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Social vulnerability to environmental hazards:

How cognitive factors influence preventive behavior to forest fires in people living in the wildland-urban interface. A case study of the Valparaiso region, Chile.

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Preface

One of the greatest motivations I had for taking the environment and society program at the Radboud University was to be able to make a real contribution to finding solutions to the socio-environmental problems of my country, Chile. My land can sometimes be a rather inhospitable place; volcanic eruptions, earthquakes, fires, droughts, floods, are just some of the environmental phenomena that Chileans must learn to live with. That is perhaps why my people is characterized by being resilient and at the same time very supportive since the misfortune if it does not touch you directly is seen very closely.

This master thesis is the first opportunity to help them on a bigger scale, by putting into something concrete all the knowledge I gathered throughout the entire master's program. Hoping to provide knowledge in relation to forest fires and thus try to help prevent a possible catastrophe.

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"Give me fuel give me fire

give me that which I desire"

-Metallica

Abstract

Background

The world is seeing an increase in environmental hazards, such as wildfires, due to the climate change crisis. But it is mostly people with fewer economic resources who have to deal with their disproportionate consequences. This unequal distribution of risk is contributing to an already high vulnerability of its population, perpetuating these groups in their precarious condition. Although the economic structures that generate these inequalities are not within these peoples' purview, they still have the power to improve their situation by nurturing their resilience and thus generating opportunities for a better life.

Objective and Theory

The objective of this research is to determine to what extent cognitive factors -in the shape of coping and risk perceptions- influence behavior that mitigates vulnerability to forest fires in people living in the wild-urban interface, which is the area where forests meets human settlements. There are four perceptions, categorized in two groups, that had been analyzed. In the risk perception category we find: perception of likelihood of event, perception of severity of the consequences of the event, and in the coping perception category we find: perceived capacity to cope with and also the perceived effectiveness of the coping behavior. In addition to this, the role of organizations -in relation to these cognitive variables- involved in fire prevention was analyzed.

Methods

The research question is answered through bibliographic research and semi-structured interviews with representatives of two institutions in Chile who work on the implementation of preventive programs in populations that live in the wild-urban interface. Based on their responses, the study sought to understand the perceptions of these communities developed in the face of the possible occurrence of forest fires.

Conclusion

The results suggest that cognitive factors alone can not explain self prevention behaviors. Contextual factors are required to be included in the variables for a better understanding of the phenomenon.

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Chapter 1: INTRODUCTION

Today's society and its economic systems are showing signs of collapse at a general level, trade wars, pandemics, increasing social inequalities, uncontrollable increase of people below the poverty level, environmental problems, etc. (UNDESA World Social Report 2020).

In this sense, the Covid-19 pandemic has painfully shown us the fissures of an economic and political system that seems not to be prepared to withstand a shock or crisis. It has revealed to us that the interconnectivity of globalization and the financialization of the economy has weakened the economic ecosystem, to the point of not supporting a single month of losses without resorting to aid or ending in bankruptcy. In addition to showing us the deficiencies at the economic and political level, the social deficiencies have become evident (Adams-Prassl et al., 2020). The different class realities are obvious and problems such as job insecurity, domestic violence or the lack of a safe shelter roof have become more acute. Today, the pandemic has made clear the vulnerability of those living in precarious conditions such as low-quality camps and social housing, or an overcrowded situation with little access to timely medical care (Adams-Prassl et al., 2020). The fact that part of the world is not affected by natural hazards does not mean that some others do not suffer from the unproportioned consequences of disasters, like wildfires, every day only because of their socio-economic condition.

As a response to this social problem, the Environmental Justice (EJ) movement emerged in the late 1970s. Then, the academy incorporates it into its elements for deeper understanding, to contrast it and investigate the implications and connections it has with the social world, allowing researchers to analyze this social phenomenon (Melosi, 2000). The concept is defined by the Environmental Protection Agency (EPA) as: To ensure that all people, regardless of race, national origin or income, are protected from disproportionate impacts of environmental hazards (Bullard & Johnson, 2000).

As in many research fields, this concept is interpreted differently by scholars, government actors and even activists as the terms 'environment' and 'justice' are highly ambiguous (Holifield, 2001). Broadly speaking, it can be said that one of the

many goals that EJ seeks to achieve is to reduce the vulnerability to environmental hazards- either be natural or anthropogenic, as vulnerability is a result of an uneven distribution of risk.

But vulnerability to environmental hazards appears to be another concept that also has an ambiguous meaning. In general terms, it could be described as the potential for loss (Cutter, 2003). Still, as noted by Cutter, the concept is as ambiguous as the EJ concept since it varies its meaning depending on the epistemological interpretations and the methodological practices that follow (see Theoretical framework section for further explanation).

The ambiguous nature of the vulnerability concept places it as a hard issue to tackle. Even with the extensive desk and empirical research available, there is a hot debate on almost every conceptualization and measurement of vulnerability. Due to the complexity of the term it has been extremely complicated for policy makers to establish effective and efficient mitigation programs that could erase the 'vulnerable' status of communities or individuals. It is essential to understand the process of how this phenomenon unfolds in society and it is also necessary to be able to point out the specific factors that alter the impacts of environmental disasters in order to create effective strategies to address the issue (Chambers, 1989).

Vulnerability can also be understood as a result of individuals interacting within a defined structure, a structure that has been built upon institutions, power relations and other historical factors that have created inequalities and make some groups or individuals more vulnerable than others (Gibb, 2018). Setting the concept in this way might put it under a fatalistic light, in which people seem to have no agency over their contingency. For this reason there is a strong stream of literature about how resilience, perceptions, preparedness and other factors are also key elements in understanding vulnerability and therefore how society and policy makers should address it. For instance, Terry Canon (2014) attempts to define this concept by taking distance from the intuitive relation of vulnerability with poverty, marginalization and other connotations of victimhood. By this, he seeks to focus on the factors that cause vulnerability so these can be reduced from within communities, thereby moving away from the passivity that this concept often is associated with. Communities have capacities and not only vulnerabilities and therefore he thinks that enhancing these capabilities may reduce vulnerability. As outlined above, social vulnerability is a multifactorial problem, problems of this nature must be addressed in an interdisciplinary way: where the economy, the socio-economic landscape, ecology, psychology, geography, and theories of social transformation meet as one force to tackle the problem (Temper et al., 2014). Besides the interdisciplinary nature of vulnerability, it is necessary to point out that the essence of this movement is that the involved community agency is crucial to achieving success (Mohai, Pellow & Roberts., 2009).

This research will specifically study people's vulnerability to wildfires in the Valparaiso region in Chile (reader can find a map in figure 1). Chile is a country located in the cone of South America, and in the last few years wildfires have been gaining attention in this long and narrow country. Although Chile has always been a good target for fires due to its subtropical weather, climate change has made critical climate events such as droughts and heat waves much more recurring, thus, substantially increasing the probability of fires. This increment in wildfire rates, plus population landscapes changes that have forced people to settle close to areas high on wood fuel -making up the so-called wild-land urban interfaces (WUI)- is turning wildfires into a bigger risk each year (Urrutia-Jalabert et al. 2018).

WUIs are characterized as areas of risk where threat (fire prone vegetation) and vulnerability (population, homes and infrastructure) live together (Ubeda & Sarricolea 2016). Hence, in terms of exposed elements, they can be detected and measured. When a WUI wildfire takes place, the total population and housing that is effectively impacted can be estimated. Thus, considering demographic trends, climate change and, in some instances, rising forest areas near human settlements, WUI wildfires constitute an unsolved and recurrent issue. Moreover, although the modes of urbanization have shifted in recent decades, the risk has risen in many world regions due to greater exposure (Darques, 2015). WUI analysis includes understanding both the location of fuel content such as forests and other connecting plant covers, and the potentially impacted communities, enabling vulnerability quantification based on proximity and other factors. The WUI dimensioning allows for the classification of mitigation and adaptation preparation steps, such as land-use planning, the construction of firewalls, monitoring devices, housing security radios, guidelines for preventing wildfires, and, more recently, prescribed fires.

But these interventions, either coming from government authorities or social movements interested in attenuating the bad consequences of wildfires in WUI, have to be integrated by the target public and then transformed into action. Sadly, It does not even require an attentive contemplation to learn that people that are exposed to wildfire risks seldom follow the guidelines given by authorities or civil society organizations to protect their health or their homes and other assets (Winter & Fried, 2000). This unexpected kind of behavior brings up a sensible question; what do people act upon when facing risk, or specifically to this case, to wildfires? Which factors explain how those that are in a risk situation use their vulnerable condition as a driver for self-protection behavior?

Globally, fire risk management has transitioned from a predominantly top-down, command-and-control approach to an integrative framework that gradually addresses the role of private households in the execution of fire damage reduction initiatives (Martin et al., 2007). In order to facilitate this change, the study of residents' perceptions of risk and preparedness needs to be integrated into local wildfire risk management (Winter & Fried, 2000).

Although researchers in the risk perception field undertook to study the perception of vulnerability of people, they came to the conclusion that this factor alone did not influence people to adopt preventive measures against forest fires. Recent studies have shown that protective behaviors are influenced not only by high risk perception but also by high coping appraisal, which means the person's own perceived ability to cope with and avoid being harmed by a threat in an effective way (Weyrich et al., 2020).

This research aims to take that into account and therefore seeks to explore this phenomena through the lens of the behavioral model developed by R.W Rogers in 1975 known as the protection motivation theory (PMT). This theory has been used for natural hazards studies several times (Floyd et al., 2000). Basically, what the PMT says is that people can be motivated to engage in desirable behaviors to avoid risks (Floyd et al., 2000). Rogers put together two sequential underlying cognitive processes, the threat appraisal together with the coping appraisal, where they combine to spark motivation in individuals to adopt protective behaviors (Wachinger et al., 2013). In order to help government and civic society to establish strategies that encourage wildfire resilience, the current research will attempt to develop an in-depth investigation into the factors that underpin household intentions and activities in response to wildfire threats. As a result, the target of this analysis will be on household perceptions of wildfires' risk and coping, as well as intentions to incorporate fire coping strategies and the role of cognitive variables in shaping coping decisions.

The research will answer the following research question:

To what extent do cognitive factors influence risk reduction behaviors to wildfires and to what extent are social organizations influencing them?

The following sub-questions were developed to help answer the main research question:

1) What individual factors influence an individual's willingness to engage in vulnerability reduction behavior? From literature

2) What is the role of social organizations in the risk mitigation process run by vulnerable individuals? From Interviews

1.1 Research aim

Disregarding social factors involved in the genesis of vulnerability doesn't mean they are not important, but they fall far apart from the scope of the research that will be carried out, since the aim is to explore the variables that drive individuals to engage into vulnerability reducing behaviors against wildfires. Studying this process will help social organizations to understand the dynamics by which individuals at risk engage in behaviors or practices that reduce their vulnerability. This means that they could be able to direct their efforts to nurture the factors that drive individuals to act and prepare for forest fires. On the other hand, unraveling this social phenomenon can also be helpful for policymakers, since understanding the factors that encourage these practices can be translated into more efficient, effective, and coherent measures.

The main objective of this research is to qualitatively fathom the cognitive perceptual process that people in the Valparaiso region in Chile go through when they are facing the decision of whether to engage into self-protection activities against wildfires. Through semi-structured interviews with the main organization addressing wildfires and their consequences named CONAF (Spanish acronym for national forest corporation) and through the glass of protection motivation theory conceptual model (Rogers, 1983), it will be sought to determine to what extent the perceptions that the inhabitants have -regarding the risk and the capacities they have- motivates them to avoid wildfire risks. Then, and also through interviews with CONAF workers, information will be collected as to what type of preventive practices people carry out. After this, both results will be compared, and it will be seen if there is any degree of correlation or not. Secondly, the influence that this organization puts during this process will be analyzed. Do the factors described in the PMT conceptual model influence them in any way so that people feel the motivation to change their behaviors to one of a preventive nature? If not, what are the limitations they are facing? In any case, the study will conclude with a set of recommendations for their intervention strategies, in order for them to see if they can be modified or even reformulated.

1.2 Valparaíso region background

1.2.1 Geographic location

The Valparaíso region can be found in the central area of the country. It is located between 32° 02' and 33° 57' degrees of South latitude and between 70° and 72° degrees of West longitude. It is bordered in the north by the *Coquimbo* region, to the east by The Andes mountain range, in the south by the Metropolitan and *Libertador General Bernardo O'Higgins* region and to the west by the Pacific Ocean. This region has a total area of 16.396,10 km2, where 394 km2 corresponds to the insular territory, which includes the Salas and Gómez, San Félix, San Ambrosio and Easter Islands, and the Juan Fernández Archipelago. (Check Figure 1 for a graphic representation of the region)



Figure 1. Valparaiso region map. Source: CONAF regional plan, 2019

1.2.2 Climate

(Is highly recommended to refer to the map in figure 2 while reading this section for better comprehension)

In this region, a temperate mediterranean climate predominates, but towards the north of the Aconcagua river the prevailing semi-arid climatic characteristic can be appreciated, while on the coast the climate is more humid or coastal mediterranean, and as one approaches towards the Andes mountain range altitude cold is found.

At a general level, the influence of the Pacific Ocean and in particular the cold nature of the Humboldt current coming from the south pole, conditions the climatic elements of the region, where this current determines the existence of a permanent band of low temperatures near the coast.

On the other hand, it is considered that the altitude and the topographic position with respect to the Andes Mountains and the Coastal mountain range (the space between these two mountain ranges form what is called the Central Valley) determines the variation of the climate within the region.

Three different climates can be identified in this region:

ТҮРЕ	AREA	CHARACTERISTICS
Steppe climate of great atmospheric dryness	Inland valleys from the border with the Coquimbo region (north) to approximately Cabildo city (mid-north).	The area does not get oceanic influence, it is characterized by low atmospheric humidity, with scant and irregular rainfall that occurs in winter and with a significant thermal amplitude, both daily and annually.

Mild warm weather with winter rains and with a dry prolonged season of high cloudiness.	Coastal sector of the region.	Permanent cloudiness throughout the year, intensified in winter, with high atmospheric humidity. (average value of 82%). There is a difference of 5 ° to 6 ° between the warmest month and the coldest month, while the difference between the maximum and minimum temperatures within a day varies between 7 ° in summer and 5 ° in winter.
Mild warm weather with winter rains and with a prolonged dry season	Middle section of the central valley of the region.	In this area, the oceanic influence has decreased, which has an impact on the daily and seasonal thermal variations which are less homogeneous. The relative humidity is lower, there are frequent frosts in winter, mainly when ascending towards the Andes Mountains.

Table 1. Valparaiso region climate



Figure 2. Valparaiso region climatic areas Source: CONAF regional plan, 2019

1.2.3 Demography

The Valparaíso region has a population of 1,815,902 inhabitants (INE 2018), being the second most inhabited region in the country, with a density of 110.75 inhabitants per km2. In turn, the region registered a population increase of 17.9%, in relation to the previous census.

Regarding the population by sex, 51.5% corresponds to females and 48.5% to males. On another order of things, it is noted that over the years the population in the region has been, as there is an increase in people between the age ranges of 15 to 64 years, as well as in the range of 65 years and over, in contrast, there is a decrease of 5.2% of the range from 0 to 14 years.

The distribution of the population between country and city has shown an increase in the population in urban areas. Figure 3 offers a graphic illustration for clearer understanding.



Figure 3. Population distribution. Source: CONAF, 2019

1.3 Interventions

Advocating for people helping themselves should not be understood as that we should let people on their own so they can adapt and learn by experience. The key concept that comes into play here is the concept of interventions. To understand the dynamics of behavior is crucial to have a good grasp on what interventions are and how they unfold during the process. In order to change one or more facets of people's awareness, behaviors, or beneficial actions -at least as viewed by the organization deploying the message- interventions may be regarded as intrusions into what may otherwise be a normal mechanism of human reaction to events or situations that pose the potential for harm (Macgregor et al., 2008). Self-protective behavior interventions are usually deployed within a complex mental context characterized by cognitive variables impacting the potential for behavior change. Different kinds of interventions share a common array of features (Macgregor et al., 2008).

