International Journal of Advanced Culture Technology Vol.11 No.2 196-201 (2023)
DOI https://doi.org/10.17703/IJACT.2023.11.2.196

IJACT 23-6-22

Army Future Experts' Prediction about Near-Future Climate X-event

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Abstract

The future is complex and unpredictable. In particular, it is unlikely to occur, but once it occurs, no one knows how it will affect our society if X-event, which has a tremendous impact, is created. This study was conducted only in the climate field to offset the ripple effect of this X-event, and was conducted through in-depth interviews with experts from the Korea Army Research Center for Future & Innovation and the Army College. As a result, it was possible to explore what factors would trigger X-event from their discourse and what X-event would be newly created by spreading them to other fields. Starting with this study, if we accumulate the discourse of experts in various fields such as population, science and technology, as well as climate, and other fields other than the Army, we can predict X-event and offset the threats that may arise.

***Keywords**: X-event, Climate, Global Warming, Food Shortage, Conflict, Korea Army Research Center for Future & Innovation, Army College.*

1. INTRODUCTION

In addition to global warming, abnormal weather such as cold weather, heavy snow, torrential rain, and drought are occurring more frequently and stronger. As a result, there are problems that have not been predicted not only for human and property damage but also for health and environment [1]. In this regard, NATO Secretary-General Jens Stoltenberg designated the climate crisis as a security threat at a 2021 foreign ministers' meeting [2]. In fact, according to a study by Stanford University in the U.S. published in June 2019 in Nature, climate has caused 3-20% more disputes over the past century and the likelihood of disputes caused by climate change will increase further in the future [3]. As you can see in the <Figure 1>, glacial decline due to rising temperatures is a phenomenon caused by climate change that still occurs.

Manuscript received: May 4, 2023 / revised: May 15, 2023 / accepted: June 5, 2023
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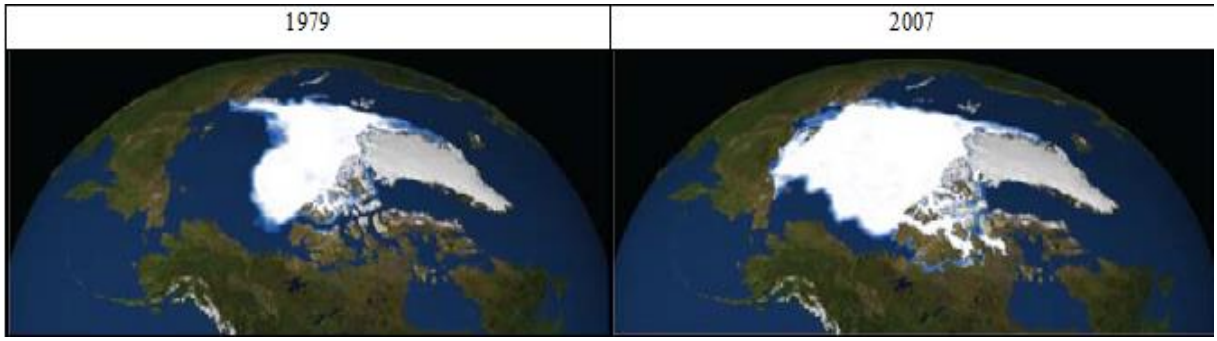


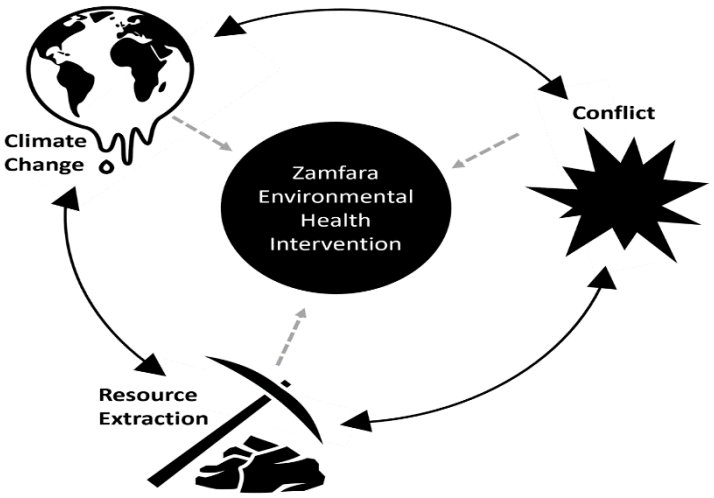
Figure 1. Arctic Sea Ice Annual Minimum

To comprehensively address climate crisis challenges, understanding the theoretical foundations of X-events is crucial. However, there is a significant gap in the existing literature on X-event theory, limiting our ability to establish robust frameworks and comprehend their significance in the context of climate change research. Therefore, our primary objective is to conduct a comprehensive theoretical study on X-events and their implications. Through examining their characteristics, causes, and consequences, we aim to contribute to proactive crisis prevention and mitigation strategies related to climate-induced X-events. To achieve this goal, this study was conducted through in-depth interviews with experts from the Korea Army Research Center for Future & Innovation (KARCFI) and the Army College, a professional organization that studies the future to explore the emerging threats from such a climate crisis.

