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Understanding 'Community' in Wildfire Research in High-Latitude Areas

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Abstract: With increasing wildfire impacts on communities in high-latitude areas, a call for community involvement in wildfire risk reduction has been widely promoted. Correspondingly, a 'community-based' approach has been advocated in research understanding wildfire, with various interpretations of 'community' evident in this work. This paper conducted a scoping review to identify and characterise how 'community' has been conceptualised and operationalised in research on wildfire risk reduction in high-latitude areas (defined as areas above 50° N). Thirty-one in-scope studies were screened by their interpretations of 'community' from the following six dimensions: research background, community role and function, social inclusion and exclusion, participatory approach, power relations, and research innovation and reflexivity. We find that the understanding of 'community' has expanded beyond its geographical scale in wildfire research, with increasing recognition and inclusion of diverse demographic attributes. Recent research has increasingly focused on, and worked with, Indigenous Nations, as well as certain community attributes. However, ambiguity over what 'community' means exists in wildfire research, with 'community' passive participation (13 out of 31) in the research and inadequate critical research reflexivity of the community-based approach (29 of 31). We therefore suggest a critical reflection of the community-based approach in future wildfire research and emphasise community heterogeneity in addressing the impacts of climate change.

Keywords: wildfires; disaster risk reduction; community; community-based approach; high-latitude areas

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1. Introduction

The increase in the frequency, severity, and duration of wildfires has caused significant loss and damages across North America, Australia, and the Arctic regions in recent years due to the impacts of climate change [1,2]. In a 2 °C warming scenario, the global area burnt by wildfires is projected to further increase by 35% (medium confidence) [1]. The impacts of wildfires not only directly threaten people and lead to economic loss, such as livelihoods and landscape changes in fire-prone areas, but also indirectly affect the health and welfare of distant communities due to smoke [3,4]. High-latitude areas—defined here as areas above 50° N—have experienced an increase in weather-based fire and are projected to experience the largest increase in fire season length by the end of this century [5]. Recent wildfires have demonstrated the increasing severity of their impacts on communities in high-latitude regions. In Canada, for example, wildfires in the Northwest Territories in 2023 resulted in 20,000 residents in Yellowknife being evacuated [6], while the Swan Lake fire in 2019 became the most expensive in Alaska's history, causing around USD 46 million

worth of damage [7]. In the context of wildfires, collaborative and adaptive governance across a broad range of actors and scales has been advanced as a priority way to reduce risks [8].

Broadly considering the increasing risks of disasters, including those linked to wildfires, the Sendai Framework for Disaster Risk Reduction (SFDRR) [9] has emphasised a shared responsibility in disaster risk reduction with central governments and relevant stakeholders as one of its guiding principles and called for the empowerment of local authorities and communities. Correspondingly, a 'community-based' approach, also referred to as locally led, has been widely advocated in research seeking to document and understand local priorities, needs, knowledge, and capacities in an effort to reduce disaster risk [10,11]. It suggests that people who experience the disaster are the centre of disaster risk reduction and empowers them in finding solutions that suit their background [12].

With the growing popularity of community-based research, 'community' has been interpreted in many different and sometimes conflicting ways. The idea of using 'community' terminology and framing has also been questioned by some, with critiques focusing on who gets to define 'community', the scope and meanings of 'community', and a need for clarity over how 'community-based' work is conducted [13,14]. The initial assumption that a community is a static and homogenous group has been increasingly challenged by the reality of social differences in identities, conflicting values, and resource priorities [15]. This conception has been critiqued for its neglect of heterogeneity inside and its engagement with outsiders [16]. We distinguish four conceptions of 'community' commonly applied in environmental change research in recent years, as follows: (a) a solely place-based community, (b) an integration of personal social networks, (c) a group of people with a shared social identity, and (d) a collaboration for shared interests [13,17–19]. These conceptions illustrate that community is not limited to one nature, rather on different scales by place, network, interests, and identities [16]. Correspondingly, the community is deep-rooted with diversity, difference, and disagreement [13,20].

The conception of 'community' further poses the question of social inclusion and exclusion, referring to who is included and who is excluded [17]. Community heterogeneity, including division, conflicts, and oppression, for example, can be downplayed if oversimplistic conceptions of community are applied in research [13]. Under-represented populations, such as marginalised genders, ethnic, and socio-economic groups, can be less motivated to participate in the community and therefore hidden or excluded from community-based research. Simply enforcing local collective actions may submerge marginal groups' voices and increase homogeneity, further strengthening the existing unequal power distribution [21,22]. Another concern about the community-based approach in the context of high-latitude areas is the potential of research fatigue due to tokenistic community participation or power hierarchies among right-holders [23]. Labelling a group of people as a 'community' may create the appearance of shared agreement on disaster risk reduction goals; however, differing individual interests can undermine the effectiveness of these efforts [16].

Given the background of increasing wildfire risk, we conducted a scoping review on different uses of 'community' in wildfire research published over the last decade in high-latitude areas. We summarise the complementarities and shortcomings of different community conceptions. We consider the potential consequences of applying the label 'community' to particular peoples and regions, which can unintentionally lead to further social exclusion and power hierarchies inside the community.

2. Materials and Methods

2.1. Scoping Review Method

We used the ROSES systematic mapping approach to identify in-scope published journal articles for review (Figure 1). We conducted the literature search on Scopus in June 2024 using the keywords ("community" OR "community-based") AND (wildfire OR "wildland fire" OR bushfire OR "brush fire" OR megafire OR "forest fire"). Peer-reviewed journal papers were included if they were published after 2015, written in English, applied a community-based approach for wildfire risk reduction, and focused on high-latitude areas (Table 1). A search strategy was initially designed by the principal researcher and further refined through the research team discussion. We began with a title, keyword, and abstract search in Scopus. This search was limited to published journal articles, written in English and published between 2015 and 23rd June 2024. We initially filtered out articles in the fields of "Veterinary, Immunology and Microbiology, Materials Science, Chemistry, Chemical Engineering, Pharmacology, Toxicology and Pharmaceutics, Neuroscience, Medicine, Physics and Astronomy, and Biochemistry, Genetics and Molecular Biology" in Scopus, and 2822 articles were retrieved. EPPI software was used to help manage the in-scope literature, including finding duplicates, literature screening, and analysis. Four duplicates were found automatically or after title and abstract screening, and 13 articles were inaccessible, leaving 110 articles subject to full-text review, after which 31 articles were retained for analysis (Figure 1).

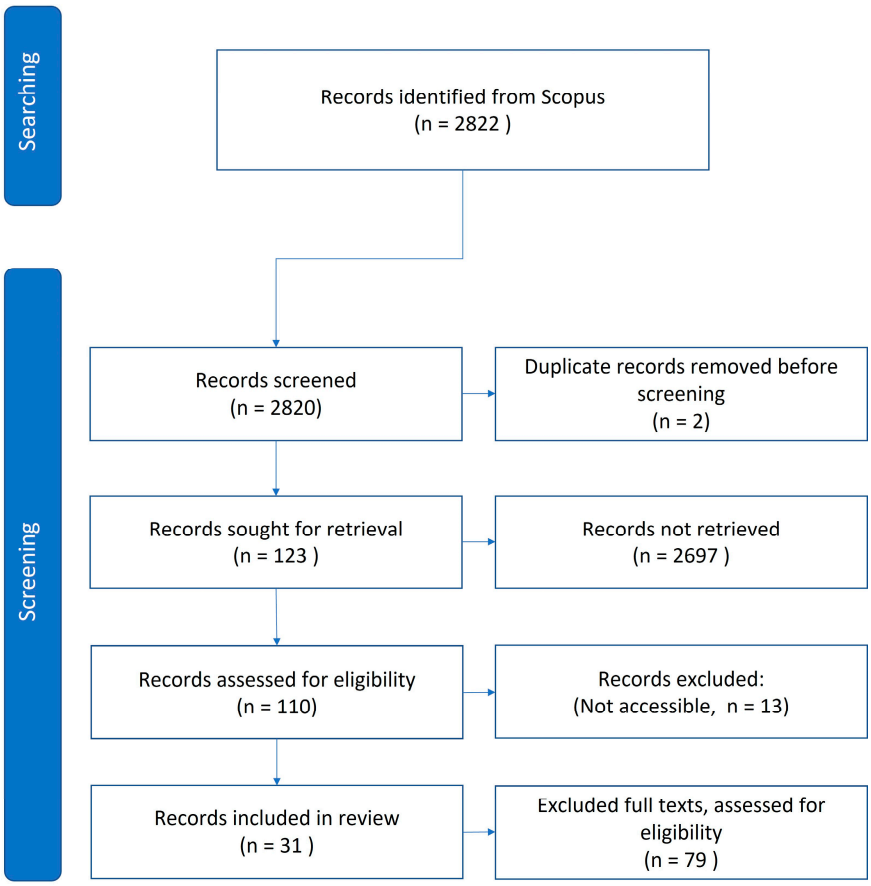

Figure 1. ROSES systematic mapping flow chart: the literature search and screening results.

