Developing an Early Warning System of *Dzud* (cold-season disaster) in Mongolia

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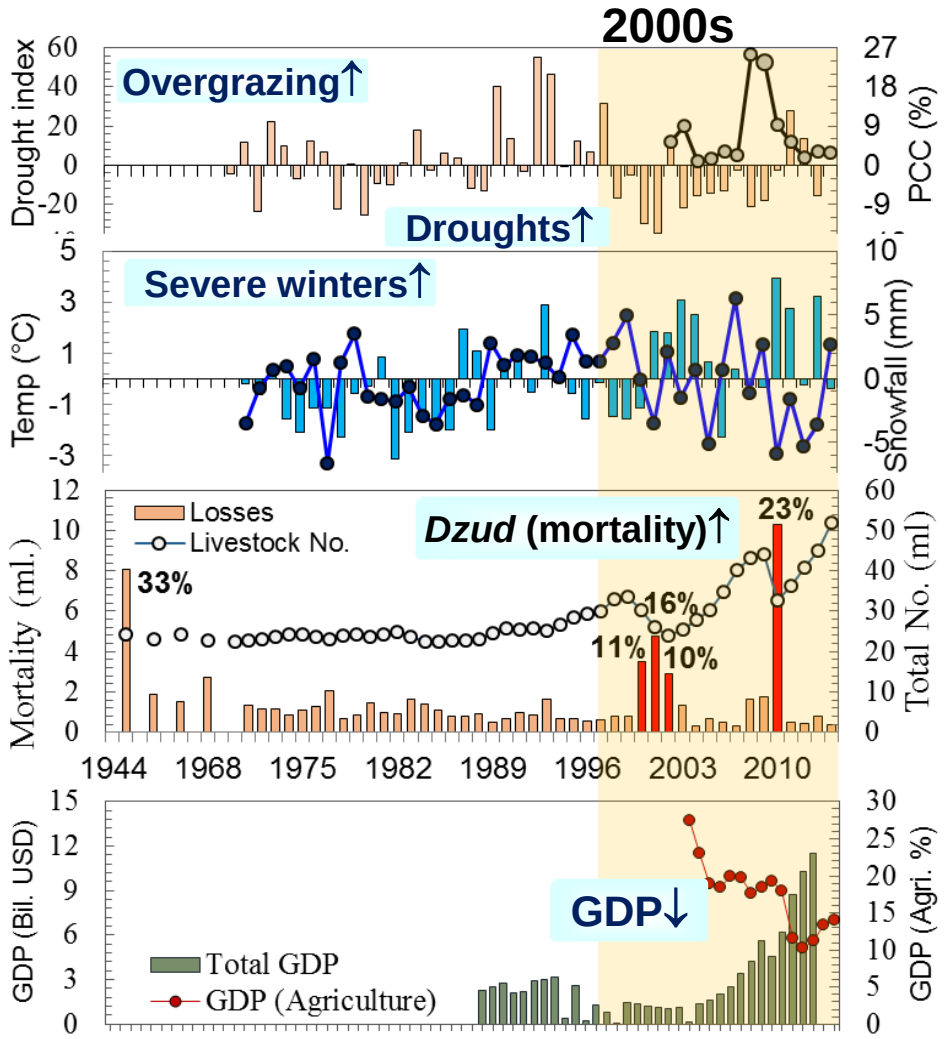
Dzud increasing with worsening effects in the 21st century (climate change & overgrazing)

***Dzud*:** Anomalous climatic & land-surface conditions (snow cover, lack of pasture) that prevent livestock pasture accessibility & availability, resulting in their starvation), thereby causes massive livestock mortality.

