which lists the following items:

- Budd Hall - Presentación proyecto DECODE
- Paloma Aguilar - Presentación proceso de investigación DECODE- Herramienta Pachagrama
- María Quispe - Presentación PROSUCO
- Bernabé Choquetopa- Presentación experiencia Yapuchiri
- María Angela Dávila y Paloma Aguilar- Presentación Folleto Ilustrado
- Sindy Perdomo (Universidad del Cauca)- Compartir de experiencias.
- Asistentes - Preguntas e intervenciones

Photograph 2. Presentation of the agenda. Own work.

1. **Welcome, territorial recognition and introduction to the Webinar :** Paloma Aguilar welcomes the attendees to the space, thanking them for their interest in the event.
2. **Highlights of emerging key messages, common PPT presentation:** Bud Hall reiterates thanks to the audience for their participation and gives an overview of the key elements of the DECODE project.
3. **Presentation of the case study:** Paloma Aguilar presents the process of systematizing the experience, taking into account its different moments, and presents the methodology used in the fieldwork, as well as the products produced (story map, brochure).
4. **Presentation of the Pachagrama :** María Quispe provides an in-depth explanation of how the Pachagrama was developed and the most relevant aspects of its use, highlighting the impacts it has had on communities and what it may continue to have in the future.
5. **Additional case study or local/regional examples:** Bernabé, a yapuchiri, presents his experience using the Pachagrama and identifying the bioindicators he uses.
6. **Presentation of the illustrated bioindicator brochure:** Paloma Aguilar and Maria Ángela Dávila present the project's illustrated materials, which aim to disseminate knowledge related to the Pachagrama . It is hoped that this brochure will be freely accessible and printed in the future to facilitate its distribution.
7. **Regional panel of experts:** Sindy Perdomo, a researcher at the University of Cauca, gives a brief presentation on a similar experience regarding the use of traditional and Western knowledge in Colombian territory.
8. **Audience Questions:** A space is opened for attendees to contribute or ask questions about the topics presented in the webinar . Participation is primarily through the Zoom chat .
9. **Closing:** Paloma Aguilar shares the final words of the program, thanking the audience for their participation.

3. Session Development

3.1.General presentation of the project

Initially, Budd Hall gives a general project presentation, covering some of its objectives, which include:

- To provide evidence that decolonized knowledge can have an impact on climate change.
- Create an open-access digital space to showcase locally produced research products.
- Collaborate in building collective learning.



Photograph 3. Project objectives. Own elaboration.

Additionally, the speaker provides an introduction to the Pachagrama project , highlighting its impact and recognizing it as a powerful example of how the Yapuchiri people can make weather predictions by systematizing their knowledge of the land. Paloma Aguilar also presents case studies from around the world that DECODE has supported in their systematization.



Photograph 4. Mapping of case studies. Own elaboration.

As shown, two case studies in Latin America have been included. The first was that of the forest guardians in Putumayo, which was also a valuable experience. The second is PROSUCO in Bolivia, whose findings were the central theme of the webinar .

3.2. Systematization process of the case study

The process of systematizing experience in partnership with PROSUCO in Bolivia consists of various activities characterized by the integration of researchers with the community and its territory. Upon selecting the Pachagrama as the experience to be systematized, the process began with a sharing of experiences, highlighting both the potential of the process and the various challenges encountered. The activities carried out are presented below in chronological order.

1. **Sharing experiences:** The community discussed bioindicators as one of the most important pillars of the Pachagrama . They also shared the difficulties they encountered in applying the indicators in different territories.
2. **tour of the territory** was conducted, visiting important and sacred sites in the Yachupiri community , such as the mountain and the lake. Francisco, a member of

the community, shared his knowledge about the climate and the land. There is a house where, every four months, a person selected by the community performs an essential role: protecting the crops from hail. This person carries out various ancestral rituals and applies their knowledge to prevent hail damage. Francisco then explained the community's relationship with the land and how they cultivate it.

3. **Heartbeat line:** PROSUCO, as an organization, has worked for over 10 years on agro-environmental issues. Therefore, one of the project's purposes was to create a historical and narrative reconstruction of what Pachagrama was , from its development to the present day.

Then, two phases were undertaken along the Heartbeat timeline: The first consisted of the community creating a timeline simulating heartbeats, writing representative milestones, positive experiences, and present emotions at the highest points. The lowest points represented moments of difficulty, allowing them to situate themselves within their experience with the Pachagram .