Table 1. The eligibility criteria for the scoping review.

Theme	Inclusion	Exclusion
Publication years	Published between 2015 and 2024	Published before 2015.
Language	Published in English	Published in non-English.
Document type	Journal articles in Scopus	Other including but not limited to books, book chapters, conference proceedings, and editorials in Scopus.
Field	Wildfire research in disaster risk reduction and climate change adaptation in the fields of social science, geography, and environment science	Other including but not limited to books, book chapters, conference proceedings, and editorials in Scopus.
Study Area	High-latitude areas (above 50° N)	Other areas (below 50° N).
Focus	A focus on community level of wildfire risk reduction	Other scales such as individual scale, national scale, landscape scale of wildfires, etc; or focus on conceptual or theoretical understanding of community-based wildfire risk reduction.

2.2. Evaluation Framework and DATA Analysis

To characterise how 'community' has been approached in research on wildfire risk reduction in high-latitude areas, we developed a framework based on Aiken et al.'s [24] critical approach to studying 'community' in climate change research. It includes consideration of the diverse meanings of 'community', recognition of social differences in community action, and alertness to community tension with powerful actors both within and outside, including within participatory approaches and critical thinking of the community-based approach itself. We also draw upon other academic literature that highlights the complexity and heterogeneity of communities, their participatory approach, and the power dynamics between communities and researchers [13,19,22,25–28]. The community-based approach inevitably includes the considerations of who is included or excluded when the problem is defined and when strategies and solutions are proposed [27]. It therefore comes to a justice issue regarding the community representation and marginalisation [27]. Additionally, from social identity and social capital perspectives, socioeconomic and demographic diversity bring broader meanings of 'community' to further represent collective interests [28]. Researchers' positionality may also drive their power relations with the community in the research, which either hinders or facilitates the 'community' interpretation and participation [29]. Therefore, we developed this evaluation framework across several key dimensions to review how the 'community' has been defined, selected, and participated in the research: community role and function, social inclusion and exclusion, participatory approach, power relations, and research innovation and reflexivity (Table 2). We also added one more dimension—the research background—to summarise the research mainstream over the last decade. Together, these six intersecting dimensions formed the basis of our evaluation framework for understanding 'community' in the context of wildfire research (Table 2). Guided by this work, as well as Aiken et al. [24], we defined and established evaluation attributes for each dimension.

We applied this evaluation framework to review the common conceptions of 'community' applied within wildfire research and the attributes studied in the context of wildfires in high-latitude areas. We examined the common research practices of representing 'community' and the research focus of a community-based approach for wildfire research. We classified the interpretation level(s) of 'community' in the literature reviewed and the participation levels of community and other stakeholders in the research along a series of codes,

referred to by the community participation levels in the research from David-Chavez and Gavin [30] and the cyber resilience maturity tiers from the National Institute of Standards and Technology [31] (Table 3). We coded the interpretation levels of 'community' from partial, in which there was a lack of interpretation, up to consistent, in which there was a clear and consistent interpretation in the research (Table 3). A similar coding category was also used in classifying the participation levels of the community and other stakeholders in the research, from partial, in which there was at most an assigned task with no decision-making power in the research, up to adaptive, in which there was a primary role over the research process (Table 3).

Apart from these categorical codes, a thematic analysis was conducted for inductive and qualitative questions to summarise the key findings in interpreting 'community' and suggest research tendencies. Based on the evaluation framework, we used the EPPI tool to conduct code analysis for each in-scope study and further grouped them in different themes to summarise potential issues, findings, and research tendency. The coding analysis was conducted by the principal researcher and reviewed by the research team. The evaluation results of all in-scope studies are in Appendix A.

Table 2. The evaluation framework, adapted from Aiken et al.'s [24].

Dimension	Content (Attributes)	References
Research background	General information on the study, including the following: (a) Study location; (b) Published journal; (c) Research themes.	
Community role and function	Dimension emphasises how 'community' has been understood in the research, including the following: (a) The Interpretation level of 'community'; (b) The community conception types; (c) The correlation between community conception and research themes.	[13,17,19,22,24,25]
Social inclusion and exclusion	Dimension emphasises which attributes of 'community' have been studied, including the following: (a) The main attribute(s) of the 'community' research studied; (b) Other attribute(s) of the 'community' research considered.	[13,17,22,32]
Power relations	Dimension refers to who represented the 'community' or participated to drive the research, including the following: (a) The research positionality in interpreting the 'community'; (b) The represented group(s) of 'community' in the research; (c) The other stakeholders who are involved in the research that influences the research process with the 'community' and their practices.	[11,13,22,29,33,34]

Table 2. *Cont.*

Dimension	Content (Attributes)	References
Participatory approach	Dimension refers to the community participation approach and level in research at various stages, including the following: (a) The participation approach of the community-represented groups; (b) The level(s) of community participation.	[10,30,35–37]
Research reflexivity	The critical reflection on community-based research itself, including the following: (a) The critical reviews on the research design, implementation, and outputs; (b) The research connection and suggestions for future research tendency.	[24,38,39]

Table 3. The categorical codes for both the interpretation level(s) of 'community' in the literature reviewed and the participation levels of the community and other stakeholders in the research [12,27].

1 The interpretation level(s) of 'community'			
Partial	**Informed**	**Consistent**	
Lack of interpretation to reflect on the criterion in the research practice. For example, the study uses the term 'community' but does not give an interpretation of 'community'.	Limited interpretation to reflect on the criterion in the research process. For example, the study uses the term 'community' and attempts to give an interpretation of 'community'. However, the interpretation is unclear and lacks transparency.	Clear and consistent interpretation to reflect on the criterion in all lines of research practice. For example, the study clearly gives a critical understanding of 'community', which serves the research aims and methodology.	
2 The participation levels of community and other stakeholders in the research			
Partial	**Informed**	**Consistent**	**Adaptive**
Perform a task requested by the researcher without the involvement of any decision-making process. For example, participate in an interview or survey without being involved in other research stages, such as design or analysis.	Being consulted in the decision-making process over the research process. For example, being asked for their opinions or feedback to help the researcher make the decisions; the preliminary result sharing with the community; and research design discussion with the community.	Work collaboratively with the community over the research process. For example, the community is consulted and involved in multiple ways to help the researcher make the decisions.	Have primary authority over the research process (e.g., represent the community). For example, a community researcher leads the whole research project.

3. Results

3.1. Publication Trends

All in-scope studies (n = 31) are published in a wide range of journals related to wildfire. The International Journal of Disaster Risk Reduction (n = 7) takes a primary role in publishing community-based research about wildfire risk reduction. Natural Hazards (n = 3), the International Journal of Disaster Risk Science (n = 2), and Sustainable Development (n = 2) are the other three journals that cover a certain amount of relevant research.

Regarding geographical coverage (Figure 2), our results are consistent with the global research tendency for wildfires that the USA, Australia, and Canada are the main three countries in the social science research of wildfires [40]. Canada (23 out of 31) is the most prominent country for community-based wildfire research in high-latitude areas. Alaska (USA) (n = 6), Russia (n = 3), Sweden (n = 2), and Norway (n = 1) are the other countries for related wildfire research. Particularly, most of the research in Canada is conducted in western and southern areas, including British Columbia (n = 7), Alberta (n = 7), Saskatchewan (n = 5), and Ontario (n = 4). The geographical locations of focus include rural (n = 19) and urban areas (n = 3), Indigenous land (n = 4), the wildland-urban interface (WUI) (n = 2), or island (n = 1).

