

## 別紙 4

報告番 -	※ -	第
----------	--------	---

## 主 論 文 の 要 旨

論文題目 Risk Management and Early Actions Required against *Dzud* Disaster in Mongolia  
(モンゴルにおけるゾド (*Dzud*) のリスクマネジメントと早期対応の必要性)

氏 名 CHADRAABAL Ariunaa

## 論 文 内 容 の 要 旨

A cold-season disaster in Mongolia, locally known as *dzud*, occurs due to the interaction of climate hazards including summer drought and harsh winter, with socioeconomic vulnerability. Between 1940 and 2015, Mongolia witnessed 12 *dzuds* that ravaged more than half of its territory, with four events (1944–1945, 1967–1968, 1999–2002, and 2009–2010) causing the largest livestock losses.

Due to socioeconomic changes, that is, transition from a socialist system to a free-market economy in the 1990s, the country experienced major *dzuds* in the winters of 1999–2002 and 2009–2010, which killed approximately 12 million (11.6% in 1999–2000, 18.5% in 2000–2001, and 12.2% in 2001–2002 of the total animal population) and 10 million (22%) livestock heads, respectively. The aim of this study was to investigate the social causes of *dzud* by examining *dzud* risk management practices in Mongolia employed during the country-wide *dzud* events in the past three decades since socioeconomic changes. Importantly, the study also

questions whether early actions played a vital role in mitigating a *dzud* disaster by conducting a field survey in one of the northern provinces of Mongolia.

In the socialist era, there was a steady system in which the state managed *dzuds* as a whole and bore all costs arising from the losses. However, the changes and reforms since then have led to a shift from social to personal responsibility as herders are now able to maintain livestock privately, and the quality of state involvement in *dzud* has changed. Therefore, it is necessary to reconsider public measures against *dzud* events.

In addition to climate-driven hazards, socioeconomic and political changes since the 1990s, such as the privatization of the agricultural sector, which collapsed the state provision of veterinary services, winter camps, wells, trucks, and machinery, as well as emergency hay and fodder systems, has severely impacted livestock husbandry in Mongolia.

Although a *dzud* is a “slow-onset” natural hazard that affords sufficient time and opportunity to prepare and implement disaster prevention and mitigation measures, the country has not fully addressed it and continues to experience significant losses. Disaster management efforts aim to reduce or avoid potential losses, carry out response actions (assure prompt and appropriate assistance to affected herders), and achieve rapid and effective recovery.

To fulfill the first objective of the study, a comprehensive review was conducted based on two major reports on *dzuds* during the winters of 1999–2000 and 2009–2010, issued by the Government of Mongolia in cooperation with international organizations. The review demonstrated that weak *dzud* management and a lack of accountability had a significant negative impact on livestock husbandry.

To achieve the second objective of this study, a field survey in Khuvsgul, the northernmost province, was conducted in October 2017. I interviewed 30 herder households to gather information on herders’ vulnerability, resilience, and governmental efforts to prevent and

respond to the *dzud* that occurred during the winter of 2016–2017. Namely, information on herder families, their winter preparations, seasonal movements, and governmental actions taken to mitigate against the 2016–2017 *dzud*, along with household-level data, were collected through structured, open-ended interviews. A field survey examining the effectiveness of *dzud* mitigation strategies showed that early action at the local level plays a vital role in reducing herders' vulnerability, livestock mortality, and *dzud*-inducing damage. Herders' actions in *dzud* preparation and mitigation were found to be heavily dependent on government policies, governmental arrangements, and actions taken by local authorities.

Overall, this work shows that *dzud* is highly dependent on *dzud* risk (or disaster) management activities and can be overcome with less damage if early actions are taken at both the state and local levels. It also provides recommendations for improving *dzud* risk management systems in Mongolia and establishing solid *dzud* mitigation strategies, such as early warning and early actions.