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How to Improve Disaster Resilience in the Climate Crisis

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A B S T R A C T

The purpose of this paper is to suggest what are the ways to improve disaster resilience in the era of climate crisis. Some suggestions to increase disaster resilience can be presented as follows. First, establishing the core system, including value, institute, leadership, devotion, expertise; Second, various stakeholders in the public and private sectors to participate in the decision-making and activities; Third, the community to have the economic capacity to secure the resources to enhance disaster resilience; Fourth, a long-term effective permanent cooperation platform between different social systems; Fifth, the socially embedded disaster management system with disaster resilience for overcoming the impact of mega-disaster; Sixth, increasing disaster relief and welfare support activities for the resilience of disaster victims; Seventh, developing the role and capacity of the local community and active participation of local residents; Eighth, reducing disaster vulnerability; Ninth, an integrated disaster management organization that can respond externally while maintaining the internal efficiency of the organization.

Key words: disaster resilience, climate crisis, disaster management, vulnerability

1. Introduction

Recently, we are feeling that the climate has changed a lot from the past. The intensity of torrential rains occurring in each region has increased significantly, and the tropical night phenomenon is getting worse every year. Abnormal climate phenomena are not only occurring in Korea, but also in China, Antarctica and Arctic, the United States, Australia, New Zealand, Chile, and South Africa in Asia. While extreme water strife and hundreds of thousands of people have been displaced in various parts of the global society, many people have died from climate disasters. At the same time, the decrease in food production and the sluggish tourism industry had a negative impact on economic growth (Oh, *et. al*., 2012: 202-204).

The climate crisis is characterized by difficult prediction and very high uncertainty. Considering that it is difficult to accurately predict even short-term weather conditions of two to three days, it is almost impossible to predict long-term climate change. It is useful to use a scenario approach for these changes. It is desirable to consider the problems that may arise in each situation from various perspectives, assuming the worst case, the best situation, and the average situation, and prepare a countermeasure for the situation in advance (Park, 2020: 33).

The purpose of climate change response is to prevent or minimize climate change and to implement preventive measures to minimize the adverse effects of climate change. The international community has proposed two strategies in the United Nations Framework Convention on Climate Change (UNFCCC) to respond to climate change. One is a strategy for mitigating the progress of climate change by limiting greenhouse gas emissions and increasing sinks, and the other is an adaptation strategy to reduce vulnerability to negative impacts and increase resilience (Lee, 2015: 3, 14-17). The two strategies of mitigation and adaptation as a remedy for global warming and climate crisis can effectively reduce the impact or risk of climate change through complementation. The initial movement of the international community appeared to focus more on mitigation policies that stabilize greenhouse gas concentrations and reduce emissions. However, GHG reductions through mitigation strategies appear slowly over a long period of time. Even if the concentration of greenhouse gases does not increase further, the temperature will continue to rise for at least several decades because the period of carbon dioxide remaining in the atmosphere is about 50 to 200 years (IPCC, 2007). Therefore, the problem of adapting to climate change is getting

attention as much as reducing greenhouse gas.

In modern society, the distinction between natural and social factors is ambiguous, and new phenomena are also complexly intertwined (Kim and Lee, 2021: 63-64). The scale and classification of disasters can vary depending on human error, social structural problems, and the complex relationships in the response process after a disaster occurs. In the past, fine dust was classified as being caused by natural influences, but now it has emerged as a social problem due to industrialization, the use of fossil fuels, polluted air, and automobile pollution. The earthquake that occurred in Pohang in 2017 was also found to be caused by artificial factors such as geothermal power generation rather than natural phenomena. The heat wave caused by the global abnormal climate threatens the safety of the socially vulnerable. The global outbreak of new infectious diseases such as COVID-19, flooding due to earthquakes, tsunamis, and major floods, collapse of dams, and heavy snow are increasing the severity of social risks.

In Korea, as disasters caused by abnormal climates are increasing recently, research on resilience in various categories is expanding. Recently, many studies have been conducted on sustainability and resilience, and resilience has become an important concept in sustainability (Lee, *et. al.*, 2019: 401). Norris, et. al. (2008) emphasized that communities have the potential to play a successful and effective disaster response function by presenting theories and models of community resilience. Networked adaptive capacity was emphasized in relation to community resilience. They presented economic development, social capital, information and communication, and community competence as main contents.