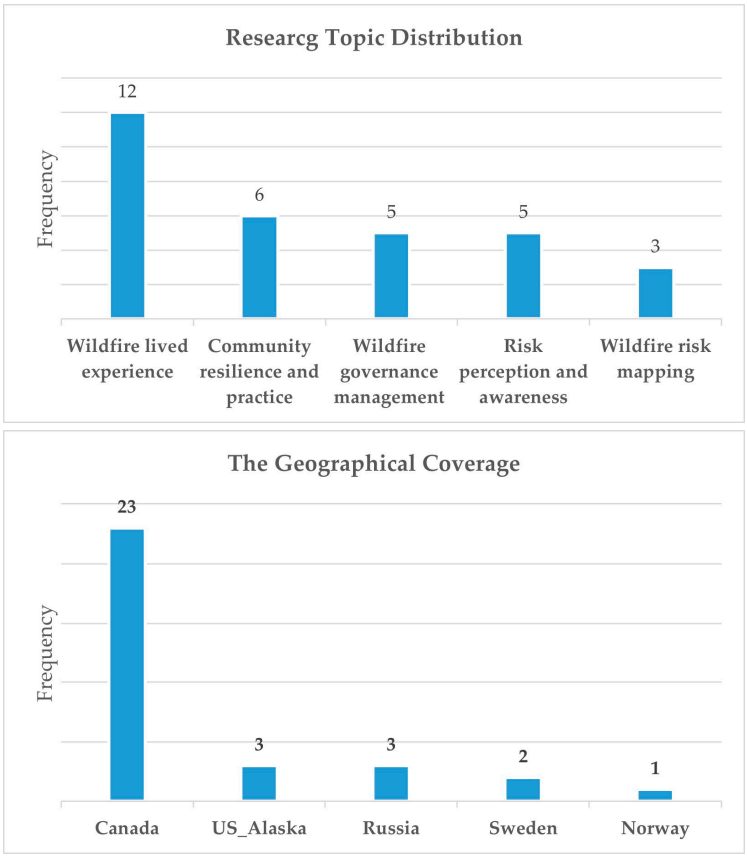

Figure 2. The summary of in-scope research about the research topic and the geographical coverage.

Furthermore, we categorise the research aims and questions in the following included articles: 28 out of 31 studies fit with the disaster risk reduction field, while the other 3 fit into the broader climate change adaptation field. Based on the research questions, the topics include the lived experience of wildfire (n = 12); wildfire governance management (n = 5); risk perception and awareness (n = 5); community practice and resilience (n = 6); and wildfire risk mapping (n = 3) (Figure 2). Among all studies, there has been an emerging research tendency of including Indigenous Nations' perspectives in wildfires (8 out of 31), with these studies mainly focusing on Indigenous Nations' evacuation experience [41,42], the interpretation of fires and fire risks [43–46], and community capacity for wildfire risk reduction [47,48].

3.2. Community Role and Function

In our examination of how 'community' has been interpreted and the way 'community' has been invoked in wildfire research, 11 out of 31 studies partially interpret

'community', and 13 studies have an informed level of interpretation. Only 7 studies give clear and consistent interpretations of 'community'. The common confusions of the 'community' conception in the research are the following: (1) the conflation of 'community' with other terms, such as neighbourhood [49,50], settlement [45,51], geographical location [47,52–54], municipality [55], First Nation land [42], or private sector [56]; (2) the over-simplification of 'community', with a focus on one specific dimension, such as a single social identity [32,41,43,45,57] or location [44,46,58–61]; and (3) neglect to define or characterise 'community' when focusing on community resilience [56].

The concept of 'community' is applied in different ways depending on the nature of the research being conducted [13]. Most community-based wildfire studies do not solely depend on a geographical boundary to characterise 'community'. Rather, 'community' has been advanced to include an understanding of social identity or collective interest and common practice. Common conceptions of 'community' in wildfire studies include a social identity-focused community (n = 16), collective interest and common practice-focused community (n = 10), and solely place-based community (n = 5) (Figure 3). A social identity-based community has been commonly applied to understanding various groups' lives related to wildfires, including their lived experience of wildfire (n = 9) and risk perception and awareness (n = 3), with a particular focus on understanding Indigenous Nations' lived experience of wildfire (n = 6) [41–46], while less focus has been given to wildfire governance management (n = 1). Collective interest and common practice-focused community conceptions are deployed in a more flexible manner to cover most themes, including understanding wildfire governance management systems (n = 3) and community resilience for wildfires (n = 3), risk perception and awareness (n = 3), and the lived experience of wildfire (n = 3).

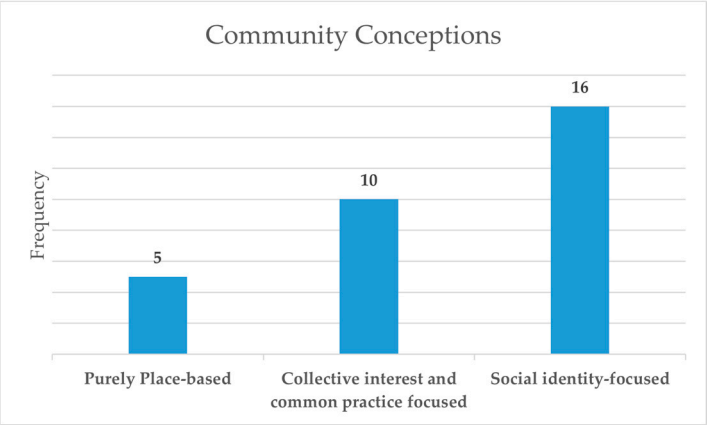

Figure 3. The types of community conceptions.

3.3. Social Inclusion and Exclusion

All community attributes that have been applied in interpreting 'community' in the literature are reviewed and clustered into the following three categories: (1) community demography: defines 'community' through demography elements, including "race/ethnicity (Indigenous Nations)", "gender", and "age", as well as others, including residency, education, employment status, income level, family size, health, and marital status; (2) the lived experience of wildfire: defines 'community' as a group of people by either a shared experience, such as evacuation decisions and wildfire practices, or their professional involvement in wildfire risk management; (3) location-based information: defines 'community' by physical geographical information, including a flammability hazard map, land cover data, and road networks.

To develop a further understanding of how different community attributes contribute to a conceptual understanding of 'community', we reviewed attributes in relation to community conceptions. Fourteen studies focus on social identity, and are primarily defined by one or more demographic attributes, such as gender, age, and ethnicity, as a way of determining the scale of 'community', with other community attributes and their interactions with these demographic characteristics used to reveal the heterogeneity within the community. Two other studies with a social identity focus define the scale of 'community' by the lived experience of wildfires using professional work experience and social media data to do so. In contrast, collective interest and a common practice-focused community primarily relies on people's lived experience of wildfires. For example, six studies conceptualise 'community' by research participants' living experience and work experience with wildfires. The other three studies are based on the demographic attributes, including ethnicity and occupation. For the remaining five studies based on the solely place-based community conception, three of them interpret 'community' by the location-based information to define the community scale, including the road network, land cover scale, and geographical location. The other two define 'community' as driven by people's lived experience of wildfires based on the geographical location.

The inclusion of multiple community attributes and their interactions in the research methodology of reviewed studies reflects an acknowledgement of community heterogeneity. When coding for the levels of recognition of community heterogeneity based on the extent of research consideration of diverse community attributes and their interactions, 16 out of 31 studies were found to be at the partial level, indicating a lack of full recognition of community heterogeneity. Additionally, 9 out of 31 studies were at the informed level, recognising community heterogeneity but with inconsistent countermeasures. Only 6 studies consistently recognised community heterogeneity and adapted measures to incorporate various community attributes. Common research practices that include multiple community attributes in the design, implementation, and discussion stages of reviewed studies include the use of (1) sample distributions based on various community attributes [49,50]; (2) inductive methods to identify social identities inside the community [61,62]; (3) quantitative-based research methodologies to include qualitative social dimension(s) [58]; and (4) awareness of research reflexivity in considering social inclusion and exclusion [54]. For example, Walker et al. [54,62] applied intersectionality theory to understand the heterogeneous lived experiences of wildfires within and across various social identity attributes and correlated power relations, describing the extent of the physical and mental impacts that Indigenous Nations experienced in wildfires due to their long-term neglected position [54]. This work indicates a need to reposition the 'community' by challenging the existing racialised and gendered power discourse [54]. We also identified common gaps in interpreting community heterogeneity methodologically, including (1) limited consideration of social inclusion and exclusion criteria in representing a 'community'; (2) an inadequate reflection of community heterogeneity in research design, implementation, analysis, and discussion; (3) in research focusing on wildfire risk mapping, with the 'community' only serving as a reference instead of a subject.

