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Perception of glacial retreat and climate change in Peruvian Andean communities: an interdisciplinary approach

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Abstract: An interdisciplinary analysis of the perceptions of glacial retreat and climate change in Andean communities in Peru allows us to have a better understanding of the problem. The aim of the study is to propose an interdisciplinary approach and present the results of the psychological constructs evaluated. The results show a relationship between the perceptions of glacial retreat and the risk of climate change. Most people in the community perceive that glaciers will shrink in the future and are very concerned about the risks of climate change on a personal and social dimension. Awareness of glacier retreat and climate change impacts increases willingness to engage in adaptation and mitigation behaviours. Finally, the implications of the findings for risk communication are discussed and future lines of research are suggested.

Keywords: Perception, glacial melt, climate change, Andean.

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1. Introduction

The study of glacial retreat as a consequence of climate change is the focus of attention of different disciplines such as geography, political science, sociology, anthropology and psychology (1). It is clear that the development of such studies from different disciplines helps us to have a better understanding of the factors linked to the perceptions of glacial retreat and the perceptions of climate change risk. However, such studies are more common in developed countries (2), and evidence needs to be generated in developing countries.

An analysis of surveys conducted in recent years in European countries reveals a decrease in concern about climate change and its consequences, combined with an increase in scepticism about its severity and anthropogenic causes (3). Indeed, public perceptions generally show much less concern about climate change compared to the reports of climate scientists (4), a situation that might be better explained by the reasoning of social psychology that lack of concern about climate change might be due to the way people perceive it as something distant from them and their community (5), this scenario is directly related to studies on social cognition that link spatial distance to the dampening of reactions and judgements (6).

A documentary analysis (7) of the years 1997 to 2012 indicates that most of the people interviewed associate climate change with the increase in temperature and the retreat of glaciers. Interestingly, however, their adaptation actions are generally oriented towards managing agriculture, community and water resources (8). In this line, studies carried out with farmers confirm that most of the populations focus their attention on water resources, due to the fact that they have experienced situations of drought, floods and water scarcity (9). Additionally, it has been observed that Andean populations show concern for the agricultural systems that support their economy, these systems are strongly connected with the water resources that come mainly from their glaciers. For example, studies in the Cordillera Blanca, Ancash, (10) found that most people perceive climate change as an increase in strong winds, periods of intense cold, constant and changing rainfall, frequent heat events that affect their agricultural productivity, the health of their livestock, generating large uncertainty in their agricultural cycles, lifestyles and socio-ecological systems.

1.1 Perceptions of glacier retreat

The retreat of glaciers represents a risk to populations due to the far-reaching impacts it will have on mountains around the globe (11). The most obvious consequences are water scarcity and flow variability, especially at dry times of the year (5). Currently, the mountains of the Peruvian Andes are losing glacier mass at a continued high rate (10, 12), causing negative impacts associated with natural disasters such as landslides, floods and landslides, putting the lives of communities at risk (13).

In this sense, studies by Forero (14) indicate that the current concern for investigating social aspects of glacier retreat and climate change in Latin America should be

prioritised. In this sense, Postigo (15) reported that in southern glacial retreat and climate change are perceived as more prolonged and intense climatic events. Moreover, local knowledge plays a fundamental role in the adoption of resilience behaviours. On this point, the study by Spence et al. (16) found that direct experiences with extreme events support people to make decisions in the face of climate change and therefore show greater commitment to sustainable behaviours and even support policies.

In order to better understand perceptions of glacier retreat in Andean communities, it is necessary to consider the factors that influence the way they think, feel and behave (17). Therefore, understanding what the interpretations, explanations and meaning of these environment-related risks are for these populations will help us to have a better social understanding of the problem. Furthermore, it allows us to generate knowledge that could contribute to the design of adaptation strategies according to particular realities, respecting their own dynamics, diversity and complexity, which would be summarized in the way they understand their historical context and the interpretation of changes in the environment (14).