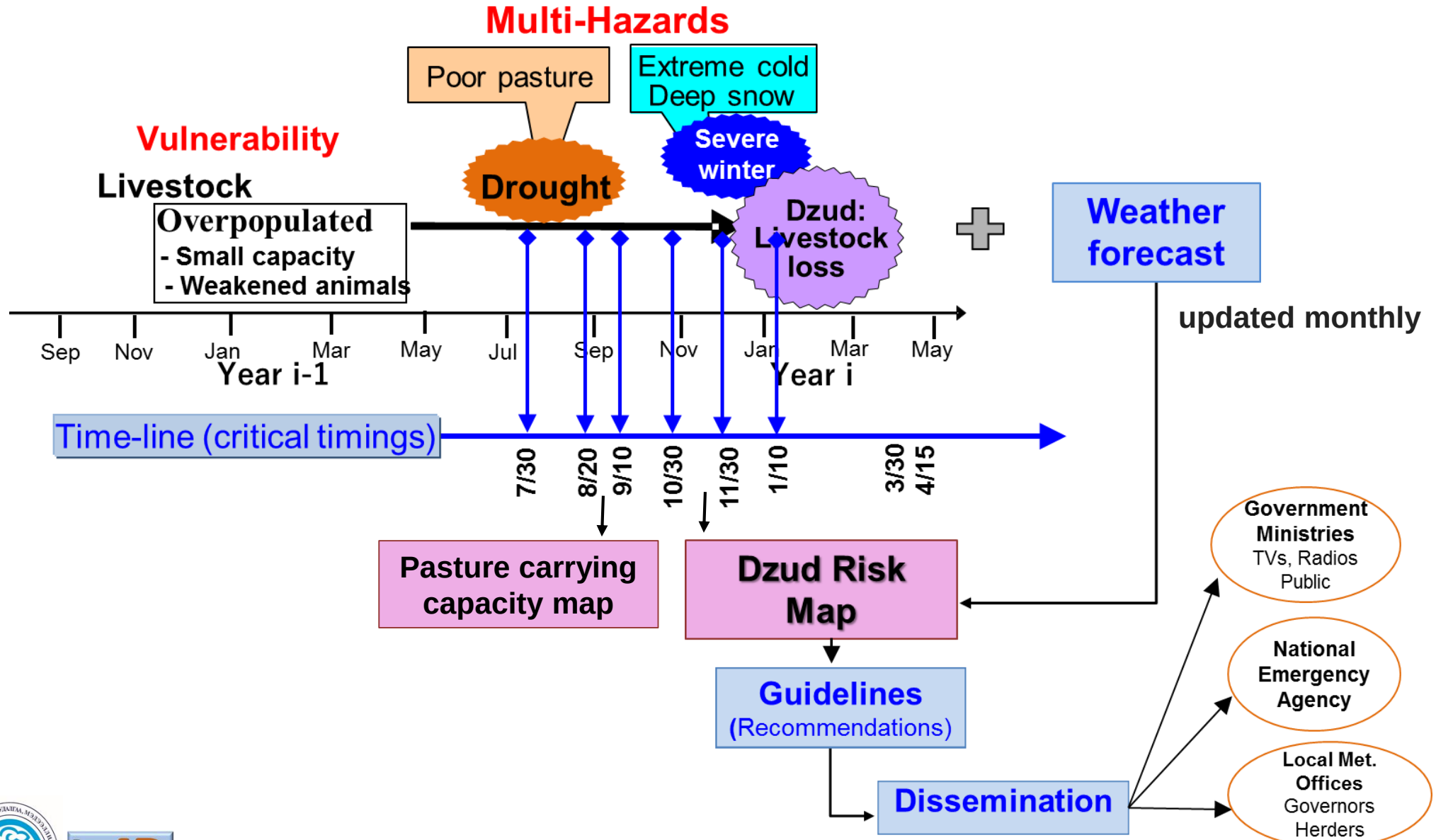
The action seeks to develop a new Dzud Risk Map for early warning system for strengthening Mongolia's capacity for proactive *dzud* management & disaster reduction through early effective preparedness.



Dzuds (2000s) killed 30 million livestock (10 ml. 2009/2010), impacted the national socio-economy (migration, unemployment, poverty).