Finally, a collective timeline of the Pachagrama was created , highlighting its highs and lows, and integrating the experiences of all participants. The timeline considered the achievements of the Pachagrama , including both past successes and challenges encountered along the way. It is important to acknowledge the role of women in legitimizing this knowledge, as they were an active part of its development.

It is hoped that the other Yapuchiri communities can replicate the knowledge in other communities through the Pachagrama , and that this knowledge will not be lost over time.



Photograph 5. Systematization process. Own elaboration.

Next, an introduction is given to the research outputs, which aimed to further disseminate this knowledge in other communities and to reflect on this community process. Key project products include a Storymap , an illustrated brochure, and the webinar summarized in this report.



Photograph 6. Products of systematization. Own elaboration.

The cover of the illustrated brochure is the image on the right. Its purpose was to be an educational tool for disseminating knowledge, using clear and accessible language so that others could easily grasp the information. Finally, the webinar aims to raise awareness about this project and encourage reflection on its relationship with Western culture, integrating knowledge from diverse regions.

3.3. Presentation of the Pachagram

María Quispe, a member of PROSUCO, expresses her gratitude for the invitation and greets the Yapuchiris present. She also explains the meaning of the term Yapuchiri , an Aymara word meaning "cultivator," which has also been adopted by other communities and local talents to enhance its significance.



Photograph 7. Presentation of the Pachagram . Own work.

On the other hand, María provides context for the dynamics of the thermal zones in her territory. Specifically, Bolivia has different ecological zones, ranging from 500 meters above sea level to 5,000 meters above sea level. PROSUCO has been working for many years in the Altiplano region, that is, from 3,800 to 4,500 meters above sea level, where mountains

and snow-capped peaks are present. This territory also boasts significant sociocultural richness due to the presence of various Indigenous peoples.

In the Andean highlands, the potato is the main crop, a cornerstone of families and their food security. Women have worked tirelessly for generations to conserve a wide variety of potato species; mothers, grandmothers, and granddaughters have all implemented practices to protect agrobiodiversity. As a result, the region boasts a diverse array of potato varieties. Within this context, traditions also exist involving the sharing of different potato varieties cultivated by families: everyone contributes something they have cooked to a communal meal.

Precisely because of the community's location, they face several challenges. Many years ago, due to the high altitude of the Andes, farmers experienced vulnerabilities, including their sole dependence on rainfall and lack of irrigation systems. The current frosts have caused significant variability and damage to crops. Previously, frosts ended around February 2nd, a date by which it was believed the crops had weathered the storm. However, with climate change, the situation has become more complex: frosts have lasted until March, or even later. Currently, *frosts are erratic*, and the frequency of droughts has also increased alarmingly. Consequently, production systems, particularly potato cultivation, have been affected by both drought and hailstorms, leaving crops highly vulnerable.

Given the context outlined above, it is acknowledged that there have been critical moments in which farmers have reflected on the sustainability of their processes. In 2009, when PROSUCO was founded, technical assistance was provided in various communities. However, it was recognized that this strategy had a paternalistic approach. For this reason, PROSUCO conducted an internal evaluation to strengthen the communities' knowledge and their ability to share it. They questioned what the expectations for social sustainability would be, focusing on strengthening local capacities without relying on external aid. In this way, the aim was to redefine, value, and reclaim the meaning of being a farmer, emphasizing vocation and innovation, but also possessing the interpersonal skills to share knowledge with others. This gave rise to a social innovation called the *Yapuchiri approach*.

Dayanna Esther Rivera... Budd Hall paloma aguilar María Quispe CFGS Events and Admi... Sindy Perdomo... Sindy Perdomo Campo

Co-creación de la innovación social: enfoque Yapuchiri (palabra Aymara: agricultor)

- Reflexión crítica entre agricultores y técnicos sobre la sostenibilidad de la gestión de conocimientos.
- Decisión: valorar y recuperar la ocupación de “ser un buen agricultor” (Yapuchiri):
 - De vocación: capacidad de innovación continua
 - No egoísta: capacidad de compartir con otros sus conocimientos.

Photograph 8. Presentation of the Yapuchiri approach . Own work.

This process also raises the question of how to generate applicable knowledge. It's found that the first step is learning—from neighbors, from parents, but also from training workshops and the exchange of experiences facilitated by social projects. The second step involves testing this external knowledge. It's not about applying it directly out of social responsibility; first, it needs to be tested on the plot of land to validate and refine it. Once the knowledge is validated, the third step is carried out, where the results are determined to be positive or negative.