The first common characteristic of interventions to emerge is their purposive nature, this means there is a set of intentions behind it. These intentions can be categorized as explicit and implicit, the latter being much harder to recognize since it is moved by more abstract concepts such as promoting trust, raising awareness or fostering responsibility (Macgregor et al., 2008). The second common characteristic of interventions is that they are a result of a detailed designed process that takes into account a certain approach to make an impact on the target population (Macgregor et al., 2008). Namely, interventions can take the shape of workshops, communal meetings, media campaigns or any other form of communication. As the design process sets clear objectives for interventions, they can eventually be assessed. Two main aspects are evaluated, in the first place the strength of the implementation is examined, namely, to assess the reach and penetration of the intervention. The second aspect to be measured is the effect of the intervention itself in terms of outcomes of interest achieved. The usual mechanism of assessment is to compare people's response to the intervention with the expected or desired reaction of their deployers (Macgregor et al., 2008).

The lens through which this phenomenon should be seen is that people's voluntary reaction to risk-related interventions unfolds as a dynamic and adaptive process.

1.4 What exactly are environmental hazards?

The environmental hazard or disaster is often a material condition or occurrence that may endanger the surrounding ecosystems or detrimentally affect the health of people, including contamination and natural catastrophes such as floods and earthquakes (Polivka et al., 2015).

Environmental hazards arise from the interaction of natural and social systems, and are distinguished from 'extreme' events or processes in nature, which are not necessarily hazardous to people (Burton & Kates, 1978). Although environmental processes and events such as bushfires are often referred to as 'hazards', they are only hazards when they threaten human life, assets or other values we want to protect (Hewitt, 1997).

A good way to illustrate this is by giving an example; Last 29th of December a 6,4 magnitude earthquake hit the Croatian city of Pretinja, there were 7 casualties registered and severe structural damage. In contrast, an exact same magnitude earthquake hit the central region of Chile on the 18th of January of the current year

and no casualties were registered and it presented no structural damage at all. In Croatia the earthquake can be considered an environmental disaster but in Chile it was only a natural event since a 6 or even a 7 magnitude earthquake doesn't present much of a threat to human lives or assets, due to strict prevention measures.

It can seem as a bold statement but everything indicates that environmental hazards are in fact social and not environmental after all. Disasters are social events because they require the interaction of the social and human environment with the natural hazard. The social causation of disasters does not mean scientists disregard the natural disaster but is understood as a broader idea of social causation of disasters. When we think about disasters we need to think about how these all forces are interacting (Chmutina, K., von Meding, J., & Bosher, L. 2019).

It is imperative to mention that this study is exclusively focusing on human vulnerability. This study is not seeking by any means to minimize the vulnerability to the consequences of natural disasters of plants and animals by not including them in the analysis. Vulnerability of plants and animals requires a study of its own, so including them would have compromised the overall quality of the investigation.

1.5 Wild-land urban interface (WUI)

WUIs are characterized as areas of risk where threat (fire prone vegetation) and vulnerability (population, homes, and infrastructure) live together (Ubeda & Sarricolea 2016). Hence, in terms of exposed elements, they can be detected and measured. When a WUI wildfire takes place, the total population and housing that is effectively impacted can be estimated. Thus, considering demographic trends, climate change and rising forest areas (FAO, 2021) (See Appendix A for graphic), WUI wildfires constitute an unsolved and recurrent issue. Moreover, although the modes of urbanization have shifted in recent decades, the risk has risen in many regions of the world due to greater exposure (Darques, 2015). WUI analysis includes understanding both the location of fuel content such as forests and other connecting plant covers, and the potentially impacted communities, enabling vulnerability quantification based on proximity and other factors. WUI dimensioning allows for the classification of mitigation and adaptation preparation steps, such as territorial

planning, the construction of firewalls, monitoring devices, housing security radios, guidelines for the prevention of wildfires and, more recently, prescribed fires.

In order to contribute to policy makers and social organization in the design process of preparedness strategies for WUI populations this research will be exploring precisely this aspect of vulnerability; how members of the community itself engage into risk reduction behaviors after being intervened by the major forest fire prevention organization in Chile.

1.6 Wildfires

A forest fire is a fire that, whatever its origin, presents a danger or damage to people, property or the environment. It spreads uncontrollably in rural areas, through woody, shrub or herbaceous vegetation, alive or dead. It is an unjustified and uncontrolled fire in which, in its spread, can destroy livestock, homes, as well as human lives (Hardy, 2005).

Annually, worldwide it is estimated that an average of 4.5 million fires occur in rural areas (2017), which according to the State of the World Plants report (2017) would affect approximately 350 million hectares, constituting close to 1.8% of the entire land area of the planet. It is for this reason that this scourge constitutes one of the causes of the process of defragmentation of forests, deforestation and desertification most important today. Similarly, forest fires cause part of the air pollution and even participate in the release, through the combustion of persistent organic pollutants or better known as POPs, dioxins, highly harmful to human health.

In Chile the problem of forest fires is not an isolated event, on the contrary, an average of 5,000 forest fires originate annually, covering an area of 55,000 hectares. This country is considered the one that is most affected by natural disasters in the world, and of the OECD countries it is the one that presents the highest risk. (Bündnis entwicklung hilft, 2019). At least 13 million people have been exposed to an extreme natural hazard, with more than 4 million affected and 800 fatalities between 1985 and 2017 (EM-DAT, 2019).

The occurrence of forest fires in Chile has experienced a significant increase in the last 25 years, reaching over 7,500 fires in the 2002-2003 season compared to less than 1,000 fires per season before 1972 (Pena E., Valenzuela L., 2008). They have their origins, almost entirely, in humans and their activities. Except for a few fires caused by lightning strikes during summer electrical storms, most of them are caused by carelessness or negligence in the manipulation of heat sources in the presence of combustible vegetation, by almost ancestral agricultural practices, by a scarce environmental culture or by intentionality originated in motivations of different kinds, including criminal (Soto, 1995). This increase does not seem to reach its peak yet because there is no decline in the number of fires despite the efforts made by the prevention programs developed by private companies and the National Forestry Corporation (CONAF), which is the civil society/state agency that by law is responsible for preventing and fighting forest fires. For CONAF, the prevention of forest fires is the set of activities designed to prevent forest fires from starting, due to human action or omission, and to previously intervene in vegetation to prevent or delay the spread of fire (Hernandez et al, 2020).

These activities are designed based on the analysis of the motivations that led the perpetrators to originate them and the conditions in which they occurred. In general, prevention considers educational and imposed actions (Hernandez et al, 2020). The educational actions are aimed at modifying the behavior of the population, making them see that forest fires are harmful. These actions are strongly supported by environmental education and mass media outreach campaigns (Pena E., Valenzuela L., 2008).For their part, imposed actions promote changes in behavior through mandatory compliance with current legal regulations. To carry out these actions, it is necessary to disclose its existence and coordinate with the institutions responsible for implementation and supervision (Pena E., Valenzuela L., 2008).

According to the report from the Climate and Resilience Center from 2020, the occurrence of forest fires in Chile was traditionally concentrated in the Mediterranean climate zone, which extends from the Valparaíso Region (in the center of the country) to the Bío Bío Region (mid southern part). However, in recent years a significant increase has been observed in the temperate zones that include the Araucanía and Los Lagos regions of Chile (southern part). Added to the greater occurrence of forest fires is the fact that in recent seasons, due to a greater load of fuel and drier climate,

the intensity of the fire is greater and many of the fires have catastrophic characteristics, being very difficult to control with serious consequences for the population and the security of the combatants, generating a more negative environmental impact (Climate and Resilience Center, 2020). The best example of this was presented in the 1998-1999 season when in the Bío Bío region more than 20,000 hectares were burned in 5 days, most of them being Pinus radiata and Eucalyptus globulus plantations, two species with highly flammable foliage (oils, resins and waxes). Undoubtedly, for any forest fire protection organization this increase in the occurrence of forest fires should be their main concern, but the problem becomes even more complicated because in the case of Chile, at least 99 percent of fires are caused by human activities that use fire, such as agriculture and forestry, or the careless and negligent use of this element by the common population, and finally the action of arsonists. Therefore, personal risk awareness is a key element to reduce this threat (Winter and Fried, 2001; Bubeck et al., 2012).

However, the limited interests of individuals in adopting protective measures prior to risks that threaten their personal and property safety have been reported by the previous literature and researchers (Kunreuther, 1996, 2006; Martin et al., 2007). Therefore, motivating personal risk reduction behaviors has elicited considerable attention from researchers (Winter & Fried 2000, 2001; Martin et al. 2007; McFarlane et al. 2011).

1.7 Who is in charge?

The National Forestry Corporation (CONAF for its Spanish acronym) is the body in charge of forest fire prevention in Chile It is a private and non-profit organization started in 1970 and backed by a legal mandate , established in the decree N° 733 of 1982, of the Ministry of interior affairs. Since it is an organization that cooperates with the state and its environmental objectives, but at the same time keeps its private nature, CONAF can be considered a parastatal organization. This is an organization that, by delegation of the State, cooperates for this purpose without being part of the public administration. In other words, its political, social and economic purposes and results have been part of the regulation of the country by the

State, and yet it is not the government itself that governs said company. It has its own legal personality and assets, constituted with funds from the public administration (not exclusively), whose objective is the provision of a public or social service, the exploitation of resources owned by the State, in this case the flora and fauna in forests in Chilean territory (CONAF, 2020).

Within the wildfire problem, the function CONAF is to ensure the development of protection activities against forest fires and the 'Carabineros de Chile' (Police) will be responsible for strictly policing the supervision and control of all the rules that regulate these matters, in addition to carrying out the investigation of the causes of this kind of events (Leychile, 2018).

Despite this being the body in charge, a joint, permanent and systematic work is necessary with the other actors involved with regard to the protection and improvements in the safety and quality of life of the inhabitants living within or close to forests, in this case, of the Region of Valparaíso. Actors such as Mayors, Provincial Governor, Regional Mayor, and National Emergency Office, aim at protecting the inhabitants of rural and wild-urban interface areas, sectors more directly exposed to the threat and vulnerable to forest fires (Ministry of agriculture, 2014).

As a consequence of the increase in population, urban-rural connectivity, in outdoor activities, forestry and livestock activities, change in land use, added to the changing global climatic conditions increased in recent years, which is generating longer periods of drought, forest fires in the Valparaíso region have become a problem of great social impact (Ministry of agriculture, 2014). Affecting not only directly the forest resource, with its consequences to the environment, but also the housing infrastructure, generating a public problem that even generates the loss of human life, and comprises the internal order and security of the State. This represents one of the main factors that have the greatest impact on the loss of renewable natural resources and one of the main causes of the desertification within the country (Hernandez et al, 2020).

With all of the above, in Chile and particularly in the Valparaíso Region, the prevention of this phenomenon is key and fundamental to ensure the success of the

State's strategic measures in this area, in the sense of ensuring the conservation and sustainable use of the forest ecosystems of the country.

Aware of this complex scenario, the National Forestry Corporation in 2019 made the decision to strongly reinforce its actions in the prevention of forest fires, which for this organization is "the set of activities designed to prevent that, by action or omission of people, forest fires originate, and to previously intervene the vegetation to prevent or delay the spread of fire, in the event that a fire occurs", establishing for this purpose the formulation a regional plan for the prevention of forest fires (Propuesta de Confección Obras de Mitigación y Actividades de Prevención de Incendios Forestales comuna de Valparaíso, 2020).

The general objective set by the organization in this regional plan is to establish regional guidelines on forest fire prevention in order to generate tools and information to prevent and mitigate the social, environmental and economic effects of forest fires. Specifically, CONAF raised the following objectives (Propuesta de Confección Obras de Mitigación y Actividades de Prevención de Incendios Forestales comuna de Valparaíso, 2020):

1) Determine risk areas for forest fires within the region.

2) Identify and promote the strengthening of the actors involved in the prevention and mitigation of forest fires through diffusion, training and awareness workshops aimed at the population.

3) Guide forest fire prevention efforts based on the identification of risk areas in the region.

4) Create monitoring and inspection plans in risk areas of the Valparaíso region.

Appendix 1 presents a summarized yet detailed overview on the prevention activities CONAF is involved in and its role within the national wildfire prevention plan.

1.8 Description of the problem

Fires in WUI's cause tremendous damage, result in great economic losses, and have serious social repercussions. In many cases, they even imply high fire extinction costs, the loss of adjacent forest resources, and a certain level of insecurity in the population (Manzanello, 2014). The impact on residents can include emotional trauma, loss or damage to homes and irreplaceable items, and even death or serious injury (Manzanello, 2014). Financial costs include the loss or damage of infrastructure, business interruption, and cost of recovering the environment, as well as direct fire control and evacuation expenses (Hernandez et al., 2020).

The problem of WUI fires continues to grow for a number of reasons (CONAF, 2018):

- Residents and others may not be aware of, or do not fully grasp, the danger of WUI fires and their possible consequences.
- They may also have a false sense of security about fire protection at the interface, or feel that it is the responsibility of firefighters or forest brigades.
- Others may be concerned but do not know how to reduce risk without sacrificing the natural environment or visual appeal of the area.
- Within many interface zones, the net effect of many years of successful fire exclusion has resulted in increasing the quantity and continuity of forest fuels available for future fires.

The WUI fire problem originates from two different fire sources. Fires can move from forest, bush, or grassland areas into the community or from the community into adjacent vegetated areas (CONAF, 2013). In the first case, it is an uncontrolled fire product of a forest fire that intensely burns the forest, bushes and the vegetation adjacent to the houses of the interface, the safety of the residents is threatened and the residential or industrial constructions built of materials fuels can also burn. The second case corresponds to the fire from burning buildings or activities such as burning garbage that can spread outside the communities, damaging rural and agricultural lands, national parks and commercial forests. Seriously threatening industries based on these resources (CONAF, 2013)

In simple terms, an interface forest fire is where the fuel that feeds a forest fire changes from forest fuel (vegetation) to urban fuel (buildings). For this to happen, wildfires must be close enough for the fire to make contact with flammable areas of homes or structures. Providing effective fire protection to the interface community is then one of the largest challenges faced by firefighters and forest brigades.

While vegetation is an attraction for residents, it is nothing more than a source of fuel for the fire. The economic and social impact of interface fires is immense. Each year hundreds of residents are placed on evacuation alert or evacuated from their homes and workplaces due to the risk of a wildfire (CONAF, 2018). About 80% of forest fires in Chile occur in interface areas, which is why the question is not 'if' a fire occurs, but 'when' (CONAF, 2018).

The main social impact of fires in WUI's comes from the fact that most of the population that inhabits these areas are people that live in very precarious conditions. Next section will provide a description of these settlements.

1.8.1 The population in danger

Population settlements in areas that are outside the legal frame of a city appear on lands that are generally on the periphery. These lands are characterized by not having an important economic value or are considered as sacrifice zones. This phenomenon is something transversal in practically all the countries of Latin America (Pino Vásquez, A., Ojeda Ledesma, L., 2013).

This is how a city that is structured and organized within a legal frame and following all construction and urban planning ordinances, has in certain adjoining areas or even in some cases within the city itself, informal or illegal towns that develop and organize outside of current regulations and legislation. They establish their own codes, norms of coexistence and hierarchies within the limits of these settlements and among their inhabitants (Armas-Pedraza et al., 2017).

