Examining the potential role of constellation in natural hazard management

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Abstract

The concept and potential role of constellation such as the position of stars, has not been rigorously examined yet in the field of natural hazard management. The goal of this study was to comprehensively study the potential role of constellation on the occurrence of natural hazards. Qualitative content analysis was the major methodology utilized in the comparison of constellation as an unreliable tool and the other, as a supplementary aid that could predict the occurrences of natural hazards, in the viewpoints of four stakeholders, namely, interested professionals, developed communities, developing communities and international organizations.

The key tenet of this study was that the four stakeholders must recognize the role of constellation as a supplementary aid when addressing networking, science and education, among others. This research examined the issue of constellation for natural hazard management as a pioneering study.

Keywords: Astrology, religion, indigenous knowledge, regional culture, psychology.

Introduction

Various natural hazards (also known as natural disasters) such as typhoons (hurricane or cyclone) accompanied by flood, earthquakes with tsunamis, drought, wildfires, sinkholes, mudslides, volcanic eruption, snowstorm, yellow dust phenomenon and desertification continue to occur regardless of national boundaries, many due to environmental changes[15,17]. The term 'disaster' etymologically came from the Latin word 'aster,' which means star[41]. Therefore, the occurrence of a natural disaster, to some, could mean an unfavorable sign or manifestation from a star to the human society.

The concept of 'as above, so below' or 'interconnectedness' means that while the motion of stars in the sky is changing, it influences the mechanism of the Earth and then indicates or triggers the occurrence of terrestrial events such as natural hazards[40]. Similarly, since the sky is part of the Earth's landscape, then the sky, including the stars, is not separable from nature. Therefore, constellation may tell many significant indications about the occurrence of natural hazards that may be valuable to human beings.

Some communities have developed information and knowledge on the relationship between constellation and natural hazards via songs, poems, or oral literatures[26]. If constellation can signal something about the occurrence of a natural hazard and this message is missed by a particular community, then it is a lost opportunity and as such, the impact of the disaster could be huge. In fact, there are some related cases as summarized in table 1.

Moreover, although information on constellation may be valuable in the fight against natural hazards, it will be useless if a community does not recognize it as an effective tool[48] that can help them prepare or curb the impact of disasters. With this thought, the research question or focus is how the role of constellation should be considered in the field of natural hazard management.

The study aims at improving the recognition of the role of constellation in the fight against natural hazards, thereby promoting effective disaster management. Consequently, this minimizes human loss, economic damages and psychological impact in the international community. In doing so, two kinds of viewpoints are examined: (1) constellation as an unreliable tool and (2) constellation as a supplementary aid. The viewpoints of four stakeholders, namely interested professionals, developed communities, developing communities and international organizations have been compared. The main finding and recommendation is that all four stakeholders must recognize the role of constellation as a supplementary aid in the field of disaster management.

Review of Literature

Constellation is referred to as the configuration of stars or stellar asterism. It is not limited to only stories about celestial objects or the sky. Rather, constellation means a quest in identifying the nature of celestial objects[4,52]. Thus, the concept of constellation is not only about the movement of stars or related changes in the sky, but also about how these changes can be understood and taken advantage of in other fields of studies such as disaster management. Throughout history, constellation has been connected to many phenomena and circumstances such as birth and destiny, agriculture, outbreak of pandemic diseases and even manmade emergencies[24]. It also relates to astrology, religion, indigenous knowledge and psychology. In this study, the focus is constellation and how it relates to and can be taken advantage of in the field of natural hazard management.

By examining not only stars but also angles, signs and placements on the chart, astrology interprets what will happen to human life[5].