Disaster management and climate change adaptation strategies have common characteristics. As a preliminary preparation stage for potential disasters that may occur in the future, it has common characteristics in terms of evaluating and managing disaster vulnerability due to abnormal climate phenomena. However, Korea's disaster management focuses on vulnerability assessment and management for each type of disaster. However, emergency management guidelines presented by the US, UK, and Australia emphasize the concept of resilience, including community disaster vulnerability assessment, adaptation, and recovery capacity (Kim, *et. al.*, 2010). The disaster management paradigm is changing in the direction of finding ways to develop a plan to improve resilience at the regional level, including adaptation to climate change, to have the ability to adapt to and recover from various types of risks (Lee, 2015: 4-5).

In this context, the purpose of this paper is to suggest what are the ways to improve disaster resilience in the era of climate crisis. The concept of resilience is important for an integrated and systematic approach to disaster management in response to the climate crisis (Park, 2020: 32). The concept of resilience can be defined as the ability to absorb confusion or disturbance and maintain the basic function and structure of a system. When the climate crisis is difficult to predict, there is high uncertainty, and information about the future situation is insufficient, a recovery strategy that enables basic social functions to be maintained even in the event of a disaster is preferable rather than a prevention strategy that prevents a disaster from occurring. Resilience has the advantage of setting goals for each field of activity and linking and fusion of policy means to achieve a common goal.

2. Climate Crisis and Disaster

Globally, extreme weather events caused by climate change are causing great damage from natural disasters. In the summer of 2020, an abnormal heat wave occurred in Siberia, Russia, reaching 38 degrees Celsius. In February 2021, in Texas, USA, a cold wave of minus 20 degrees Celsius and paralysis of the power system caused numerous casualties and property damage. Climate scientists have warned that if greenhouse gases are emitted at the current rate, the global temperature rise will cause ecological destruction to the extent that plants and animals, including humans, cannot adapt (Park, 2021: 41).

Recently, UNISDR concluded that cities will become increasingly vulnerable to global environmental changes, including droughts, floods, heat islands, extreme rainfall and natural disasters (Elmqvist, *et. al.*, 2019). The World Economy Forum also presented extreme weather events, failure to reduce and adapt to climate change, and natural disasters as Top 1 to 3 among global risks through the ‘2019 World Risk Report (WEF, 2019)’. The impact of climate change and disasters is expected to extend to risks at the city and national level (Lee, *et. al.*, 2019: 402).

Climatologists are looking for the cause of the unprecedented occurrence of abnormal weather in the global warming phenomenon that has been observed since the last century. It's not just the climate that is changing. In Asia, megacities are rapidly increasing as people flock to cities. In 2007, Statistics Korea reported that the world population was 1 billion people in 1804, 2 billion people in 1927, 3 billion people in 1960, 4 billion people in 1974, and 5 billion people in 1987 (Oh, *et. al.*, 2012: 204). And according to the '2021 World Population Status Report' of the United Nations Fund for Population Activities (UNFPA), the total number of the world's population is 7.875 billion (UNFPA, 2021).

The explosively increasing number of mankind after the Industrial Revolution requires more energy and resource consumption. Not only the increase of the population, but also the lifestyle of mankind requires more energy. A new word, Affluenza, was created as a compound word of affluence and influenza. As a result, since the Industrial Revolution, the amount of carbon dioxide in the atmospheric composition has continuously increased at a rate of 0.7 ppm/year at first and then at a rate of 1.5 ppm/year later. Of course, 1.5 parts per million of atmospheric components is a ridiculously small amount. But if you look at past air bubbles trapped in polar ice, this number is the highest since the last ice age about 20,000 years ago (Oh, *et. al.*, 2012: 204).