1.2 Perceptions of climate change risk

The Special Report of the Intergovernmental Panel on Climate Change (18) identifies Peru as one of the countries most vulnerable to the effects and risks of climate change. In this sense, it is necessary to know how people perceive these risks. Overall, perceptions are based on social cognition (19) "the way in which we interpret, analyse, remember and use information about the social world" (20). Risk perception is understood as the subjective evaluation of the probability of an accident or negative event occurring and how much this could harm us (21). From an integral point of view (22), risk perceptions are made up of emotional, cognitive, social and socio-demographic variables, which are manifested in the face of risk situations. Moreover, these factors could affect individuals' judgement of environmental risks (glacial retreat and climate change), which go beyond their objective consequences. Natural risks are perceived as a direct function of other risks as a whole which, for example, the inhabitants of the community of San Isidro de Chicón in southern Peru perceive: social, political, cultural, economic and ecological risks (23,24).

1.3 Interdisciplinary approach to the study of perceptions of glacier retreat and climate change

The study of perceptions of the retreat of glaciers and climate change suggests considering an interdisciplinary approach, including natural and social dimensions (17). This first part describes contributions from the following disciplines: geography, anthropology and social psychology. From the field of geography, the geographical contextualisation of the study area is included (see topic 2, Study area: Chicón Basin - Sacred Valley of Cusco), due to the implications of glacial retreat and climate change, it is important to understand the dynamics of interaction between natural and social systems (25). In the second part, anthropology (qualitative method) and psychology (quantitative method)

are considered. This combination of methods will allow us to assess the perceptions of glacier retreat and climate change among the people of the Sacred Valley of Cusco.

Interdisciplinary methodology will be beneficial for both natural and social science approaches (26), both of which start from the same general question, but require different methodologies to search for answers (27). Furthermore, parallel mixed methods are considered, which develop a sequence of independent steps for each approach, which will allow two sets of data to be collected and analysed at the same time or with a time lag (28, 29).

1.3.1 Ethnographic Aspects

Regarding the ethnographic study, semi-structured interviews, in-depth interviews, participant observation, cartographic storytelling and informal conversations were used as a product of the daily coexistence between researchers and villagers (30).

Before starting the fieldwork, in order to prepare for the semi structured interviews, a general guide was prepared by selecting key topics during the interview and giving the interviewer and interviewee enough freedom to go deeper into a topic or to address new ones (27).

The procedure for the development of the interviews included the application of the informed consent form, where participants were explained the purposes of the study and the freedom to leave the study if necessary. The interviews were recorded and were conducted during the agricultural or livestock work days, in some cases in their own homes.

In order to analyse the qualitative data, we first transcribed all the interviews (31), then the information was organised into previously defined categories to be processed with the RQDA software (32), which is a digital interface that allows the selection of information according to the established categories and key words. Moreover, we participated in meetings with the community to inform them about the purposes and progress of our study. Finally, a research report was delivered to the community leaders.

1.3.2 Psychological aspects

The psychometric paradigm (33, 34) was considered for the study of perceptions of glacial retreat and climate change (35). The use of scales and correlation analysis techniques allowed us to generate quantitative representations (35).

Regarding instrument selection, the recommendations of van der Linden (22) were followed. Because the instrument versions have been developed in English cross-cultural adaptation of the instruments was implemented in two phases (36). The first phase includes a back-translation design, for which translators were identified who are fluent in both languages (English and Spanish), and who also have knowledge of psychometrics, one of whom will be an expert in climate change studies and risk perceptions. After the translators had a consensus version of the instruments in Spanish and English, the sec-

ond phase consisted of the implementation of a pilot study in a sample of 80 participants with the purpose of obtaining empirical data about the instruments which were later administered to a larger sample. The data were analysed in the R statistical package (37).