When the results are positive, the knowledge can be applied because it has been adapted to the soil, climate, and latitude. It becomes clear that this knowledge can be shared with others and that it is reliable among peers. The next step is to share this knowledge with others, both within and outside the community, reaching other producers and potentially providing technical assistance in other regions. The final step involves collaboration with other stakeholders, such as at the municipal level, universities, or other institutions. It's a cyclical knowledge management process because it always returns to the starting point: learning.

Along these lines, it's understood that the Yapuchiris have been particularly interested in the weather because each agricultural cycle requires strategic decision-making to avoid losing their crops and harvests. Therefore, farmers constantly ask themselves questions like:

Will this be a rainy year? A dry year? Will it be a year with frost or hail? Where should I plant?

The Pachagrama system was created because it was necessary to record and validate climate-related knowledge to support crop management. The first version was an Outlook calendar where the Yapuchiris began generating their iconography to indicate when rain, frost, or hail would occur, systematizing the climate to identify climate variability. However, over time, when this knowledge was shared with other farmers, the method for comparison was not very efficient.

Registro PACHAGRAMA para evidenciar la variabilidad climática

- Es una herramienta co-creada con los Yapuchiris.
- Un Yapuchiri “observador local agroclimático” (sensor humano), registra el impacto diario de las condiciones meteorológicas en el desempeño de los cultivos para generar conocimiento de la variabilidad climática intra e interanual.

1ra versión

2da versión

3ra versión

Este proceso fue apoyado por la Fundación Mc Knight

Video 1: <https://www.youtube.com/watch?v=kkick7g0t1w>

Video 2: <https://www.accessagriculture.org/es/hacer-un-registro-del-clima>

Photograph 9. Record of the Pachagram . Own elaboration.

At one point, the possibility of switching to a different systematization tool was considered. During this process, a graph was created to more effectively identify climate variability. This second version was not the final one; it was then revised and validated by the farmers. Daily records were then started for each month to document events over time that could affect crops. This instrument also considered crop health, indicating whether the crop was holding up in the face of the events. The instrument contains no text; it is simply a bulleted record. Additionally, a record was kept of the tasks performed by the farmers.

The Pachagram has allowed us to think about and propose adaptive innovations, to consider what to do to adapt to environmental variability. Thanks to the development of the Pachagram, we have obtained evidence of how the climate is behaving, and we have also been able to connect this knowledge with scientific understanding.

Therefore, to share this information with other farmers, an application—a digital tool—has been developed to maintain a historical record for different communities, as this was initially presented as a challenge. In this way, these systematized points will facilitate knowledge sharing with people in other regions.

3.4. Experience with the Pachagrama and bioindicators

Bernabé is an organic quinoa producer in Bolivia. His community has specific rules regarding agricultural productivity. They allow the plots to rest every three or four years. They work with natural bioindicators, such as counting birds, foxes, reptiles like lizards and snakes, and observing the sand, the stars, and the winds. This information incorporates the wisdom of their ancestors; these ancestral indicators have been used since the time of the Incas.

They've written a book where they record and plan using a bioindicator calendar for peaches and animals. It's digital, and they create a calendar each month, recording natural phenomena. Currently, they're facing difficulties because of a frost; in recent days, they've had freezing temperatures that have damaged their crops.

There is a bird called a liki The fox must be monitored in November. They themselves select the natural bioindicators. Some are for snowfall, others for hail, and most importantly, rain. Several indicators foretell rain, such as foxes, lizards, spiders, and many other plants found on the high plateau. To predict frost, they observe the winds and cloud formations; if they blow east, west, or south, it indicates freezing temperatures. There are also ovenbirds that lay their eggs facing south when freezing temperatures are approaching.

Pachagrama (a traditional Andean agricultural system) for over ten years . They usually release a bulletin in August to predict if there will be frosts, since quinoa planting begins in September. They also publish a bulletin at the beginning of the year to announce the weather forecast and how the planting will be: early, mid-season, or late. For 2026, they have

estimated normal rainfall and a regular harvest, though it may be slightly better in the hills. The bulletin also provides information on the recommended planting times. This year they planted 440 square meters, and they estimate that next year the figure will be 342 square meters.