This is a phenomenon that responds to the needs of part of the population, which, for various reasons, does not have access to formal homes. As Davis (2014, p. 283) puts it, "formal housing became unaffordable for hundreds of thousands of people and the only alternative left for the population was to risk their lives in the estuaries, flood-prone areas, and settle in the riverbeds."

These are generally people of a low socioeconomic level, with few educational resources and lacking personal and state support networks. Therefore, faced with the need to satisfy one of the basic needs of the human being, such as housing, they opt for this informal resource.

This social phenomenon is even said to be a desperate act, even rebellion, in the face of exclusion, the marginalization of a system that often makes the situation of these citizens invisible (Pino Vásquez, A., Ojeda Ledesma, L., 2013). In terms of Certeau and Foucault, they could be understood as a system of creative resistance to exclusion (Pino Vásquez, A., Ojeda Ledesma, L., 2013).

These settlements receive different names in Latin America; "Favelas" in Brazil, "villas miseria" in Argentina, "chabolas" in Peru, the "cantegriles" in Uruguay, "barrios bajos" in Colombia, "barrios rancho" in Venezuela, "chacharitas" in Paraguay and "tomas" or "campamentos" in Chile. This has given rise to what is known today with the concept of "favelization" (Pino Vásquez, A., Ojeda Ledesma, L., 2013). A phenomenon that calls for broadening the gaze to not only conceive the city as that place built according to the norms, ordinances and pertinent legislation, with houses that comply with what is necessary to respond to the needs of its inhabitants, but also consider the needs of marginalized people who live in these "cities" that are built in a precarious and improvised way in dangerous areas.

In Chile, particularly, the housing crisis is due to various factors that gradually led to this informal occupation or "takings" of these lands with the consequent construction of slums. The "tomas" are defined as the action of occupying and illegally inhabiting a land, it is "the possession of a land without a property title" (Pino Vásquez, A., Ojeda Ledesma, L., 2013, p.3), building on it a house, a ranch or a hut. It is a response to a lack of those who have no other possibility in the face of lack of roof. This problem has been dragging on since the mid-nineteenth century as a result of modernization and industrialization, but also due to natural phenomena that especially affect those who live in dangerous areas and in very precarious conditions. Thus, we find the following common causes:

- Country-city migration.
- Overcrowding in urban centers, product of a crushing of the working and peasant classes.
- Inaccessibility to formal housing. It is the poorest population in the country without access to buy houses or land.
- Ineffectiveness and inefficiency of government policies and programs, generated to provide an effective solution to the housing problem.
- Populations affected by natural phenomena such as earthquakes, floods, tsunamis, volcanic eruptions, etc. that can destroy houses (Pino Vásquez, A., Ojeda Ledesma, L., 2013, p.2).

Today, according to the latest cadastre carried out by the MINVU (Ministry of Housing and Urbanism), published in the "National Land Registry of Camps 2020-2021", in Chile there are 969 camps. This implies a total of 81,643 families, being the Valparaíso Region, the Bio Bio Region and the Metropolitan Region (the Region where Santiago de Chile is located) the places that concentrate the largest number of these settlements, representing 61% of the national total.

The same report states that 225 camps were registered in the Valparaíso region, of which 50% are located on state and municipal lands. Valparaíso (capital of the Valparaíso region) and Viña del Mar (second largest city in the Valparaíso region) concentrate the largest number in the region and the country, with 69% of the regional total and 15% of the national total. The city of Valparaíso concentrates 70% of the camps in the region, located in geographically risky areas difficult to access, such as hills, slopes and streams. Thus, a large proportion of these spaces face great disadvantages, not only because of the remoteness, but also because of the risk and difficulties in living.

It is these disadvantages that make these settlements especially risky in the face of fires, since the access of fire trucks is difficult or sometimes impossible. This, combined with the fact that the houses are made of lightweight material, and also

considering that these settlements border forest areas, transform these places into high risk areas.

However, the problem does not end with the fire, the aftermath can be as harmful as the fire itself. People lived in precarious conditions before the event so it is expected that after experiencing the consequences of fires their situation can get worse. Inhabitants of these settlements are not only vulnerable to forest fires but to many other natural hazards or even social hazards such as crime or drug abuse. This is why this matter needs to be urgently addressed.

1.9 Relevance of research

1.9.1 In society

Studying these questions, regarding human behaviors and their drivers, are vital in two dimensions. According to MacGregor (2008), these questions offer resources for insights into the conditions that typically drive voluntary self-protection from a public perspective and shed light on how risk-reducing strategies impact the people, civil society and policy makers intended to protect. From an agency viewpoint, these concerns are essential to assessing the possible effectiveness of initiatives planned to provide a public reaction that responds accordingly to the threats analyzed by the agency.

Understanding this process will aid decision makers in untangling the factors that directly influence the risk perceptions of various stakeholders, in developing effective communication strategies, and in influencing actual behavior on private property while designing incentives aimed at mitigating the risk to individuals and communities (Martin, Martin & Kent, 2009).

In order to contribute to policy makers and social organizations in the design process of preparedness strategies for WUI populations, this research will be exploring precisely this aspect of vulnerability; how members of the community itself engage into risk reduction behaviors after being intervened by the major forest fire prevention organization in Chile.

To discuss the second relevant aspect of this research it's necessary to bring back the concept of interventions. According to MacGregor (2008), most of the current wildfire behavior change interventions are not incorporating individual factors in their design phase. In the case of wildfire risk, the studies that define and promote the need for risk interventions are primarily based on technical models of ecosystems and the effect of fire activity on such ecosystems, as well as other models that describe periods of fire incidence, rates of spread and other fire characteristics that are directly or indirectly linked to the risk to humans and their property. A detailed explanation of the cognitive factors influencing behavioral change with respect to wild-land urban interface fire risk is absent from these models. The cognitive context in which the decision on executing risk mitigation activities takes place is therefore not modeled by agency analyses that characterize fire risk. Taking these observations into consideration, what this research also seeks is to encourage intervention deployers, such as NGOs or government agencies, to include the individual cognitive factors in their intervention design process. The current project aims to bring the awareness that being vulnerable means different things to different individuals. The fact that society often plays a part in how the definition of danger is perceived by the general population has culminated in the need to take better account of the cognitive factors of individuals in which risk is encountered.

1.9.2 In science

In addition to this, the current status of research on Chilean household wildfire coping is worryingly scarce compared to the amount of studies available on Australian and United States fires that use cognitive or socio-psychological frameworks to explore the relationship between wildfire risk and coping behaviors. Consequently, this work will attempt to make visible this aspect of the phenomenon so that it can be considered in further research. According to Cismaru et al. (2008), most of the empirical data supporting the cognitive framework that will be used in this study is based on quantitative data.

Although the previous reference is rather old, only one study was found that explores the cognitive process with a qualitative approach, so what this work aims is to add to this uncharted domain in the risk mitigation studies in this particular area of the world by also applying a qualitative approach.
Chapter 2: THEORETICAL FRAMEWORK

2.1 Introduction

In the past 35 years within the risk and vulnerability studies, the question of why individuals make the decision to mitigate or ignore risk has become more and more relevant (Eiser et al., 2012). With special attention to wildfires. The recurring catastrophic fires happening in California and Australia in the last 5 years, plus the growing population migrating to wildland-urban interface areas as consequence of demographic and socio-economic pressures, has drawn the attention of authorities, as well as researchers, to find a solution for this population living in constant vulnerability. Action across the environment, which requires the treatment of both private and public lands, is needed to minimize the risks of wildfires for communities and homeowners in the WUI (Calkin et al., 2014). There is a strong body of literature that demonstrates that the main determinant of home's ignition potential during wildfire events are the materials in the surroundings of people's houses. However, many homeowners do not take mitigating precautions to secure their properties and their lives from wildfire dangers (Calkin et al., 2014).

In the transition from top-down to people-centered methods for catastrophe risk prevention, the implementation of risk reduction initiatives plays a crucial role. Authorities and some NGOs stress the value of people defending themselves and see sharing responsibility as an acceptable way of reacting (Box et al., 2013). In the face of this transition, it is important to analyze people's current readiness to pursue risk mitigation activities and to recognize the causes that impact the activities of individuals. As Figueredo et al (2009) already noted; in order to promote this shift, assessments of residents' risk perceptions and preparedness must be incorporated into local risk assessment activities. However, this shift has also been a reminder that researchers should remain cautious when facing this mostly uncharted area of vulnerability, or any other given phenomena. The majority of the studies that have focused on risk perceptions are frequently narrowed down solely to the effects of past experience as an explanation for protective behaviors. Yet, theoretical and empirical

research has found no solid grounds to support that higher risk perceptions alone lead to a risk mitigation behavior (Kellens et al., 2013).

According to recent findings, preventive habits are affected not just by high risk expectations, but also by high coping judgment, which corresponds to an individual's perceived capacity to deal with and prevent damage in an efficient manner (Parker et al., 2012; Welter, Welter & Großschedl, 2021). These studies indicate that it is crucial to not only emphasize on wildfire risk awareness as the primary driver of risk reduction behaviors, but also to recognize other factors -such as personal coping skill perceptions- that may cause people to take precautions (Kellens et al., 2013).

2.2 Exploring Vulnerability

2.2.1 Vulnerability and its social, environmental, and socio-environmental dimensions

Vulnerability consists of a risk condition, which is the current condition in which a particular individual or social group finds itself, presenting three dimensions: social, environmental, and socio-environmental, which are analyzed below. In recent years, the notion of social vulnerability has been used by many academics and international organizations from a poverty line perspective. The socioeconomic characteristics of populations in risk areas are a fundamental component when we speak of social vulnerability (Mercer, 2007).

Studies on social vulnerability have shown that this notion is not motivated to study only poverty in its comprehensive and complete dimension, but also other forms of social disadvantage. In this aspect of the discussion, concerning the study of social issues, vulnerability is understood as an integration of individuals' sensitivities to social problems, especially those associated with poverty.

Social vulnerability seeks to discuss, then, all forms of social disadvantage, however, the most discussed is poverty, configured as an element that is part of vulnerability, not being the same as the second.

From an environmental perspective, the term vulnerability began to be used in the 1990s, as it was a period marked by the occurrence of various natural events, such as floods, in many parts of the world. These events began to be studied, especially in the "relational, circumstantial and spatial approaches: the societies and / or individuals in each place and exposed to the same dangers, can be affected in different ways and present different capacities and responses to them (Cutter, 2012).

These events do not affect everyone equally. It is in this context that the approach is inserted in which the poorest social groups are most directly affected by such disasters, which is justified by the fact that they live in places that are exposed to dangers and survive in conditions, especially of poverty (Cutter, 2012).

Therefore, we understand environmental vulnerability as that which, although it focuses on the vulnerability of the place, is linked to social aspects, verifying the susceptibility of the individuals or social groups that are inserted in that place.

Based on these notes, we realize that the social and environmental dimensions of vulnerability are related, and it is based on this association that socio environmental vulnerability can be studied. This association is observed when individuals or social groups are exposed to environmental or natural risks, which makes them vulnerable to events, also, environmental or natural.

We understand socio-environmental vulnerability as one that relates and analyzes the social and environmental spheres of a given environment in an integrated way and, to capture and translate the phenomena of spatial overlap and interaction between social and environmental problems, being suitable for one of the socio environmental dimensions (and spatial) of poverty. (Mercer, 2007)

2.2.2 Vulnerability, risks, and natural disasters: national risk management and natural disasters

Ultimately, there are a large number of areas in situations of environmental risk and in terms of countries and regions of the world. It is in this scenario where the concept of risk is inserted: it is the probability that harmful consequences or expected losses will occur, as a result of interactions between a natural hazard and as conditions of local vulnerability (Thywissen, 2006). This conceptual notion is

confused, in many situations, with that of danger, which makes it difficult to understand and manage: the danger is related to the probability or even the occurrence of an event causing a certain loss (Cardona, 2013).

A second part of the study of the concept of risk is vulnerability, being, in this aspect, the focus given to the analysis of the risks and the dangers, regardless of nature (economic, social, among others). According to the researchers in this topic, the notion of vulnerability, in this context, is of fundamental importance, in addition to being a central element in addressing the development of strategies to reduce and mitigate the effects of natural disasters, at four scales of analysis (local, regional, national and world) (Temper, 2015).

Earlier it was said that vulnerability could be broadly defined as potential for loss. Nevertheless, we must consider what kind of loss we are referring to and whose loss we are talking about. Regarding the last point, we can speak at the level of the individual as we can also refer to a group or social group level. At both levels, the potential for loss occurs at the spatial and non-spatial level, or in structural or nonstructural domain (Temper, 2015). In the two cases the spatial consequences are different and vary over time. As a third element there is also a potential for loss influenced by the interaction of a certain social group with the conditions of the biophysical space it occupies (Füssel, 2007).

According to Cutter (2012), the discrepancies in the meaning of this concept are due to their different epistemological approaches and their respective differences in the methodologies that these epistemologies require. Other differences that we can find are fundamental conceptual differences or different focuses of study.

Some studies focus on the likelihood of exposure and others focus on the likelihood of adverse consequences or a combination of both, but with confusing meanings and approaches that do little to understand vulnerability to environmental hazards. Liverman (1990) proposed a new way of understanding how and why places and people are vulnerable to environmental hazards. He dissects vulnerability into 3 topics of study:

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- Vulnerability as a pre-existing condition: Examines the source of biophysical hazard
- Vulnerability as tempered response: Coping response and resilience to hazards (social resistance). Examines the social construction of vulnerability.
- Vulnerability as hazards of place: Combines elements of the two above.

2.2.3 Vulnerability is conceived as a biophysical risk as well as a social response

As the concept of vulnerability has no consistent definition, it was expected to be exceedingly difficult to find variables or indicators to operationalize the concept. Luckily, the measurement task is easier than the definitional one. Add to this that Susan Cutter's report stresses that detailed vulnerability assessment reports are conducted at the local level and that larger reports that can explain general patterns sacrifice detailed case studies to obtain general patterns that can explain a greater number of cases. Referring to the methodologies used in this area, Cutter states that the study techniques for the concept of vulnerability range from analytical approaches, contextual analysis and mapping techniques.

Due to the wide variety of theoretical orientations the literature related to the causes of vulnerability is mixed. We can identify 2 approaches that the studies follow to explain the origins of vulnerability:

- Causal structure: This stream in the literature explains vulnerability by the underlying social conditions, these conditions are often far away from the origin of the hazard itself. Relates also with the coping abilities a certain societal group has against environmental hazards. It is defined by three processes: economic capability, political/social empowerment and political economy.
- Vulnerability/exposure assessments: This path for understanding the causality of vulnerability explores the topic by modeling the potential exposure to hazards. This approach is based, of course, in the assumption that vulnerability depends on the proximity to the source of risk itself, like a wasteland.

2.3 Protection motivation and transtheoretical theories integrated model (PMT-TTM)

To explore protection-related behavioral change, several theories were developed. One of the most used set of behavioral change theories is Rogers (1983) protection motivation theory (PMT), since it does not only considers risk perceptions but also coping perceptions of individuals, besides, it specifically integrates the role of protection-related messaging (this study will refer to these messages as interventions) in the impact of behavioral change. According to Rogers and the PMT, a protection-related intervention degree of success (success as an individual implementing the coping response) is determined to some extent by people's perception of:

- The severity of the consequences of an event,
- The probability of the occurrence of said event
- The <u>belief in the effectiveness of the recommendations</u> given in the intervention
- And the <u>belief that one has the capacity</u>, <u>skills and abilities</u> to carry out those recommendations.

Arousing protection motivation is dictated by expectations of these 4 factors, which in turn sparks the impetus to follow vulnerability mitigation behaviors (Block Keller, 1998). These variables tend to predict that intentions to comply are usually greater when the danger is serious, when the individual feels helpless, when it is viewed as a successful way to mitigate risk when implementing the advice, and when the individual feels capable of executing the coping response (Eagly, Chaiken, 1993).