Table 1
Examples of constellation (particularly of the moon) toward natural hazard

Natural hazard	Constellation-related information
- Volcanic eruption in Tambora, Indonesia in 1815	- During new moon, the majority of volcanic eruption happens (Pluto is related to volcanic eruption, while Neptune is related to gases). Such as, volcanic eruption occurred in Tambora on April 10, 1815 and thus about 12,000 people were killed. In 1816, about 80,000 people died eventually because of diseases and starvation.
- Flood in the Netherlands in 1953	- While Saturn is being conjunct with Neptune, the effect of lunar eclipse remains for a certain period. On January 29, 1953, the eclipsed full moon was visible in Netherlands. On January 31, strong wind was formed and then caused flood. The number of human loss was 1,835.
- Volcanic eruption in Mount Nyiragongo, Congo in 2002	- Due to the uneasy relationship between lunar cycle and fires under the ground, the volcano around Congo's Mount Nyiragongo was erupted in February, 2002. As a result, dozens of residents in Goma were killed.
- Tsunami in Indian Ocean in 2004	- During lunar eclipse (or when the midpoint between Mars and Neptune is 25 degrees Virgo), violent tsunami occurs. On December 26, 2004, the tsunami killed more than 250,000 people.
- Earthquake in Tohoku, Japan in 2011	- During new moon or full moon, the level of tidal stress is very high and thus many tiny rocks are ruptured. Accordingly, big earthquakes occur including the Tohoku earthquake (magnitude 9.0) in 2011 where about 27,000 people lost their lives.
- Rain fall in Africa in 2023 - Halo of the moon in Africa in 2023	- Crescent moon, which faces upward, indicates rain fall in the next 3 days in many places to include South Africa, Zambia, Malawi and Zimbabwe. - The rise of new moon with its halo means heavy rain in next 3 days in many places such as South Africa, Tanzania, Malawi, Zambia and Zimbabwe.

Sources: Weehuizen[53], Ide et al[23], Jiri et al[25], Rice[42], Brown University[6], Paparrizos et al[39].

Due to the importance of agriculture in early days or even now, astrology has dealt with the occurrence of natural hazard. It is very hard to make a generalization on the combination of astrology indexes, because astrology utilizes degrees of stars, retrograde of stars, conjugation with other stars, house placements, magic, timing and other elements on the chart. At any rate, by comprehensively considering the effects of stars, astrology as a soul map predicts the future to include the occurrence of natural hazard.

Astrology has interacted with other disciplinary areas, particularly throughout the European history. Astrology was considered as a kind of science during the Renaissance period. In doing so, astrology has come to coexist with other fields of knowledge[46]. Among many, cosmography (a science of mapping the characteristics of universe), sorcery (or magic), physiognomy (a study of examining facial expression for the goal of identifying the ethnic origin) and palmistry (or chiromancy) have exchanged information and knowledge with astrology.

The concept of constellation has spread over the world since ancient times[36]. Depending on ideologies in each region, such as religion the extent of relying on constellation varies. In the case of Islam, Muslims consider the importance of scientific astronomy in their services while condemning astrology. Specifically, Islam has not put significance onto using the concept of supernatural constellation to prepare for a natural hazard, in general.

Hinduism developed its own system on the concept of constellation. For example, the regard for constellation is reflected in Hindu people's names, holidays, calendar and others. In doing so, many followers in Southern India believe in the close relationship between the heavenly body and the occurrence of a natural hazard[54]. Also, Hinduism has made efforts to apply the concept of western science to its beliefs on the role of constellation.

Christianity basically looks at the occurrence of a natural hazard as an act of God according to the Bible and also believes that God created the stars. However, the support of Christianity has changed much throughout the years[51]. Christianity considered and used constellation during the Renaissance period as well as the period of its early days. During medieval times though, Christianity had little support or use for constellation. To date, many Christian followers do believe in constellation or its impact to society.

While considering the occurrence of natural hazard as a test from Allah according to Quran, the Muslims strongly believed in astrology during the Middle Ages[2]. Nonetheless, Quran and the prophet Muhammad did not maintain that the people should be fatalistic to the occurrence of natural hazard at all. In addition, many Muslims traveled around desert regions during night and thus they came to rely on star movements for journey guidance. At the same time, the Muslims happened to depend upon celestial bodies for determination of pray times.

Buddha taught that an individual's life is decided by Karma (emanation, spirit, or aura, which determines individuals' next life) and not by constellation or its impact on natural hazards[7]. During his time, he discouraged monks from

practicing astrology. Since his death, however, Buddhism has come to support constellation in diverse counties. Similarly, many monks have practiced or used constellation against natural hazards, with the support of folk beliefs.

