

# Community Resilience in Ecotourism Associations in Peruvian Hills: A Collective Fight Against the Covid-19

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## Abstract

Only in South America surrounded by the Pacific Ocean are coastal hills, natural areas formed by the action of fog, located. Near these ecotourism places are established community associations that are focused on the preservation and development of the natural heritage and currently they are in the process of adaptation to the biological crisis. The present study aims to analyze the main indicators developed by two ecotourism community associations in Peru to achieve community resilience to the Covid 19 pandemic, in 3 phases of the disaster and / or crisis: pre-disaster, response and recovery; allowing its replicability and improvement in other community associations belonging to the Peruvian Hills Network or other community associations from different geographical areas in the world. Focus groups and interviews were held with representatives, members of community associations and members of the Peruvian Hills Network. It was observed that the sense of community and community participation are the most influential and developed indicators in community resilience, unlike education, coping style, and improvisation and inventiveness. In addition, it was concluded that these community associations have a good level of resilience to face the pandemic; however, it is necessary to improve aspects of internal coordination, as well as work together with the authorities.

**Keywords:** *Community Associations; community resilience; Peru; pandemic*

In a crisis and disaster situation, resilience is a form of response that societies and organizations seek to recover the state of well-being that they presented before the occurrence of the crisis. The complexity of this concept determines its multifaceted character, since it encompasses physical, social, economic and institutional aspects; where both physical and socio-institutional aspects are essential to achieve resilience [1]. From a methodological perspective, resilience is not a way of avoiding a situation, but rather a means of studying how to cope with change and transformation [2, 3]. In addition, resilience makes it possible to overcome adverse situations where the role of the family, community and society are promoters of the emergence of resources that each individual has, allowing self-management of personal and social development [4, 5].

Resilience is a broad concept and has been applied in different disciplines and categorized in social resilience, organizational resilience, community resilience, etc. The latter understood by many authors, as a way to respond, face and recover from a crisis situation due to social or natural phenomena, but not as an individual or family, but as a community. Community resilience has been studied and analyzed in situations of natural disasters [6-9] and in tourism [4, 5, 10-12]. Additionally, from an approach of the ecosystem under study, a resilient ecosystem is defined as "one that is capable of providing ecosystem services after suffering damage". In this context, although the natural resources studied in the research have not been affected in their ecosystem services due to the pandemic, other consequences have been generated in terms of socio-economic dynamics and processes, such as tourism.

Therefore, the study focuses on analyzing the community resilience of the different ecotourism community associations that are located in the coastal hills in a context of natural resource management to the pandemic crisis. Community or social resilience is referred to as the ability of a community to sustain itself facing external impacts, especially for those that depend on resources and are subject to environmental variability, social, economic and political factors [13, 14]. Human and social resilience is not only resisting, it is also rebuilding and overcoming adversities; although resilience is born of adversity, it is also the capacity that allows us to continue working [15, 16].

Community based natural resource management [CBNRM] is defined as a joint, dynamic process of social and environmental systems, where the empowerment of people through participation can affect both systems; likewise, on a larger scale, environmental hazards can generate environmental and social pressure [17, 18]. Natural capital, land productivity, water and biological resources will determine community resilience by reducing or exacerbating its adaptive capacity [19-21].

Additionally, [22, 23] argues that a disaster is divided into 3 stages: pre-disaster, response, and recovery, where pre-disaster is the preliminary phase that analyses the social situation existing before the disaster. Response is the stage which develops when the disaster starts and where social situation and quality of life are highly affected. Finally, recovery stage refers to technical, economic and social aspects that are being restored and is, therefore, reflected in the improvement of community situation. The indicators mentioned in this model are community participation, education, information exchange, learning, shared information, social support, a sense of community, confidence, coping mechanism, demographic information, improvisation and inventiveness, leadership, community effectiveness and coordination.

Studies such as [24, 25] show six factors that promote resilience in socio-ecological systems, such as assets, flexibility, social organization, learning, socio-cognitive constructions, and the agency factor relating to power and freedom of response to socio-ecological changes. Likewise, in the study by [5, 7, 19] mentioned that achieving self-organization of the users of a resource will depend on ten variables, including the size of resource system, system productivity, predictability of system dynamics,

mobility of resource unit, number of users, leadership, standards/social capital, knowledge about socio-ecological system, importance of resource for users, and rules of collective choice; emphasizing that achieving long-term sustainability will depend on whether resource system, resource units and users match.