Nandintsetseg et al., *Nat. Hazards*

Dzud early warning system framework



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Dzud Dust Drought Desertification 4D

DRR in Action:
Early Warning – Early Action

2018 AMCDRR

Achievements and Impacts

DRR in Action:
Early Warning – Early Action

Produced new Dzud Risk Map to predict risky areas
(based on research findings)

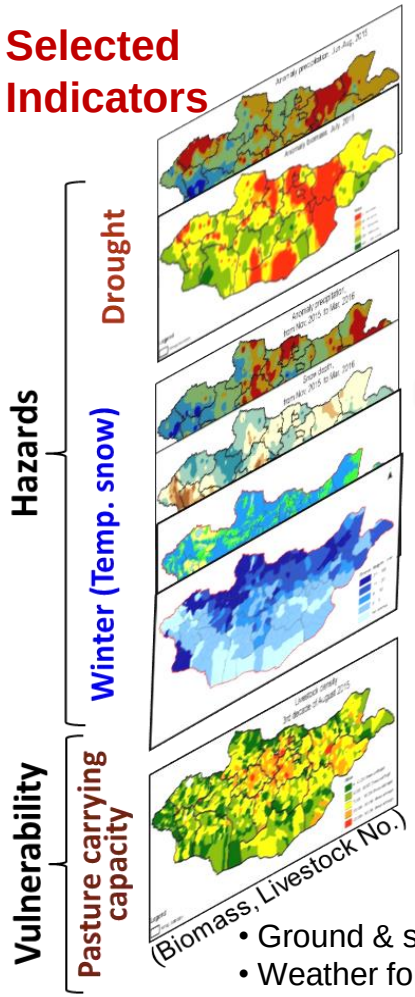
→ **Implemented for dzud EW**

→ **Government took early actions**

→ **Mongolia experienced comparatively low livestock losses in recent winters**

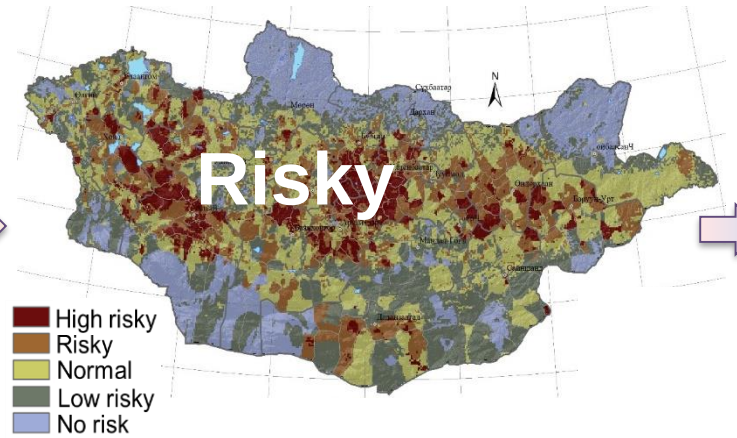
(even though climate-hazards were severe)

Selected Indicators



- Ground & satellite observations
- Weather forecast

Predicted dzud risk
for 2017/2018 winter

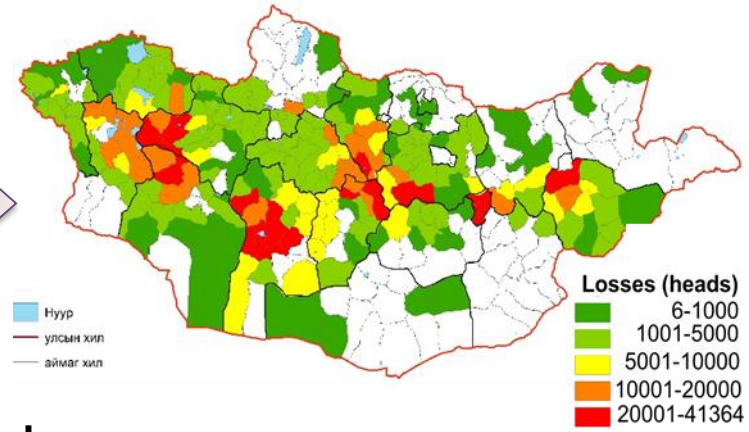


Produced by Information and Research Institute of Meteorology, Hydrology and Environment
Date: **10 Nov 2017**

Early preparation

- **The government allocated fund for preparedness** (Providing/relocating hay/fodder, Coordinating *otor* movement)
- **International organizations** (Red Cross, FAO, UNDP, PIN) Cash transfer, animal care kit)