Indigenous knowledge is often called traditional knowledge, local knowledge, or regional culture. Indigenous knowledge refers to know-how, which has been accumulated in the region throughout generations. It includes information on constellation as well as that of animals, plants, clouds, sky colors, wind and others. Some generations have contributed to re-affirming how constellation is associated with their physical environment.

While many indigenous places are experiencing environmental changes, they have often observed autonomy or self-governance in fighting against natural hazards[21]. To this point, indigenous people have exercised their knowledge on the concept and role of constellation by keeping up the pace with regional politics or State-sponsored programs. Some indigenous people are successful in preserving their beliefs about constellation, whereas others are not.

Shamanism in various regions has relied on constellation, while predicting the occurrence of a natural hazard[20,29]. Nostradamus predicted the occurrence of earthquakes in the 21st century by referring to constellation. In a similar token, many shamans in Far East Asia including Korea, China and Japan have done past rituals to foretell the occurrence of a natural hazard by utilizing constellation even now.

The reliance on constellation via shamanism (also known as psychological astrology) plays a role psychologically in supporting many individuals[3,32]. By referring to constellation, those individuals can do a self-assessment and then can help to cope psychologically, when dealing with the impacts of a natural hazard. In many countries including the United States (U.S.) or other developed nations, the number of people who believe in fortune telling has not decreased since 1970s[22,49].

Further on the topic of constellation, not many researchers have systematically studied its status or related implications in the international community, although the number of researchers is increasing[13,35,45]. However, none of them have approached the concept and role of constellation in the field of natural hazard management.

Material and Methods

Research design: Research design is to locate, identify, evaluate and summarize a whole body of appropriate literature, while reducing the extent of bias about the topic of constellation in natural hazard management[16,50]. Research design (referring to fig. 1) included many important design factors such as a research question, the scope of research, variables, categories, flow direction, or else. In particular, qualitative content analysis was the main methodology used in this study, when reflecting that it made all efforts to identify appropriate texts and then flexibly interpreted them. This research design was formed at the beginning of research and revised continuously.