1.4 The present study

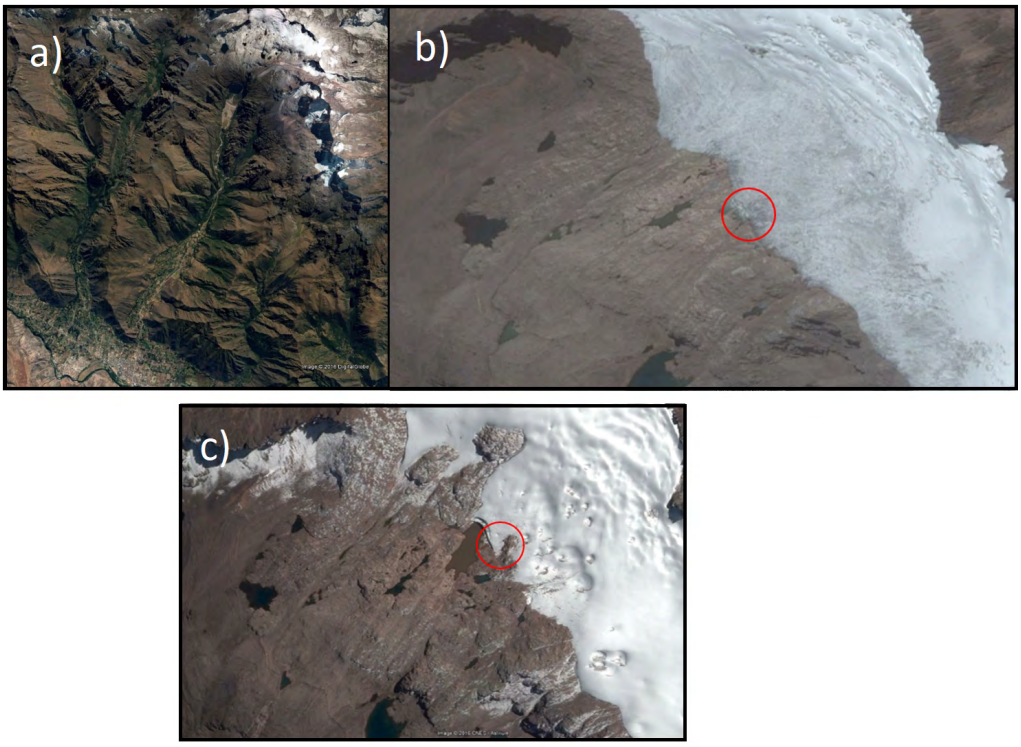
Assessing perceptions of glacial retreat and climate change is necessary for a better understanding of these natural phenomena and how they are experienced by local people. However, few studies have been carried out in the social sciences (17, 22). This paper shows the results of the psychological study, describing constructs such as perception of glacial retreat, risk perception of climate change, experiences with extreme events, landslides and willingness to engage in adaptation and mitigation behaviours.

2. Methods

2.1 Study area: Chicón basin - Sacred Valley of Cusco

The Chicón basin extends from the city of Urubamba reaching an altitude of 2860 meters above sea level (m a.s.l.) up to the snow-capped mountains in the upper part of the basin with altitudes of (ca.) 5000 m and 5400 m a.s.l. (Fig. 1). The basin is made up of the communities of San Isidro de Chicón (463 inhabitants), Chichubamba (250 inhabitants) Yanacona (255 inhabitants), while the city of Urubamba has a population of 28,79 people according to the 2015 census conducted by the municipality of Urubamba.

Figura 1- Study area



Note:

a) The Chicón basin from the town of Urubamba up to the Chicón snow-capped mountains.

b) The Chicón glacier, the formation of Lake Riticocha has just begun and is indicated by the red circle.

c) The Chicón glacier and Lake Rit'iqocha (red circle). See Figure 1, part c for reference of glacier and lagoon change over 7 years.

Source: Satellite image taken from GoogleEarth (2016).

The upper part of the basin can be defined from the Pampa Ocururuyoc with an altitude of 3850 m a.s.l., up to the glaciers, with an area of 8.75 km2.