Livestock mortality
(during 2017/2018 winter)



Mortality:
2015/2016: **1.4 ml.** heads
(**2.5%** of 56 ml.)
2016/2017: **0.3 ml.** heads
(**0.5%** of 62 ml.)
2017/2018: **1.8 ml.** heads
(**2.7%**of 66 ml.)
unofficial data

Learning

- ***Dzuds*:** Half-to-half combination of multi-hazards & man-made vulnerability (animal overpopulation, inadequate preparation). The risk map not yet included (hay/fodder) preparedness (to be addressed soon).
- **Remains a challenge** of displaying quantitative, user-friendly parameter with a fatal threshold (e.g., predicted mortality) on the risk map.
- The dzud-EWS developed under a scientific project supported by Japanese government. In future, it is anticipated that the Mongolian government would support & promote a continuous improvement of this *dzud* EWS.

Good Practice

1. *Dzud* Risk Map: Used as early warning to guide preparation for early action (first attempt).
   - In future applications, the improved EWS provide a useful basis for a proactive disaster management.
2. The risk maps contributed to reduce livestock mortality for recent three winters.
   - Predicted 30-50% of the country face very risky conditions.
   - With the subsequent early preparedness action, dzud resulted relatively low livestock mortality.
3. With the predictions & recommendations:
   - Mongolian Gov., & Int. organizations (e.g., Red cross) able to take early action in reducing herders' vulnerability in risky areas (distributing cash & fodder/hay).

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Dzud Dust Drought Desertification 4D

Nandintsetseg et al., *Nature: Sci. Reports*

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Way forward

- The knowledge & experience: Applicable to regions with a similar geographical background (e.g., Eurasian steppe) & slow-onset events (drought).

- Dzud-EWS has been produced/operated well based on the national meteorological network that was established during the socialism regime.
  - Thus, to reuse/enhance an existing network and supporting skillful human resources should be first considered to extend the EWS to hard-to-reach & remote populations.

- **The first transdisciplinary workshop** "Knowledge Exchange Conference 2018: Pastoralism, Governance and *Dzud* Risk in Mongolia" held at the early winter (in collaboration with PIN) when EAs were taken by stakeholders provided a timely opportunity to introduce the dzud risk map & promote its use in the public.

Thank you

Closing remarks – Key messages

- **An innovative international** Japanese-Mongolian **collaboration integrating scientific research/technology** to inform nationwide disaster risk management, developed a new *Dzud* Disaster Risk Map successfully used for the early warning, early actions, early prepredness & disaster reduction of *dzud* in Mongolia.