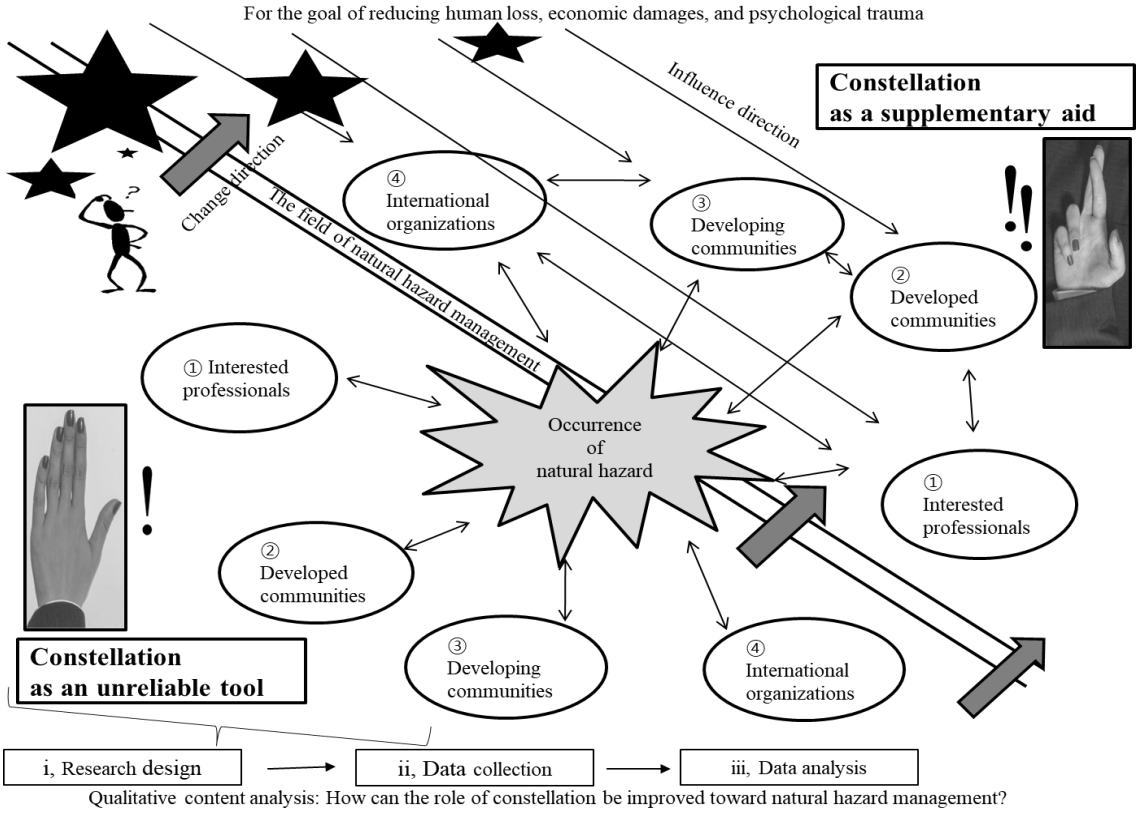

Fig. 1: Research design

Data collection: Several internationally known search engines, Google Scholar, ScienceDirect, Oxford University Press, EBSCOhost (ASC) and others were utilized to search texts. The keywords used for the search engines included 'natural hazard and constellation,' 'natural hazard and astronomy,' 'natural hazard, religion and astrology,' 'natural hazard and indigenous knowledge,' 'indigenous knowledge and constellation,' 'constellation and psychology,' 'fortune tellers as psychologists,' 'astrology and developed communities,' 'astrology and international organizations,' and 'astrology and professionals.' Further, various countries as part of the international community were covered, as far as possible.

A major criterion of including or excluding a specific text was whether it would be clearly related to constellation and natural hazard or not[30]. As such, when a text discussed many things about constellation and natural hazard, it was included into this study.

Data analysis: An unreliable tool refers to technique of guessing constellation implications, whereas a supplementary aid means to support individuals with the issue of constellation[18]. Each person has guessed differently or inconsistently, but a supplementary aid has been considered as a critical element in the field.

This study was to systematically compare the role of constellation as an unreliable tool (! = without interaction among components) with that as a supplementary aid (!! = with interaction among components) (these two roles were considered as analytical categories during data coding) via the same four variables (as units of analysis), namely interested professionals, developed communities, developing communities and international organizations. Above four variables or components were chosen based on the extensive literature view. Namely, those four came to include all key actors in the field of international emergency management.

To elaborate, each four variable has own reason to be selected here in particular on the way to include all major stakeholders on the role of constellation[14]. Interested professionals at personal level are the parties concerned who are directly dealing with the role of constellation as occupations. Both developed communities and developing communities address major communities in terms of local community level. International organizations are not national unit but multi-national efforts. Namely, those four variables comprehensively include individuals, various communities and multi-national cooperation towards the role of constellation.

Results and Discussion

Constellation as an unreliable tool in natural hazard management

Interested professionals: Not many professionals use the concept of or principles on constellation when dealing with natural hazards, partially because the role of constellation requires the combination between facts and human intuition[9]. Nevertheless, just a few professionals feel responsibilities to guide the humans by relying on the role of constellation. For instance, astrologers use star charts as tools to predict the timing or occurrence of natural hazards[28]. In other cultures, shamans also predict the occurrence of natural hazards. Both professions employ nontraditional science or means.

Other professionals such as astronomers and seismologists have considered the role of constellation to some extent via their scientific equipment. Astronomers as physicists, also research the area of astronomy. In doing so, some astronomers, in certain occasions, are able to predict the occurrence of various natural hazards[55]. At the same time, only a few seismologists use constellation to predict the occurrence of earthquakes, tsunamis, or volcanic eruption.

Developed communities: The U.S., as the most economic nation continues its efforts toward the prediction of the occurrence of natural hazards by allocating and spending a huge amount of funds via the U.S. Geological Survey (USGS) (e.g. earthquakes and other geologic hazards), the National Oceanic Atmospheric Administration (NOAA) (e.g. hurricanes, tornados and climate change) and other private institutions. With regard to constellation, these institutions have looked into using cutting-edge technology or employing astronomy such as satellite-based geospatial techniques, disaster risk index, all hazard monitor and others.

Nonetheless, above fact does not mean that those U.S. institutions have made similar efforts to interpret the astrological aspect on constellation. In general, those institutions consider the role of constellation to be an unreliable tool toward natural hazard. Similarly, although there are some published materials (in various languages) about how Native Americans in Alaska manage natural hazards, nothing exists on natural hazards and constellation[8].