Rogers categorizes these four factors in two different categories, <u>threat</u> <u>appraisal</u> (or risk perception) and <u>coping appraisal</u> (or coping perception). Threat appraisal assesses the individual's perception of the likelihood and the severity of consequences of the threat. Coping appraisal evaluates an individuals' perceived capacity to cope with and also the perceived effectiveness of the coping behavior. Despite the fact that danger appraisal has been linked to increased risk reduction

behaviors, research findings have been mixed when it comes to different natural hazard risks. However, a positive link has mostly been seen in the area of wildfire threats (McFarlane et al., 2011).

It is important to mention that PMT does not assume that the decision makers are rational or unbiased. Each of the cognitive appraisal processes can be biased by heuristic judgment (Martin et al., 2007) .This indicates that people simplify the calculation of probabilities in a decision-making process by taking shortcuts. They begin with cognitive biases in decision-making and then grow to incorporate emotional influences. Difficulties in understanding risk probability, biased media, misleading personal experiences among others can lead to an overestimation or an underestimation of risk (Block & Keller, 1998)

In the general understanding of the role of these four variables, several PMT empirical studies have shown no support for Roger's assumption that these variables are equally important in predicting behavioral intentions (P. Weyrich et al., 2020). Multiple empirical tests have shown that the presence of the effects of these factors is not consistent (Eagly & Chaiken, 1993). This model's flaw -and others that also use expectations as their primary variables- is that they assume that people are equally prepared to respond to risk (P. Weyrich et al., 2020). The public, however, is not a homogenous collective, a certain group of people may be able to take action and act to minimize their risk, while others may take the opposite action. As a consequence, there are multiple levels of preparation that may impact an individual's willingness and ability to defend themselves from a threat (Horwath, 1999). This suggests that people who are subjected to risk reduction interventions can ponder their perceptions of severity, vulnerability, response efficacy, and self-efficacy differently when determining whether or not to adopt the intervention's recommendations.

With this insight in mind, Lauren Block and Punam Keller developed a more sophisticated theory in 1998 that could predict when each of the PMT model's four components would enhance behavioral intentions. They did so by combining PMT with the clinical psychology transtheoretical model (TTM). TTM is a stage theory that analyses people's behavior change based on the assumption that any set of variables that drive behavior change will influence different people in different ways. Stage theories specify an ordered set of categories into which people can be classified. Based on this categorization, one can identify the factors – like risk consequences severity perception- that can explain how to communicate more effectively with each subgroup of people by understanding that these different stages act as a moderator in an individual's decision on whether to implement coping measures or not (Martin et al., 2007; Brian et al., 2019). It frames change as a process involving progress through a series of six stages (pre-contemplation, contemplation, preparation, action, maintenance and termination) an individual faces when exposed to a threat. Yet, for environmental risks concerns, only the three or four first stages are expected to be applicable. The explanation for this is that the maintenance and termination phases are more concerned with the suppression of harmful activity (such as smoking) rather than a reaction to a threat (Prochaska et al., 1994). The decision stage spectrum, then, would begin with a person that responds to bushfires in a maladaptive way embodied in denial and fatalism, this is known as the precontemplation stage. One could also find individuals that had built intentions to cope with the risk but those intentions will not materialize into actions in the short term. This illustrates the contemplative stage, embodied in wishful thinking and postponement. The other end of the spectrum will combine the preparation and action phases into what this study will call the responsive stage. Responsive stage is characterized by individuals who are already implementing coping measures (Bryan K., 2019).

The integrated theory from Block and Keller was put to empirical test by Martin, Bender and Raish in 2007. They proved that in the precontemplation decision stage, increased perception of the likelihood of the event in people was a key motivator to engage into risk-mitigating behaviors. Similarly, they arrived at the conclusion that for the case of homeowners within the contemplative stage, they are mostly moved by increases in the perceived risk severity and vulnerability. In addition to these findings, they proved that for people in the action stage, high appraisal of the response efficacy and self-efficacy were determinant in the number of risk-mitigation activities deployed. Lastly, researchers also found out that perception levels of the severity of the event was increasing when people were moving from the precontemplation stage towards the contemplative stage, and that people in the action phase showed the highest degree of vulnerability and severity perception (Martin et al., 2007). (Reader can refer to table 2 for a summary of the decision stages and the require perceptions to move within each stage)

The combination of PMT and TTM has been selected to become the underlying theoretical basis for the present research. Figure 4 presents a diagram in which the reader can better understand how this process goes in the mind of a person.



Figure 4. Illustration of the cognitive process in the face of risk, according to the PMT model, on whether or not to adopt a prevention response. Adapted from Cismaru et al., 2008

2.3.1 Precontemplation Stage

Individuals in this stage are characterized by being reluctant to change and in most cases they will either not see or will underestimate the risk of a hazard. The hazard risk perception literature concludes that overall, people are optimistic about risk, perceiving them to be lower than what they actually are (McMath & Prentice-Dunn, 2005). Other studies have shown that individuals, on one hand, tend to deny the risk of hazards by disregarding the possibility that anything serious could happen to them, and on the other hand they show to be resigned in the face of risk and indulge in a fatalistic mindset (Mileti et al. 1995). Additionally, people may be resistant to acknowledge higher risks if this action means for them to experience negatively loaded emotions like anxiety, thus convincing themselves that risk does not exist in order to avoid unpleasant emotions (Lazarus and Folkman 1984). Stuteville (1970) studies on decision stages suggest that underestimated perceptions of vulnerability or likelihood of occurrence emerge from the inability of picturing oneself in an adverse situation. A clear sign of avoidance can be spotted in phrases like: 'I am the exception to the rule', 'that will not happen to me' or any other phrase tainted with avoidance and denial (Block & Keller, 1998). Studies from Folkes and Kiesler (1991) and from Weinsten (1987) have similarly demonstrated that there is a tendency for people to hold positive-self-delusions towards a threat, claiming that the risk only applies to their peers but not for themselves. In this stage, before individuals even consider to engage in any risk reduction activity they must first accept the fact that they are vulnerable to wildfires. For this exact reason, efforts from external agents to motivate people to deploy mitigation measures in this stage should be focused on increasing people's perceived vulnerability to wildfire risks.

2.3.2 Contemplation stage

In this phase individuals have already acknowledged that they are living together with a wildfire risk, there is a higher perception of the likelihood of occurrence as there is also a higher estimation on the severity of the potential consequences. Although individuals in this phase believe that they are vulnerable to risk and are considering engaging into risk reduction behaviors, they still lack any action plan. Block and Keller believe that people in this state of readiness need a risk communication intervention that puts emphasis on the severity of wildfires in order to motivate them to undertake risk mitigation actions. It is important to note that according to the hazard literature, perceptions of likelihood perception alone cannot influence risk reduction behaviors, it is considered a necessary condition but at the same time not sufficient, other factors are also important when it comes to materializing intention into action. Considering these observations, external agents should enhance homeowners perceptions of likelihood and severity of consequences as a means to motivate them to take action.

2.3.3 Responsive stage

The final stage is characterized by people that are either preparing to take action or have already taken action to reduce their risk through specific activities. Studies from Marcus et al. in 1994 and from Sporny and Contento in 1995 brought to view that people in the responsive stage showed a significant increase in self-efficacy perceptions. These findings tell that confidence is a key attribute in people who are in the responsive stage to take risk reduction behaviors. Confidence in themselves, believing that they hold the personal requisites, but also confidence that these behavior changes will be effective (self-efficacy and response efficacy). At the same time, this also implies that different perceptions of vulnerability and risk severity will not have a big impact on homeowners' need for self-protection. For this exact reason, interventions should seek, in this case, to improve individuals' confidence and belief that they can deploy effectively the proposed risk reduction activities (Martin et al., 2007). Fundamental is to consider, according to Martin et al, that increasing vulnerability and severity perceptions in this stage might lead to what researchers

called a 'boomerang effect'. When risk perceptions are too high there is a chance that individuals revert their decision to engage into self-protection activities and do nothing due to the perceived uncontrollability of wildfires.

A summary of the above can be found below in table 2. With the stages and the required perceptions to move forward until individuals deploy the desired action. And in Figure 5 the reader will find an illustration of the integrated PMT-TTM model chosen as the conceptual model of the present research.

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Table 2. The required perceptions increase to move forward into the next stage. Final stage shows the requirements to take action. Source: Own elaboration



Figure 5. PMT-TTM. Source: Own elaboration

Chapter 3: RESEARCH DESIGN

3.1 Methodology

For the present project, a qualitative type methodology will be used, based on the bibliographic review and interviews with a group of experts. Qualitative research works with the universe of meanings, motives, aspirations, beliefs, values and attitudes, which corresponds to a deeper space of relationships, processes and phenomena that cannot be reduced to the operationalization of the variables (Maxwell, 2012).

Among these data, we can mention some examples, such as observation and analysis of feelings, perceptions, intentions, behaviors and other elements of a subjective nature. Objectively, qualitative research seeks to produce deep and illustrative information (Yilmaz, K. 2013).

Regardless of the sample size, whether small or large, the important thing is that it can produce new information. Therefore, qualitative research deals with aspects of reality that cannot be quantified, focusing on understanding, and explaining the dynamics of social relationships. This means that we can identify and analyze data that cannot be measured numerically (Medico et al, 2014).

Qualitative research is:

1. Objectification of the phenomenon.

2. Hierarchy of actions to describe, understand, explain, precision of the relationships between the global and the local in each phenomenon.

3. Observance of the differences between the social world and the natural world.

4. Respect for the interactive nature between the objectives sought by the researchers, their theoretical orientations and their empirical data.

5. Look for the most reliable results possible; opposition to the assumption that defends a single research model for all sciences (Medico et al, 2014).

The difference between qualitative and quantitative research is that quantitative research has its roots in positivist logical thinking. Therefore, it tends to emphasize deductive reasoning and the rules of logic and measurable attributes of human experience. Qualitative research tends to highlight the dynamic, holistic, and individual aspects of human experience. Therefore, it apprehends the whole in the context of those who are experiencing the phenomenon (Yilmaz, K. 2013).

Moreover, perception is a key component of qualitative analysis since it helps the researcher to accurately examine what is happening in the field while both experiencing and interpreting the context that comes with it (Stake, 1995). It should be noted that the only valid interpretations are from the participants and not from the researcher. The researcher is interested in hearing the participant's thoughts and perceptions, which can help address the research question. The interpretation dimension tells qualitative case study researchers that the primary aim is to learn how participants perceive, understand, and interpret events.

The research aims to investigate the nature and causes of risk reduction behavior to bushfires in the Valparaiso region in Chile, by examining local people's certain attributes that are said to drive engagement into activities that lower their vulnerability to bushfires. Because of the exploratory aspect of the research, a qualitative approach was seen as highly pertinent.

In addition, and according to Slovic (2004), there is strong evidence that experts and laypeople have different perspectives on risk. He compared the methods utilized by experts and laypeople in assessing and measuring risk, finding that experts rely on quantitative considerations such as the amount of accidents or incidents that might be predicted or the likelihood of an occurrence occurring, while laypersons consider both quantitative and qualitative factors. Besides considering the numbers, they focus on qualitative aspects of risk, such as ability to control the hazard, knowledge of the hazard, experience, and intuition. What Slovic describes reinforces the idea that carrying out qualitative research on wildfire risk is a sensible decision. There is a need to bring closer people's subjective experience together with the technical knowledge of experts. Risk managers must understand the increasingly diverse perspectives and experiences that characterize the population in order to deploy effective interventions. (Gordon et al., 2012)

Undertaking this type of research represents a continuation of empirical literature on the topic of risk behavior, for which a qualitative approach is suggested in order to explain deeper motivations, impulses, and conducts that characterize human behavior under a risk scenario.

3.2 Research philosophy

Constructivist ontology was the research approach chosen, constructivist theory states that reality is constructed by our own perceptions. Truth can be grasped through a number of intangible conceptual constructions that are socially and experimentally based, local and contextual in nature, and contingent on the person who carries the construction. Furthermore, the meaning is built intentionally and constructed between the subject and the object (Berbary, 2017).

The constructivist or interpretivist epistemological approach is based on the belief that reality is a social construct, and that research into social phenomena should focus on understanding rather than explaining (Allen, 1994). The researcher is linked to the subject of the investigation in an interactive way. In this sense, the investigator's findings are created as the investigation unfolds (Allen, 1994). This exactly fits the research aim. It was noted above that environmental hazards do not only have a natural dimension, there is also a behavioral aspect involved in which this research intends to explore that realm through the interpretivist approach.

According to Rubin (2005), researchers who conduct semi structured interviews talk about how things happen in an extended conversation with the interviewee, with limited questions and follow-up questions. As a result, this study included semi structured interviews with follow-up questions, allowing participants to contribute to the body of risk knowledge.

As the research will be built upon semi structured interviews with different experts in the field the researcher has to interpret interviewees' scope on the matter.

Reunite their views and find similarities which would provide the leads towards a conclusion.

One of the advantages of running this study through a qualitative perspective is that it takes into consideration meaning and purpose. According to Gubba and Lincoln (1994), unlike physical objects, human activity cannot be interpreted without regard to the meanings and purposes given by human actors to their actions. It is believed that qualitative data can offer a wealth of knowledge about human behaviour.

This idea gains even more ground when we take a look at the definition of behavior given by David S. Gorchman in his book 'Health behavior':

"those personal attributes such as beliefs, expectations, motives, values, perceptions, and other cognitive elements; personality characteristics, including affective and emotional states and traits; and overt behavior patterns, actions and habits that relate to health maintenance, to health restoration and to health improvement." (Gochman, 1982, p. 169)

Behavior is all about subjective human experience, therefore running a quantitative research under the positivist or positivist paradigm would be the same as using a measuring tape to see how much a water glass weighs. Quantitative methods are simply choosing the wrong tool if the aim is behavior analysis.

3.3 Case study and the search of truth

Case study methodology is becoming more common among researchers as a tool for conducting qualitative research (Thomas, 2011). Is widely used to investigate current events by combining several data sources over a period of time (Yin, 2013). Case studies pioneers were post-positivists, but since this methodology " is not assigned to a particular ontological, epistemological, or methodological status," case studies may be approached from a variety of philosophical perspectives (Rosenberg & Yates, 2007, p. 447). Case study has been suggested by constructivist researchers

such as Stake (1995), who have considered its role in understanding, experiencing, and interpreting the studied phenomenon.

The definition of a case study differs among researchers. For example, Creswell in his book titled "*Qualitative inquiry and research design*" defines case study as a " qualitative method in which the investigator examines a bounded system (a case) or multiple bounded systems (cases) over time, through detailed, in-depth data collection involving multiple sources of information", which includes a case outline as well as patterns depending on the case" (p. 73).

For Creswell there are five main characteristic for case studies:

- The case study is a qualitative research approach
- The researcher uses case study to explore a *case* or *cases*.
- There is a time frame for the investigation (the period of the research).
- The data collection in the case study relies on multiple sources of information.
- The case study findings are written in a report consisting of the studied-case themes.

In his technical description of case study, Yin (2009) dissects the definition into two sections. The first section is all about the case study's scope, referring to it as a "practical investigation". The second section is related to the case's data collection and interpretation of the data.

It is apparent from both definitions that a case study is more than a data collection process, as Creswell describes it as a combination of a design, data collection method, and data analysis technique. Without paying much attention to the case study itself, Yin focuses on the capacity, procedure, and methodological uniqueness of the case study process.

Stake (1995), on the other hand, focuses primarily on the essence of the case and its context. "The analysis of the particularity and complexity of a specific event, in order to comprehend its operation within significant circumstances," he explains (p. xi). Also emphasizes the essence of the case study as the subject of inquiry, with less emphasis on the procedure. Furthermore, case study research explores a specific topic and that the findings should be descriptive in nature. "A case study is an in-depth description and interpretation of a bounded system," she says (Merriam, 2009, p. 37).