3.4. Power Relations

A community-based approach has been critiqued for either implicit neglect or misuse of power hierarchies inside and outside the community, where questions are raised about whether the inequitable research relationship can benefit the community in reality [63]. The community-based approach is grounded in the recognition of participants' identification as being part of a community [64]. The power relations dimension reflects who represents and influences the conception of 'community' in the research. We started by examining

positionality in interpreting the 'community' and who represents the 'community' in the reviewed studies. With a focus on academic journal articles, all reviewed studies initially stand on an outside academic position to define the scope of 'community'. Adopting such an *etic* perspective to conceptualise 'community' can simplify the research design process for researchers. However, reliance on an outside position risks overlooking internal hierarchies, social frictions, and the nuanced dynamics within communities, potentially leading to a misrepresentation of community interests [13]. Yet, a community-based approach can equally offer an opportunity to identify and renegotiate the balance of power [65]. Moreover, 20 out of 31 reviewed studies give an additional standpoint of interpreting the 'community' beyond its academic understanding. For example, eight studies reflect the term 'community' and its meaning from a policy standpoint in the research procedure. The other twelve studies include an insider standpoint to define the scope of 'community' by consulting the 'community' themselves in the research procedure, including community elites and local residents.

Another perspective on power relations in relation to the community-based approach is to examine how the 'community' has been represented. The sample selection to represent the 'community' in research reflects a result of competing dialogues about the power relations among different groupings [66]. Some groups may have more power to earn their position and stand for their opinions in driving the research discussion and results, while others may not even be able to get a place in the research to represent their diverse interests due to potential social exclusion or marginalisation. We summarised the community-represented groups among all reviewed studies. The most represented group is local residents (n = 24). Other commonly represented groups are community elites (n = 8), such as gatekeepers, community officers, or key informants, and officials from multi-level governments and fire divisions (n = 8) who have knowledge related to wildfire or climate change adaptation, NGO representatives (n = 2), and the private sector (n = 2). Nine out of thirty-one studies include representatives of multiple groups in the research and recognise the potential power hierarchies driven by community representativeness in the research [44,47,48,54,55,58,67–69].

Besides the community group that is represented, who else participates in research and their relationship with 'community' can influence the research understanding about the power dynamics within and outside of the 'community' and drive the community participation in the research. Common stakeholders in the studies include official agencies (n = 9), community elites (n = 8), private sector organisations (n = 3), local residents (n = 1), or NGO representatives (n = 1). Stakeholders participated in the reviewed studies by (1) assisting in making connections between the 'community' and researchers (n = 9); (2) being a member of the research community advisory committee (n = 3); (3) advising and providing relevant information (advice or data resources) about the community (n = 3); and (4) reviewing the preliminary analysis results (n = 2).

3.5. Participatory Approach

Based on the understanding of who represents and influences the 'community' shaping in the research, the participatory approach further reviews the way 'community' is involved in the research. 'Community' is able to be involved at various stages of research, from deciding the research topic, designing the methodology, implementing data collection and analysis, to disseminating the research results [65]. Most studies keep a passive relationship with the community (13 out of 31), only engaging communities to perform data collection tasks, such as interviews and surveys. There is also an increasing tendency of improving community involvement in the research. For example, six studies included a consultation with the community, such as community suggestions on research design, a community

advisory committee setup, or community assistant assignation. Eight studies built up a working collaboration with the community. In addition to the usual practices of consulting with the community, preliminary results were commonly shared with them for review to strengthen this collaboration. The study conducted by Bélisle et al. [44], for instance, was able to make the community drive the study, helping to build a strong partnership between academic researchers and the community. However, three studies reported no direct interaction with the community.

We also found that the extent of community participation in the research varies with different conceptual understandings of 'community' (Figure 4). Studies with a focus on collective interest and common practices involve the community either by performing a task for the research (n = 7) or being consulted in the research process (n = 3). Meanwhile, studies with a social identity-focused community understanding show more willingness to involve the community. Most of them can collaborate or consult with the community to a different extent beyond the requested data collection activity (9 out of 16), while the other 7 studies are still limited to asking communities for a task or excluding community involvement in the research. This difference can be rooted in the fact that most of the social identity-focused studies focus on the wildfire impacts on different social groups' lived experiences of wildfires, with a wider recognition of community heterogeneity in nature, while the collective interest and common practice-focused community studies focus on how the wildfire has been managed and prepared.

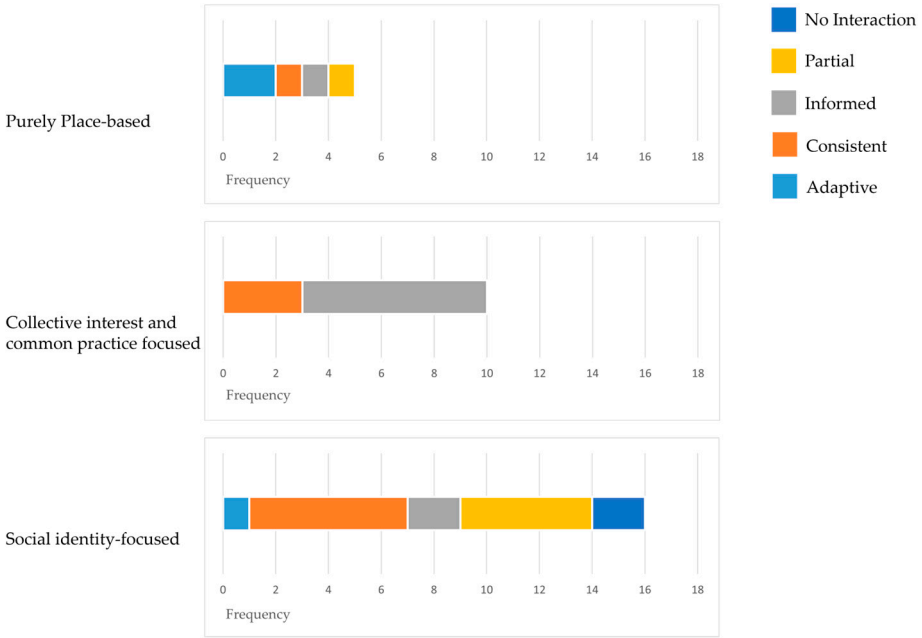

Figure 4. The extent and frequency of community participation in the research based on the community types.

3.6. Research Reflexivity

Awareness of research self-reflexivity in community-based research refers to the ability to acknowledge and deal with the potential issues and limitations of community selection and participation in the research [39]. We found a lack of consistent critical reflection in the studies reviewed; 20 out of 31 studies lack awareness of reviewing their community-based approaches in design, implementation, and analysis; another 9 studies give an inadequate self-reflection of the community-based approach. The remaining two studies have consistent reviews on their community-based approaches from sampling methods, community participation level, data collection tools, and result significance [58,70]. Commonly

reported research limitations are the following: (1) community representativeness bias; (2) geographical scale limitation; (3) inconsistent community participation; (4) community heterogeneity ignorance; (5) research unsuitability to local background; and (6) limitations in data collection strategy.

We also summarised the research recommendations of community-based approaches made in the analysed papers and categorised them into four mainstream categories, as follows: (1) suggestion to understand community practices and behaviours for wildfire risk reduction; (2) emphasis on the necessity of recognising and involving the community in research of wildfire risk reduction; (3) recommendation to increase understanding of wildfire governance changes under the impacts of climate change; (4) consideration of community heterogeneity and inclusiveness in community-based wildfire research.

4. Discussion and Conclusions

The use of a community-based approach within wildfire risk management research is an acknowledgement of community rights and knowledge [66]. The interpretation of diverse community attributes, as well as the power relations inside and outside of the community, shapes the complexity of involving a 'community' in research and determines how participation takes place. This paper conducts a scoping review of the different interpretations of 'community' in wildfire research in high-latitude regions. In this section, we further contextualise and discuss the results in light of the broader literature and explore how the term 'community' accompanies the set of assumptions generated by the research community that can unintentionally reinforce potential issues.

4.1. The Ambiguity of 'Community'

The distribution of various conceptions of community demonstrates that there is no consistent way to conceptualise 'community' in research. From our results, a transformation of 'community' from a solely place-based understanding to a focus on its inner heterogeneity has been demonstrated in wildfire research. 'Community' is thus not just constrained to a static and unchanging formation by geographical location and social characteristics [71]. Rather, it is seen as reflecting on people's living in a reality given time, spatial, and subjective scales [71]. The main conceptual understanding of 'community' in the wildfire research reviewed here is driven by social identity and collective interest and common practice. The distribution of various community conceptions demonstrates that there is no best way to conceptualise 'community' in research. A more flexible conceptual understanding of 'community' based on the problem being addressed opens space for the expression of views from all interested in the community-based approach [22].