The climate crisis is predicted to exacerbate inequality. Internationally, it means that the damage from climate change is concentrated in less developed countries with relatively low carbon emissions rather than developed countries with high carbon emission responsibility. In the domestic context, climate inequality will focus on the socially vulnerable groups suffering from abnormal climates such as heat waves, cold waves, typhoons, and droughts. It has become an important policy task to prevent such inequality in the climate crisis in advance and provide relief afterwards (Park, 2021: 50-51). In the case of developing countries, due to the lack of formal and systematic planning, it is highly likely that housing will be introduced in areas exposed to natural disasters, so the economic loss of residential areas due to earthquakes is expected to increase by 25% and floods by 42% (Lee, *et. al.*, 2019: 402). In the past decade, natural disasters have affected 200.2 million people, costing $100 billion annually. Unless more investments are made in resilience by 2030, damage from natural disasters is projected to increase to $314 billion per year worldwide (UN-HABITAT, 2018).

The damage caused by climate change is more serious than natural disasters such as earthquakes, wildfires, and tsunamis. Sub-Saharan Africa and Asia, such as India and China, are rapidly becoming desertified and many people have abandoned their homes for generations and are becoming nomads. The increasingly serious environmental refugee problem can no longer be dealt with within one country and will soon develop into an international issue that can cause conflicts between countries (Jin, 2007: 95). The climate crisis can typically be divided into three categories (Oh, *et. al.*, 2012: 211). First, there are long-term environmental changes such as climate warming, sea level rise, deforestation, soil erosion, salinization, flooding, and desertification. Second, natural disasters such as earthquakes, volcanic eruptions, floods, hurricanes, monsoons, tsunamis, and tornadoes. Third, environmental accidents such as industrial disasters and chemical disasters. A climate crisis such as toxic waste and radioactive pollution will occur along with destruction of the natural environment such as reduction of forests due to global warming, climate change due to air pollution, acid rain, resource depletion, water scarcity, and desertification.

3. Disaster Vulnerability and Resilience

As local communities become more urbanized, their vulnerability to disasters increases as populations, industries, and important facilities are concentrated. It is expected that the possibility of indirect damage due to delay in recovery as well as direct damage due to the occurrence of a disaster is expected to be very high. Climate Crisis Mega-disasters occur frequently, and these climate crises appear not only as local problems that occur only in specific regions, but also as global problems. Although various disaster management measures are being discussed to prevent mega-disasters, there are also opinions that it is practically impossible to completely prevent an increasingly large-scale disaster due to limitations in finance, resources, and manpower.

Disaster resilience can be defined as the capacity to make the community safer than before the crisis from various disasters that threaten the safety of the community. In order to have such resilience capacity, it is desirable for the community to have disaster resilience to prevent, prepare for, respond to, and recover from disasters in advance.

In a risk society, it is required to have disaster resilience. In essence, risk society has a risk as a component that has not yet occurred but is currently approaching. Risks are both real now and a future that must be prevented. In that sense, the concept of resilience, which has the meaning of elasticity that can recover from risks, is an indispensable element of society in the future as well as in the present. Disasters will continue to occur as long as human society exists. Some societies are more prosperous based on experience after overcoming disasters, and others are not. Therefore, some scholars study the ‘resilience’ of a society to withstand disasters and recover quickly, while others study vulnerability (Mutter, 2015: 30-31). Resilience and vulnerability are common research topics in disaster research (Lee, 2018: 77).

Combining with the vulnerability of natural or man-made environments and the characteristics of vulnerable social groups, disasters are more likely to inflict more damage on the vulnerable rather than inflict the same damage on everyone. Therefore, the concept of resilience is used as a concept to supplement the vulnerability of the vulnerable in disasters (Jang, 2016: 5-6; Kim and Lee, 2018: 87).

Disaster resilience is inevitably weak for those who are vulnerable in physical, mental, linguistic,

geographical, social, economic and cultural fields. There is a need for a plan to make the disaster vulnerable such as the disabled, the elderly, children, women, and the low-income class members of a healthy local community. After a major disaster, many disaster victims experience various sequelae such as post-traumatic stress disorder, depression, and suicide. Now, it is important to recognize that it is important to strengthen the response capacity at the individual level for disasters, but it is also important to try to strengthen the crisis management resilience by increasing the response capacity at the community level.