The social capital represented by community associations of the hills studied forms an important factor in the development of their resilience to the biological crisis and where political instability, inequality, corruption, and lack of decentralized training are part of the current national context. As [26-28] demonstrates, in the analysis of the interrelationship of social capital and resilience in the Somkhanda Game Reserve in the Gumbi community for community tourism, there are three shocks of community resilience, such as governance (abuse of power, exclusion, etc.), finances, conservation and management skills for tourist facilities.

For assessing resilience in an ecosystem, [29-31] recommends generating local support involving political will, stakeholder participation, effective collaboration between scientists, local communities and local government officials to make the scientific data obtained part of adaptation policies and measures.

In Peru it can be found a variety of ecosystems, such as bofedales (high-Andean peatlands), wetlands, hills, among others; but if we focus on the latter, they have very unique characteristics due to their climate, topography, soil or landscape; furthermore, they are unique in South America, mainly in Peru and Chile. Hills form a single biome along the slope towards the sea of the Andean foothills. These are maintained by the maritime fog that is of great importance for the survival of plants, besides influencing the climate of these particular areas [32-34].

The coastal hills are important because they offer a diversity of eco-systemic services, such as generating environmental awareness, they are spaces for leisure and recreation, they are sinks for greenhouse gases, among others. One of the main activities developed in the hills is ecotourism, due to the biodiversity of flora and fauna as a result of their particular climate. This encourages communities of the area to organize and, together with the authorities, form a team to implement strategies to protect the hills, because of their importance as a natural area.

On the other hand, the current health situation and restrictions due to the COVID-19 pandemic have generated difficulties for these associations to maintain their essential activities for the protection and conservation of the hills. Hence this research focuses on answering the following question: What are the main indicators developed by community associations of Lomas de Carabayllo and Independencia to achieve community resilience to the Covid 19 pandemic?

With regard to the situation of Covid-19, [35-38] proposes that the support of governments, market players, technological innovators and the workforce will enable tourism sector to be transformed into a new economic order characterized by sustainability, climate action, social well-being and the involvement of local communities, helping the sector to become much more sustainable than it was before the crisis. Therefore, this includes that the associations of the hills of Lima in the attempt of a reorganization and adaptation to the pandemic can have much more positive changes during and after it. In addition, according to [39-42], through the biological crisis, social and health responses can be improved, enabling social well-being to be promoted.

Also, one of the few studies directly related to community resilience in the Peruvian hills is by [43-45] where determined that self-organization, discipline, democracy, solidarity, topophilia, self-reflection and appropriate community management were the support for the resilience of the rural community of Quebrada Verde in the Lomas of Lúcumo, in the face of the pandemic.

Therefore, given the limited studies linking community resilience of community associations that manage ecosystems, such as hills, in a context of pandemic and social crisis, this research has the general objective of analyzing the main indicators developed by two ecotourism community associations (Lomas de Carabayllo and

Independencia) to achieve community resilience to the Covid 19 pandemic, in 3 phases of the disaster and / or crisis: pre-disaster, response and recovery.

### **Methods**

#### **Research Design**

This is a descriptive and transversal study, two community ecotourism associations from Peru were studied, these are Lomas de Carabayllo and Independencia, analyzing how they develop community resilience to the Covid-19 pandemic; excluding control groups and describing the variables of the group in a short period of time [46-48].

This is also a qualitative study focusing on social sciences, such as psychology, human geography and sociology [46-48]. Qualitative method includes individual and focus group interviews, participant observation, etc. It allows to describe what is happening and why, as well as assisting in problem practice and solving [49-51].

#### **Population and Sample/working group**

The study area is located north of Lima city, capital of Peru, in the districts of Carabayllo and Independencia. The communities under study are located in a coastal mountainous area, surrounded by miles of hectares of hills, on the outskirts of major cities.



*Figure 1.* Location map of Lomas de Primavera – Carabayllo and Lomas de la Bella Durmiente – Independencia (own illustration).

The research took ethical aspects into account, key informants were coded keeping their identity, videoconferences and telephone calls were recorded with express consent, and convenience sampling presented 9 participants, choosing the right people who provided relevant information for the results presentation.