Some native Australians regard constellation as part of their culture[19]. As such, specific lunar phases (full moon or new moon) for 1 day or 2 consecutive days for them could mean high tide. Further, the appearance of bright comets in the sky suggests the occurrence of drought. Celestial connections indicate seasonal change, while a specific star or star group is rising. Accordingly, native Australians reflect the importance of constellation through their traditional rituals or ceremonies.

Developing communities: The concept and role of constellation has been widely supported in many communities in South Asia. For example, the majority of Indians strongly believe in the importance of constellation regarding the occurrence of natural hazards. As evidence, many areas have training programs toward constellation. Indian rulers have traditionally relied on constellation before

or when they make decisions. Many astrologers even now are considered as educated intellectuals and thus, are respected in communities.

In South America, the Chipaya people in Bolivia have usually monitored constellation to predict the occurrence of natural hazards, while discerning what species they have to plant or where they have to plant in their land. Some South American communities consider the knowledge of constellation to be sacred or a secret and so they are not open to share this knowledge. Hence, the transfer of knowledge in their communities is usually through their descendants via oral communication.

In Africa, many developing communities use the concept of constellation. The people of Botswana believe that the movement of stars from west to east during a clear night indicates heavy rain in the next 3 days, similar to cases of Malawi, Swaziland, Zambia and Zimbabwe. However, that kind of constellation information has not been well documented[27]. As a result, when senior citizens who hold the knowledge or information on constellation pass away, such knowledge is lost.

International organizations: The United Nations (UN) also continues with its efforts to mitigate the impact of climate change in the international community. Some sub-organizations such as the UN International Strategy for Disaster Reduction (UNISDR), UN Educational, Scientific and Cultural Organization (UNESCO) and UN University have done some partial research on the concept of constellation, while also studying indigenous knowledge[37].

Moreover, many international non-governmental organizations (INGOs) have also done some activities to support indigenous people's right in the international community, including their beliefs around the concept and role of constellation[57]. Examples include the International Working Group for Indigenous Affairs, the Survival International, the Cultural Survival, the Regional Indian Council of Cauca and the World Council of Churches. Other international programs have been set up and also support the concept of constellation for the field of natural hazard management. One example is the Disaster Monitoring Constellation (DMC), which was initiated by China, United Kingdom, Spain, Turkey, Nigeria and Algeria. The DMC is tasked to provide daily constellation image and related capacity or resources for partner countries. At present, DMC provides about 5% of constellation images without charges[38].

Constellation as a supplementary aid for natural hazard management

Efficient disaster management is crucial in sustaining order in the global village including the fields of trade, labor, capital and technological advances[43]. Apart from the usual traditional tools employed in disaster management, the concept and role of constellations are emerging. For this reason, the viewpoints of stakeholders, namely interested professionals, developed communities, developing communities and international organizations, on the subject have been compared.

Further, the stakeholders will benefit from approaching the concept and role of constellation as an opportunity for cross-cultural collaboration and appreciation of cultural differences[12]. Various ideas related to constellation and natural hazard management should be welcomed and evaluated, instead of being outright rejected. Table 2 considers some alternatives or recommendations on the subject.

Science is defined as the intellectual and practical efforts, which systematically addressing behavior and structure of physical world by relying on experiment as well as observation. Without fully utilizing science, any professional field would face with tremendous difficulties to achieve own goal[10,44]. However, it does not mean that science is flawless. Even though science is very useful, it may not be considered as a panacea. Thus, the interaction between science and the role of constellation (as a supplementary aid) is urgently needed. The interaction between science and constellation is not linear but very complicated process via independence, conflict, dialog and integration[1].

Table 2
Major alternatives on constellation as a supplementary aid for natural hazard management

Stakeholders	Alternatives and recommendations
Interested professionals	- Astrologists, shamans, astronomers, seismologists and the like must be more responsible and must exercise more care as they share their knowledge and guide people on how to potentially benefit from understanding constellation and natural hazards.
Developed communities	- Not only USGS and NOAA but also other national communities need to invest more funds and policies to examine and interpret the astrological aspect of constellation regarding the occurrence of natural hazard.
Developing communities	- Many developing communities in South America and Africa are encouraged to fully document constellation information toward natural hazards, like in the case of communities in India.
International organizations	- UN sub-organizations, INGOs and other international programs need to focus on the role of constellation regarding the occurrence of natural hazards, as a particular focus or priority.