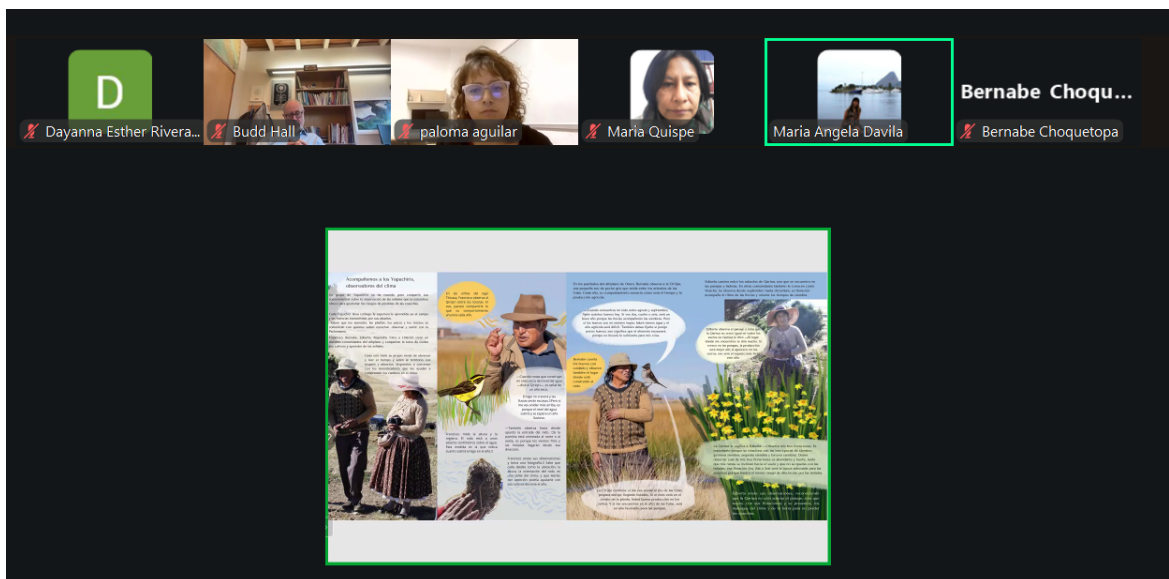
Many say that these things don't happen, but most people in the area know that they do. Because every animal gives a warning. For example, there's the belief that when a hen goes crazy, it means an earthquake is coming; when a fox or a snake comes to the house, it's a sign that someone is going to die. There are also dreams and other kinds of knowledge. There's a lot of knowledge available.

Paloma Aguilar points out that it's important to highlight that the topic of bioindicators has been studied for a long time, as evidenced by the books and other publications that have emerged from it. Support is needed for dissemination, given the wide range of knowledge available on the subject and agriculture. In fact, Bernabé has published several books compiling research on bioindicators. PROSUCO has also been supporting these processes for many years.

3.5. Presentation of the illustrated brochure

Paloma Aguilar and María Ángela Ávila present one of the products obtained within the framework of the project: the illustrated brochure. The brochure is designed to be easy to distribute and inexpensive to print; its purpose is to be used for educational purposes. This approach is not new, as PROSUCO has produced numerous books, reports, products, and guides throughout its history to disseminate the bioindicator system and its techniques. The Yapuchiris also have various resources related to this knowledge, as they are leaders and disseminators of this knowledge, passing it on to children and other communities. However, this brochure aims to further support the dissemination of the Yapuchiris ' knowledge , especially regarding bioindicators.

To do this, a storytelling format was used. The Yapuchiris were introduced by explaining who they are and what they do. This was done very briefly, as the purpose was to summarize the extensive information so that it could be easily shared.



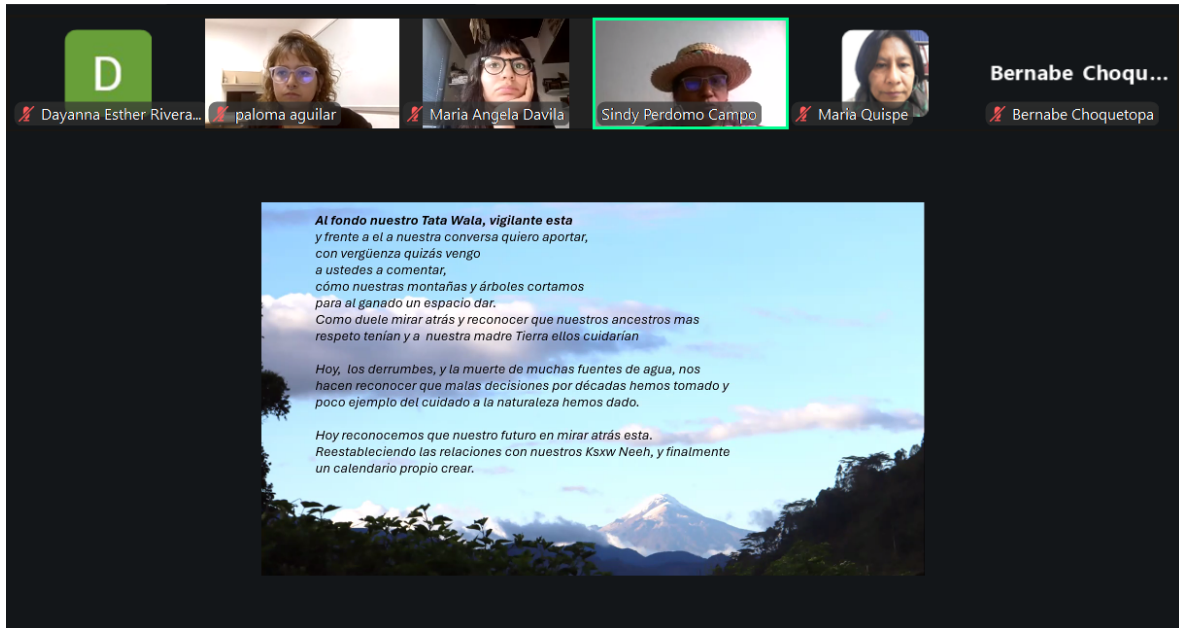
Photograph 10. Illustrated brochure. Own work.