The total area of the entire Chicón basin is approx. 35 km2. Based on a high-resolution satellite image of 29 June 2016, the glacier area draining into the Pampa Ocururuyoc is determined to be approximately 1.27 km2. Further, other glaciers in the eastern part of the basin currently occupy about 0.6 km2. The downstream rivers extend to the lower part of the Pampa Ocururuyoc, upstream from the community of San Isidro de Chicón. Most of the glaciers have a small altitudinal extent, from about 4800 m a.s.l. to 5000 m a.s.l. in the north-western part and up to 5250 m a.s.l. in the south-eastern part.

Several factors influence glacial retreat, with temperature increase being the most important factor (38). Changes in precipitation and humidity may have additional and related effects (39). The small altitudinal extent of the Chicón glaciers, just over 5000 m a.s.l., means that the glaciers in the basin lack a substantial accumulation area that could sustain them in the future. Consequently, these glaciers are more vulnerable to climate change and are likely to disappear over the next 20-30 years or even sooner. One point to consider in this context is that climate models predict that tropical glaciers will be exposed to amplified tropospheric warming over the next century compared to mid-latitudes (40). In recent years, glacial retreat has indeed been strong, as shown in Figure 1, part b and c. In terms of length, glacial retreat in the last 10 years was ca. 20 m per year.

2.2. Sample gathering and participants

After a pilot test where 80 individuals participated, face-to-face interviews were conducted with the help of tablets. Data were collected between May 2016 and January 2017. The random route procedure (41) was used, selecting roads previously identified on maps. The interviewers then visited each of the houses requesting the voluntary participation of people over 18 years old. The random route methodology is representative of the geographical area sampled. Interview time was between 50 and 90 minutes.

Total sample for the community of Chicón-Urubamba was N=155, mostly women 84 (54.2%) and men 71 (45.8%). In terms of education, the sample consisted of participants with secondary education 60 (38.7%), primary education 46 (29.7%), no education 27 (17.4%), higher education 14 (9%) and technical education 8 (5.2%). Regarding religious practice, the majority were Catholic 149 (96.1%) and Christian 3 (1.9%), others 3 (1.9%). Concerning economic income 39 people (42.4%) reported an income of 300 nuevos soles (Peruvian currency) per month, 34 participants (37.0%) with 800 nuevos soles, 9 participants (9.8%) with 1300 nuevos soles, 9 participants (9.8%) with 2050 nuevos soles, and one participant (1.1%) with 7000 nuevos soles. All participants filled out the informed consent form (42).

2.3. Measures

Scale of Risk Perceptions of Climate Change (22) has 8 items to assess general risk perceptions, and the scale has two dimensions, social and personal, with response options from 0 to 4, where 0 = not at all, 1 = a little, 2 = quite a lot, 3 = mostly and 4 = a lot. For example, respondents were asked "How serious do you think climate change is for the environment?". Internal consistency analysis provided an ordinal alpha □=.96.

To assess the perceptions of glacier retreat, experience and intimidation with landslides and the willingness to take on adaptation and mitigation measures, specific questions were used, combined in a single questionnaire. In addition, socio-demographic information was collected

Questionnaire of Glacier Retreat Perceptions (43), comprising three items, the first assesses the perceptions of a decrease or increase in glacial ice, with a Likert scale of 1 to 7, from 1 = will increase strongly to 7 = will decrease strongly; the second assesses the probability that these changes are occurring at present, with a scale of 0 = not at all certain to 5 = totally certain. And the consideration of whether these impacts will be positive or negative, with a response scale of 1 to 7, where 1= wonderful to 7= catastrophic, for example, what do you think, how much will glaciers decrease or increase in the future?