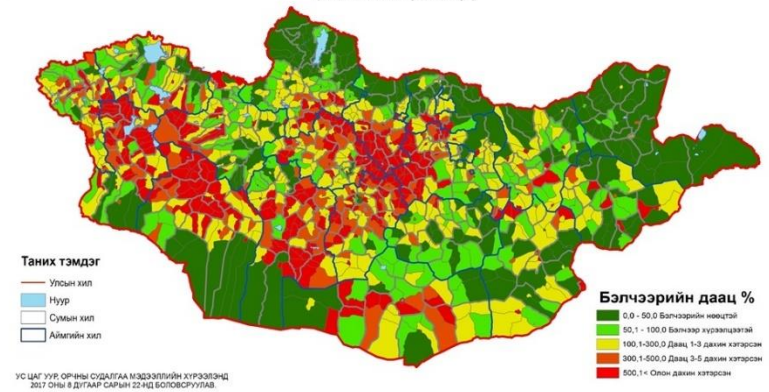
The case study highlighted

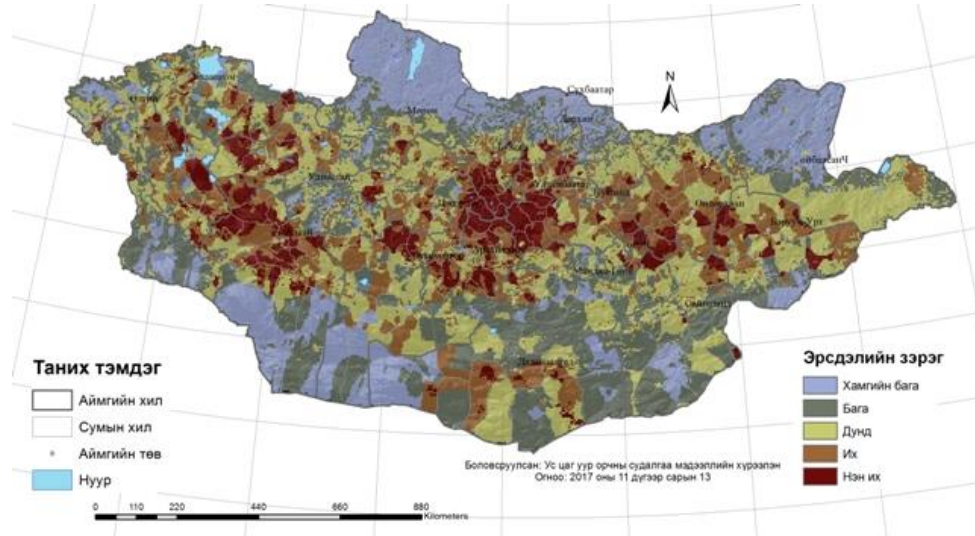
- Importance of understanding, assessing, monitoring of slow-onset disaster risk;
- Strengthening disaster risk governance & coordination across policy makers, institutions & international organizations;
- Enhancing the multi-hazard EWS for early actions & preparedness through research/technology.

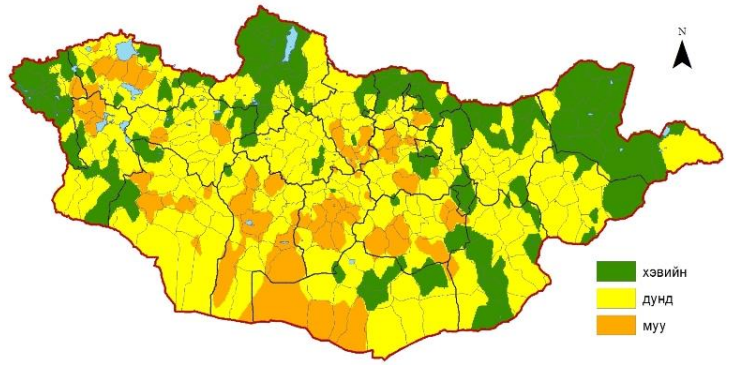
All these are in line with the objectives in the implementation of the Sendai Framework/the Asia Regional Plan and the 2030 Agenda for Sustainable Development.

In future, the Mongolian government should support & promote a continuous improvement of this *dzud* EWS through improving science-based technology and capacity building.

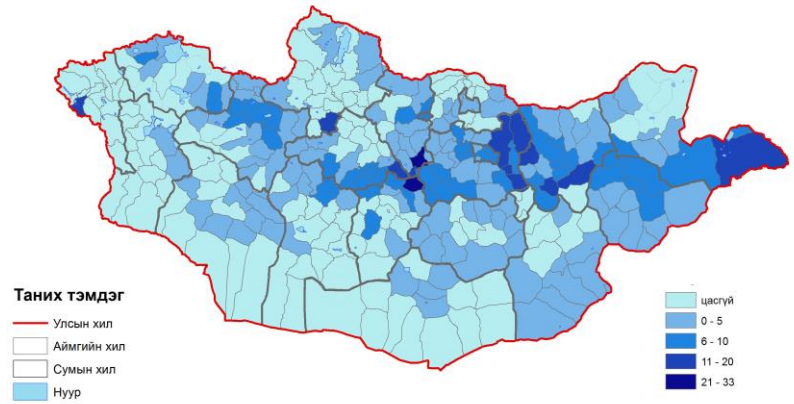
2017-2018 оны өвөл, хаврын бэлчээрийн даац, %
(багийн нутгаар)







3 дугаар зураг. Зуншлагын байдал
(2017 оны 7 дугаар сарын 20-ны байдлаар)



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