First, a discussion was held with various community leaders about how bioindicators work. The brochure appears long because the idea is to create an accordion-style format for easy distribution. The final version is not yet available, as the aim is to make it more concise and easier to understand. Given the wealth of information available, the goal is to summarize the section on bioindicators, as it is an interesting topic worth sharing with other communities. For this reason, a story format was used, explaining natural bioindicators concisely. The brochure also includes a description of the tour conducted with representatives from the different territories, who provided the explanations of the bioindicators. Photographs were taken to document the activities, using the PROSUCO archives. All of this was integrated with various interactions and dialogues to create characters such as animals and plants, facilitating the understanding of the signs used to predict weather and crop behavior.

The brochure looks long because it will be folded accordion-style and is still a work in progress. The intention is to conclude with some reflections on the entire process. A booklet was also created for the Forest Guardians project, so this illustrated brochure is another product that is expected to be produced as a result.

3.6. Experience in using traditional and Western knowledge.

Sindy Perdomo gives a presentation related to her territory, the Cauca Valley, where she first shares a written piece:



Photograph 11. Poem presentation. Original work.

Sindy Perdomo begins her presentation by reflecting on the loss of our connection with nature. She believes that everyone present shares the same intention: to reconnect with Mother Earth. She recalls when her mother would talk to the roses and they would bloom.

This poem alludes to how Mother Earth fell in love with the stars, and thus the Nasa people were born. Colombia is a country with many mountains and many rainforests. But the poem focuses on the Cauca region, where two situations emerge: on the one hand, very little vegetation remains in the mountains due to the many transportation routes, such as highways; on the other hand, human activity has impacted the territory. People have to clear the mountain to claim that small piece as their own, and they have to fence it off. The construction of avenues and highways has required prior consultation with ancestral communities, but in the end, these communities accept the intervention in their territory because of the economic benefits it brings, regardless of the fact that the roads are built right through the high-altitude wetlands. In this way, they have settled in and taken ownership of the territory.