In the past, it was recognized that the individual should have the primary responsibility for safety from disasters. However, as the degree of differentiation and complexity of society has increased and the linkages between sectors have been strengthened, it has been found that there is a limit to placing risk and safety factors under individual control and responsibility. Rather, a "social risk" has emerged, in which communities manage factors beyond which individuals are unable to control and assume responsibility. In this context, social disasters are important risk factors that communities must manage as a target of policies and services (Seo & Lee, 2012: 2).

In the highly complex modern society, the resilience of social systems is necessary because it is impossible to prevent the accidental occurrence of huge shocking accidents. In particular, urban communities where there are many disaster-vulnerable groups such as the poor, the elderly, and the disabled need to secure the resilience that allows them to quickly return to normal. Not only natural disasters, but also disasters such as infectious diseases and environmental pollution are distributed unequally to the low-income class. Middle-class residential areas are relatively resilient to the impact of the same disaster, while low-income residential areas are relatively less resilient (Rho, 2016: 120-121). In the case of the earthquakes in Chile and Haiti, the ruling classes are essentially free from changes in their incomes, as they have the capacity to mitigate disaster shocks. But when the poor die, get hurt, or lose their home, they suffer more than ever before, and lose all they have at all. The gap between the rich and the poor widens because the ruling class loses less and can recover faster compared to the poor. An unequal society will become more unequal, and power and wealth will be more concentrated on the rich (Mutter, 2015: 150).

Timmerman (1981), who first used the concept of resilience in relation to natural disaster damage, defined resilience as the ability of a system to absorb the effects of natural disaster damage and to recover from the damage (Klein, *et. al.*, 2003).

Here, disaster resilience is dealt with from the perspective of an individual who does not despair of himself after a disaster, and actively copes with various problems in life throughout his or her life. Therefore, disaster resilience is defined as 'a continuous process in which a system does not despair from disaster damage and actively overcomes various problems of the system'.

4. Disaster Resilience in the Climate Crisis

Definitions of resilience are as diverse as academic fields of study. The spatial domain considering resilience is also divided into several hierarchies from the global level to countries, regions, cities, communities, and individuals. In terms of resilience related to climate crises or disasters, there are various sectors to be considered, such as floods, fires, and ecosystems (Lee, *et. al.*, 2019: 402).

Recently, as the possibility of disasters has increased worldwide and the scope of disaster damage has been widened, resilience is defined as a concept that can minimize disaster damage or restore life before the disaster. Wildavsky (1998: 525-527) defined resilience as the ability to respond to unpredictable crises while learning to return to the normal state before the crisis. Bruneau, et. al. (2003: 733-752) referred to the ability of a social unit to minimize social split and conflict caused by disasters and to mitigate the impact of disaster risk. Norris, et. al. (2008: 127-150) defined it as "the ability to resist or recover from loss". In the field of disaster management, Timmerman (1981: 21) first defined resilience as the capacity to absorb and recover from the occurrence of hazardous events. An organization with resilience as an act of returning from a disaster is one that can quickly return to normal operation or a better state after a disaster has occurred (Koslowski & Longstaff, 2015: 12; Park, 2015: 104).

Resilience can be defined as the process and capacity to return to pre-disaster levels and includes efforts to strengthen resilience from potential risks in preparation for disasters (Jeon, *et. al.*, 2017: 48). Resilience is the ability to reduce the likelihood of a disaster by alleviating the vulnerability of a community or individual to disaster, and to restore the system's ability to the level before the disaster even if a disaster occurs (Yang, 2016: 146). In Lee (2015: 22), resilience refers to the ability of a system to withstand and recover from shock or stress to return to a previous or better state.

In the process of preventing, preparing for, responding to, and recovering from climate crisis disasters, the vulnerable, such as the elderly, the disabled, children, economically vulnerable groups, and foreigners, have many difficulties in overcoming disasters on their own. The normal functioning of social systems is severely impacted by disasters. Disaster can be defined as a sudden and catastrophic event that transcends the disaster response

capacity of a community and causes human, material, economic and environmental loss. Disasters cause great losses when they affect the vulnerable. In extreme disaster situations, it is difficult for everyone to adequately respond to the disaster. In particular, there are those who are vulnerable to disasters, who find it difficult to overcome or respond to disasters on their own, and must seek the help of others to protect their lives, bodies, and property and minimize damage (Kim and Lee, 2018: 88-89).