In previous definitions, the determining element was either the case itself or the method used to address the case. Stake's description was selected for this thesis because it relates to the researcher's ontological and epistemological views. In qualitative case study analysis, the complexity of a specific case or cases is examined and analyzed in their natural setting (Stake, 1995).

Realist, relativist, and interpretivist viewpoints are represented by case study researchers. Realists believe in a single empirical truth that is unaffected by human thought. The truth, according to realism, is one constant reality that can be revealed objectively without any need for human interaction. Furthermore, as with post-positivist researchers, meaning is uncovered and found outside of the subject. Constructivist, social constructionist, and interpretivist scholars, opposed to realists, believe in various interpretations of reality. Our values establish a relative reality of a meaning that is constructed from our perceptions and interpretations. "We study a case when it itself is of very special interest," Stake (1995) writes. We're looking for the finer points of interaction with its context" (p. xi). Stake's interest in seeking meaning in the relationship of the subject and the object is expressed in this quotation. This approach reflects the tactic used for the present research.

3.4 Sample and research limitations

It's obvious that for research that wants to investigate peoples' perceptions, the data should be gathered from the participants themselves. The first intention was to run individual interviews to a sample of the CONAF workers and community members. Contrasting answers from these two groups appeared to be a very beneficial approach, taking into account that data could be gathered from both groups of actors involved. Analyzing if the data gathered from both matched or not could enrich the conclusions of this study. But considering that the lead researcher of this work is geographically based in the Netherlands, combined with the travel restrictions due to the current Covid pandemic, makes it very hard to get a direct interview with the people involved. With this in mind, it was considered to plan online meetings, but since people in this specific location lack a stable internet connection and that many of them do not own a smartphone makes this option not feasible.

With all these limitations a third option was considered, the idea of doing a focus group with the inhabitants of Valparaiso together with personnel from CONAF in one of their offices. The concept of gathering information from a conversation between the group of actors seemed very attractive, also because focus groups present the advantage of delivering high amounts of information in one take and in a very short period of time. This could solve the technological limitations presented above and at the same time provide rich information. However, Covid-19 measures in Chile are very dynamic and can change from one week to the next one, so coordinating a focus group seemed like a very tedious activity. In addition, even if the measures allow a gathering for a focus group there is still a risk of people getting infected with Covid-19, and the first priority of the researcher is always people's safety, so this idea was also discarded.

Aside from the technical problems, a mixed focus group with locals and CONAF workers could lead to biased information. People could change their answers if there are CONAF personnel in the room in order to give socially accepted answers. If they want to be critical they might hold back and not share that information because they do not want to appear rude to people that are trying to help them. Another possible scenario is that some CONAF members could give wrong information and other members would stick to that same wrong information to avoid conflict among their colleagues.

Another argument against running a focus group is the fact that the person leading the research would not be able to be in the same room together with the participants. It's important for the researcher to be present in the room and have a full sight of the individuals that are participating because there is information coming from what people say but also there is a lot of information hidden in how people are putting their thoughts out. Particularly, the information provided by body language would be lost since it's hard to get a full grasp of the whole group through online platforms. Having considered all these options, the only safe way to get the information needed was to have individual semi-structured interviews with three groups of people experts in the matter that work with these communities, as they do not share the same technical limitations as the people they work with. First group is personnel from CONAF, the second group is formed by members of the Valparaiso firefighter department, and a former undersecretary of the ministry of housing and founder of an NGO called "TECHO" (aimed at eradicating precarious settlements in south america) was incorporated to the sample as a third group of actors.

Though there were better alternatives to get more and richer information, practical problems bounded the data collection to a sample of only 7 interviews to these 3 different groups. This would allow triangulating information from three different sources, a technique that comes in handy considering the low amount of interviewees recruited.

In order to provide more reliability to the data gathering, information from an empirical and qualitative study from 2017 done in the same region was also considered. This study, carried out by Armas-Pedraza, Gascón-Martin and Muñoz-Salazar is called "Perception of socio-environmental risks in land occupation of Playa Ancha, Valparaíso Chile. The cases of Pueblo Hundido and Vista al Mar"

Chapter 4: DATA ANALYSIS

4.1 Introduction

Following the interviews the transcription process took place in order to proceed with the analysis. In accordance with the constructivist research philosophy that underlies this research, which understands reality as a social construct, and the not so high amount of data to process (constant comparison method is by definition very time consuming), the constant comparative method was chosen. This analysis method is an iterative process of reducing the data through constant comparison through different themes created by the researcher, each iteration divides the data into smaller units of meaning in order to find similarities (Fram, 2013) Although this methodology, developed by Glaser and Strauss' (1967) to analyze data in grounded theory research, has shown to be directly affected by methodological innovations, moreover, it has been improved to be adapted and used outside grounded theory. In words of O'Connor et al. (2018):

"It must be clear that constant comparison, the data analysis method, does not in and of itself constitute a grounded theory design. Nor does the process of constant comparison ensure the grounding of data whether "grounding" is used in a positivist or interpretive sense. Simply put, constant comparison assures that all data are systematically compared to all other data in the data set. This assures that all data produced will be analyzed rather than potentially disregarded on thematic ground" (p. 41)

The process followed a very intuitive approach, the interview transcripts were read several times. Each time the researcher highlighted fragments, tagging them with different themes or topics that were contained in each fragment. On the side, some notes were added in addition to the identified themes, such notes included insights that could add value to the analysis. No special software was used for this process, the researcher only used Microsoft Word.

4.2 CONAF: Implementing an integrated community approach

Historically, the analysis of the risk of forest fires has been oriented towards the knowledge of its physical parameters (vegetation, topography, weather, fire behavior) with important advances in digital cartography, information networks and even in legal regulations (Propuesta de Confección Obras de Mitigación y Actividades de Prevención de Incendios Forestales en Comuna de Valparaíso, CONAF, 2020). However, the analysis of the social component has occupied a very secondary place. This had led to focus the control strategy on investing in operational resources such as brigades, airplanes and helicopters, and on the search for high-cost technological solutions. However, we are talking about a problem of anthropic origin and not a natural phenomenon within the dynamics of forest regeneration. Interviewee Daniel A., ranger from CONAF illustrates this with the following quote: 'What yesterday was a solution, today could rise more problems'

Daniel A. adds: "This institutional shift has been hard to implement, historically CONAF members working in the field were mostly forestry engineers and preventionists, so adding this social approach required people with more experience with [human] behavior, such as social workers, that could help us include the human factor..."

CONAF understands that the territory must be conceived as an important actor in rural development and not only as a physical and biological support. This is the expression of the organization and activity of the different agents that live and work in it for their own development.

Manuel C. adds: "The problem of the occurrence and damage of forest fires is not solved in one summer, [...] requires joint, permanent, systematic and especially focused work with the inhabitants of those communities most directly exposed to risk and vulnerable to forest fires."

It is important to show both, the local authorities and the inhabitants of the most critical areas, that the expenses that must be incurred to control and extinguish recurrent forest fires and the losses that they generate from a personal, social and cultural point of view , as also the economic and environmental costs, are substantially greater to investment in prevention measures to be implemented. (Propuesta de Confección Obras de Mitigación y Actividades de Prevención de Incendios Forestales en Comuna de Valparaíso, CONAF, 2020).

To make this a reality, he says that CONAF defines as fundamental to promote the active participation of the community in the mitigation of forest fire risks with environmentally appropriate forest, agricultural and fire management practices. He believes that this greater awareness in the community is achieved by promoting the education and active participation of the owners, and supporting their goals and objectives that promote their development and well-being in a safer and healthier rural environment. He finishes saying that "we should not perceive the community as part of the problem, but as part of the solution to the problem"

According to Ganz, Troy and Saah (2007), the success of this 'work with communities approach' within the wildfires problem, in many cases, is subject to a strategy that considers the skills, knowledge and interests of local communities and combines them with the skills and experience of external agents or preventionists. The important thing is that the community understands that implementing prevention measures before and during the summer period is to act with responsibility and commitment towards oneself, their family and before the whole of society.

If one compares the intention and vision that CONAF has to address the problem with the activities that they are actually doing, we can see that there is a clear coherence between what they do and what they want to do (the reader can see Appendix B where the activities that this organization implements in conjunction with the community at risk are exposed). Therefore, it can be ruled out a disconnection of the personnel with the strategic plan. However, it can be noted too that although they are shifting towards a more social approach by integrating communities in the problem solving process, they do not seem to have the intention to explore deeper social aspects from these communities in order to better understand if there are other forces playing a role in whether they execute the recommendations or not

Another piece of information that can be retrieved is that work with the community seems to be a necessary but not sufficient condition to solve the problem. As has been proposed from the beginning of this report, and according to the

theoretical framework selected to analyze the case, the perceptions of risk and coping capacity must also be considered, as well as determining in which decision stage this group of people is, since different perceptions have different effects depending on the stage.

In the following section the situation of each of the factors will be described in detail. Author of this report determined that it is convenient to start with the decision stage analysis, seeing that it is this that determines the scenario in which perceptions are moving. Having this clear from the beginning will facilitate the subsequent analysis of the perceptions of risk and coping.

4.3 An X-ray of perceptions in Valparaiso region

4.3.1 Decision stage

As defined in the theoretical framework section, the transtheoretical model raises three different decision stages in which people can be situated. These stages are: 1) pre-contemplative stage, 2) contemplative stage and 3) responsive stage. In the first stage, before people even consider participating in any risk reduction activities, they must first come to terms with the fact that they are vulnerable to wildfires.

In the community that is the object of this study, it is possible to appreciate that people are in a pre-contemplative stage when making decisions about their safety towards wildfires. This can be concluded after the repeated mention by the interviewees (Daniel A., Manuel C., Ricardo B., Rodrigo P., Pablo R., Sandro B and Francisco I.) about activities that involve fire that the inhabitants themselves carry out. All the interviewees highlighted how people handle fire in a negligent way, carrying out expendable activities that involve fire, such as: launching fireworks, burning cables, bonfires, burning garbage or badly extinguished cigarette butts.

Ricardo B., Viña del Mar fire commander of the Valparaiso fire department, declares: 'This thing in Valparaíso, in the ravines, the fires are from the theft of cables. In other words, these stupid people start burning tires to burn the cables and they burn the cables to get the copper out of it and then sell it. ' When asked about

the residence of these people, he declares that he is convinced that they are inhabitants of nearby rural urban interface areas. "Without a doubt they are people from the area, I have no doubt, absolutely none." This is also backed by other interviewees.

In an interview in 2011 for the local newspaper 'La Estrella', after a large-scale fire in Valparaíso, Ricardo B. said the following: "My statements have been harsh, but if I don't say them, no one says them. an emergency of six fires declared at the same time, with a sequence of five minutes, and I feel that the community in general is not aware of the risks, and when I speak of everyone, it is everyone, including myself; narrow streets with cars parked at the two sides of the sidewalk, where there is no room for a water car; people go to look at the fire; they block our access for cars; etc. because yesterday I was almost run over and the level of violence in some sectors, while we were working, surpassed all the limits "

The image below (figure 6) confirms in a certain way the low environmental and risk awareness that exists. In it the reader can see ashes and remains of fire in a micro garbage dump under the electrical wiring. Fire probably started to melt the coating of electrical cables to proceed to remove the cables and sell them by the kilo.



Figure 6. Micro garbage dump next to WUI settlements. Photo provided by CONAF

Another type of reckless activity that involves fire, as stated above, is the use of fireworks. interviewee Pablo R., Lieutenant of the Valparaíso fire department says the following: 'You know that in the periphery you see a lot that fireworks are thrown to warn that the drug has arrived, generally those fireworks fall in sectors that the weed has not been taken out or dry grass and you have to go and they won't let you in. 'He then adds:' There are other sectors where there is no problem, people receive us with the normal fright of an emergency but they will always maintain the good treatment. On the other hand, in the periphery sometimes they show you knives or pistols.'

Beyond the worrying of how risky this practice is, which does not leave much room for interpretations other than the null perception of the risk of fires. What is striking is the last sentence of this quote that, when firefighters arrive, in some cases the same people in the sector interfere with the work of firefighters. Similar to what R.B describes in the interview with the newspaper 'La Estrella', where he declares that the violence with which they are received in some sectors already exceeds all tolerance limits.

Manuel C., forest ranger and preventionist of CONAF has a similar observation: "In Valparaíso there are kids who are going to fool around to set fire, there are videos of people burning branches and starting a fire, so fighting against that is super complicated because fires many times they are given by actions of those that are later affected by it."

It could not be concluded that they are in a precontemplative stage just because they do not carry out preventive activities. As we have seen, carrying out these types of activities in a systematic and effective way depends on more factors, however, people manipulate fire recklessly. This leads to the idea that they don't see themselves as subjects of risk, otherwise these activities would not be carried out. However, it could be argued that activities such as burning garbage have a sanitary purpose, but are still practiced without any safety measures. On the contrary, the rest of the aforementioned activities related to fire, which are absolutely dispensable, since they do not add any value to community life, are carried out indiscriminately.

Pablo R. declares: 'These people know about fires, they know that they happen, you would have to be a newborn or come from Mars to not know that fire exists and that fire needs fuel and that vegetable matter is fuel and then realize and say, 'oh, I'm living in a time bomb.'

The bulk of CONAF's actions are aimed at activities in the field with the community, it is observed that there is an adequate stage of planning and reflection around the effectiveness of the strategies to cope with the problem with the community itself, since they even develop a specific and joint action plan for each one of them to later share it. But these communities need to internalize this as a reality, that they live in a condition of constant vulnerability to forest fires. For Pablo R. the root cause of this is: 'Chilean culture is very shortsighted and it is difficult for us to evaluate the future. You live day to day, even the person who takes precautions in any area of life is ridiculed and branded as exaggerated. As imminent as the risk, people tend to deny it.'

The engine that drives people out of the precontemplative stage is the feeling that they are at risk. That the community has full confidence in the activities recommended to it and in its own capacity to carry them out is not relevant to the state of decision in which they find themselves, and continuing insisting on this is a waste of resources. Illustrating it as an old country adage, it's like putting the horse before the wagon. It does not make sense to have full knowledge of the activities to be carried out if people do not first see themselves as individuals at risk, since implementing these measures without that engine, which is feeling in danger, becomes a totally irrational act.

4.3.2 Threat appraisal

4.3.2.1 Perception of likelihood

Given the decision stage that people in these sectors are in, the perception of likelihood of a fire becomes the most relevant since it is the one that has the greatest

weight in people so that they can move to the contemplative stage, where the greatest perception of likelihood of event will at least make them think about having to do something.

However, it is necessary to bear in mind that people who live in illegal settlements in WUI areas are people who live in insecurity and are vulnerable to many other threats in addition to fire. When the materials of the house are not the best, even a heavy rain can mean losing all of their belongings. Or as these settlements are built on ravines, there is a high risk of landslides. In short, the list of dangers to which they are exposed is long. Not only natural hazards but also social ones, such as being victims of crime, as has been shown in the previous section. (Valenzuela et al. 2010)

The interesting thing comes when mitigating measures towards a certain danger mean an increase in vulnerability to another threat. Each decision involves a mental exercise in which the costs and benefits of said action are weighed. If the costs get a higher score than the benefits then rational logical thinking stops us and we prefer to suppress the action that was being evaluated. The decision of people to implement a mitigating measure or not is not free from this evaluation. In this case, when people decide to burn their garbage, for example, the benefit of this is to get rid of material that serves as a breeding ground for infections and unwanted animals such as rats, cockroaches or flies. Picture below (Figure 7) could help to visualize the garbage problem in these places.