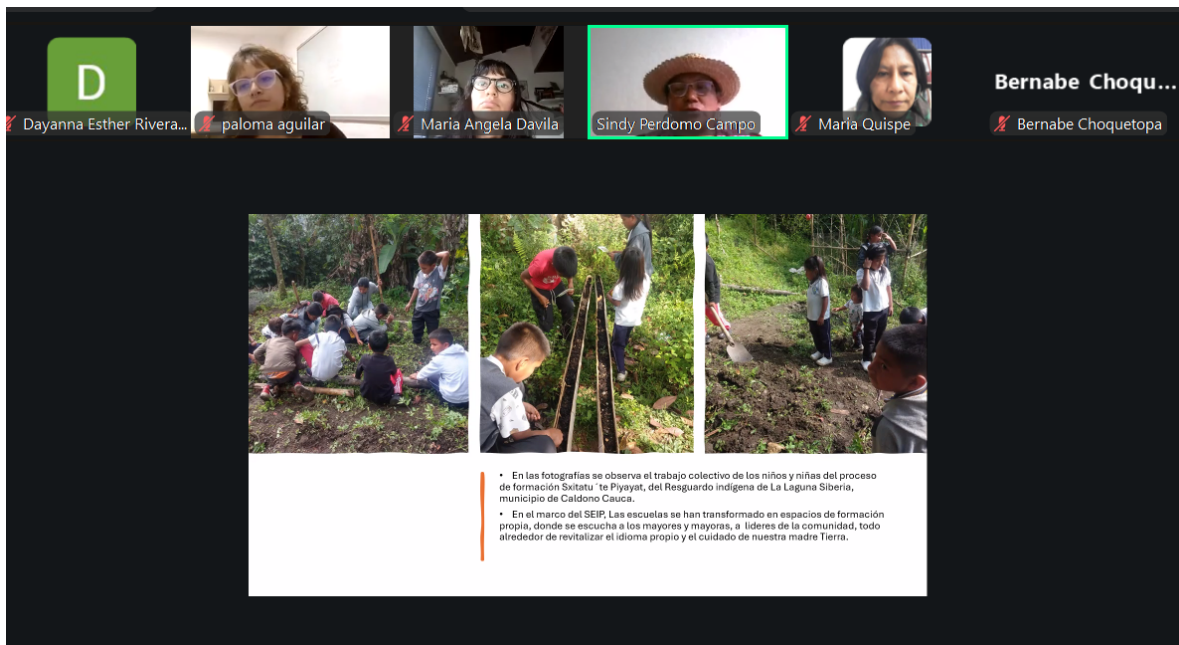
Faced with so many challenges, numerous leaders have come together to create spaces for dialogue, where they have discussed an educational approach rooted in the hearth, that is, the family. As a result, they have established their own training programs, where the teachers are members of the community, the elders. This has been beneficial and has also allowed them to uncover a number of fears. Discussing their own educational approach with families often generates apprehension, as they perceive it as a return to traditional methods. Consequently, disagreements have arisen with parents. However, the aim is to implement a training process with elders to connect with the land, while remaining faithful to the regulations established in Colombia regarding the education of Indigenous peoples. Many communities still resist changing the school system and accepting the involvement of elders. Nevertheless, this initiative has succeeded in preserving a variety of cultural traditions. Crafts, but also rescuing the variety of potatoes and corn, has been an approach made possible thanks to the schools.



Photograph 12. Indigenous education system. Own elaboration.

The educational spaces and schools that have introduced children to these practices allow them to learn when and where to plant. It has been a valuable experience because the children listen to their parents about when it's time to plant. They participate in exercises that re-establish the children's connection with nature. They listen to their elders, and there are times when they plant something out of season, learning that their elders were right. In this way, a

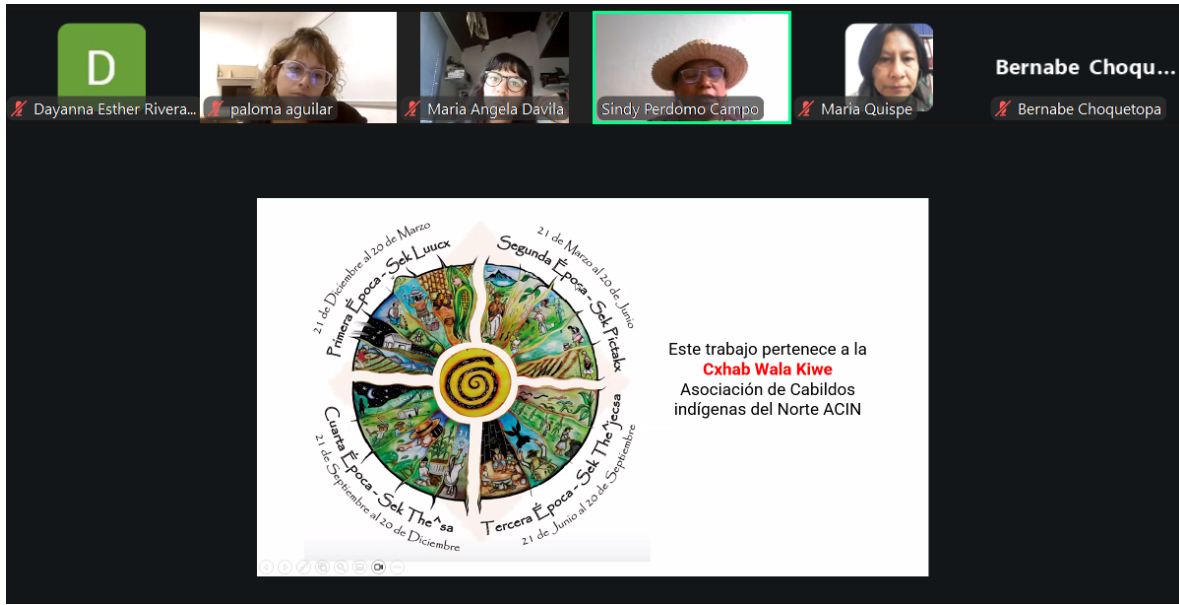
bridge of communication is re-established between them and their elders, and with nature itself.