The disaster vulnerable people should be approached with a different concept from the socially disadvantaged, which refers to a group that is easily separated from, discriminated against, or marginalized from a large number of groups by social conditions such as age, race, gender, and disability. Disaster management services provided by the state cannot be discriminated against or marginalized, so it is necessary to define them differently from the concept of the socially disadvantaged (Sim, *et. al.*, 2010: 9). Disaster vulnerable people are defined as follows; 'Persons who need help from others because they have limitations in risk observation, cognitive ability, information acquisition and transmission, speaking ability, risk avoidance and evacuation, and vulnerability to physical, geographical, social, cultural, and environmental factors'. The category of disaster vulnerable people includes basic livelihood recipients and the next lower class, the elderly, the disabled, critically ill, infants, pregnant women, foreigners residing in Korea, foreign tourists, multicultural families, and geographically isolated people (Jang, 2016: 4-5).

The concept of resource loss has become central to stress theory, mainly because of the influence of Hobfoll's "conservation of resources theory (COR theory)" (Hobfoll, 1988, 1998, 2006). The tenet of COR theory is that "individuals strive to acquire, maintain, protect, and nurture the resources they value" (Hobfoll, 2006: 217). According to Hobfoll's COR theory, stress occurs when a resource is threatened, when a resource is lost, or when an individual makes a significant investment in another resource and then fails to obtain it. In the resource conservation theory, people must invest resources to prevent loss of resources, recover from losses, and acquire resources. People with more resources are less vulnerable to resource loss and are empowered to acquire more resources.

Disasters can have a devastating impact on the health of populations and communities through loss, displacement and death (Tiernan, *et. al.*, 2019: 63). After Typhoon Haiyan in the Philippines in 2013, major health problems emerged as a result of the failure to prevent epidemics due to lack of access to food, water, housing and medicine and the increasing severity of non-communicable diseases (Aitsi-Selmi and Murray, 2016). Mental health problems are prevalent when a population experiences extreme loss or sudden displacement (Goldmann and Galea, 2014).

Stressors reduce a community's ability to cope and play a role in slowing the recovery process. Severe stressors, such as displacement or death of people living with them, were left behind after the disaster. Stress factors such as loss of opportunities to enjoy friendship and leisure with colleagues in everyday life, community conflicts over disaster causes and responses, and failure to support are left behind after the disaster (Edelstein and Wandersman, 1987; Kaniasty and Norris, 2004; Tobin and Whiteford, 2002).

5. Suggestions for Improving Disaster Resilience in the Climate Crisis

On December 12, 2015, the Paris Agreement, a new climate change regime that replaced the Kyoto Protocol, which was the existing climate change regime, was adopted (Paris Agreement, 2015). The Paris Agreement aims to maintain the average global temperature at a level considerably lower than 2℃ compared to pre-industrialization, and to pursue efforts to limit the increase in global average temperature to within 1.5℃. To this end, each country is required to submit its Intended Nationally Determined Contributions (INDC), with its reduction targets raised every five years. A more notable change is the emphasis on the importance of climate change adaptation as well as greenhouse gas reduction. The phrase "sustainable" appears 24 times in the Paris Agreement. It means that not only the global challenge of "reducing greenhouse gases", but also the issue of adaptation to climate change in order to survive in a world that is getting hotter in each country (Oh, 2021: 1-2). In this context, suggestions for improving disaster resilience in the era of climate crisis are as follows.

First, it is necessary to newly find and establish the core system, including value, institute, leadership, devotion, expertise to manage disasters in the climate crisis society that has emerged as a new normal society. There are environment, input, conversion, output, and feedback elements that make up the social system model. Among them, the conversion process remains a black box with its substance still unknown. In fact, in order for the new disaster management system to be effectively operated and converted into a safe community, the function and role of the conversion process must be properly performed. Efforts of the local community should be made to acquire the values, philosophy, system, leadership, devotion, and expertise that the disaster management system in the era of the new climate crisis should possess (Lee, 2014: 20-24; Lee, *et. al.*, 2019: 96).