Questionnaire of experience and intimidation with Landslides (43), was assessed with two items, the first one assesses whether participants have experienced extreme landslide events in the last 5 years, with response option from 0 to 4, where 0= never and 4= more than three times; and the second one assesses how intimidated they are by this event, with response option from 0 to 4, where 0= Not at all, not at all intimidated to 4= Very intimidated, for example, how intimidated are you, even today, about these experiences?

Questionnaire on Willingness to undertake adaptation and mitigation behaviours (43), was assessed with two questions, asking participants how much time they would be willing to give to prevent and reduce the impacts of extreme events such as landslides, with a response option from 0 to 2, where 0= none, 1= Less than one hour and 2= More than one hour. For example: If you could reduce the damage caused by landslides or avalanches, how many minutes per day would you spend on this cause?

2.4. Procedure for statistical analysis

First, a normality test was performed to observe the distribution of the data, which showed that our data had a non-parametric distribution. Second, descriptive analyses of the study variables were performed. Finally, correlations were performed using Spearman's Rho. These analyses were carried out in R-Studio, a programming language software that allows statistical analysis and free graphics. Some of the packages used were: apaTables (44), PerformanceAnalytics (45), psych (46), corrr (47).

3. Results

3.1 Descriptive

3.1.1. Perceptions of glacial retreat

Table 1 shows the descriptive results of the perceptions of glacial retreat, N=68. In the item "What do you think, how much will glaciers decrease or increase in the future?", 50% indicated that glaciers will strongly decrease, on the contrary, 7% indicated that glaciers are strongly increasing. On the second item "How good or bad would the

consequences of such changes be for you and the people near you", 47.9% indicated that the consequences of glacial melting will be catastrophic. Finally, regarding the item "How sure are you that these changes will or will not occur", 37.3% indicated that they are absolutely sure that these changes will occur.

Table 1 - Perceptions of glacial retreat

		f	%
What do you think, how much will glaciers decrease or increase in the future?	Will increase strongly	7	10.3%
	Will increase somewhat	3	4.4%
	Will increase slightly	1	1.5%
	No change	0	0.0%
	Decrease slightly	2	2.9 %
	Will decrease somewhat	21	30.9%
	Will decrease strongly	34	50.0%
	Total	68	100.0%
How positive or negative would the consequences of such changes be for you and the people close to you?	Wonderful	1	1.4%
	Somewhat wonderful	5	7.0%
	Not very wonderful	0	0.0%
	No change at all	1	1.4%
	Slightly catastrophic	2	2.8%
	Somewhat catastrophic	28	39.4%
	Catastrophic	34	47.9%
	Total	71	100.0%
How sure are you that these changes will occur or that no change will occur?	Not Sure	1	1.5%
	Somewhat Sure	8	11.9%
	Slightly Sure	22	32.8%
	Mostly Sure	11	16.4%
	Absolutely Sure	25	37.3%
	Total	67	100.0%

Source. Own elaboration.

3.1.2. Perceptions of climate change risk

Table 2 shows the descriptive results of the Risk Perceptions of CC, N=150 participants. The item with the highest score was "How concerned are you about climate change?" 52% reported that they are very concerned about climate change. Following this, the item "In your opinion, how likely is it that, at some point in your life, you will suffer serious threats to your health or general well-being as a result of climate change?" 51.7% responded that it is very likely how climate change will affect their lives. The item "In your opinion, how likely do you think it is that climate change will have very

damaging long-term impacts on our society?", 45.9% of participants responded that the likelihood of suffering damaging impacts on society is very much. On the item "How threatening do you think climate change is to you?", 44.3% indicated that climate change is very threatening. Regarding the item "How threatening do you think climate change is to the environment?", 43% of the participants reported that the threat would be very much. Concerning the item "How often do you worry about the negative consequences of climate change?", 32.9% indicated that they worry a lot, while 12.1% indicated that they worry a little. On the item "How serious do you think the current impacts of climate change are worldwide?", 31.3% indicated that the threat of CC is very serious for the world. Finally, the item "How serious do you think the impacts of climate change in Peru would be?", 28.3% and 37.9% of the participants responded that the impact of climate change in Peru will be very serious and mostly serious.