Photograph 13. Training work with boys and girls . Own work.

This is how the need for the Calendar arose, as there was an urgent need to have their own calendar. They work with four periods of the lunar calendar, and much is done through ceremony, the care and storage of seeds. Initially, a calendar was created that incorporates the wisdom of the elders, beginning on December 21st with the harvest season, March 21st which is the season of the sun, and the Seck (a traditional Andean festival). This is where water cultivation takes place. And the last one consists of the lunar phase, which is a phase of care.

This is the product of a process of accompaniment and experimentation; the elders also experimented with this information. This can also allow us to recover much of the knowledge of our elders. Currently, there are plans to replicate the Pachagrama in schools.



Photograph 14. Calendar. Own work.

Paloma Aguilar points out that PROSUCO and the Yapuchiris have already realized that the experience can be replicated in different territories.

María Quispe confirms this information, explaining that the tool was initially co-created with the Yapuchiris , but it has been adapted when other communities have been involved. For example, in the Chaco region, where the Guaranpi people live , it is called Chacograma . The Leco culture, located in the lowlands, has named it Lecograma . Therefore, the tool fulfills precisely this intention: sociocultural adaptation.

Paloma Aguilar reiterates that she expects the adaptation of Pachagrama to continue growing in different territories of the region. She also expresses her gratitude to the participants who shared their territorial knowledge and invites everyone to participate in the dialogue.

3.7. Audience questions

Based on the presentation of case studies and experiences related to the Pachagram , the following interventions are made via the Zoom microphone :

- **Sindy Perdomo:** I wanted to ask my colleague María, and thank her for the knowledge she shares. How is it possible to relate the Pachagrama activity to our own language? What has been the experience of the Pachagrama with revitalization?

- **María Quispe:** In dialogues with farmers, language is always very important. That's where concepts are refined, as they aren't entirely technical. We identify many indicators, since things are expressed differently in the southern highlands. In this way, we recover the terminology, learning how certain words and animals are known through the use of their own language.
- **Humberto Camacho:** It's a pleasure to learn about this wonderful experience. I wanted to share that many crops from other parts of the world arrive in Bolivia. Organic quinoa arrives here, and that's why it's important to let other people know that these foods reflect the knowledge held in this territory, and how this knowledge can be adapted to Western culture. I would also like to share this knowledge further so that it can be preserved and have a social impact.
- **María Quispe:** Okay, I believe that what Indigenous peoples, the Yapuchuris, do when working towards food sovereignty is not only to produce food for their families but also to safeguard it globally. It's a way of dignifying their work.



Photograph 15. Dialogue space. Own work.

Interactions also occur in the Zoom chat, as shown below:

- **Sindy Perdomo Campo 5:19 PM:** If we wanted to work with children, the pachagram is a research tool of its own.
- **Lenin Anacona Obando 5:23 PM:** Here at Pebi Cric we talk about paths of life and wisdom to decolonize the term research, and on that path, walking with Mother Earth is vital, a challenge.
- **MONICA CATERINE SANTIAGO RIVEROS 5:26 PM:** Congratulations on the experience and the great contribution of Pachagrama . Question for Maria: How could this experience be replicated in contexts like Colombia? What would be the minimum knowledge and conditions necessary for that replicability?
- **Jenny R 5:34 PM:** Thank you, Paloma, for the invitation, and congratulations to everyone for the wonderful thing you're sharing with us. I'd like to know if you could elaborate on the notion of "bridge" with the West: are you referring to interdisciplinarity with digital technology, or to something else entirely?
- **Álvaro Velásquez 5:35 PM:** What relevant experience do you have regarding state participation for the success of this project?
- **Juan Francisco Aguilar Soto 5:40 PM:** Is it possible, or desirable, for the pachagrama to be part of the curriculum of the indigenous education system itself, or even of the national education system of Bolivia or Colombia?
- **Fatima Muriel 5:42 PM:** Thank you, Paloma, for considering us to participate in this important discussion. I would like to know how Bolivia has reached agreements regarding illicit crops? I am Fatima Muriel, legal representative of the Putumayo departmental network of women's organizations, Tejedoras de Vida (Weavers of Life). Putumayo is located in southern Colombia and is a border department. We have 15 indigenous communities, and the network comprises 65 organizations of women displaced by the internal conflict related to drug trafficking.
- **Wilson Eduardo Gómez 5:45 PM:** Thank you for sharing. 🙏 I'd like to know how climate change and its effects modify the Pachagram ? How are all these unexpected changes in the climate interpreted?
- **Waldina Muñoz Martínez 5:50 PM:** Thank you very much and congratulations. We send you a big hug from the department of Putumayo.
- **Claudia Alejandra Rosas 5:50 PM:** Excellent tool, congratulations.