Second, in order to effectively overcome mega-disasters in the era of climate crisis, it is necessary for various stakeholders in the public and private sectors to participate in the decision-making and activities of the mega-disaster management system. Competent and well-resourced cities and governments work with citizens, businesses and other stakeholders to reduce disaster risk through specific risk reduction policies and investments and by improving infrastructure and service delivery (Byun, 2018: 12). At the level of disaster resilience, risks should be considered in all areas and processes of activities of the government and private sectors. Currently, government agencies such as the central government and local governments are active in disaster management (Park, 2020: 33). However, at the resilience level, various stakeholders in the private sector who may be potentially harmed must be involved. This is because it is necessary to take into account the risks that may arise from the climate crisis at the beginning of all planning and development in the government and private sectors.

Third, the community is required to have the economic capacity to secure the resources to enhance disaster resilience. Resilience can fail if resilience-resources themselves are damaged or destroyed by stressors. Those living in the communities that experienced the highest level of threat for the longest period were found to perceive less resilience than those in other communities (Kimhi and Shamai, 2004). The robustness of resilience-resources is important because the community's ability to respond to the threat itself has been damaged by the threat. Disasters and stressors may cause both resource mobilization and resource deterioration (Norris, *et. al.*, 2008: 135). Ultimately, after disaster damage occurs, it is necessary to raise the economic level of the community in order to restore it to a better condition than before the disaster (Lee, 2015). Efforts should be made to attract industries that create high added value while considering existing industries so that the industrial structure can be diversified in order to improve the economic level.

Fourth, it is necessary to create a long-term effective permanent cooperation platform between different social systems. Without a comprehensive platform that provides information in disaster situations, resources are wasted and work conflicts occur, and the capacity of social organizations cannot be sufficiently mobilized (Dong and Lee, 2021: 14). A platform is needed where citizens working in various fields constituting the community as a system can work together to minimize disaster damage. Disasters occurring in the local community have a serious negative impact on the overall social system, so measures to minimize the threat to the local community are required. At the same time, communities are required to develop innovative ways to collaborate and strengthen public relations. Since the local community always faces the problem of resource shortage, it is desirable to secure many cooperative institutions by strengthening public relations and establishing a cooperative platform.

Fifth, it is necessary to establish the socially embedded disaster management system with disaster resilience for overcoming the impact of mega-disaster. Since society has become urbanized, modernized, industrialized, and densely populated, it is desirable to abandon the idea of managing all disasters by the government alone. It is required to move forward in the direction of establishing a socially embedded disaster management system throughout society including disaster resilience (Yoo & Lee, 2021: 3). Social disaster may have two meanings. One is when the cause of disaster is in society. The other is when disasters cause social damage. The latter needs to be identified as to what the source of the disaster is. In this paper, a social disaster refers to a case where the cause of the disaster is in society. Disaster only has its meaning when it has a negative effect on society. There are a number of incidents or accidents that have a negative impact on the community, but disaster can be said to be a disaster when the perception of massive damage is shared among them (Lee, *et. al.*, 2019: 122). In this context, social disaster management refers to a method of ensuring safety by embedding a disaster management system in the social structure itself. It is not a method in which one entity in society is responsible for disaster management of the entire system, but all the entities that make up society, such as agriculture, manufacturing, electricity, dams, reservoirs, factories, industrial facilities, distribution, and even the daily life of families. It refers to a method in which the disaster management system is internalized throughout the structure and safety management has become routine. For example, it means building basic disaster management infrastructure facilities in all social systems to enhance disaster resilience. Kim and Lee (2018: 99) selected physical capacity, administrative/institutional capacity, and network capacity as effective capacities to strengthen heatwave disaster resilience. Among them, it was found that strengthening the heat wave forecasting and warning system belonging to the physical capability category was the most important.

Sixth, it is possible to improve disaster resilience by increasing disaster relief and welfare support activities for the resilience of disaster victims. After a disaster, disaster victims experience economic, social, environmental, mental and physical damage. Therefore, it is necessary to quickly meet the needs of disaster victims. In order to increase the satisfaction and effectiveness of disaster relief welfare, it is required to provide and satisfy the economic and cash support for disaster victims and the need for medical service support for social services at a necessary time (Kim and Lee, 2021: 73). In other words,

if timeliness is low, disaster relief and welfare support activities may become ineffective.