On the other hand, the cost that it has for them to start a garbage burning is in the first place something intangible, which is an increase in the probability of fire, since control of the fire can be lost either due to carelessness or due to changes in weather conditions, changes in the direction and intensity of the wind can drag the fire towards areas with vegetable fuel. This increase in probability is something that people cannot feel and therefore it is difficult to weigh when making a decision. It is the same that occurs with the risks of climate change, the effects are imperceptible to the senses of the human being, therefore the perception of risk remains rather immobile, hindering the transition towards a more sustainable behavior in people (Weber, 2010).



Figure 7. Accumulation of high volume of trash. Place affected by several fires in the past. Source: CONAF

Francisco I., former undersecretary of housing ministry and co-founder of 'Un techo para mi país' (A roof for my country), an NGO present in almost all of South American countries that seeks to end precarious housing, states: "*The vulnerability* of these groups is not only to fire, this must be taken into account when interpreting their actions to define their perception of the occurrence of risk. Because it could be that there is a high perception of risk but even if it is high it might be lower than the perception of other risks."

The fact that people burn their garbage can be interpreted directly as that the perception of risk of infections is much higher than that of forest fires, but it would not lead to the conclusion that the perception of occurrence is low. However, this conclusion is made more obvious by the following: the burning of residues is a very old agricultural practice in the country, therefore it is deeply rooted in the customs of rural communities. For this reason, the authorities do not prohibit burning but they are subject to regulation. When someone wants to burn residuals, they must notify

CONAF officials, once notified they go to the place to analyze the area where they want to do the burning. Officials must approve the place after verifying that there is no risk of spread, in addition to approving the procedure, there must be at least one official present at the time of burning in case the fire gets out of control.

This regulation is precisely to enable the burn without the risk of spread, it is a good solution to the dilemma of reducing waste in exchange for an increase in the probability of a fire happening. A preventionist will ensure that risk is kept to a minimum, in addition to being present during the event, which provides a greater sense of security. However, according to CONAF officials interviewed, people do not announce their intentions to carry out the burning and do it anyway without any notification. In the words of Manuel C., ranger and prevention officer in the Valparaíso region: "... CONAF regulates burns, fires, fire not in the city, rural fire, it also regulates fires on agricultural land, controlled burning or waste, this is also regulated by CONAF and no one asks CONAF for permission, people without even thinking set a fire at any time when what the law says is that to do so you have to ask CONAF for permission and announce that you are going to do it on a certain day."

The problem seems to go even deeper, Manuel mentions the following:

"For people it is a hindrance [the controlled burning protocol], this whole process, people live their lives day to day and continue with their practices that probably their father taught them, they think it is ridiculous to ask for permission."

When before it was said that people make an evaluation of the costs and benefits, in this case the cost of burning waste is practically zero, in the sense that the perception of the occurrence of the fire is so low that measures that aim to reduce the risk for people are seen as a hindrance rather than a benefit. This means that the idea of a possible fire does not even cross their minds.

4.3.2.2 Perception of consequences

Here it is necessary to talk about the misrepresentation in people's perception regarding the possible consequences of the fires, given the repeated encounter with this topic during the interviews. Keeping the due proportions and respect for the risk and vulnerability of the people, it seems that the perception of the consequences in the medium term, in some cases, is favorable for these communities, in that it is a way of forcing the state to solve their housing problem. The state, the organization that must take care of the housing problem of these people after the fire, cannot start a reconstruction of the houses on the same site. This is because the vast majority of the populations affected by the fire are illegal settlements, so if the state rebuilds in the same place it would be acting outside the law and thus violating the constitution.

Taking this into consideration, in addition to the fact that the state must find a solution, it has no choice but to relocate the affected people in legally established housing areas. In this way, people went from living in an illegal settlement, without basic services such as water, electricity, gas, among others, to living in a town where all these services are assured, in addition to having regularized their housing situation.

Six out of seven interviewees indicated that state assistance creates a 'I have little to lose' mentality. Ricardo B. points out: *"this is a very personal opinion, I believe that people of a lower sociocultural level have a mixture of ignorance and comfort …" "… comfort because if their houses are burned, everyone comes to help them, so if they rebuild your house, chances are you will have a much better home than you did before. But if a neighbor of 'Los Pinos' [A mid class housing sector] was unemployed and could not pay the fire insurance and his house burned down, who would help him? No one."*

Ricardo continues: "If people believe that a fire will never happen, the less they will think about the consequences it has for them, it does not make sense. I do not need anyone to tell me that, when I see that there are houses that are literally surrounded by trees where the branches reach the windows, it is absolutely clear to me that people do not know that a fire can kill them, because when there is a fire there, those people are going to die. If they think about the consequences, I am sure they only think about material consequences, but losing their lives never crosses their mind."



Figure 8. Vegetation intertwined with dense vegetation, eucalyptus (highly flammable tree) between them. (photo provided by CONAF)

The problem here is more complex than it may look. Apparently, people in these settlements are seeing bushfires as an opportunity to put pressure on the government to take action about their precarious housing conditions. This idea becomes stronger if it is linked to the 'threats to leave' that sometimes firefighters receive when they show up to put down the fire. In any case, If the consequences of a fire can be instrumentalized as a means to put pressure on the government in order to get a more decent life standard, then comes the realization that the consequences are not always bad for them and therefore the consequences can be undermining the incentives to execute preventive activities. This, combined with the apparent belief of these communities that fires can only cause material damage makes the problem hard to tackle since there is a deeper social problem underneath.

4.3.3 Coping appraisal

4.3.3.1 Efficacy of response perception

People have high confidence in the measures proposed to them, they believe in authority, whether of government or technical authority, such as firefighters or brigade members and CONAF volunteers. People listen carefully to the proposals and are excited to participate in the workshops

Ricardo B. says: "... from what I see, people do believe in what we say, they listen to us with respect when we have workshops, they ask good questions and they seem interested. It is difficult for me to tell you if they trust what we recommend, it is something very personal, but if I have to evaluate that depending on their attitude towards us, my answer is that they have a high appreciation for the message we give."

What Ricardo says can be supported from a testimony by Mrs. Roxana, inhabitant of a settlement in Valparaiso called "Pueblo Hundido". *"For instance, there are houses in the middle of the woods. If you tell them to clean up, and I give them pamphlets with instructions, they won't do it"* (Armas-Pedraza, T. D., Gascón-Martín, F., & Muñoz-Salazar, P., 2017, p. 197). Although these words first tell us that people are not engaging in the recommended activities, a second read suggests that they trust the measures provided by authorities because they save the information pamphlets and distribute them to some of their neighbors.

Sandro B, forest ranger that works directly with communities, has a similar opinion as Ricardo. "This is very personal because we have never assessed if they trust the information we give. But I think it is easy to perceive that they trust us. At the same time I can tell you that when we give the workshops the people participating are mostly older people, I don't know, between 40 and 60. maybe because older people have a tendency to be more cautious. But also that does not mean that younger people are skeptic about our recommendations, as we talked before, they may think they are just unnecessary"

It may be concluded that peoples' efficacy of response perception is at a high level. Unfortunately, this perception will not influence them before they feel vulnerable to fires so the impact of this driver is not determinant in this particular case.

4.3.3.2 Self efficacy perception and response cost

In this case, the answer is intertwined with the item of the costs of applying the measures. Although the substance of the message that CONAF delivers is understood, that is, people understand the logic of the recommended measures, apparently there is a problem in the overall plan. This problem escapes the economic issue, it has to do with the logistics or systematization of these measures. Picking up the trash, setting up a firewall, or doing a fuel cut doesn't require as much skill and effort if done once. However, these activities, to be effective, must be done constantly, otherwise it is useless.

And here lies the problem, to systematize these activities and transform them into a communal habit, more sophisticated infrastructure and logistics are required, unrealistic elements if we consider that these people live in very precarious conditions. For example, the authorities place great emphasis on the importance of good waste management as a key activity to prevent fires. But let's remember that the illegal settlements do not have municipal garbage collection service, therefore it is the neighbors themselves who must solve this.

To a large extent, they deposit the garbage in what are called micro-garbage dumps, small garbage cells distributed in the peripheries of the settlement. The recommendation of the authorities and CONAF is to accumulate the garbage in a single sector and then transport the garbage in vans to a legally established landfill. Here there are three big problems that are hard to see for someone who lives in the city. In the first place, people must carry the waste themselves to this designated space for its accumulation. The illegal camps can become extensive and can easily be kilometers away from one end to another, so carrying several kilos of garbage on the back for a few minutes is a first disincentive. Second, once the garbage has accumulated, it must be transferred to the landfill. This is only possible with freight vehicles, which in most cases requires more than one to achieve this. Third, to be able to enter the landfill to deposit the garbage, one has to pay.

So here one can see a high degree of disconnection between the authorities and these vulnerable communities. The authority, to a greater or lesser extent, knows in general terms which are the activities that must be instilled in people so that they are the ones that overcome their status of vulnerability. They know what they need but the important question is not the 'what' but the 'how'. Authorities should be careful about what they ask from people, because the desire to overcome vulnerability can be transformed into frustration when facing so many obstacles.

Francisco I., highlights this interesting point: '... let's do a one-minute analysis of any preventive measure that is recommended to people. Let's take the case of garbage, very well. We ask people that they have to better manage their garbage, they can not throw it in the first empty lot they find, they must take it to a landfill, etc. Think about it, you are a student, you work, you have commitments, you and I have no spare time, nobody, what would happen if tomorrow they tell you that there is no garbage collection and you have to organize with the neighbors to collect it at the end of your street, you will have to move the garbage once a month to the landfill, and you will also have to pay to be able to rent the vehicle and pay the entrance to the landfill. I think that you and I also would end up dumping the garbage somewhere around there. Do you realize why people don't do what is proposed to them? Okay, they should do it but the authority should give them all the help possible, but for them to do it themselves, otherwise it is a tedium that nobody is willing to bear'

In this way, it can be said that the inhabitants of these places have a positive perception regarding their capacities to carry out the different tasks that are proposed to them. The key point to take into consideration here is how capable people feel to systematize these activities and transform them into part of their day-to-day life, because doing them in an isolated way and sporadically does not solve anything.

The research done by Armas-Pedrasa and her colleagues (2017) adds a relevant insight related to the already known problem of systematization of preventive activities. Their study reveals that people in these settlements have issues when it comes to organizing themselves. In words of the researchers: "It is outstanding the poor prevision the neighbors live with daily, because they haven't found a way to organize themselves to confront emergencies; and they haven't agreed on any alert system. With the previous idea in mind, from the logic of territorial planning, but not from a technical rationality, but from the neighbor's logic itself, they are so used to live in that area that they have naturalized risk and they failed to see it as such."
Although it is concluded that people, in the current decision stage, would not engage into mitigation behaviors, such as proper garbage management, before accepting themselves as people in danger. It was considered relevant to expose other factors that could hinder the process after people move upwards in the decision scale. A note for authorities would be to not overlook the organization difficulties these people have.

Chapter 5: DISCUSSION

During the investigation, a series of data that the researcher considered relevant to explain this phenomenon as a whole came to the surface. However, these were outside the margins imposed by the selection of a particular conceptual model. Given the repeated encounter with this information throughout the interviews, it was thought pertinent to at least mention them, with the purpose of generating continuity regarding the research in this field. This chapter will discuss these other themes and therefore challenge the overall conclusion of this research.

5.1 The self-fulfilling prophecy

As dictated by the analysis method, the information must be systematized and compared, this methodology ensures that all the collected data are compared since they are not transformed into a "database" by itself. It is precisely the necessary reflection to raise the following point.

Although most of the interviewees point out that the reason why people do not carry out mitigating measures against forest fires lies in the disposition and actions that the inhabitants of the WUI areas have, in which they mention the lack of concern for maintaining the environment of their homes in conditions such that they do not allow the start or spread of fire in the event of an accident, manage the surrounding vegetation, clean the surrounding areas, handle garbage, etc., these are actions that in the eyes of the interviewees seem to have zero or little receptivity in the inhabitants of these areas. On the other hand, they report a passive attitude in terms of being, according to them, conditioned by excessive aid on the part of the State.

Finally, all conclude that there is no perception of risk as something imminent. Although people have a notion of the implications of a forest fire in these communities, their close experiences do not seem to trigger in them a more proactive response to the problem.

The question is now, what draws special attention about this perception on the part of the interviewees? Although these perceptions could be absolutely adjusted to reality, it is also important to consider to what extent the concept of the "theory of self-fulfilling prophecy" influences this problem. Robert Merton takes a theorem from the American sociologist W.I. Thomas who says the following: 'If individuals define situations as real, they are real in their consequences' (Merton, 1995, p.505). Merton unravels this theorem and explains that people respond mainly to the subjective sense they have of a particular situation, leaving aside the objective aspects of it, from then on the behaviors are determined mainly by the meaning that is given to said situations. Merton is so confident in this theorem that he dares to say that if its scopes were more popular, the understanding of how society works would be much broader. In simpler words, this theory can be defined as a false description of reality which causes a new behavior, which makes the originally false description true.

Robert Rosenthal and Lenore Jacobson (1968) complemented this theory after experimenting with teachers and students. The researchers informed the teachers that the results of a test given to their students suggested that some students had outstanding intellectual potential, however this was not true. Months later, the students were retested and the results showed outstanding performance in those students for whom high expectations were held. This means that expectations that people have about people play a fundamental role in their behavior.

When the organizations or institutions in charge of educating, managing and establishing prevention strategies against this problem, have established the idea that, in the words of R.P, a forest firefighter from the Valparaíso region: "regardless of what we do, the residents of these areas do not take action, they are not interested because they know that in the event of a disaster, state welfare measures will be activated and a catastrophe, such as a fire, becomes the key to regularize their housing situation". It is very likely that this "prophecy" will become the inexorable destiny of these communities. It is interesting not to lose sight of the fact that the people who are in state organizations or NGOs that are in charge of working on prevention, if they have a preconceived idea that "there is not much to do because they will not achieve changes with their actions" (Pablo R., firefighter region of Valparaiso) clearly the changes will not occur.

It seems that what makes the difference in the face of a certain reality is not only that of the subjects on whom the actions are carried out, but also the expectations of those who implement them affect the results obtained. As noted, it is not that what the interviewees observe is not real and is even a constant in the problem, but it is still important that in order to reverse the situation, those who are in these key positions and who must work to change realities cannot be carried away by a preconceived disposition. Even because they themselves can perpetuate this look in the new members who join the prevention work and finally the implicit message is "is my work worth my management, if regardless of what I do, I will not achieve my goal?"

It is also to think and look at the problem from another point of view. In the Chilean reality, fatalism and externalizing responsibilities are characteristic. It is suggested here that these organizations should also reflect and make an inquiry about their expectations and ask themselves; what responsibility they have in ensuring that their actions do not reach the target audience and do not achieve the changes they seek. Social problems, especially those that affect people's safety, quality of life and dignity, cannot be analyzed linearly. Its explanations are shown by the action of several - and sometimes unexpected- forces.

5.2 Cultural realm

In Chile there is a tendency for the State to take action on any matter, generating laws or ordinances, after extreme situations that cause a great national commotion. For example, legislation was enacted on the responsibility of driving under the influence of alcohol after an accident in which the driver, under the influence of alcohol, fled, resulting in the death of a baby of a few months of age. The "Emilia Law " (Emilia by the name of the baby involved in the accident), which has been in force since September 16, 2014, sets punishment by an effective jail time of at least one year for drunk drivers who cause very serious injuries or death to third parties. The same logic was followed by the law that punishes discrimination, the law was only created after a young homosexual man was tortured and killed in 2012. A similar story can be found behind responsible pet ownership and animal abuse law, known as 'Cholito' law, named after a stray dog that was brutally hit until death. In addition to these examples, during the Covid-19 crisis it was proposed by a group of politicians, in order to mitigate the damaged economy of households, to allow people

to withdraw a portion of their individual pension funds, seriously compromising the already low pensions of citizens. It is important to mention that the vast majority of the population supported this even though it meant that 40% of the saving accounts were left with no funds at all (Rodriguez C., Pierola G., 2021, February 22).