Various community attributes have been studied in wildfire research to further reveal the heterogeneity of 'community'. This finding indicates a transition to include diverse community attributes and conceptualise the 'community' from a social and historical perspective, as well as the innovation in community participation patterns. However, the oversimplification of 'community' is still evident, with most studies that we reviewed primarily focusing on certain demographic attributes such as ethnicity, gender, and age, or involving community key informants who are in certain powerful positions. This finding is consistent with research more generally, where it has been argued that there is a simplification of the social and historical dimensions of wildfires and marginalisation of who is involved in research as a representative of the community [72]. This issue can expose mismatches between the external imagination of the 'community', the internal self-reflection of the 'community' itself, and the corresponding actual complex relationship that exists on the ground [16].

With the flexible community conception as well as the heterogeneity inside the community, an ambiguity exists in understanding 'community' and its application in wildfire research. We argue that the norm of 'community' for wildfire research has been accompanied by a set of assumptions from researchers' perspectives that may not fully reflect the complexities of local backgrounds in high-latitude areas. The simple assumption of 'community' as a homogenous group can no longer meet the diversity of community-based research in the last decade. This ambiguity can bring disparate interpretations of 'community' by research beneficiaries in understanding wildfire risk reduction at the community level [16]. It also complicates the boundaries and scale of collaborating with the community in research [66]. Furthermore, there is a lack of critical research reflection (29 out of 31) of the community-based approach in the research we reviewed. A hasty treatment of interpreting the 'community' based on preconceived research expectations and stereotyping can lead to research bias regarding equity, trust, and communication [73]. This raises a concern of pre-labelling different groups to decide who should be included (and excluded) in the research [12]. It may further exacerbate marginalisation linked to the inequitable governance system and existing socio-economic position in a community [12]. Few studies, for instance, have explored how social complexity integrated from social characteristics, history, culture, and regional settings influences community capacity for wildfire risk reduction [74]. The exploration of 'community' needs to go beyond academic practice, and researchers need to work on a more nuanced and dynamic understanding of 'community' and pay extra attention to these when practicing a community-based approach [13]. Further research is needed to tackle the interaction between various community attributes and reveal potential exclusion when selecting 'community' representatives.

4.2. Indigenous Voices in Research

A community-based approach offers the possibility to extend the focus of research from the Western-dominant scientific knowledge to incorporate other forms of knowledge [22]. There has been an emerging tendency in research over the last decade of incorporating Indigenous worldviews of fires, ecosystems, and humans and respecting Indigenous rights for climate change adaptation. Indigenous Nations are identified as highly susceptible globally to climate change due to socio-economic marginalisation and land dispossession, along with habitation in areas undergoing rapid warming [75]. In high-latitude areas, the understanding of 'community' for Indigenous Nations is linked with development and colonial history [76]. For Indigenous Nations, fire is not just a physical phenomenon but is seen as a living, dynamic force that plays a crucial role in their way of life and their connection to the land. According to Christianson et al. [77], fire is integral to Indigenous livelihoods and helps maintain and strengthen relationships with the land. Additionally, as noted by Vinokurova et al. [45], fire holds unique spiritual and moral significance for Indigenous Nations, embodying deep cultural, spiritual, and ethical values. Indigenous Nations have managed their nature, land, and resources by fire for thousands of years. Such cultural practices surrounding fire are different from the Western perspective on prescribed burning and lie in the complex social and cultural dynamics beyond professional wildfire risk management [71]. A research tendency to acknowledge and address the under-representation of Indigenous Nations in wildfires is a critical step of knowledge reconciliation and research collaboration between researchers and Indigenous communities [44]. Future wildfire research can pay more attention to examining the reality of various social groups, as well as the historical, political, and territorial understanding of fire, land, and forest [72].

4.3. The 'Community' Role in the Research

We use wildfire as one of the examples to present an overview of the theoretical understanding, methodological assumptions, and participatory approaches of the community-based approach in disaster risk reduction. The initial motivation of involving the 'community' in research reflects a need for grassroots collaboration, as well as invoking the idea of shared interests and values existing among a group of individuals in disaster risk reduction [78,79]. The community is expected to play the same important role as other key actors to address the increasing wildfire risk [80]. Wildfires can prompt a sense of collective mobilisation to learn and prepare for the future fires, which promotes a format of 'community' centred by locality, social identity, and collective interests [78]. The community-based approach is expected to create a partnership with the community based on an equal power relation [63]. However, this review demonstrates that the collaboration between communities and researchers is not as fluent as the initial motivation expected, due to the ambiguity of community conception, passive community participation, and the neglection of community heterogeneity and exclusion [81]. Although we have seen some appropriate efforts in the reviewed studies to mitigate existing inequalities and improve community representativeness in the research, these efforts are insufficient to envisage the implications of social inclusion and the exclusion of the 'community' [40]. Potential problems can be raised, such as community tokenistic engagement, research fatigue, and marginalisation when the community-based approach is not well structured for the community heterogeneity and power dynamics [23,63].

Following the research recommendations, the starting point of choosing 'community' in the approach should be equipped with deliberative thinking in research design and implementation, instead of superficially pursuing a prevailing term of the 'community' itself [13]. We encourage a transit of community position from being passive to an active actor in the research to contribute to the knowledge of wildfire risk reduction [12]. We suggest an adaptive way to design and develop research aims, practices, methods, and instruments based on the local background and community needs [23,39]. A multi-faceted approach is needed to explore values in the community heterogeneity [62]. The academic team should keep a deliberative mind in seeking shared power with the community, support community decision-making and privilege local needs [63], and give a bottom-up understanding of wildfire risk reduction beyond the inherent central governmentalised or academic-led mindset. Furthermore, wildfires may cause community trauma, and it takes a long time for a community to recover from wildfires. Researchers should also consider community feelings when engaging the community during and after a wildfire happens [39].

4.4. Community Inclusion in Wildfire Risk Management Strategies

This review gives practical meanings for policymakers and practitioners in the design of wildfire risk management strategies. It emphasises an empowerment of the local community in the formal institutional structure and enforcement of formal rules and collective agreements to prioritise local preferences in disaster risk reduction at the policy level [82]. The community often refers to sharing values, interests, and experiences in terms of a certain geographical scale in the policy [12]. This may leave limited space to develop the inclusion of community engagement and knowledge in the policy development of disaster risk reduction [83]. Individuals in the 'community' can face disproportionate challenges in wildfires due to their diverse but overlapping identities. We encourage the disaster risk management strategy to have a further inclusive consideration of community-distinct needs in terms of socio-economic positions, political power, culture, and historical background [12,84].

4.5. Limitations

Due to the subjective nature of the methodology, potential bias can exist in the coding analysis based on the researchers' standpoint. We acknowledge other research limitations of this scoping view. Firstly, this review is only limited to the English literature due to the language restriction of the research team. It excludes the other literature written in other languages and may have made the research findings dominated by the English-dominated academic perspective. Especially considering the community diversity in high-latitude areas, the research findings may not fully represent Indigenous Nations and other non-English community voices and exclude the grey literature contributions in understanding 'community'. Secondly, this review focuses on the wildfire research since 2015, after the Sendai Framework for Disaster Risk Reduction emphasised the community involvement in disaster risk reduction. Thirdly, the literature research is limited to the Scopus database due to the research methodology design. A broader literature search in other databases is recommended for future research.