**Data Collecting Instruments**

The work is based on the model [52, 53] which shows the indicators of community resilience for each phase of disaster and/or crisis: pre-disaster, response and recovery. For recovery, this study was based on projections that community associations have about the future post Covid-19. The model allowed to assess and compare community resilience implementation in two different contexts and analyze the level development of the indicators in each phase.

The techniques used were the focus group and the in-depth interview, applied to key informants selected through convenience sampling, that is, carried out to people related to the object of study [54-57]. The instrument consisted of 10 open questions endorsed by expert judgment.

In the research, 2 focus groups were carried out, which consisted of meetings with an open dialogue carried out by videoconferences through the Zoom platform [58-60]. The first one with the participation of 2 members of the Ecological Association Lomas de Primavera (Carabayllo), and the second one with the presence of the representative and 3 members of the Scientific Cultural Association Apu Ikiri Warmi Lomas de Amancaes Bella Durmiente (Independencia).

In addition, there were two deep interviews via Zoom: firstly, to the president of the Ecological Association Lomas de Primavera and Lomas de San Juan de Lurigancho, and, secondly, addressed to a professional on the subject of hills and member of the Association Ecotourism Circuit Lomas de Paraíso (Villa María del Triunfo).

The processing of the responses of the focus groups and the in-depth interviews was through the Discourse Analysis technique, where codes were identified in the responses, and then analyzed, related and created categories [61-63], and with this, construct descriptive arguments to be presented as results of the investigation [64-66]. The coding of the participants names is presented in Table 1.

Table 1

*Encoding of key participants or informants.*

Group of key informants	N° of key informants	Positions	Codes
Ecological Association Lomas de Primavera (Lomas de Carabayllo)	3	President of the association and president of the Peruvian Hills Network	AELP1
		Member of the association	AELP2
		Member of the association	AELP3
Scientific Cultural Association Apu Ikiri Warmi - Lomas de Amancaes Bella Durmiente (Hills of Independencia)	4	President of the association	ACCAIW1
		Vice-president of the association	ACCAIW2
		Member of the association in charge of publicity and networks	ACCAIW3
		Member of the association	ACCAIW4
Red de Lomas del Perú (Peruvian Hills Network)	2	Member of the Association Ecotourism Circuit Lomas de Paraíso	RLP1
		Member of the board of directors of Peruvian Hills Network and president of "Make your world green"	RLP2
Total	9		

## Findings and Results

### Situation before Covid-19 in Lomas de Carabayllo and Independencia

#### Community Participation

Hill associations work together to continue the preservation of hills, as stated by RLP2 "... we began to work hand in hand with each of the human settlements of populations, leaders and neighbors who have become the main allies of this project today...".

In Carabayllo and Independencia, since their formation, have been organized to provide support to low-income families, as mentioned by AELP1 "... participation has been active recently ... we are organized in a group called Union and Force Lomas de Primavera to fight hunger and give our support to 180 - 200 people...".

#### Education

The majority of the population of Independencia had no knowledge about hills and their care, as confirmed by ACCAIW2 "... they are very uninformed, little education and awareness...". This has often caused neighbors to engage in activities that are harmful to the ecosystem.

On the other hand, the hill associations did not have the information and / or knowledge about a pandemic or biosafety measures, as ACCAIW2 comments "...they were definitely not prepared for an epidemic, or for any other event of great magnitude that might occur...".

#### Learning

The community associations have acquired new learning based on what they have been working, as RLP1 comments on internal communication "...we understood that there are communities... where it is better to go to... that we first have to see what the community we're going to work in is like, before taking a similar form of communication to all of them".

In addition, the population has been learning the importance of conserving these ecosystems, as stated by RLP2 "...they have understood that their hills are such an important resource and that, if we take advantage of it in a sustainable way, it can help in the development of their communities...".

#### Communication and information exchange

For the representatives of the hills, it is important to bring information to the community, "...let them know what they are doing, damaging the flora and fauna..." (ACCAIW1).

Another important topic is the promotion of the hills by virtual platforms where sometimes the information is not correct, as RLP1 says "...social networks, youtubers, sometimes do not handle accurate information and, as we are not there to inform them, it generates a whole distortion of information that eventually harms us, the work we do, and the hills...".