2. X-event's Theoretical Study

The biggest feature of the future is 'uncertainty'. This is because it becomes more and more complex and diverse, and there are various factors that affect the future. X-events are surprising events capable of killing millions, if not hundreds of millions, of humans happen. Moreover, even without huge loss of lives, capital stock is decimated, setting back development worldwide for decades. Each of these events is what has come to be called recently an "extreme" event, or Xevent for short. X-event refers to events that are difficult to predict and unlikely to occur amid such uncertainties, but when they occur, the event itself is very surprising and has great ripple effects such as life, loss of territory, and emotional chaos [4].

COVID-19 is a representative climate-related X-event that has occurred recently. As such, X-event has a tremendous ripple effect, so various studies are being conducted domestically and internationally to predict it. Even if the X-event is triggered in a specific part, it is amplified by the overall threat of the system due to direct and indirect effects. In order to respond to such a variable and complex X-event, it is necessary to explore and converge on mid- to long-term future threats beyond short-term responses [5]. Methods of exploring X-event include literature exploration, expert interviews, and Internet data surveys. In particular, the goal is to develop a better understanding of 'unknown' to establish a type of early warning system for new types of extreme situations such as war or political and economic crises and to establish preemptive countermeasures [6]. Also, There is mounting evidence that conflict, climate change, and resource extraction are not only related, but fuel each other <Figure 2>.



Source : Global Health (2022).

Figure 2. Climate change, conflict, and resource extraction

3. Analyst Ratings for Climate-Related X-event

40 experts from the KARCFI and the Army College conducted in-depth interviews with Big Question, "What climate-related X-event can emerge in the near future?" In order to convey the purpose of the study to them and ensure sufficient research time, a video conference was conducted two weeks before the in-depth interview and a big question was delivered. As a result, they gave off various ideas, and the researchers boldly fused and combined similar contents and organized them into 31 as shown in <Table 1>.