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Appendix A. The Evaluation Results for In-Scope Study

Research Background					
In-Scope Study	**Study Location (Country)**	**Journal**	**Geographical Location**	**Research Theme**	**Research Topic**
[49]	Canada	International Journal of Disaster Risk Reduction	Rural	Disaster risk reduction	The lived experience of wildfire
[67]	Norway	International Journal of Disaster Risk Reduction	Rural	Disaster risk reduction	Wildfire governance management
[85]	USA	Ecology and Society	Unclear	Climate Change adaptation	Wildfire governance management
[62]	Canada	Climate policy	Indigenous land	Disaster risk reduction	The lived experience of wildfire
[50]	Canada	Forest Policy and Economics	WUI	Disaster risk reduction	Risk perception and awareness

Research Background					
In-Scope Study	**Study Location (Country)**	**Journal**	**Geographical Location**	**Research Theme**	**Research Topic**
[86]	Sweden	International Journal of Disaster Risk Reduction	Rural	Disaster risk reduction	The lived experience of wildfire
[52]	Russia	Arctic Science	Rural	Disaster risk reduction	Wildfire risk mapping
[68]	Canada	Frontiers in Forests and Global Change	WUI	Disaster risk reduction	Risk perception and awareness
[87]	Canada	Canadian Journal of Forest Research	Rural	Disaster risk reduction	Wildfire governance management
[70]	Canada	International Journal of Disaster Risk Science	Unclear	Disaster risk reduction	Risk perception and awareness
[32]	Canada	Sustainable Development	Urban	Disaster risk reduction	Community practice and resilience
[88]	Canada	International Journal of Disaster Risk Science	Rural	Disaster risk reduction	The lived experience of wildfire
[58]	Canada	International Journal of Disaster Risk Reduction	Island	Disaster risk reduction	Wildfire risk mapping
[43]	Russia	Polar Science	Rural	Disaster risk reduction	Indigenous-focused perspective Community practice and resilience
[59]	Canada	International Journal of Disaster Risk Reduction	Rural	Disaster risk reduction	The lived experience of wildfire
[69]	Canada	Natural Hazards	Rural	Disaster risk reduction	Community practice and resilience
[41]	Canada	Society and Natural Resources	Rural	Disaster risk reduction	The lived experience of wildfire Indigenous-focused perspective
[55]	Canada	International Journal of Disaster Risk Reduction	Rural	Disaster risk reduction	Wildfire governance management
[44]	Canada	People and Nature	Rural	Climate change adaptation	Indigenous-focused perspective Risk perception and awareness

Research Background					
In-Scope Study	**Study Location (Country)**	**Journal**	**Geographical Location**	**Research Theme**	**Research Topic**
[61]	Canada	Frontiers in Environmental Science	Indigenous land	Disaster risk reduction	The lived experience of wildfire
[60]	Canada	Sustainable development	Urban	Climate change adaptation	Risk perception and awareness
[51]	Canada	Fire	Urban	Disaster risk reduction	The lived experience of wildfire
[47]	Canada	Journal of Forestry	Rural	Disaster risk reduction	Indigenous-focused perspective Community practice and resilience
[57]	Canada USA	Natural Hazards	Rural	Disaster risk reduction	Wildfire risk mapping
[46]	USA	International Journal of Disaster Risk Reduction	Indigenous land	Disaster risk reduction	Community practice and resilience Indigenous-focused perspective
[56]	Sweden	Journal of Contingencies and Crisis Management	Rural	Disaster risk reduction	Wildfire governance management
[48]	Canada	Environmental Hazard	Rural	Disaster risk reduction	Indigenous-focused perspective The lived experience of wildfire
[53]	Canada	Mountain Research and Development	Rural	Disaster risk reduction	Community practice and resilience
[45]	Russia	Sustainability	Rural	Disaster risk reduction	Indigenous-focused perspective The lived experience of wildfire
[42]	Canada	Natural Hazards	Rural	Disaster risk reduction	Indigenous-focused perspective The lived experience of wildfire
[54]	Canada	Geoform	Indigenous land	Disaster risk reduction	The lived experience of wildfire

Community Role and Function			
In-Scope Study	**Community Type**	**The Interpretation Level of 'Community'**	**The Potential Issues of Interpreting 'Community'**
[49]	Social identity focused	Partial	The conflation of 'community' with other terms, such as neighbourhood, settlement, geographical location, municipality, First Nation land, or private sector
[67]	Collective interest and common practice focused	Informed	Neglect to define or characterise 'community' when focusing on community resilience
[85]	Social identity focused	Consistent	N/A
[62]	Social identity focused	Consistent	N/A
[50]	Collective interest and common practice focused	Partial	The conflation of 'community' with other terms, such as neighbourhood, settlement, geographical location, municipality, First Nation land, or private sector
[86]	Collective interest and common practice focused	Consistent	N/A
[52]	Place based	Partial	The conflation of 'community' with other terms, such as neighbourhood, settlement, geographical location, municipality, First Nation land, or private sector
[68]	Collective interest and common practice focused	Consistent	N/A
[87]	Collective interest and common practice focused	Partial	The conflation of 'community' with other terms, such as neighbourhood, settlement, geographical location, municipality, First Nation land, or private sector
[70]	Social identity focused	Partial	Over-simplification of 'community' with focus on one specific dimension, such as a single social identity or location
[32]	Social identity focused	Informed	Over-simplification of 'community' with focus on one specific dimension, such as a single social identity or location
[88]	Social identity focused	Consistent	N/A
[58]	Place based	Informed	Over-simplification of 'community' with focus on one specific dimension, such as a single social identity or location

Community Role and Function			
In-Scope Study	**Community Type**	**The Interpretation Level of 'Community'**	**The Potential Issues of Interpreting 'Community'**
[43]	Social identity focused	Partial	Over-simplification of 'community' with focus on one specific dimension, such as a single social identity or location
[59]	Social identity focused	Partial	Over-simplification of 'community' with focus on one specific dimension, such as a single social identity or location
[69]	Collective interest and common practice focused	Consistent	N/A
[41]	Social identity focused	Informed	The conflation of 'community' with other terms, such as neighbourhood, settlement, geographical location, municipality, First Nation land, or private sector
[55]	Place based	Partial	The conflation of 'community' with other terms, such as neighbourhood, settlement, geographical location, municipality, First Nation land, or private sector
[44]	Social identity focused	Partial	Over-simplification of 'community' with focus on one specific dimension, such as a single social identity or location
[61]	Social identity focused	Partial	Over-simplification of 'community' with focus on one specific dimension, such as a single social identity or location
[60]	Social identity focused	Informed	Over-simplification of 'community' with focus on one specific dimension, such as a single social identity or location
[51]	Place based	Informed	The conflation of 'community' with other terms, such as neighbourhood, settlement, geographical location, municipality, First Nation land, or private sector
[47]	Collective interest and common practice focused	Informed	The conflation of 'community' with other terms, such as neighbourhood, settlement, geographical location, municipality, First Nation land, or private sector
[57]	Place based	Informed	Over-simplification of 'community' with focus on one specific dimension, such as a single social identity or location

Community Role and Function			
In-Scope Study	**Community Type**	**The Interpretation Level of 'Community'**	**The Potential Issues of Interpreting 'Community'**
[46]	Social identity focused	Partial	Over-simplification of 'community' with focus on one specific dimension, such as a single social identity or location
[56]	Collective interest and common practice focused	Informed	The conflation of 'community' with other terms, such as neighbourhood, settlement, geographical location, municipality, First Nation land, or private sector
[48]	Collective interest and common practice focused	Consistent	N/A
[53]	Collective interest and common practice focused	Informed	The conflation of 'community' with other terms, such as neighbourhood, settlement, geographical location, municipality, First Nation land, or private sector
[45]	Social identity focused	Informed	The conflation of 'community' with other terms, such as neighbourhood, settlement, geographical location, municipality, First Nation land, or private sector
[42]	Social identity focused	Informed	The conflation of 'community' with other terms, such as neighbourhood, settlement, geographical location, municipality, First Nation land, or private sector
[54]	Social identity focused	Informed	The conflation of 'community' with other terms, such as neighbourhood, settlement, geographical location, municipality, First Nation land, or private sector

Social Inclusion and Exclusion							
In-Scope Study	**Main Study Attribute(s) of the Community**	**Themes**	**Other Inclusive Attribute(s) of the Community**	**Themes**	**The Interaction Between Attributes (Pro)**	**The Interaction Between Attributes (Con)**	**The Interaction Level**
[49]	Ethnicity (right-holders)	Demography	Gender Age Wildfire experience Family or household Roles and Responsibilities	Demography The lived experience of wildfire	Sample distributions based on various community attributes	Inadequate reflection of community heterogeneity in research design, implementation, analysis, and discussion	Informed