#### Social Support

In the case of Independencia, support is received from external entities, as mentioned by ACCAUW1 "... we have the support of the Network, we are part of the Peruvian Hills Network...; [also] EBA Lomas, a United Nations group, which practically gave us awareness workshops...". On the other hand, the association of Carabayllo began receiving support from the same residents. AELP1 comments "...we started in 2013 with a group of enthusiastic young people to promote these natural spaces...".

#### Sense of Community

Hill associations were formed with the purpose of preserving the hills of Lima, as mentioned by AELP2 "... in my opinion hills are recreational spaces... a space where you can be distracted, where you can find diversity of plants, animals, depending on the rainy season...".

The Apu Ikiri Warmi association is clear about its main task, as ACCAIW2 states "... they have a lung there that will save them in the future, so that's what we want people to become aware of, that they understand it as such and protect it... for us life is first...".

### **Trust**

In the Ecological Association Lomas de Primavera, the relationship they have established with the district municipality has allowed them to feel more secure, as mentioned by AELP1 "...the mayor is the leader of all actions and activities, of a firm commitment to our human settlement, and several projects are being indeed carried out here, for example, on health and food issues".

Likewise, for the Apu Ikiri Warmi association, the external support is very favorable and a collaborative bond is built based on trust, ACCAIW2 comments "Yes, we have indeed strengthened ties of collaboration. There has been joint work and then let's say we know each other on the field...".

### **Demographic information**

In the hills of Carabayllo and Independencia there are communities of scarce resources that seek help through hill associations, which provide support through soup kitchens or the municipality. A large part of these populations also lacks the main services, as ACCAIW2 says "...they are generally vulnerable populations that belong to the sector of extreme poverty, that do not have access to services, that are occupying areas of risk, are in situation of overcrowding. This problem is very strong...".

### **Coping Style - Improvisation and Inventiveness**

In both hills, invasions have been a latent problem during the last years, as stated by AELP1 "...as in every hill there are always problems. Invasions occurred in January 2016, where 4 or 5 groups began to divide these spaces of hills into lots... and the struggle has been of our association, which made a district working table that is still in force ...". Likewise, ACCAIW1 states "...we are painfully losing many hectares of hill land...".

Given this situation, Carabayllo has tried to move forward, as mentioned by AELP1 "... Ordinance 398 was drawn up declaring only Loma de Primavera, in the area of Carabayllo 2, to be of public and scenic interest... 8 evictions, which have been extrajudicial recoveries".

### **Leadership**

In both associations have a leader or manager for the division of tasks and decision making, as stated by RLP2 "...this organization is the one that is well managed, for example, as Mr. Ascencio has been managing, or is being developed in various areas, which helps us to see not only the needs regarding the health emergency but also other community needs...".

### **Situation during Covid-19 in Lomas de Carabayllo and Independencia**

#### **Sense of Community**

Both associations have a strong sense of community, as AELP3 shows "... We work selflessly because there is a lot of need, we work because we like it or we want to support others... And, seeing the other neighbors happy makes us continue working and walking..." In addition, ACCAIW1 mentions "...our concern is that this district will be revalued and that there will be more social opportunities for work, education and culture..."

Likewise, in both associations there is a strong collective self-esteem, as ACCAIW1 states "...our hill of Independencia is special... it has a silhouette of a woman, there is much mystery... We will not be content to lose it... because, apart from being a good opportunity for the district, it is the only wonder of all coastal Lima...".

### **Community Participation**

In the case of Carabayllo, the group "Union and Force Lomas de Primavera" has been formed. They are the winners of "Adopt a Soup Kitchen" from the Municipality of Lima and are part of Red de Ollas de Lima Metropolitana (Network of Soup Kitchens of Lima Metropolitan); "...we are the biggest soup kitchen, so we have attended many neighbors of the area who were really in need and are still now" (AELP3). Likewise, AELP1 mentions "This pandemic has also brought us together". Likewise, ACCAIW3 says "... 2 weeks ago we went for an inspection, and we also reaffirmed that the residents are very involved and would like to support this project. Unfortunately, this time has slowed us down".

### **Social Support**

During the pandemic, social support is being developed and maintained in both community associations.