By dedicating a space to respond to the interventions made through the chat, the speakers shared the following:

- **Bernabé:** The behavior of birds and animals hasn't been greatly affected; this year specifically, the temperature hasn't risen much. Waterfowl are especially affected by climate change; there's one bird that's already endangered. The condor too; we no longer see any condors. In our territory, we have regulations prohibiting the killing of all birds. But that's only enforced here.
- **María Quispe:** The Pachagrama system itself is a way to understand climate variability, to raise awareness, and to consider adaptive innovation. More tolerant varieties and new agricultural practices are being developed. Currently, different pilot projects are underway to recover from frost damage.
- **Paloma Aguilar:** As observers of the indicators, they can understand how these climate changes occur, and therefore are related to climate change. People who want to monitor what is happening to their land and their sun can implement this system, as it is practical and sensitive.

I would also like to acknowledge the Pachagrama as an important element within the community. Furthermore, it allows us to gather knowledge passed down from our elders—knowledge that has always been rooted in the land. The Pachagrama 's contribution lies in its ability to systematically record this knowledge . This represents a significant learning experience for communities in general that possess a deep understanding of their relationship with nature.

- **María Quispe:** Beyond interdisciplinarity, it's transdisciplinary knowledge, since it integrates technical knowledge with conversations held with the community. The contribution is precisely to systematize knowledge and ensure it isn't lost.

There is another application that integrates short- and long-term forecasts. They have also begun designing another application for the Pachasol system. It is innovative to continue with these innovations to reduce the gaps. And most importantly, this knowledge should be available to farmers, integrating local knowledge with modern technology.

- **Paloma Aguilar:** It's about combining Western technical knowledge with the ancestral knowledge of the Yapuchiris . Since it was oral knowledge, it wasn't recorded in the past, but it's knowledge that has always existed.
- **Maria Quispe :** Bolivia has very broad policies for the integration of the Yapuchiris . However, from an operational standpoint, these policies have not been consistent. PROSUCO has requested support at various times for promoting the Yapuchiris , but there have been losses; they have adapted the approach, but it hasn't been consistent. We have provided databases, but they haven't worked. We are currently reviewing the possibility of including them in the national system. This is also being considered in terms of the possibility of forming public-private partnerships to ensure its sustainability.

Regarding the education system, it has been the schools themselves that have facilitated Francisco's inclusion. There has been a very important relationship, but it has been driven by the Yapuchiris themselves . This depends heavily on the openness of the education system because there are very rigid curricula, and it relies a lot on the willingness of certain individuals.

We have established an open and flexible curriculum for Yapuchiris training , similar to any adult education center that might train Yapuchiris . However, we have also collaborated with the public policy school, seeking close interaction. We have attempted to implement other tools, such as the socio-productive project, where we can have an impact.

There is no interaction with coca, because we are in the highlands and not in the lowlands.

- **Paloma Aguilar:** These two case studies show us how relevant and useful they have been in their legitimization, as a tool to address local problems.
- **María Quispe:** The Pachagrama is not affected by climate change; rather, it is a record that shows variability. For example, it shows that climate change alters bird migration patterns. The Pachagrama serves to track and record time, as the Yapuchiris say .

4. Conclusions

The space covered different critical points related to climate change and the recording capacity of the Pachagrama bioindicators in the prediction of climatic phenomena and in the behavior of crops in different territories.

Through ancestral wisdom, various forms of knowledge have been recovered. Despite their long history, these have been systematized by different community-based and international organizations for approximately 10 years. The current objective is to validate and replicate the knowledge of bioindicators and the Pachagrama system in different territories, recognizing that the dynamics in each territory are unique and require a situated sociocultural interpretation. Even in territories like Colombia, there is the possibility of implementing this knowledge, with the opportunity to integrate other aspects such as the revitalization of native languages.

Pachagrama projection and the bioindicators are found to be an ongoing phenomenon, constantly growing, and demonstrating the consequences of climate change on the occurrence of frosts, hail, droughts, and wildlife migrations. It is hoped that this knowledge will foster new interactions among communities, further strengthening local knowledge in Latin America.