These are only a few examples, among many others, that suggest the Chilean idiosyncrasy as very short sighted and reactive. Thus, a low anticipation from people -when it comes to risk could also be expected- since even policy makers, which are highly educated and experienced, have trouble thinking ahead.

Today, in relation to forest fires, it is being discussed that in areas that present a high risk of fire, which are generally rural interface areas, they cannot be declared suitable post-fire so that they can be buildable, since this is a form that some unscrupulous real estate companies use to gain access to land that they acquire at low cost and generate very profitable real estate projects for them. D.A from CONAF says the following: 'It is typical, actually very common to see on land that has burned, after a year, machinery, personnel cleaning and leveling the land to build, after another year you see a condominium. It is totally obvious but nobody says anything. The truth is, I don't know if someone makes a complaint or something, but the damage has already been done.'

The Bill indicates that in the event of fires in which forests, crops, pastures, mountains, hills, plantations or xerophytic formations of those defined in Law No. 20,283 are burned, it is prohibited, for a period of 30 years from the cessation of havoc:

- Make changes in the use of the damaged land through modifications to territorial planning instruments.
- Application and granting of building, subdivision, subdivision or urbanization permits and buildings, on the lands that were part of the burned surface.
- Any activity incompatible with the recovery of the vegetation cover.

But this is still a bill while the fires continue.

5.3 Socioeconomic factors and environmental justice approach

As previously mentioned, the problem of forest fires has always been present in Chile, however, in recent years there has been an increase in the frequency and intensity of this due to the consequences of climate change. The lack of rain and an increase in temperature have converted previously less fire-prone places to risk areas. This means that people who were not previously vulnerable to wildfires, today they are. And as mentioned, they are from very low socioeconomic strata. Therefore, for the moment, the costs of global warming in the country are being placed on the most vulnerable sector of the population.

Obviously, this is an unfair situation since it is probably the highest socioeconomic strata that contribute the most in accelerating the desertification process of the territory, or even if the contribution would be the same, it is the most deprived sectors who are paying the consequences by facing higher risks.

These risks generally expose the social groups most vulnerable to environmental conditions in the process of degradation. In this perspective, the conception of the environmental issue emerges as an issue of distributive justice, making the management of socio-environmental conflicts in a democratic and participatory way one of the greatest struggles (Pye et al., 2008).

The distribution of these risks in society can be compared with the social distribution of wealth. In this way, the conflicts that arise from scarcity are replaced by problems and conflicts that arise from the production and exchange of risks, which Beck (1999) describes as a transition from class society to risk society. In this transition, the nature of the risks becomes more complex, product of economic development.

The theme in vogue today is the degradation of the environment that affects contemporary societies. The idea that is spreading is that we are all potential victims because we live in the same macro ecosystem global - the planet Earth. Giddens (1996, p. 256) states that "ecotoxicity potentially affects everyone, producing generic contamination, by chemicals that indirectly affect the environment". This reasoning, however, is too simplistic if analyzed socially, since the impacts are distributed both in

terms of incidence and intensity, showing that the majority of the poorest and the powerless ethnic groups fall, disproportionately, socially induced environmental risks. (Gochfeld, M., & Burger, J., 2011)

This approach suggests that the solution to wildfire vulnerability rests on finding a solution for economic equality which is already a big problem itself with no clear solution seen on the horizon.

5.4 Dependency syndrome

Pablo R. thinks that: "... today social assistance, which many say is precarious, I think it is super good for people from lower social strata, but in the long run that is counterproductive. Look, I'm going to give you an unrelated example but the same principle operates. My clients [He is a carrier]1 are farmers, it costs them a lot to have labor for the packing, why? Because people preferred not to work for the covid checks that the government gave them, and there was a lack of labor. Perhaps the problem lies in these misunderstood aids."

But what does the literature say about this statement? Although no authors have been found who have investigated whether post-disaster state aid discourages people to undertake prevention activities. There are reports on some African communities that have become dependent on international aid, that is, when the support is gone, the performance of these communities drops down (Matsa M., Dzawanda B., 2014), showing that these groups cannot solve their problems without outside help. This phenomenon is called "Dependency syndrome" and can be defined as "any chronic behavior affecting a person or society so as to force it perpetually to succumb to depending on someone or society to address his, her or its needs and sometimes problems in order to develop." (Mhango N., 2017, p. 1)

Even though the situation in these African communities presents nuances if compared to the target case of this research, it can be extrapolated in order to get insights within their common grounds.

The problem in Africa emerges when an outside entity, be it the government, an NGO or any other private enterprise, provides help in the form of new infrastructure for the community, such as a water tank, for example (Bartle, 2012). For the inhabitants of this place, that water tank continues to belong to the donor, therefore when the external organism leaves the place, people neglect the water tank, and stop doing the maintenance or even stop using it (Bartle, 2012). It is an expected reaction if we remember that these people do not see this asset as their own and do not have the motivation to keep something that is not theirs operational. The lack of a sense of responsibility for the tank makes it impossible for people to care about it.

As Jean Paul Sarte said in his famous phrase: "Man is condemned to be free", the greater the freedoms of the individual, the greater are the things that must be taken care of. Fromm explains in his famous book "Escape from freedom (1941)"; modern men embedded in the capitalist system have realized that the cost of its greater freedom and independence is the insecurity that afflicts him, which brings with it feelings of alienation, loneliness and powerlessness. And to avoid these uncomfortable feelings, people find ways to give away their freedom in order to get rid of the responsibilities that cause them so much uncertainty.

In the case of the present study, the situation is a little different since there is no material good provided to the community before the fire, but even so the concept of responsibility comes into play. We could suppose that, and as the interviewees pointed out, those affected, upon having knowledge of the support they will receive after the fire, lose the sense of responsibility they have with themselves and their safety, since in some way other people are the ones who must bear this responsibility. They lack that sense of ownership and therefore do not feel responsible for what happens. A situation that becomes even more worrying if one remembers that fewer responsibilities mean less freedom. If one wants to restore dignity to these people, you have to empower them and hand over responsibility for their own lives. Let them be the ones who can help themselves but with the state and/or civil society accompanying them until the end of the process.

5.5 What about priorities?

It must be insisted that these people live in extreme precariousness, therefore we must stop and observe the sensitivity of the needs of the inhabitants. We can define a need as the space that exists between a person's current situation and how they would like their situation to be in the future (M. Vazquez, 2010). Since resources are scarce and wants infinite, people rank their needs according to their importance. Maslow (year), developed a famous hierarchy of human needs, which offers great clarity to understand this phenomenon. It would not be relevant for this study to give a detailed explanation of each level of needs that Maslow defined, it is only the first two levels of the pyramid that are interesting for this analysis. Maslow grouped at the base of the pyramid the most urgent needs for any person. According to him, the physiological needs are what we will find here. In other words, when one or more of the needs of this group are not covered, the human body suffers significant damage and in the long run it will stop working (M. Vazquez, 2010). The repetitive nature of these needs, added to the fact that most of them are solved with money, makes them a special concern in underdeveloped or developing countries.

The next step in the pyramid is the security needs. Once the physiological needs are there, people tend to attend to their need to feel protected against dangers and threats. It is precisely here where people vulnerable to forest fires would begin to worry about the risk of an eventual catastrophe. However, a significant part of the population in third world countries live struggling every day to satisfy their physiological needs, and many times they never manage to have the privilege to worry about needs that come higher in the pyramid.

As Francisco I. details: 'These people really live from day to day, their livelihood comes mainly from informal jobs, and the food they put into the pot when they get home was bought with the money they managed to raise that same day, if the household income was zero one day, that family does not eat that day '

This may suggest that as soon as physiological needs are met, people will assign a higher 'score' to the negative consequences of a wildfire that threatens their lives and / or belongings.

It seems relevant to have this consideration about the hierarchy of needs of people for government agents or civil society organizations. If the objective is to get people to worry about their safety while they have to struggle every day to maintain their homeostasis, the efforts to motivate them must take into account these hierarchies to execute educational campaigns with greater penetration or that generate a greater impact with in order to bring the need for fire safety to a higher level of urgency. Nevertheless, ideally, the state could help lift these people out of poverty by providing better opportunities, so that later, out of their own motivation, they can face the factors that threaten their security.

Chapter 6: CONCLUSION

6.1 Conclusion

To answer the research question, the present work, in the first place, chose to use the PMT-TTM as a conceptual model, a model based on the cognitive processes of individuals. As we have seen, this model states that there are four factors involved in this process (perception of likelihood, perception of severity of consequences, perception of efficacy and perception of efficacy of response). These factors fall into the category of perceptions, that is, the self-care of people vulnerable to forest fires will be determined by their risk (likelihood and severity) and coping (self-efficacy and efficacy of response). However, these perceptions influence decision-making to a greater or lesser extent depending on the attitude of people towards said risk. We can understand these attitudes as a stage that moderate the decision-making process of an individual.

Second, to answer the questions raised, it was decided to carry out a case study in the Valparaíso region, Chile. A region historically affected by forest fires but also with an increase in cases in recent years mainly due to climate change.

It was known beforehand, about the individuals in this particular region, that the preventive activities they carried out had a tendency towards zero. The challenge was to be able to indicate, under the argumentative line of the chosen conceptual model, how realistic the risk perceptions of this group of people were and if they were consistent with the low or almost no presence of preventive behaviors.

It was considered prudent to start finding out what the attitude of the people was towards the risk, since this allowed the researcher to determine in what stage of decision (precontemplative, contemplative, action) these individuals were. In this way, there would be more clarity regarding the effects of perceptions on their behavior. The data in this first part of the analysis was categorical, all interviewees described the attitude of individuals in risk areas as reckless, denial or very myopic. That is, people are aware of fires and no one would be surprised at the moment of experiencing one, however, some of their practices (and not practices) reveal a false sense of security in these people. In other words, they minimize risk or do not see themselves as vulnerable to these events. These attributes belong to the description of the precontemplation stage.

Once it is known which decision stage it is being dealt with, the rest of the analysis becomes less complex, since it is already known in advance which perceptions are the most relevant for this specific case. It could then be expected that the perception of likelihood was low or very low, otherwise it could be argued that these people are in a contemplative stage, since when people have a perception of likelihood according to the situation, they can be categorized in this stage. But indeed the data provided by the interviews confirmed the first assumptions, the perception of likelihood of a forest fire is worryingly low, as has already been made clear throughout the chapter that details the empirical data.

Although the perception of likelihood is the most important to be able to migrate to the next stage of decision, a perception of the severity of the consequences of the fires - although to a lesser extent - adjusted to reality is also important to leave the precontemplation stage. In this case, as expected, the perceptions are also far below of what they should be. According to those interviewed, the 'I have little to lose' mentality is dominant in these groups. As some interviewees pointed out, in many cases people are better off after a blaze has consumed their homes. Another type of phrase that was repeated a lot is that people do not see their lives threatened in case of fire. People have the idea that fire moves slowly, and that in the worst case scenario they will have time to get themselves and their most valuable belongings to safety.

The second topic of interest in this research was to know what role the paraestatal organization, CONAF, is playing in the vulnerability mitigation process with these communities exposed to the risk of fire.

After making a recapitulation of what was found with the interviews, plus what was found in documents that CONAF itself provided for this research, the following can be concluded: Although they have a bottom-up approach, where they seek to

find solutions together with the communities, these organizations focus their attention and resources on disseminating and explaining, in addition to providing support, almost exclusively to the activities that people must carry out to reduce their risk. However, given the precontemplative decision stage, these efforts are most likely to be irrelevant, as people first need to integrate a sense of vulnerability to carry out the recommended activities on their own. Although it is true, CONAF proposes a less technical and more social approach by integrating the community, the data collected indicates that this organization finds it difficult to break with the technical paradigm, since its work in the form of workshops with populations at risk, are reduced to workshops to fortify houses, clear the grounds or how to manage waste. All technical workshops that do not aim to make risk perceptions more realistic.

People have ideas about the potential for damage, according to the ppm-ttm model, and without these beliefs, a change toward prevention activities is impossible. As previously indicated, these beliefs include perceptions of likelihood of the event and the severity of its consequences, as well as beliefs about their own capacity to undertake these prevention activities and the efficacy of said risk-reducing practices. In the case of wildland fire risk mitigation, this implies that individuals must feel they are personally at danger, that the danger is considerable and severe, and that their efforts to mitigate the risk will be effective. Although these beliefs are a necessary condition, other factors that popped out throughout the interviews indicate that these perceptions are a necessary element for a shift towards preventive activities but not a sufficient condition for that purpose. Therefore the extent that perceptions influence people to undertake these safety measures is limited by economic and cultural variables.

6.2 Validity and reliability of study and recommendations for future research

Although it is true that by choosing a conceptual model the researcher is, in a way, chopping a highly complex reality to pieces that are easier to process in order facilitate analysis, the author of this report never suspected that the chosen model was ignoring aspects or variables that seem to be quite important and that they play an apparently key role in changing people's behavior.

As already mentioned before in the discussion chapter, there are cultural and socioeconomic factors that seem to have a strong influence on people and the behaviors they choose to carry.

Socioeconomic factors manifest themselves as an underlying and determining force in the vulnerability of individuals or groups. Not only vulnerability to forest fires, but as we have already said before, vulnerability in all kinds of things. For this reason, it is prudent to acknowledge the rather superficial scope of this research approach. This does not mean that insights at this level should be disregarded, in order to find solutions to problems it is necessary to have a holistic knowledge of the phenomena that affect our society. However, as it is tempting to oversimplify social problems, it is of the utmost importance to keep this in mind for future research.

In addition to the socioeconomic factors that this model did not consider, some cultural factors that could be playing a role in this phenomenon came to light as well. Given this, the present research believes that anthropological studies can further illuminate the panorama and help to better understand what happens to people in this situation and thus intervene more effectively.

A more complete PMT--TTM conceptual model can be found below in Figure 9. The updates include socioeconomic and cultural factors as contextual forces affecting peoples' perceptions.



Figure 9. PMT-TTM model with integrated cultural and socioeconomic factors. (source: own elaboration)

In an aspect related to the methodology itself of this study, it is considered prudent to deepen what this study began, but with a methodology that can yield more and better data. As discussed in Chapter 3, the context imposed by the current pandemic made the coordination of the interviews quite difficult. The initial intention was always to collect data through vis-a-vis interviews with the actual people vulnerable to forest fires. The spatial distance and the difficulty for the researcher to travel to the study location raised interviews via telephone call, through the data network, as the next alternative. Unfortunately, the inhabitants of these areas live in extremely precarious conditions, very few have smartphones that allow communication by data network. Added to this, is the problem of poor wireless data network coverage in peripheral areas, which is precisely where the target people to interview live. For this reason, it was determined that it was best to collect data from people who work on forest fire problems in the field with these people.

What at first seemed like a smooth and expeditious process turned into an adventure. The vast majority of the CONAF officials contacted seemed very interested in participating in the study, however, it was difficult for them to commit to a

certain day and time to undertake the interview. Many ignored the calls when they were urged, respectfully, to set up the meeting.

Four interviews were possible, evidently a number that affected the validity and reliability of the research. For the same reason, it was decided to contact other organizations involved in the search for a solution to this problem and thus triangulate the sources. The Chilean fire brigade or firefighters from the Valparaiso region were contacted using the researcher's network of contacts and, in the last instance, it was possible to coordinate an interview with the former undersecretary of housing in the 2012-2014 period via LinkedIn.

The purpose of triangulation is the contrast of several data and methods that are focused on the same problem, thus, comparisons can be made, taking the impressions of different groups, in different contexts and temporalities, thus evaluating the problem with more breadth, diversity, impartiality and objectivity (Ruth and Finol, 2009).