Table 2 - Perceptions of Climate Change Risk

	Not at all	A little	Quite a lot	Mostly	A lot
	f(%)	f(%)	f(%)	f(%)	f(%)
How concerned are you about climate change?	1 (0.7%)	7(4.7%)	39(26.0%)	25(16.7%)	**78(52.0%)**
In your opinion, how likely is it that, at some point in your lifetime, you will experience serious threats to your health or general well-being as a result of climate change?	2(1.4%)	5(3.4%)	14(9.5%)	50(34.0%)	**76(51.7%)**
In your opinion, how likely do you think it is that climate change will have very detrimental long-term impacts on our society?	0(0.0%)	4(2.7%)	21(14.4%)	54(37.0%)	**67(45.9%)**
How threatening do you think climate change is to the environment?	1(0.7%)	8(5.3%)	37(24.5%)	40(26.5%)	**65(43.0%)**
How serious do you think the current impacts of climate change are worldwide?	1(0.7%)	13(8.8%)	34(23.1%)	53(36.1%)	**46(31.3%)**
How threatening do you think climate change is to you?	4(2.7%)	11(7.4%)	31(20.8%)	37(24.8%)	**66(44.3%)**
How serious do you think the impacts of climate change would be in Peru?	4(2.8%)	15(10.3%)	30(20.7%)	55(37.9%)	**41(28.3%)**
How often do you worry about the negative consequences of climate change?	1(0.7%)	18(12.1%)	34(22.8%)	47(31.5%)	**49(32.9%)**

Source. Own elaboration

3.1.3. Experiences and Intimidation with landslides (Huaycos)

In table 3 (part A), we describe the frequencies of experiences and intimidation with landslides or huaycos. Considering N=71, regarding experiences with extreme events in the last 5 years, 33.8% of the participants reported having experienced landslides at least once, while 6.9% experienced more than three times, and 22.5% indicated that they had no such experiences. Regarding the type of intimidation from a sample of N=55, 30.9% felt very intimidated and somewhat intimidated.

3.1.4. Willingness to undertake adaptation and mitigation behaviours

Table 3 (part B) shows the descriptive frequencies of the willingness to assume adaptation and mitigation behaviours. 58.3% of the participants showed their willingness to adapt and mitigate to the impacts of extreme landslide and mudslide events by spending less than one hour on tasks that can prevent or reduce the negative impacts of extreme events. Meanwhile, 25% indicated more than one hour of tasks for adaptation and 26.4% for mitigation. In contrast, a smaller number of 16.7% indicated that they would not be willing to engage in adaptation behaviours and 15.3% in case of mitigation.

Table 3 - Part A: Experiences and intimidation with landslides (huaycos)

		f	%
Considering roughly the last 5 years, how often have you personally experienced landslides or avalanches in your local area?	Never	16	22.50%
	Once	24	33.80%
	Twice	9	12.70%
	Three times	10	14.10%
	More than three times	12	16.90%
	Total	71	100.00%
How intimidated are you still today about these experiences?	Not at all intimidated	0	0.00%
	Somewhat intimidated	14	25.50%
	Slightly intimidated	17	30.90%
	Considerably intimidated	7	12.70%
	Very intimidated	17	30.90%
	Total	55	100.00%

Part B: Adaptation and Mitigation Provision with Landslides and Flash Floods

If you could prevent landslides or avalanches, how many minutes per day would you spend on this cause?	Not at all	12	16.70%
	Less than one hour	42	58.30%
	More than one hour	18	25%
	Total	72	100%

If you could reduce the damage caused by landslides or avalanches, how many minutes per day would you spend on this cause?	Not at all	11	15.30%
	Less than one hour	42	58.30%
	More than one hour	19	26.40%
	Total	72	100%

Note: For experience you have a response option from 0 to 4, where 0=Never, 1=Once, 2=Twice, 3=Three times and 4=More than three times. For intimidation from 0 to 4, where 0=Not at all intimidated, 1=A little intimidated, 2=Somewhat intimidated, 3=Considerably intimidated and 4=Very intimidated. For willingness to act, the response option for this questionnaire comprised 0 to 2, where 0=Not at all, 1=Less than one hour and 2=More than one hour. Source. Own elaboration.