In Carabayllo there are soup kitchens in terms of internal support between neighbors, regarding external support, this is received from the National School Feeding Program Qali Warma, the Ministry of Health [MINSA] with biosafety trainings, and the municipality of Lima Metropolitan and Carabayllo. However, specifically for the hills there has not been any support. AELP2 mentions "... the municipality has supported us with supplies, but that is for food... for the hills... we do not have any other support yet, except for the panels that were recently put..."

In the Apu Ikiri Warmi association, despite of being a recently formed organization, there is a high level of neighborhood support even during the current circumstances. ACCAIW3 comments "...people told us: here you have our support, we are going to take care and water it..." Likewise, the association has been joining with other social organizations as the ecological group of the northern cone in Lima Metropolitan and the social grouping Tahuantinsuyo to face the crisis. Regarding external support, ACCAIW1 comments "...we have no help from the authority... We lack the economy to do many things like the idea of more awareness". On the other hand, they have the support of Peruvian Hills Network and EbA Lomas.

Additionally, the invasions of hills are becoming more established and support from local authorities has not been evident, ACCAIW2 comments "...what local management has basically done is to meet certain basic needs..., but really there is no emergency or contingency plan for this type of situations".

### **Coping Style**

For both community associations, it has been a complex process to manage to adapt to the new context. For Carabayllo, AELP1 comments "...it has also been a bit difficult to be able to understand how people are going to be assigned, we were even afraid to leave and to contact each other, but afterwards we were receiving trainings and we risked as a group to make arrangements and there the soup kitchen was born".

Similarly, in the association of Independencia, many of the activities have been suspended and others have had to adapt to the new normal, as mentioned by ACCAIW3 "... in fact, we have not slowed down, but we continue working on some administrative issues, finding out who can make some steps..."

### **Improvisation and Inventiveness**

During the quarantine innovative and creative actions have been implemented to cope with the situation in both hill associations, for example, AELP1 mentions "... I have a space behind the house. Then there... we are planting lettuce, vegetables and we harvest... besides, there are moms who are dedicated to do some craft work... people who do sewing workshops and hairdressers". In addition, there are ideas and projects to implement; however, for lack of support are not currently executed, ACCAIW1 comments "...there is an idea to make a book... to plant, decorate the main



areas to make them an ecotourism street, make murals, bring plants... look for wood... it's a matter of logistics, but there we are going forward".

### **Coordination**

Virtuality has been key to the reorganization of activities for coordination in both hills, RLP1 mentions "...most are older neighbors, who do not handle technology very well... So, adaptation to this new way of coordinating is a little stressful, until you understand it". In the same way, ACCAIW4 expresses "...we have been coordinating by using alternative means such as social networks or virtual meetings".

The Ecological Association Lomas de Primavera had a quick action and coordination with the neighbors. AELP1 mentions "... I had to call all the neighbors and that's when the soup kitchen was born and we made an improved kitchen". This association has much more experience in practice and coordination as expressed by AELP3 "... we have continued to organize throughout this pandemic and we have been able to reach every neighbor, because from the beginning we have managed a register of inhabitants... that was done before [the pandemic] and we're still on it..".

### **Communication and information exchange**

Both community associations have had to adapt to the new technological modalities and distance measures, as mentioned by RLP1 "... as Network [Peruvian Hills Network] there have been virtual meetings, with them and with the authorities; through the media we are communicating, coordinating and sharing information or evidence of the things that happen in our environments".

Additionally, we got responses like "... we use is WhatsApp and social networks like Facebook..." (AELP1), "...mostly by calls, cellphone and the news..." (AELP3), "...by Zoom or Meet" (ACCAIW3).

### **Trust**

The Ecological Association Lomas de Primavera trusts both the local government and the municipality of Carabayllo. Likewise, internally AELP3 comments "... Covid-19 has made us stronger... now we are more and we have to continue fighting, not only in soup kitchens... but also... in other efforts for the benefit of the population...". On the other hand, sometimes management has sometimes been misinterpreted, as stated by AELP2 "...it is thought that hills are for the personal benefit of some people, but it is not so, and maybe that needs to be known...".

The association Apu Ikiri Warmi trusts the organizations that have been giving support during the Covid-19 crisis as Hills Network, EbA Lomas, Tahuantinsuyo and Ecological Network of Lima Metropolitan, as ACCAIW2 mentions "... do I have confidence in these institutions? Yes, of course. They are our strategic allies".