Seventh, the resilience of disaster victims can be strengthened by devising measures to develop the role and capacity of the local community and active participation of local residents. The satisfaction and effectiveness of disaster relief and welfare support activities for disaster victims can be increased by increasing the disaster management capabilities of local communities and residents. And it will help to strengthen the resilience of disaster victims (Kim and Lee, 2021: 73). For disaster relief and welfare support activities for disaster victims, local communities should have quick access to effective response and recovery at disaster sites. The central government should provide comprehensive support at the national level, such as disaster prediction, stockpiling of disaster management resources, and support for project costs, and focus on the role of blocking unnecessary central government intervention and complementing the local community. And in order to increase the active participation of the residents, the local community should create a path through which citizens can directly participate.

Eighth, it is desirable to prepare a plan to improve disaster resilience by reducing disaster vulnerability. The greater the disaster vulnerability, the greater the impact of the shock and the more resources required to recover. By increasing investment in vulnerable groups, areas and facilities, while managing risk, disaster resilience across society can be improved. Disaster management policies need to give priority to vulnerable groups, regions, and facilities.

Ninth, it is necessary to design an integrated disaster management organization in the form of an overlapping structure that can respond externally while maintaining the internal efficiency of the organization. Even if the current threat factors and types are similar, they have different shapes and patterns at the time of disasters, and it is difficult to accurately predict the impact and scope through interaction. Using the hierarchical organizational structure that characterizes the modern administrative system to respond to various crises singly and clearly is extremely dangerous and inefficient (Lee, 2018: 35). Therefore, the importance of activities in each stage of crisis management is as follows. In the prevention/mitigation stage, policy coordination and policy evaluation, cooperation network and education and training in the preparedness stage, support/adjustment and situation management in the response stage, and damage investigation, support and disaster evaluation and performance evaluation activities were identified as important in the recovery stage (Lee, 2018: 34-35).

6. Conclusion

It is important to suggest measures to improve disaster resilience in the era of climate crisis. In the era of climate crisis, the intensity of disaster damage is severe, the range of damage is wide, and new types of disasters will occur due to the effects of the climate crisis. The climate crisis differs in the severity of the disaster's impact on rich and poor countries. And even within a country, the polarization of disaster vulnerability will show that the rich and poor have different effects of disaster damage. Disaster-vulnerable groups with physical, mental, linguistic, geography, social, economic, and cultural vulnerabilities are inevitably less resilient to disasters. There is a need for a way for people with disaster vulnerabilities such as the disabled, the elderly, children, women, low-income groups and foreign migrants to return to being healthy members of the local community.

After a mega-disaster, many disaster victims not only suffer PTSD, depression, and suicide, but also experience serious damage to their property, falling into poverty and hunger. It is almost impossible for an individual to overcome such severe disaster damage. In order to overcome disaster resilience in the era of climate crisis, it is necessary to strengthen resilience at the individual level, but it is also important to make institutional efforts to strengthen disaster resilience at the local community level.

When managing mega-disasters that occur frequently in the era of climate crisis, some suggestions to increase disaster resilience can be presented as follows. First, it is necessary to newly find and establish the core system, including value, institute, leadership, devotion, expertise to manage disasters in the climate crisis society that has emerged as a new normal society.

Second, in order to effectively overcome mega-disasters in the era of climate crisis, it is necessary for various stakeholders in the public and private sectors to participate in the decision-making and activities of the mega-disaster management system.

Third, the community is required to have the economic capacity to secure the resources to enhance disaster resilience.

Fourth, it is necessary to create a long-term effective permanent cooperation platform between different social systems.

Fifth, it is necessary to establish the socially embedded disaster management system with disaster resilience for overcoming the impact of mega-disaster.

Sixth, it is possible to improve disaster resilience by increasing disaster relief and welfare support activities for the resilience of disaster victims.

Seventh, the resilience of disaster victims can be strengthened by devising measures to develop the role and capacity of the local community and active participation of local residents.

Eighth, it is desirable to prepare a plan to improve disaster resilience by reducing disaster vulnerability.

Ninth, it is necessary to design an integrated disaster management organization in the form of an overlapping structure that can respond externally while maintaining the internal efficiency of the organization.

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Profile

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