3.2. Correlations

Table 4 shows a significant correlation between the perceptions of glacier retreat and negative consequences, the higher perception of glacier retreat will increase the perception of catastrophic consequences r=.81**. A positive relationship is observed between the perception of glacier retreat and the perception of CC risk r= .56**, the higher the perception of glacier retreat, should increase the perception of climate change risk. Furthermore, there is a significant correlation between the negative consequences of glacier retreat and the risk perceptions of CC r= .50*, the higher the perceptions of negative consequences, the higher the risk perceptions of CC. Moreover, it is evident that the stronger the intimidation with landslides, the higher the risk perception of CC and the higher the perception of glacier retreat (r=. 40 and r=.35, respectively).

Landslide experience has significant negative relationships with almost all variables, the lower the landslide experience, the higher the perception of glacier retreat and the higher the risk perception of CC and (r=-.44**, r=-.38**, respectively). Intimidation with landslides only had significant relationships with the perceptions of glacier retreat of r=.35*, the risk perception of climate change r=40** and negatively with the experience of landslides of r=-.32*.

Table 4 - Correlation of variables

Variable	M	SD	1	2	3	4	5
1. Decrease or increase in glacier mass	5.74	1.98					
2. Consequences of glacial retreat	6.07	1.44	**.81****				
			[.47, .76]				
3. Certainty that glacial retreat will occur	2.76	1.13	.36*	.39*			
			[-.16, .52]	[.01, .61]			
4. Risk Perception of CC	24.83	5.54	.56**	.50*	.05		
			[.13, .60]	[.01, .51]	[-.21, .33]		
5. Experience Landslides	1.69	1.41	-.44**	-.37*	-.23	-.38**	
			[-.68, -.19]	[-.57, -.03]	[-.55, .10]	[-.59, -.15]	
6. Intimidation landslides	2.49	1.18	.35*	.16	.18	.40**	-.32*
			[-.08, .55]	[-.18, .45]	[-.22, .53]	[.15, .65]	[-.53, -.04]

Source. Own elaboration. Exported from R-Studio.

4. Discussion

The study of perceptions of climate change in tropical Andean contexts responds to current research needs on how high Andean communities perceive and interpret climate change (48). The existing literature gap comprises an important challenge and task in addressing climate change (49). The importance of integrating local perspectives is receiving greater attention, due to the need to understand the responses of people from different positions in the world (24) in this particular case of the Andean people of Peru.

Glacier melt has multiple implications, one of the most important of which, for example, is water supply and land use (50, 51, 52). However, the present research highlights the role of the relationship between the perceptions of glacier retreat and the risk perceptions of CC (22), and also considers the relationship with extreme events and adaptation and mitigation behaviours in an Andean community in Peru. According to Forero et al. (14), each culture has its own perceptions of nature and its territories, and going into these communities will allow us to understand their interests, requirements, and necessities.

Our findings showed significant relationships between the constructs of perceived glacial retreat and risk perception of CC, as well as willingness to engage in adaptation and mitigation behaviour. This is consistent with studies by Perez et al. (53), in farmers

in Bolivia, Peru and Ecuador, who identified that climate change and deglaciation affect the activities of farmers, highlighting the importance of the strategies employed in adaptation and mitigation in the face of negative impacts. Several authors (17) point out that glaciers stand out as evidence per excellence of global climate change. Moreover, glacier melt is a local and global concern. In this sense, studies emphasize the importance of understanding local and regional experiences with glacier change, and its wider implications for a global ice loss policy (54, 55, 56).