### **Leadership**

In both community associations the issue of leadership is very important, as AELP2 highlights the efforts of the leaders "...our leaders... They have stopped doing many things to seek help for all of us. That is gratifying and we have to learn from it".

### **Situation after Covid-19 in Lomas de Carabayllo and Independencia: a projection for the future**

#### **Community Participation**

It is estimated that the level of community participation will continue to be positive, as mentioned by AELP2, regarding the soup kitchen, "...the idea is not just to join right now because families are not necessarily in need today; we need tomorrow, we need every day because the situation of the pandemic has hurt us very much... and, as parents, we need a time to recover...".

#### **Social support and Trust**

Both community associations have the willingness and trust to continue working with support agencies, even after the pandemic, AELP1 states "...two days ago we had

a meeting with the president of Congress to evaluate the leftovers from all the soup kitchens... there is a commitment... so that the next year 2021 that surplus budget will be allocated...". Likewise, AELP2 comments "...the soup kitchen will be useful for us and hopefully someday the premises for this will be created... that will be permanent..., the idea is to incorporate more neighbors...".

On the other hand, RLP2 expresses "...I can't say that I trust this can continue after the pandemic because in the next administration, possibly someone who ignores everything that has happened will arrive, ignoring the associations and organizations...".

### **Sense of Community**

The feeling of belonging and attachment to society will continue for both hills, as RLP1 comments "...this is something that has been born of us, the neighbors, and, for being ours, despite the things that happen... or maybe pandemics to come... we'll find a way to motivate ourselves and move on ...". Likewise, ACCAIW3 expresses "... we want to save this representative image of the North of Lima, of Independencia... where we can rescue biodiversity...".

### **Coping Style**

In both community associations, different mechanisms and activities for recovery from the Covid-19 crisis are proposed, AELP2 comments "... we need the support of other organizations to put plants...; irrigation... cleaning... implementation of paths with sign posts or the repair of the path...". Additionally, ACCAIW4 proposes activities, such as "...educate the population, organize workshops, groups... make known the importance of our hills and maybe generate economy by using the resources of these ones...".

### **Improvisation and Inventiveness**

The associations have been forced to find new ways and ideas to recover, RLP1 comments, regarding Quebrada Alta in Villa María del Triunfo, "...the community not only wants to manage it as a welfare kitchen... but now they want to guide it... [to] a type of community restaurant...". In addition, ACCAIW4 comments "...in our hills the 'Amancaes' flower is quite characteristic... [then we could] use those resources to generate income; [also] put on recreation areas for children and young people".

### **Communication and information exchange**

In both hill associations, one of the most important issues is education and awareness about their natural resources, ACCAIW4 expresses "...we must prioritize in educating the population, doing jobs, workshops with children, with young people, so we can face new episodes". In the same way AELP2 mentions "... hopefully we have people from other places to raise awareness, to teach and make known the importance [of hills] ...".

### **Learning**

The learning that the pandemic leaves for both hills is based on environmental, biosafety, technology and social unity value. RLP1 mentions "...to be a little more cautious..., better organized, that we must always be looking for, learning and bring ourselves up to date... the topic of hygiene..., overcrowding, to prevent so many children from being in one space together..., to be a little bit more organized...".

Furthermore, AELP1 comments "...good practices and coexistence as a group; knowing how to value people, neighbors, and, mainly, to be supportive...". On the other hand, AELP2 expresses "...this situation has not necessarily been bad for some, but it has taught us to live as a family, to share, to have other initiatives, to draw skills from where there is no, to think on the subsistence of each one and to support others...". Likewise, this Covid-19 crisis has left environmental lessons, as ACCAIW2 comments "...what we're learning fundamentally is that oxygen is the most important. That is the great lesson that is being directly or indirectly learned...".

### **Leadership**

After the pandemic, leaders of associations will have acquired new skills, as mentioned by RLP1 "...we have virtually attended several talks on Covid-19, protocols..., [we learned to] communicate virtually... so we will be able to manage the situation better, especially, in communication...".

### **Community efficiency**

The prospects for effectiveness and good results after the pandemic are positive to some extent, as mentioned by AELP2 "...yes, we are going to overcome many things because we know that Peruvians are fighters and resourceful... but we would need much help and support for not to be like before but better...". Similarly, AELP1 comments "...efficiently, I don't believe because the problems are diverse and this pandemic has left us many consequences...".

