Technology Fact Sheet for Adaptation

Technologies in the animal husbandry

B.1. Seasonal to Inter-annual Prediction[1] and Livestock Early Warning System [i]	
1. Introduction	This technology allows for a forecast of weather conditions for a period of three to six months ahead. Seasonal forecasts are based on existing climate data; in particular, on sea surface temperatures, which are then used in ocean-atmosphere dynamic models, coupled with the synthesis of physically plausible national and international models.
2. Technology characteristics	According to the World Meteorological Organisation (WMO) definitions, Seasonal to Interannual Prediction (SIP) ranges from 30 days up to two years. Modern and science-based systems facilitate seasonal forecasting. Predicting climate seasonal anomalies requires the use of complex coupled atmosphere-ocean models. It is believed that ocean variability is an important factor influencing climate variations and changes due to the ocean's larger capacity to absorb from and release heat back into the atmosphere. A considerable effort has been made to improve the understanding of the phenomena responsible for seasonal variability and most of the major meteorological institutions around the world have developed Ensemble Prediction Systems (EPS) for operational seasonal forecasting based on coupled atmosphere-ocean general circulation models. Climate change is challenging traditional knowledge about seasonal forecasting and farmers can no longer predict climate using natural indicators. Although knowledge and understanding of the socio-economic circumstances is important and must be taken into account, knowledge of climatic variability can lead to better decisions in agriculture, regardless of geographical location and socio-economic conditions. Within agricultural systems, this technology can increase preparedness and lead to better social, economic and environmental outcomes. It helps decision-making, from tactical crop management options, and commodity marketing to policy decisions about future land use. This technology has the following key components: - Seasonal to interannual prediction using dynamic models - Monitoring of pasture including vegetation and snow coverage using ground observation data validated remote sensing methods - Modelling of pasture using real time monitoring data and weather prediction - Harsh winter/Zud and drought mapping with pasture carrying capacity which will be input for livestock planning in winter

[1] http://climatetechwiki.org/content/seasonal-interannual-prediction

	- Validating through real data and improvement to the system
3. Country specific applicability and potential	Today, long term weather predictions (from 1 month to 6 months) are being produced using statistical methods in Mongolia. Economic losses and damage caused by atmospheric disasters has increased in the last few decades in Mongolia. Frequency of these types of disasters increased due to climate change and vulnerability has worsened due to increased disaster magnitude and excessive human pressures. Due to climate change, even though air temperatures have increased, occurrences of harsh winters/zud's are expected to increase as a result of frequent drought, and increased extreme phenomena such as snow and storms. For example: during the zud of 2008-2009, about 10 million livestock died and it led to massive social impacts on herders' livelihoods and the country's economy. Almost one third of herders lost all their animals. SIP is linked to a great variety of practical applications, from security related issues, such as water resource management, food security, and disaster forecasts and prevention; to health planning, agriculture management, energy supply and tourism. It is an important element in some policy/decision-making systems and is the key to achieving the longer-term goals of climate change adaptation strategy. SIP is taken into consideration for the strengthening of drought and Zud/ harsh winter preparedness and management, including zud contingency plans of animal locations in winter and spring, at the local (soum), provincial (aimag) and national levels. The technology would need about 3-4 years to implement.
4. Status of technology in country	Currently, the Government and other organizations make winter plans of animals' location and their movements. The plan is based on pasture capacity defined by maximum biomass stock cut seasonal prediction is not taken into account due to insufficient seasonal prediction capacity.
5. Benefits and impact on the country development ✓ Economic (- Job creation; - Investment) ✓ Social (- Income generation; - Education; - Health) ✓ Environmental	SIP will contribute to more precise livestock winter movements and forage preparation. Also, within agricultural systems, this technology can increase preparedness and lead to better social, economic and environmental outcomes. It helps decision-making, from tactical crop management options and commodity marketing to policy decisions about future land use. Based on the technology, animal loss in winter can be reduced by 20-50 % especially during zud. Herders' vulnerability to natural disasters and climate change would be reduced.
6. Climate change adaptation benefits	It will strengthen climate change adaptation capacity.

7. Financial Requirements and Costs	.**The total required funding is estimated at 800,000 USD** - Seasonal to interannual prediction using dynamic models cost - Monitoring and modelling of pasture would require some equipment and research - Mapping software and models - Trip to testing sites, research and capacity building of users including decision makers at national and local levels, herders and other officials such as NEMA.
8. Institutional requirements	SIP requires cross-disciplinary research approach that brings together institutions (partnerships), disciplines (such as climate science, agricultural systems science, rural sociology, and many other disciplines) and people (scientists, policy makers and direct beneficiaries) as equal partners. The Ministry of Nature, Environment and Tourism and the Ministry of Food, Agriculture and Light Industry will play major roles to introduce SIP enable it to reduce negative impacts of natural disasters and to make precise decisions on agricultural practices. Participation of research institutions such as the Institute of Meteorology, Agriculture and Livestock Institutes, NGOs including Green Gold, Pasture Management Association of Mongolia and government agencies such as the National Emergency Agency (NEMA), herders and farmers are essential in this process. The interpretation of seasonal predictions of climate are not easy for most agricultural technicians and farmers as they are given as probabilities of positive or negative variations in temperature or precipitation. Although it must be recognised that all such predictions have an uncertainty associated with them, agricultural stakeholders need a lot of assistance as to how to identify the likely seasonal trends. Equally, meteorological services need staff with skills to present the information in a way that the public can understand and make use of it.

[i] **This fact sheet has been extracted from TNA Report – Technology Needs Assessment For Climate Change Adaptation– Mongolia. You can access the complete report from the TNA project website http://tech-action.org/**