On the other hand, experiences with extreme weather events and their relationship to perceived glacial retreat and risk perceptions of CC is a relatively new area of study. Studies have shown that personal experience is a predictor of risk perception of CC (22, 57). The present research provided evidence of a significant relationship between risk perception of CC with experience of extreme events (such as landslides or huaycos). In this line, studies have shown the relationship between these elements, such as van der Linden (22, 58), where personal experience is conceptualised as a predictor of risk perception. Reser and Bradley (59), show the relationship between experiences and perceptions of CC; furthermore, linking the fear variable as a motivational factor for actions in the face of climate change. In this sense, our results show significant evidence between intimidation and risk perceptions of climate change and glacial retreat, which allows us to determine the appropriateness of climate change communication designs that aim to engage and influence individuals, communities, and audiences regarding the current threat and risks (60, 61).

Finally, we can conclude that glacier retreat often becomes an area where diverse actors interact. In this scenario, experience and intimidation play an important role on perceptions and on this basis people and communities make decisions to act in the face of climate change (62). Furthermore, at the local level perceptions of changes and necessities are generally diverse creating a major challenge for the design of adaptation and mitigation policies (63).

Limitations and Implications

The present research is not without limitations, such as the sample size which does not allow for generalization of the research results. The level of education, mostly at the secondary level may imply some cognitive limitations; however, the diversity of opinion is what this research seeks to discuss in a developing context of rural mountain areas. It is important to recognise the need for comparative sample studies, given the diversity of perceptions of climate change and the risk-benefit it represents. It is recommended that future research could extrapolate the data to other contexts. We believe that there is still some way to go in terms of communication of results and improving understanding of this phenomenon and its implications for livelihoods.

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AMBIENTE & SOCIEDADE 25 anos 25 años 25 years

SciELO

Percepção do derretimento das geleiras e da mudança climática na população andina no Peru: uma abordagem interdisciplinar

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Resumo: Uma análise interdisciplinar da percepção do degelo glacial e das alterações climáticas nas comunidades andinas no Peru permite-nos ter uma melhor compreensão do problema. O objetivo do estudo é propor uma abordagem interdisciplinar e apresentar os resultados das construções psicológicas avaliadas. Os resultados mostram uma relação entre a percepção do derretimento glaciar e o risco de alterações climáticas. A maioria dos habitantes da comunidade percebe que os glaciares irão encolher no futuro. Estão muito preocupados com os riscos das alterações climáticas a nível pessoal e social. A consciência do recuo dos glaciares e dos efeitos das alterações climáticas gera uma maior vontade de assumir comportamentos de adaptação e de mitigação. Finalmente, as implicações dos resultados para a comunicação dos riscos são discutidas e as linhas futuras de investigação são prosseguidas.

Palavras-chave: Percepção, fusão glacial, mudança climática, andina.

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SciELO

Perception of glacial retreat and climate change in Peruvian Andean communities: an interdisciplinary approach

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Christian Huggel
Luis Vicuna

Resumen: Analizar de manera interdisciplinaria la percepción del deshielo glaciar y el cambio climático en comunidades andinas de Perú, nos permite tener una mejor comprensión del problema. El objetivo del estudio es proponer el abordaje interdisciplinario y presentar los resultados de los constructos psicológicos evaluados. Los resultados evidencian relación entre la percepción del deshielo glaciar y el riesgo del cambio climático. La mayoría de habitantes de la comunidad, perciben que los glaciares en el futuro disminuirán. Presentan alta preocupación por los riesgos del cambio climático a nivel personal y social. La conciencia sobre el retiro de los glaciares y los efectos del cambio climático generan mayor disposición para asumir conductas de adaptación y mitigación. Finalmente, se discuten las implicancias de los hallazgos en la comunicación de riesgos y se siguieren futuras líneas de investigación.

***Palabras-clave*:** Percepción, deshielo glaciar, cambio climático, andina.

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