To succeed in overcoming the crisis, good decisions are needed throughout the process, as ACCAIW3 comments "...this is borne with education, culture, which nationwide we lack a lot... [but] yes, we will get through this, and we will continue with our work with all the enthusiasm and motivation to move forward".

### **Discussion**

The community associations of Lomas de Carabayllo and Independencia developed their resilience in the 3 stages of the disaster in a similar way. Before the disaster, indicators of community participation, sense of community and trust in both community associations are more developed because of the high interest in the preservation of the hills, the internal support and good relations between working groups. In addition, community associations are looking for the ways to continue improving and learning through good and constant communication with residents, having leaders who seek the well-being of everybody and allies who can provide support. On the other hand, education is scarce due to the lack of information about hills and the extreme poverty that geographically exists in some localities.

In the stage of response to the Covid-19 crisis, community hill associations presented great development in the sense of community, community participation, social support (internal) and coordination, because the pandemic has led to greater neighborhood unity. Other indicators such as social (external) support, coping style, communication and information exchange, trust and leadership have improved. However, external support from local authorities, better handling of virtual platforms and the overcoming of some difficulties in terms of flexibility and adaptability to change are still needed. The indicator of improvisation and inventiveness has low level of development since, although some activities are already being implemented to cope with the crisis, other ideas are not yet being realized, leaving only proposals. This may also be due to the lack of external support.

In the recovery stage, there is conviction that the sense of community, community participation, social support (internal) and learning will continue even after the pandemic as neighborhood motivation for the preservation of the natural resource and collective well-being is not going to easily disappear. In addition, the pandemic leaves a vast set of lessons to be drawn for future conflict situations. On the other hand, coping style and improvisation and inventiveness are at the lowest level of development, as the ways and new activities to recover and adapt to the pandemic are still unclear, besides they will need external support to implement them.

Specifying the above, community associations of Carabayllo and Independencia have a strong sense of community for both the place and collective well-being that continues even in these circumstances of Covid-19. Both hills have a strong collective self-esteem because they know the value of the hills, by [67-70] those societies with high collective self-esteem would recover before. Therefore, sense of community will be the key to their post-pandemic recovery.

In both hills, community participation and internal social support have been key to carrying out collective activities such as soup kitchens and the creation of new social groupings, before and during the pandemic, and which will be essential for their subsequent recovery. According to [67-70] community participation improves awareness, preparedness and resilience, creates sense of ownership, builds capacity, acquires the necessary support and promotes sustainability, and acts in the interest of the community. In addition, strong social ties provide benefits during hazards, allow for greater trust and social cohesion, and strongly influence response and recovery. As similar results, in the study by [71-73], family members, relatives and neighbors worked together searching and rescuing people, sharing food and building temporary shelters.

Both community associations have learned from past conflict situations (invasions) and had the support of local authorities (municipalities and Peruvian Hills Network) to some extent, and NGOs (Eba Lomas), and with those who still maintain commitment and confidence. However, it emphasizes the need for greater support from the authorities in terms of investments for the environmental improvement, conservation and awareness, specifically of the hills. Similar as the results of [74-77] there was low satisfaction level respecting for the government since it did not help much in terms of food, negligence of local government and local representatives; on the other hand, 74% received mostly support by NGOs. [78-80] identified that relatives and neighbors, informal community organizations, samaj, local government and NGOs are involved in the recovery processes of Bangladesh's coastal communities. Additionally, the residents of York-England mentioned that they are disappointment of local authorities and government because of lack of giving support.

Because of the lack of education and awareness of both associations, participants suggested more training and neighborhood workshops and thus strengthen environmental awareness and biosecurity. [78-80] mentions that it is necessary to carry out training and awareness campaigns for communities and prevent them from risk situations in the future. Likewise, the participation of field professionals in workshops allow to promote a good education to the residents and to educate on adaptation opportunities.

Because community members, mostly from developing countries, lack training or professional knowledge, understanding of community participation and of their national protected areas, it is difficult to promote community participation, to organize activities that allow for their long-term development, strengthen their capacity and improve their level of response to threats. There are similar results as the study by in which 34,15% of Taiwan rural communities had low exposure–high awareness and 20.57% high exposure–low awareness being the last one with higher risk. Also according to [81-83] in the areas that are often affected by floods more than 50% of the population is informed about storms, unlike the areas where isn't common floods. The study determined that the high education level means high capacity to respond and with low education level, the response capacity is low.