In view of the problem that arose with respect to the study sample, it is strongly recommended that future research be able to deepen and contribute knowledge to the present study by collecting data from the same people who are the object of this study. If the sample for the interviews would have been the people dealing with the fire threat itself, most probably the socioeconomic and cultural factors would have appeared more clearly. But more importantly there still might be some drivers that remain hidden that could only come out when interacting directly with the target group of research. This study gathered data from intermediates, and it is highly probable that there is information that these intermediates are still unaware. Also worth mentioning again the problem with the preconceived ideas that the interviewees could have, and the problem it means when it comes to get reliable information free from as many biases as possible.

Finally, and although the focus of this study was to explore the preventive behavior of people in the face of forest fires, a deeper investigation about the causes of the fires themselves can add more value to the final conclusions of this research. As has been previously stated, a large part of the fires are intentional. For this reason, a social analysis could bring to light certain underlying mechanisms or processes of Chilean society, which can strengthen the tools used to combat this problem or reveal a paradigm shift in the same methods and tools that are currently used.

6.3 Recommendations for praxis

Considering all the insights this research has provided- and taking into account the limitations of this research discussed above - this study proposes a series of recommendations to both political authorities and CONAF.

Since one of the things these people need, to achieve a change in their behavior towards one of a more preventive nature, is more realistic perceptions of likelihood of occurrence, the first recommendation is that CONAF should invest more resources in educational and awareness programs about wildfires. To teach people the characteristics of these events along with their causes. That they could know the geographical and climatic characteristics of the region and why these characteristics make forest fires imminent. Beyond repeating to people that forest fires have a high rate of occurrence, the best thing would be to make them understand why this is the reality so they could realize the dangers of a fire by knowing their environment. Hopefully, if people have a more comprehensive knowledge of fires and their causes, they can better understand their nature and thus ground their perceptions on the platform of what is feasible.

The second recommendation is possibly deeper and therefore more difficult to implement because it requires -within the institutions- developing a comprehensive vision regarding vulnerability. As mentioned before, vulnerability to wildfires is not the only type of vulnerability that people in WUI have to face, there is a long list of risks that threaten these communities. For this reason, each of these specific vulnerabilities appear to be manifestations of something greater, a social vulnerability strongly rooted in the socio-economic and cultural situation of Chilean society. It can be said that the different risks that human beings face reveal this underlying problem, where only some groups see their lives and possessions threatened.

Taking this into consideration, this research states that it is necessary to fight vulnerability to natural and even social hazards with a broad perspective, with a strategy which addresses the problems of vulnerable people in an organic way, understanding that it is difficult to exclusively solve the problem of forest fires if it is not looked at the large-scale image. Otherwise, it will be difficult to understand that people's different vulnerabilities are not isolated events but are phenomena that are closely related to each other, or rather different expressions of a deeper problem. Given this, the researcher in charge of the research proposes to put better focus on the root problem but without neglecting the different forms of vulnerability in which this problem manifests itself. It is necessary to understand that complex problems like this also require complex solutions that do not just happen overnight. For this reason, the risk of forest fires, like so many others, must be addressed because it directly affects the quality of life of people this exact day, but always understanding that the real solution lies in the depths of our society.

In medical jargon it can be said that the disease is only one and that the list of different vulnerabilities are different expressions or symptoms of this disease, which is poverty. Where these expressions vary depending on the geographical context. The most disadvantaged settlements in the north of the country will not be threatened by forest fires (arid landscape) but are instead more vulnerable to the consequences of droughts. At first glance the problem is different, but if we look closer we will see that the problem arises from the same patogen. As in the treatment of a disease, where it is important to alleviate the symptoms because they make the process more bearable for the patient, governmental and non-governmental bodies should not neglect the different types of vulnerability which require different treatments.

Given the complex nature of the problem, it is believed optimal to achieve coordination - ideally led by the state - between key ministries for social development; such as health, education, housing, among others, with communities, private agents directly involved in work to mitigate the risk of forest fires, universities, as well as private entities that can contribute knowledge regarding this issue. These ministries, being also coordinated with actors involved in working with other types of vulnerabilities, could better articulate comprehensive and deep solutions thanks to a multistakeholder governance framework. It is expected that this coordination will bring the political elite closer to the real needs of the most disadvantaged groups through effective and harmonious communication between the different stakeholders, and the integration and reconciliation of different ways of knowing (WOK) (Buuren, A. V. ,2009;).

The third and final recommendation has to do with what was previously described as the problem of self-fulfilling prophecy. As mentioned then, the interviewer, in addition to noticing a certain fatalism in the words of the interviewees, also noted a certain resignation in the intonation of the voice when they had to express their frustration about the reaction of these people to the recommendations of the firefighters and CONAF personnel. This recommendation has to do with a change in the predispositions of the personnel who work alongside communities vulnerable to forest fires. If there is a fatalistic mindset within the institutions in charge of tackling this problem, not much progress can be expected. For this reason, mechanisms must be found to reverse these perceptions in the officials themselves, keep them motivated and convince them that generating changes is possible if things are done well.

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APPENDICES

Appendix A: Forest land growth in Chile



Figure 10. Chilean forest surface (in million hectares). Source: FAO, 2020

Appendix B: The national wildfire prevention plan

In 2005, Chile adhered to the Hyogo Framework for Action (2005 -2015), which suggests that countries adopt measures to reduce disaster risk based on a plan of action to 10 years that focus the efforts of the signatory countries around 5 guiding axes. Later, in 2015, Chile joined the Sendai Framework for Action (2015-2030), which responds to the Hyogo Framework for Action, which proposes a change from disaster management to disaster reduction management (Ministerio de Salud, 2018).

As a consequence , it was considered of fundamental importance to implement an intervention strategy with the participation of public and private actors, provincial governments and regional government, in order to try to organize the territory through the creation of related ad hoc planning instruments and to achieve concrete actions that ultimately address the problem of forest fires in a comprehensive manner and that can find solutions in the short, medium and long term.

Actors involved in national wildfire risk management plan

The list of actors and a brief description of their duties are described below in table 3.

ACTOR	ROLE
Regional mayor	Be the coordinator of the prevention commission at the regional level, summon, assign resources and responsibilities.
Governors	Coordinate the prevention commission at the provincial level
Mayors	Search for resources, apply for programs, generate ordinances.
Firefighters	Coordination with institutions, support campaigns, generate red alerts instructions

Carabineros (police)	Participate with other institutions in patrolling inspection routes, as well as coordination meetings and tracing plans. Have sufficient order and security units that allow the protection of people and their property in the area of the event or incident, as well as the need to evacuate population sectors or facilities.
Investigation police	At the instruction of the Public Ministry, establish and coordinate investigative actions, aimed at establishing the origin, causality and background related to the event or incident and report them to the respective prosecutor's office.
Universities	Support with research around forest fires, which serve as a guide for decision making.
Basic service companies	Participate in the prevention commission, as well as carry out maintenance and cleaning of land and public strips.
Armed forces	Support in tasks related to forest fires through its Forest Brigades (BRIFAR), as well as carry out debris removal tasks in case of large-scale disasters.
National Emergency Office	Responsible for calling all actors into action, coordinating commissions, advising on the development of emergency plans, supporting campaigns, convening a commission to update the forest fire plan.
CONAF	Prevent and fight forest fires in the State Forest Heritage, contribute to the protection of private lands, ensure the life and integrity of people and protect natural ecosystems from destruction by fire. Execute prevention policies and programs and protection against forest fires in vegetation

	formations and in forest urban-rural interface areas.
Communities	

Table 3. Actors involved in forest fires in the Valparaiso region. Source: Plan Específicode Emergencia por Variable de Riesgo, ONEMI 2018

Strategic pillars for wildfire prevention

The prevention plan considers at least 8 areas of action as crucial to the fire risk mitigation challenge

STRATEGIC PILLAR	ACTION MEASURES
Education	Formal and non-formal in the summer season.
Territorial ordinance	Territorial regulation
Punitive prevention	Determination of the cause of forest fires and criminal prosecution
Use of fire	Control and prosecution of the illegal use of fire.
Prepared community	Inform and educate vulnerable communities.
Water units	Deploy artificial water sources as mitigation infrastructure
Fuel management	Management of planted and native forests and xerophytic formations, firewall implementation.
Emergency planification	Emergency evacuation plan for forest fires

Other	Improve access and electrical wiring

Table 4. Strategic pillars for wildfire prevention Source: Plan Específico de Emergenciapor Variable de Riesgo, ONEMI 2018

Education activities

ACTIVITY	DESCRIPTION
Environmental education workshops in educational institutions	Workshop focused on delivering information regarding the consequences of Forest Fires to students of educational establishments located in urban-forest interface areas or close to them
Environmental education workshops for teachers	Workshop aimed at kindergarten educators and teachers of primary and secondary education, with an emphasis on prevention of forest fires. In a first instance for critical communes, then expanding to all communes in the region.
Forest fire prevention lectures	Preventive talks aimed at educational establishments on the problem of forest fires
Primary education activities (first grades) and activities with 'Forestin' (CONAF mascot) for pre primary grades.	Ludic presentation focused on forest fires and the benefits of trees and nature in general

 Table 5. Education activities in the wildfire prevention plan. Source: Plan Específico de

 Emergencia por Variable de Riesgo, ONEMI 2018

Dissemination activities

ACTIVITY	DESCRIPTION
Vis-a-vis	Direct contact with residents in WUI areas.
Lectures	Aimed at WUI residents, coordinated through community and functional organizations, to deliver preventive measures based on management of trees, protection of homes, elimination of micro-garbage dumps, among others.
Media dissemination	Through radio and television, mainly in communitary radios from rural areas
Informative signs	Preparation and installation of signs with preventive messages in high risk sectors

Table 6. Dissemination activities in the wildfire prevention plan. Source: Plan Específico de Emergencia por Variable de Riesgo, ONEMI 2018

Awareness activities

ACTIVITY	DESCRIPTION
Lectures	Focused on modifying people's behaviors through personal experiences testimonials in relation to forest fires
Focused lectures	Lectures for residents located in sectors considered high risk, explaining the damages and consequences that these events have had in the territory, as well as what measures to take to avoid their repetition.
Walking tours	After the occurrence of a fire, a tour of the area is made with the residents, in

	order to observe the disaster left by the forest fire
Sense of belonging	Encourage the population to have a "sense of belonging" to the place they inhabit, in order to protect the sector from impending forest fires.
Work with children	Work with children and teenagers regarding the care of the environment, inside and outside their home, which will take place in educational establishments located in WUI and rural areas. Within the work to be carried out, there are dynamics of recognition of the nearby landscape, cleaning operations, workshops that address problems and solutions to forest fires.

Table 7. Awareness activities in the wildfire prevention plan. Source: Plan Específico deEmergencia por Variable de Riesgo, ONEMI 2018

Working plan with communities

The work plan developed consists of three theoretical-practical workshops of half a day each, in which the key actors of the commune are invited to participate, such as municipal personnel, the police, firefighters among others, so the community can be informed and understand the work of each actor in the field of forest fires and to know how they are prepared in the event of these emergencies. Besides this, it reinforces the idea that residents are part of the team and not just a group of people waiting for a solution.

The joint work of CONAF with the community is divided into three units, workshops on self protective activities that residents can undertake, smaller activities that reinforce workshops and a complementary tracing program for each specific workshop. Along the process, members of CONAF elaborate a preventive plan tailored specifically to each community and its unique circumstances.

ACTIVITY	FORMAT	DESCRIPTION
	Theoretical	Meeting with community representatives.
Invitation to participate	Touring	Deliver invitations through phone calls and door to door.
Workshop 1: Fortified house against forest fires	Theoretical/practical	Introduction, concepts and presentation of key actors of the corresponding commune. Residents are invited to be part of the Community Council
Workshop 2: self protection space and communitary actions on fuel management	Theoretical/practical	Added complexity, understanding individual and collective preventive measures according to the sector. Followed by dynamics of participation and mental map. Surrounding awareness activities
Workshop 3: Emergency preparedness	Theoretical/practical	S.W.O.T analysis of the community regarding forest fires and the preventive plan methodology to be developed is presented. Different tasks are given to the participants.
Tracing 1: Progress of the preventive plan	Observational	Meeting with the community council to check progress of the plan and the preventive actions established in workshops.
Tracing 2: Field Tour	Touring	Tour by sectors to observe with the

		participants the critical security points, which under their criteria they established. Technical look is delivered
Tracing 3: Progress of preventive plan + field tour	Touring	Second tour visit. A report is made afterwards to help elaborate the preventive plan.
Controlled burning training	Theoretical	A training on controlled burning and associated regulation is carried out.
Cleaning operation	Practical	Community cleaning operation coordination with the corresponding Municipality.
Delivery of Preventive Plan for approval	Meeting	Delivery of final plan by CONAF for approval and possible distribution to the Community.
Tracing	Practical	Visit to the community and tour to see the development of the Preventive Plan approved by the Council

 Image: Image:
Appendix C: Questionnaire

Question 1:

How do you (CONAF) evaluate the relationship that the community has with the potential environmental hazards that the area in which you carry out your work presents. (context; probability and severity))

Question 2:

How do you evaluate the degree of social / environmental awareness that the community manifests in relation to the potential danger of forest fires in the area? (severity)

Question 3:

Do you perceive in the community a constant preoccupation (anticipation) for these types of threats, taking some type of preventive action. If there are, with what systematization do they implement them? (efficacy-self-efficacy)

Question 4:

How do you evaluate the degree of involvement and commitment of the population in relation to fires? (Fires, natural disasters, etc.) (Stages) (effectiveness)

Question 5:

What degree of commitment does the population manifest in relation to managing (self-management) on their own initiative, actions that seek to make these risks present in the community. (self-efficacy)

Question 6:

What perception do you have about the willingness of community members to inquire about the geographical characteristics of the area, the probability and consequences that forest fires can cause in your community. (self-efficacy) (stages)

Question 7:

What perception do you have about the effects of the actions that you carry out as an organization in the community with the aim of preventing forest fires and protecting the community. (efficacy)

Question 8:

What is the degree of satisfaction (perhaps here it could be said with a likert scale) that you attribute to the work that you carry out in prevention, observing the behavior of the community and the degree of vulnerability it experiences. (stages and efficacy and self efficacy)

These questions are about the actions applied by the external body in the community

Question 1:

What actions (or foci) are you developing to address forest fire prevention with the community?

Question 2:

What have been the actions that, in your opinion, have had the greatest impact in relation to achieving the objective (reducing the vulnerability of the population).

Question 3:

Of the informational and / or educational activities, of which are you most proud or satisfied?

Threat appraisal

- Likelihood
- Consequences

Question 1)

Do you think that people know the geographical characteristics of the area and the risks (spontaneous and / or caused) to which they may be exposed?

Question 2)

Do you think that people consider forest fires to be one of the greatest threats to the area in which you live.

Question 3)

What factors do you think people consider influencing the possible occurrence of these disasters?

Coping Appraisal

- Efficacy of responds
- Self efficacy
- Response cost

Question 1)

Faced with this possible risk, what actions do you see that people implement within their physical space (where they live) to reduce the chances of its occurrence?

Question 2)

How would you describe the degree of seriousness with which people take the information provided by the institution?

Question 3)

Based on your experience, do you think people at risk feel capable of implementing the recommendations you provide?

Decision Stages

Question 1)

Do you think that forest fires only depend on the conditions of nature? Is it possible to generate a community action plan that you can contribute to avoid them?

Question2)

What actions or initiatives do you know that have been generated from community organizations that may mean making this situation relevant for the community. There are concrete actions, which ones.

Question 3)

If the previous answer was NO, why do you think the community is not involved? What factors hinder this awareness on the part of the community.