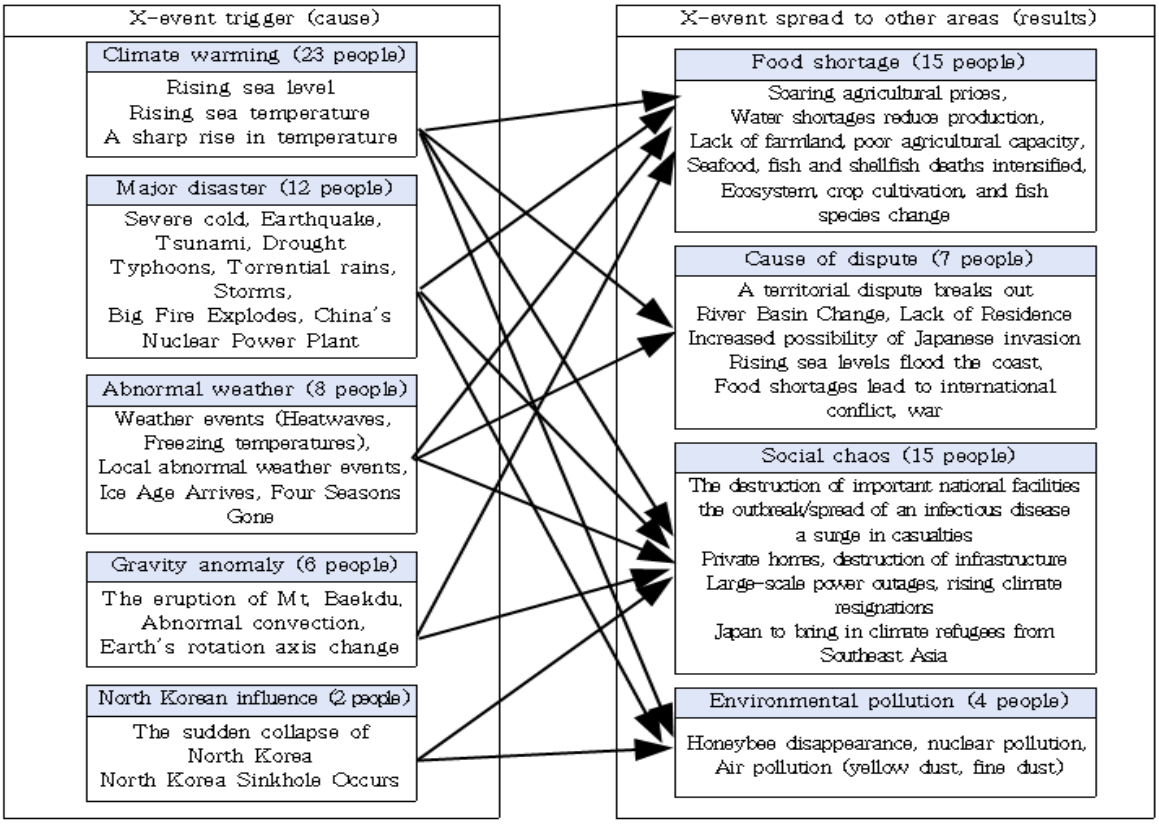
Table 1. Summary of expert Opinions

Classification	Survey Results	Classification	Survey Results
1	Global warming reduces agricultural capacity, water shortages, Food shortages due to changes in vegetation (5)	16	The eruption of Mt. Baekdu caused crop damage, famine, mass refugees, military conflicts, and nuclear use.
2	Rising sea levels affect agricultural production and Residential Insecurity Caused	17	Large-scale natural disasters due to global warming.(Drought, desertification, forest fires, typhoons, heat waves) Occur (4)
3	The eruption of Mt. Baekdu causes disasters and local abnormal weather (2)	18	The explosion of Mt. Baekdu threatens the security of the Korean Peninsula, unusual weather (3)

4	Global warming intensifies the death of seaweed and fish and shellfish, and changes in crop cultivation.
5	Global warming paralyzes society due to food shortages, infectious diseases, social infrastructure collapse
6	Due to rising sea levels caused by global warming, Territorial and territorial disputes arise (3)
7	Rising Sea Levels Increase the Possibility of Japanese Invasion
8	Large-scale power outages caused by heat waves, freezing temperatures
9	Rising sea levels flood private homes, near sea level the destruction of important national facilities
10	Tropical storm, torrential rains send agricultural prices soaring, victims
11	The outbreak and spread of infectious diseases caused by warming (3)
12	Water shortage due to drought, large fires, food shortage (2)
13	Heavy rain paralyzes infrastructure, casualties surge
14	Increased occurrence of abnormal climates such as earthquakes, droughts, and tsunamis (3)
15	Heavy rains cause North Korean sinkholes, causing chaos in North Korea.
19	The four seasons disappear and are divided into hot and cold climates, resulting in water/food shortages and ecological changes (2)
20	Ice Age Arrives Due to Explosion of Mt. Baekdu
21	Climate refugees from Japan, Southeast Asia flow into the Korean Peninsula due to rising sea levels
22	The collapse of North Korea has left industrial facilities and energy infrastructure unattended or destroyed without permission, accelerating environmental pollution.
23	Crop cultivation is not possible due to severe air pollution (yellow dust, fine dust).
24	Due to lack of food due to climate change, an international conflict
25	Due to natural disasters, human resources, terrorism, etc. Nuclear pollution in Korea by exploding Chinese nuclear power plants
26	Global Warming Disappears Honeybees, Food War breaks out
27	Abnormal convection frequently
28	Only two seasons exist due to climate change, life changes (2)
29	A sudden rise in temperature that changes the ocean current
30	Climate resignation to quit jobs due to climate crisis
31	Changes in fish species due to changes in the Earth's axis of rotation

Looking at the expert opinions summarized in <Table 1>, it can be seen that one climate-related X-event trigger (cause) spreads (results) to X-event in various fields. In other words, there are various X-events in the ideas expressed by experts at the KARCFI and the Army College. Accordingly, in order to explore climate-related X-event, the researchers extracted major keywords from <Table 1> and grouped them into causes and effects, and the results are shown in <Table 2>.

Table 2. Extracting and grouping key keywords from experts' opinions



As a result of grouping expert opinions, the cause of the X-event trigger was "climate warming" by a number of opinions, followed by "food shortage" and "social confusion" spread by the triggers, followed by "troubles" and "environmental pollution." In particular, the trigger was climate-related X-event, but the results spread not only to climate, but also food and housing, but also to international conflicts, war outbreaks, infectious diseases, honeybee disappearance and nuclear pollution. In addition to the climate-related X-events that many people expect, various X-events that can be caused by unexpected factors such as North Korea's sudden collapse, North Korea's sinkhole, and China's nuclear power plant explosion have also been presented.

4. Conclusion

In this study, climate-related X-event was analyzed, and the characteristics of complex, diverse, and continuous X-event that one X-event can be a trigger and cause various other X-events were confirmed. Through this study, it is also important to come up with measures to cope with food shortages or social chaos that many experts predicted as climate-related X-event, but X-event research in various fields is needed to explore X-event that may occur in unknown areas. The findings of this study emphasize the need for proactive measures and strategies to enhance our preparedness and response capabilities in the face of X-events. As uncertainties in the future continue to increase, understanding and anticipating the occurrence of X-events will contribute to safeguarding lives, territories, and societies from their far-reaching impacts. Starting with this study, if X-event research in other fields such as population and science and technology and X-event research

in other groups other than the Army are followed, various opinions will be gathered to generate other ideas to prepare for the extreme situations that X-event can bring and escape the threat.

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