Because of the Covid-19 pandemic, associations have been forced to adapt to new ways of communicating, coordinating and reorganizing themselves through virtual platforms (WhatsApp, Facebook, Zoom, Meet). Social networks are platforms that allow communication, collaboration, transmission of a sense of unity and the building of crowd-sourcing communities, especially in crisis and emergency situations. As similar results, mentioned that the ways the adult population of Hong Kong seeking for information about typhoon-related information are: television (88.2%), apps via smartphone (30.4%), websites (21.8%) and social media (17.3%). Communication allows members the opportunity to express their needs, views and attitudes.

The pandemic has allowed community associations to seek and learn new ways to move forward and face conflicting situations, such as soup kitchens, and to learn new points of view regarding environmental care, biosecurity, new strategic allies, new ways of working, neighborhood union, technology, etc. As similar results, in District Layyah, Pakistan 36% of people said that they started using a tractor tube for crossing,

rescuing their family and other assets by themselves and 5% use Sandhar (traditional suit) for crossing flood water. Also, after cyclone Sidr, localities started to reconstruct their houses at higher elevations and build much stronger houses.

Additionally, both ecotourism associations were trained and found a way to continue with the tourist activity that is an important source of income; and by [84-86] the most resilient communities are those with non-traditional economic activities such as tourism.

The leaders of both associations have been the pillar of response to the Covid 19 crisis, they have coordinated, reorganized and made the best decisions for neighborhood welfare. Through community leadership, creative, innovative and personalized solutions that will meet the needs, as well as release inventiveness and commitment to avoid crisis and continue the renewal can be shown [87-89]. Beneficial improvised actions that were obtained as learning from past situations must be formalized in institutional policy, so that they endure in memory through time and can be applied to future events.

The prospects for the members of community associations to overcome and recover from the Covid-19 crisis are positive. However, there will be some aspects of resources, culture and education that still need to be improved. mentions, the behaviors and measures taken adequately by the community will define the effectiveness of the response through the results obtained.

Hill associations are mostly those communities that are most vulnerable and the most affected by social inequalities during this pandemic. "The more socially vulnerable an area is, the greater the impact of a disaster will be". Therefore, some key recommendations for the equitable planning of community resilience (preparedness for disaster) include internal coordination and collaboration, external communications and participation, safe spaces and physical projects involving the participation of multicultural communities, and long-term sustainability by reinvesting in leadership and development in the community by building partnerships.

Therefore, the indicators studied in the research allow to improve the deficient aspects and replicate the strengths and knowledge acquired that helped to cope with the three stages of the crisis, in the other community associations belonging to the Peruvian Hills Network and other community associations of different geographic spaces in the world. Likewise, the results obtained will be of support to prepare the associations for future crises; it will also be a guide for the development of contingency plans that allow a more effective community resilience.

Additionally, some of the study limitations were the restrictions on face-to-face visits to community ecotourism associations due to the pandemic; in addition, the difficulties of the use of virtual platforms for conducting interviews and focus groups by participants. Likewise, the responses of the members of two community associations and representatives of the Peruvian Hills Network were analyzed, with the study of the other associations belonging to the network being a suggestion that allows the results obtained to be compared.

## Conclusions

Community associations have an important role in the care and preservation of hills. However, they often present difficulties that put at risk this geographical space and social well-being, for example, invasions, social inequalities and environmental pollution. It is therefore essential that they develop their community resilience to better respond to and recover from new conflict situations.

This study concludes that community associations of Carabayllo and Independencia have key characteristics for achieving community resilience in the three stages of the pandemic (pre-disaster, response and recovery), such as their sense of community and community participation. However, they have deficiencies in terms of education, improvisation and inventiveness, and coping style that hinder the efficiency

of their total resilience to cope and recover from the Covid-19 crisis. This analysis has made it possible to identify the most developed and least developed indicators in the three stages of the disaster, which will be a starting point for the development of resilience in the post-Covid stage, a model for other community associations and a guide of areas to be improved by the relevant authorities. It will also be the basis for developing and/or improving national programs of social resilience to face future crises.

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