Social Inclusion and Exclusion							
In-Scope Study	**Main Study Attribute(s) of the Community**	**Themes**	**Other Inclusive Attribute(s) of the Community**	**Themes**	**The Interaction Between Attributes (Pro)**	**The Interaction Between Attributes (Con)**	**The Interaction Level**
[67]	Roles and responsibilities	The lived experience of wildfire	N/A	N/A		Limited consideration of social inclusion and exclusion criteria in representing 'community'	Partial
[85]	Roles and responsibilities	The lived experience of wildfire	N/A	N/A		Limited consideration of social inclusion and exclusion criteria in representing 'community'	Partial
[62]	Gender ethnicity (right-holders)	Demography	Age	Demography	Inductive methods to identify social identities inside the community		Consistent
[50]	N/A	N/A	Gender Age Employment Disaster-relevant knowledge Ethnicity (right-holders) Occupation Education	Demography The lived experience of wildfire	Sample distribution based on various community attributes		Consistent
[86]	Occupation	Demography	N/A	N/A		Limited consideration of social inclusion and exclusion criteria in representing 'community'	Partial
[52]	Road network	Location-based information	N/A	N/A		'Community' only serving as a reference instead of a subject	Partial
[68]	Roles and responsibilities	The lived experience of wildfire	Ethnicity (right-holders) Population Wildfire practices Location-related information	Demography The lived experience of wildfire Location-related information		Inadequate reflection of community heterogeneity in research design, implementation, analysis, and discussion	Informed
[87]	Roles and responsibilities	The lived experience of wildfire	N/A	N/A		Limited con-sideration of social inclusion and exclusion criteria in representing 'community'	Partial

Social Inclusion and Exclusion							
In-Scope Study	**Main Study Attribute(s) of the Community**	**Themes**	**Other Inclusive Attribute(s) of the Community**	**Themes**	**The Interaction Between Attributes (Pro)**	**The Interaction Between Attributes (Con)**	**The Interaction Level**
[70]	Age	Demography	Gender Ethnicity (right-holders) Income level	Demography		Inadequate reflection of community heterogeneity in research design, implementation, analysis, and discussion	Informed
[32]	Ethnicity	Demography	N/A	N/A			Partial
[88]	Ethnicity (right-holders)	Demography	Gender Age	Demography		Limited consideration of social inclusion and exclusion criteria in representing 'community'	Partial
[58]	Location-based information	Location-based information	Roles and responsibilities	The lived experience of wildfire	Quantitative-based research methodologies to include qualitative social dimension(s)		Consistent
[43]	Ethnicity (right-holders)	Demography	N/A	N/A		Limited consideration of social inclusion and exclusion criteria in representing 'community'	Partial
[59]	Gender	Demography	Age Income level Education Family or household Marital status	Demography		Limited consideration of social inclusion and exclusion criteria in representing 'community'	Partial
[69]	Roles and responsibilities	The lived experience of wildfire	Gender Age Education	Demography		Limited consideration of social inclusion and exclusion criteria in representing 'community'	Informed
[41]	Age Ethnicity (right-holders)	Demography	Wildfire experience Health condition Roles and responsibilities	Demography The lived experience of wildfire		Inadequate reflection of community heterogeneity in research design, implementation, analysis, and discussion	Informed
[55]	Roles and responsibilities	The lived experience of wildfire	N/A	N/A		Limited consideration of social inclusion and exclusion criteria in representing 'community'	Partial

Social Inclusion and Exclusion							
In-Scope Study	**Main Study Attribute(s) of the Community**	**Themes**	**Other Inclusive Attribute(s) of the Community**	**Themes**	**The Interaction Between Attributes (Pro)**	**The Interaction Between Attributes (Con)**	**The Interaction Level**
[44]	Ethnicity (right-holders) Occupation	Demography	N/A	N/A		Limited consideration of social inclusion and exclusion criteria in representing 'community'	Partial
[61]	Ethnicity (right-holders)	Demography	Gender Age Ethnicity (right-holders) Ethnicity Residency	Demography	Inductive methods to identify social identities inside the community		Consistent
[60]	Ethnicity	Demography	Gender Age Residency	Demography		Limited consideration of social inclusion and exclusion criteria in representing 'community'	Partial
[51]	Wildfire experience	The lived experience of wildfire	Gender Age Employment	Demography		Limited consideration of social inclusion and exclusion criteria in representing 'community'	Partial
[47]	Ethnicity (right-holders)	Demography	Gender Age	Demography		Inadequate reflection of community heterogeneity in research design, implementation, analysis, and discussion	Informed
[57]	Landcover	Location-based information	Flammability hazard	Location-based information	N/A	N/A	Consistent
[46]	Wildfire experience Ethnicity (right-holders)	Demography	Residency Occupation	Demography		Inadequate reflection of community heterogeneity in research design, implementation, analysis, and discussion	Informed
[56]	Roles and responsibilities	The lived experience of wildfire	N/A	N/A		Limited consideration of social inclusion and exclusion criteria in representing 'community'	Partial

Social Inclusion and Exclusion							
In-Scope Study	**Main Study Attribute(s) of the Community**	**Themes**	**Other Inclusive Attribute(s) of the Community**	**Themes**	**The Interaction Between Attributes (Pro)**	**The Interaction Between Attributes (Con)**	**The Interaction Level**
[48]	Ethnicity (right-holders)	Demography	Age Disaster experience Roles and responsibilities	Demography The lived experience of wildfire		Inadequate reflection of community heterogeneity in research design, implementation, analysis, and discussion	Informed
[53]	Roles and responsibilities	The lived experience of wildfire	Disaster relevant knowledge	The lived experience of wildfire		Limited consideration of social inclusion and exclusion criteria in representing 'community'	Partial
[45]	Ethnicity (right-holders)	Demography	Gender	Demography		Inadequate reflection of community heterogeneity in research design, implementation, analysis, and discussion	Informed
[42]	Ethnicity (right-holders)	Demography	Roles and responsibilities	The lived experience of wildfire		Limited consideration of social inclusion and exclusion criteria in representing 'community'	Partial
[54]	Wildfire experience	The lived experience of wildfire	Gender Roles and Responsibilities	Demography The lived experience of wildfire	Awareness of research reflexivity in considering social inclusion and exclusion		Consistent

Power Relations				
In-Scope Study	**Positionality in Interpreting the 'Community'**	**Community-Represented Group**	**Who Else Participates in Research**	**The Other Stakeholder's Participatory Approach**
[49]	Define the scope of 'community' by consulting 'community' itself	Local residents Officials from multi-level governments and fire divisions Community elites, such as gatekeepers, community officers, or key informants	Officials from multi-level governments and fire divisions	Being a member of the research community advisory committee
[67]	Define the scope of 'community' by consulting 'community' itself	Officials from multi-level governments and fire divisions	Officials from multi-level governments and fire divisions Local residents	Assisting in making connections between 'community' and researchers
[85]	A policy standpoint	Officials from multi-level governments and fire divisions	N/A	N/A

	Power Relations			
In-Scope Study	**Positionality in Interpreting the 'Community'**	**Community-Represented Group**	**Who Else Participates in Research**	**The Other Stakeholder's Participatory Approach**
[62]	N/A	Local residents	N/A	N/A
[50]	A policy standpoint	Local residents	N/A	N/A
[86]	N/A	Local residents	N/A	N/A
[52]	Define the scope of 'community' by consulting 'community' itself	Local residents	N/A	Advising and providing relevant information (advice or data resources) about the community
[68]	Define the scope of 'community' by consulting 'community' itself A policy standpoint	Officials from multi-level governments and fire divisions Community elites, such as gatekeepers, community officers, or key informants	The private sector	Advising and providing relevant information (advice or data resources) about the community Assisting in making connections between 'community' and researchers
[87]	A policy standpoint	Community elites, such as gatekeepers, community officers, or key informants	N/A	N/A
[70]	A policy standpoint	Local residents	Community elites, such as gatekeepers, community officers, or key informants	Assisting in making connections between 'community' and researchers
[32]	Define the scope of 'community' by consulting 'community' itself	Local residents	N/A	N/A
[88]	Define the scope of 'community' by consulting 'community' itself	Local residents	Community elites, such as gatekeepers, community officers, or key informants Officials from multi-level governments and fire divisions	Advising and providing relevant information (advice or data resources) about the community Assisting in making connections between 'community' and researchers
[58]	A policy standpoint	Local residents Officials from multi-level governments and fire divisions	NGO The private sector Community elites, such as gatekeepers, community officers, or key informants Officials from multi-level governments and fire divisions	Reviewing the preliminary analysis results
[43]	N/A	Local residents	N/A	N/A
[59]	N/A	Local residents	N/A	N/A
[69]	N/A	Local residents Officials from multi-level governments and fire divisions	N/A	N/A
[41]	Define the scope of 'community' by consulting 'community' itself	Local residents	Community elites, such as gatekeepers, community officers, or key informants	Assisting in making connections between 'community' and researchers Reviewing the preliminary analysis results