For the goal of natural hazard management, it is inevitable for all four stakeholders to address the extent of dialog and integration between science and constellation while decreasing independence and conflict between them. Without scientific support, the role of constellation could not be fully recognized and thus fails to get its location in the field.

As one of the highest science levels, all four stakeholders may use the role of space technology to fight against natural hazards. While utilizing cutting-edge space technology, related researches or scientific equipment will not be influenced by the impact of natural hazard on the Earth. Rather, space technology can play a role in providing extensive information on constellation for the global community and thus will contribute to the management of natural hazard in a timely manner.

On the way to jumping into a supplementary aid, all four stakeholders in each region will use native languages as well as an official language(s)[33]. For the goal of documenting or researching the role of constellation, they should initiate to communicate with local residents via a series of field work. After that, they need to study any archive in the region containing indigenous knowledge. In short, language archives (either oral or written) must be a good source of tracing the role of constellation in various regions.

When possible, all four stakeholders need to make databases on the role of constellation[47]. As successfully setting up appropriate databases, the use of constellation information will be dramatically increased. Also, more individuals, organizations, or nations will participate in observing, collecting, recording and disseminating information on the role of constellation. Therefore, those databases will be considered as another source of scientifically tracing constellation.

Disaster management consists of four phases, namely disaster prevention/mitigation, preparedness, response and recovery. Among them, disaster mitigation is connected to constellation. As such, constellation-related information or signals can be coursed through this phase for evaluation and potentially to warn or benefit communities. Additionally, the role of constellation is connected to disaster preparedness. With related information, community residents can undergo training on disaster preparedness and on emergency operations planning.

All four stakeholders need to integrate the concept of constellation into natural hazard management education[56]. Similarly, a subject on constellation in higher education curriculum may be considered. In doing so, higher education will become a key agent in spreading the significance of constellation or how it can aid in natural hazard management.

In general, future public agenda is moving from control oriented subjects to diversity based subjects[31]. Control oriented subjects include technical knowledge, information or interests and thus provide accurate foresight and probabilities. Control oriented subjects have been already supported by many individuals in most of the Nations. On the other hand, diversity based subjects include internally dynamic thinking, paradoxes and fluctuation. During these days, some stakeholders begin to seriously examine diversity based subjects.

In fact, all four stakeholders in the field of natural hazard management should directly or indirectly discuss various control oriented subjects such as disaster operations, disaster management organization, disaster management resources, disaster management principles and others. Accordingly, it is time for those stakeholders to further elaborate on the roles of diversity, regional subjects, or dialectic thinking. Namely, they need to address the role of constellation toward natural hazard, as a new public agenda in the field.

Conclusion

This study aimed to extensively delve into how to recognize the concept and role of constellation in predicting the occurrence of natural hazards as the ultimate goal of disaster management. In doing so, viewpoints on the subject (as an unreliable tool and as a supplementary aid/tool) were satisfactorily evaluated. The main finding is that the four stakeholders (i.e. interested professionals, developed communities, developing communities and international organizations) must recognize the concept and role of constellation as a supplementary aid. To do so, they need to implement certain changes and alternatives embracing cross-cultural collaboration, the creation of relevant databases including those on languages other than English and programs on disaster mitigation and preparedness, education and public agenda.

This study possessed many advantages, depending on individual perspectives. Among them, the biggest advantage is that the study has fully focused on the role of constellation to deal with the occurrence of natural hazard. Even though previous researchers have touched upon the topic of religion, indigenous knowledge and others in term of natural hazard, they have not comprehensively examined the role of constellation yet.

Appropriate researchers may further study the role of constellation for natural hazard management. While recognizing that above two approaches have been suggested as a sort of framework here, those researchers will examine detailed factors such as several challenges, minute alternatives etc. and while doing so, the role of constellation will be clearer. The efforts will ultimately contribute to the goal of transnational disaster management.

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