	Power Relations			
In-Scope Study	**Positionality in Interpreting the 'Community'**	**Community-Represented Group**	**Who Else Participates in Research**	**The Other Stakeholder's Participatory Approach**
[55]	A policy standpoint	Local residents Officials from multi-level governments and fire divisions	Officials from multi-level governments and fire divisions	Advising and providing relevant information (advice or data resources) about the community
[44]	Define the scope of 'community' by consulting 'community' itself	Local residents Community elites, such as gatekeepers, community officers, or key informants	N/A	N/A
[61]	Define the scope of 'community' by consulting 'community' itself	Local residents	N/A	N/A
[60]	N/A	Local residents	N/A	N/A
[51]	A policy standpoint	Local residents	Community elites, such as gatekeepers, community officers, or key informants	Assisting in making connections between 'community' and researchers
[47]	Define the scope of 'community' by consulting 'community' itself	Local residents Community elites, such as gatekeepers, community officers, or key informants	Officials from multi-level governments and fire divisions	Assisting in making connections between 'community' and researchers
[57]	N/A	N/A	N/A	N/A
[46]	N/A	Local residents	N/A	N/A
[56]	N/A	Private sectors	N/A	N/A
[48]	Define the scope of 'community' by consulting 'community' itself	Local residents Community elites, such as gatekeepers, community officers, or key informants	Officials from multi-level governments and fire divisions	Assisting in making connections between 'community' and researchers Advising and providing relevant information (advice or data resources) about the community Being a member of the research community advisory committee
[53]	N/A	Community elites, such as gatekeepers, community officers, or key informants	N/A	N/A
[45]	N/A	Local residents	Officials from multi-level governments and fire divisions	Performs as research participants
[42]	Define the scope of 'community' by consulting 'community' itself	Local residents	Officials from multi-level governments and fire divisions	Assisting in making connections between 'community' and researchers Being a member of the research community advisory committee

Power Relations				
In-Scope Study	**Positionality in Interpreting the 'Community'**	**Community-Represented Group**	**Who Else Participates in Research**	**The Other Stakeholder's Participatory Approach**
[54]	N/A	Local residents NGO Private sectors Community elites, such as gatekeepers, community officers, or key informants Officials from multi-level governments and fire divisions	The private sector	Advising and providing relevant information (advice or data resources) about the community

Participatory Approach		
In-Scope Study	**Community Presented Group Participatory Approach**	**The Participation Levels of Community Represented Group**
[49]	Community suggestions on research design Community advisory committee setup Community assistant assignation	Consistent
[67]	Assistance on data collection	Informed
[85]	Partnership project with the community	Consistent
[62]	Passive assignment	Partial
[50]	Passive assignment	Partial
[86]	Passive assignment	Partial
[52]	Community suggestions on research design Preliminary results sharing Community researcher in the team	Consistent
[68]	Passive assignment	Partial
[87]	Passive assignment	Partial
[70]	Passive assignment	Partial
[32]	Preliminary results sharing	Informed
[88]	Community suggestions on research design Community advisory committee setup Community assistant assignation Preliminary results sharing	Consistent
[58]	Preliminary results sharing Assistance on data collection	Consistent
[43]	No interaction	Non interaction
[59]	Passive assignment	Partial
[69]	Passive assignment	Partial
[41]	Community suggestions on research design Community advisory committee setup Community assistant assignation Preliminary results sharing	Consistent
[55]	Passive assignment	Partial
[44]	Community researcher in team	Adaptive

	Participatory Approach	
In-Scope Study	**Community Presented Group Participatory Approach**	**The Participation Levels of Community Represented Group**
[61]	Community suggestions on research design Preliminary results sharing	Consistent
[60]	Community suggestions on research design	Informed
[51]	Community suggestions on research design	Informed
[47]	Community suggestions on research design	Informed
[57]	No interaction	No interaction
[46]	Passive assignment	Partial
[56]	Passive assignment	Partial
[48]	Community suggestions on research design Community advisory committee setup Community assistant assignation Preliminary results sharing	Informed
[53]	Passive assignment	Partial
[45]	Passive assignment	Partial
[42]	Community suggestions on research design Community advisory committee setup Community assistant assignation Preliminary results sharing	Consistent
[54]	No interaction	No interaction

	Research Reflexibility		
In-Scope Study	**The Research Reflexibility Level on the Research Design, Implementation, and Outputs**	**Reported Research Limitation of Community-Based Approach**	**Reported Research Recommendation of Community-Based Approach**
[49]	Informed	Inconsistent community participation	Emphasis on the necessity of recognising and involving the community in research of wildfire risk reduction
[67]	Informed	Geographical scale limitation	Emphasis on the necessity of recognising and involving the community in research of wildfire risk reduction
[85]	Informed	Community representativeness bias	Recommendations to increase understanding of wildfire governance changes under the impacts of climate change
[62]	Partial	N/A	Consideration of community heterogeneity and inclusiveness in community-based wildfire research

	Research Reflexibility		
In-Scope Study	**The Research Reflexibility Level on the Research Design, Implementation, and Outputs**	**Reported Research Limitation of Community-Based Approach**	**Reported Research Recommendation of Community-Based Approach**
[50]	Partial	Geographical scale limitation	Consideration of community heterogeneity and inclusiveness in community-based wildfire research
[86]	Partial	Community representativeness bias	Consideration of community heterogeneity and inclusiveness in community-based wildfire research
[52]	Partial	N/A	Emphasis on the necessity of recognising and involving the community in research of wildfire risk reduction
[68]	Partial	Community representativeness bias	Emphasis on the necessity of recognising and involving the community in research of wildfire risk reduction
[87]	Partial	N/A	Suggestion to understand community practices and behaviours for wildfire risk reduction
[70]	Consistent	Inconsistent community participation Community representativeness bias	Consideration of community heterogeneity and inclusiveness in community-based wildfire research
[32]	Informed	Community heterogeneity ignorance	Consideration of community heterogeneity and inclusiveness in community-based wildfire research
[88]	Partial	N/A	N/A
[58]	Consistent	Limitations in data collection strategy	Emphasis on the necessity of recognising and involving the community in research of wildfire risk reduction
[43]	Partial	N/A	
[59]	Partial	Inconsistent community participation	N/A
[69]	Informed	Community representativeness bias	Consideration of community heterogeneity and inclusiveness in community-based wildfire research
[41]	Partial	N/A	Consideration of community heterogeneity and inclusiveness in community-based wildfire research
[55]	Partial	Geographical scale limitation	Recommendations to increase understanding of wildfire governance changes under the impacts of climate change

	Research Reflexibility		
In-Scope Study	**The Research Reflexibility Level on the Research Design, Implementation, and Outputs**	**Reported Research Limitation of Community-Based Approach**	**Reported Research Recommendation of Community-Based Approach**
[44]	Informed	Community representativeness bias Research unsuitability to local background	Emphasis on the necessity of recognising and involving the community in research of wildfire risk reduction
[61]	Partial	N/A	Consideration of community heterogeneity and inclusiveness in community-based wildfire research
[60]	Partial	N/A	Consideration of community heterogeneity and inclusiveness in community-based wildfire research
[51]	Partial	Community representativeness bias	Suggestions to understand community practices and behaviours for wildfire risk reduction
[47]	Partial	Community representativeness bias	Suggestions to understand community practices and behaviours for wildfire risk reduction
[57]	Partial	N/A	Recommendation to increase understanding of wildfire governance changes under the impacts of climate change
[46]	Informed	Community representativeness bias	Consideration of community heterogeneity and inclusiveness in community-based wildfire research
[56]	Informed	Geographical scale limitation	Recommendation to increase understanding of wildfire governance changes under the impacts of climate change
[48]	Partial	N/A	Emphasis on the necessity of recognising and involving the community in research of wildfire risk reduction
[53]	Partial	N/A	Suggestions to understand community practices and behaviours for wildfire risk reduction
[45]	Partial	N/A	Suggestions to understand community practices and behaviours for wildfire risk reduction
[42]	Partial	N/A	N/A
[54]	Informed	Community representativeness bias	Consideration of community heterogeneity and inclusiveness in community-based wildfire research

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