



# The future of livestock farming in Inner Mongolia: Working with farmers for holistic grassland management

Educational Resource File 2 (Supplementary educational material to be used in conjunction with the ACCC documentary)

*This educational resource accompanies the Adapting to Climate Change in China documentary and provides further background on some of the adaptation strategies being employed by communities in northern China. The purpose of this supplementary material is to promote wider discussion and to foster cross-cultural understanding of some of the key issues raised within the film.*

# The future of livestock farming in Inner Mongolia:

Working with farmers for holistic grassland management



**The grassland eco-system of Inner Mongolia plays an important ecological role and is the foundation of a major livestock production base. Much of China's northern grasslands are located in the Inner Mongolia Autonomous Region and it has a key function to play in maintaining the ecosystem balance. As well as sustaining livestock including sheep, cattle, horses, mules, donkeys and camels, the grasslands help regulate climate and maintain biodiversity. What's more, the grasslands are a major carbon sink. Climate variability such as rainfall and thermal conditions directly affect the shape and density of the grasslands. This is drawing significant interest of climate scientists as they work on China's climate change challenges.**

Like other areas of northern China, climate change is having adverse impacts on the natural environment and local livelihoods in Inner Mongolia. The pace of climate change in this region is particularly rapid and urgent adjustment has been needed to limit further damage to the local environment. If the current trend continues, climate change will lead to the drastic reduction of this vast area of grassland vegetation and bring further hardship to already vulnerable communities.

Inner Mongolia has suffered from persistent droughts in recent years which have caused reservoirs to dry up, making it difficult for people and livestock to obtain drinking water. With insufficient rainfall, the availability of grassland vegetation for grazing reduces causing livestock deaths.

The causes of grassland deterioration are multiple and so an effective response must identify and tackle all of them in a holistic approach. Climate change, industrialisation and

human activity are all exacerbating the problems and the buy in and behaviour change of communities who live on the grasslands is vital in promoting the recovery and restoration of the grasslands.

Inner Mongolia is one of the pilot provinces in the Adapting to Climate Change project. Researchers are working to understand the impact of climate change in Inner Mongolia so they can develop better ways of protecting the environment here and contribute this to global knowledge of grasslands and drylands adaptation. As well as undertaking impact, risk and vulnerability assessments, the researchers are keen to learn from the experiences of local herdsmen. They are said to have an 'intuitive' relationship with the landscape and have witnessed subtle changes in climate conditions over many years. Experts now realise the benefits of using this human insight as a reference point for learning which could help other countries adapt to the effects of climate change in the future.

## The climate: past and present

(Documentary 23:15 – 24:35)

**Research in Inner Mongolia has been taking place over a number of years. Experts working under the ACCC project at Inner Mongolia Agricultural University have tracked changes in temperature and have discovered that the region is becoming warmer and drier. Precipitation patterns are changing; dropping in some areas while remaining the same in others and in other parts of the region it is slightly increasing.**

At the same time, the average temperature is climbing at a speed of 0.23C every decade – above the average in China and worldwide - and continues to rise. Extreme weather is becoming more frequent and higher temperatures in winter are sometimes having a negative effect on local ecosystems.

Studies have shown that while in the past the region saw 10 separate rainfalls of 200mm evenly spread across the year, now there might only be three to five of them causing severe water shortages and associated problems.

Herdsmen are used to adapting to a variable climate. Traditionally, Inner Mongolia has been affected by what has become known as 'black disasters' and 'white disasters' in the winter months. White disasters happen when there is severe snowfall. This situation is particularly disastrous if snow storms are followed by a swift temperature rise and drop. This can cause a layer of ice to form over the snow preventing livestock from being able to find food. This can result in livestock deaths if there is insufficient fodder in storage.

Black disasters, on the other hand, are droughts which reduces the water content in the soil and affect growth. The resulting drier landscape also becomes susceptible to wind erosion and is likely to result in sandstorms the following year.

Working in conjunction with local herdsmen, researchers have been able to shed light on areas they previously knew very little about. For example, climate scientists always regarded serious snowstorms as the worst disaster to affect the region and were surprised to discover that herdsmen actually view snow as a desirable event. When interviewed further, the herdsmen explained that from their own experience, that snow can relieve the dry winters and high levels of evaporation, which cause them livelihoods problems in winter, bringing benefits for plants to burgeon in the following spring and providing a source of water for livestock.

Inner Mongolia has always suffered droughts but they have become more severe in recent decades. Rain is vital for replenishing soil moisture and revitalising groundwater supplies. Decreased levels of precipitation, increased sunlight exposure, reduced cloud cover and warmer temperatures cause moisture to evaporate from the ground. This increases soil aridity and makes it harder to sustain plant life as well as leaving the soil susceptible to wind erosion.

Records show temperatures in winter have been steadily rising since the 1980s. Spring now arrives earlier while winter comes later. This extends the growing period of grass which in effect means more grass is available for livestock. As more grass became available over the years, greater numbers of livestock have been reared on the land. While this initially protects animal stock, the natural environment is gradually eroding through the additional stress placed on the grasslands which will reduce the availability of food in the long-run.



## Grassland degradation

(Documentary 22:00 -23:12)

**The decline of Inner Mongolia's natural grasslands is one of the most serious issues facing the region. Many years ago, the grasslands of Inner Mongolia were home to fewer herders who roamed across various pastures according to the season. This allowed time for the grassland to recover and revitalise before livestock were able to feed on the grass again. In more recent times, many more herders and animals live off the land and the vast majority of the grassland no longer has a distinction between seasonal pastures which makes it difficult for the grass and soil to recover.**

Research has shown that at least 50% of the grassland in Inner Mongolia has already degraded. The extent of the degradation varies within the region, for example the further away from the herders' habitat and livestock drinking area, the higher the quality and density of grass. This suggests that human activity and cattle-rearing is at least partially responsible for grassland degradation and supports the view that leaving the land undisturbed will promote rejuvenation.

Researchers categorise the various areas of grassland as severely degraded, degraded or slightly degraded. Overgrazing removes vegetative cover and without this soil is washed away during heavy rain. Vegetation has a valuable role to play in the ecosystem by helping to keep the soil moist and loose, binding it together against erosion. If those areas of severely degraded grassland continue to be worked unsupervised, the soil will become drier and will be swept away by the wind, removing the ability to sustain plant life or feed livestock.

## Adaptive Measures for the Grasslands of Northern China

The authorities in northern China have chosen several different measures to try and improve the situation for the worst-affected grasslands, alleviate the pace of degradation and promote regrowth.

**In areas where the degradation is slight or less severe, regulation has been introduced to limit the number of livestock allowed to graze on it. Each pasture is given a 'stocking rate' which is the capacity at which the grassland can sustain grazing. When grazing exceeds this level, herdsmen are encouraged to reduce the number of livestock on the pasture and are offered incentives to protect their income.**

For the most severe cases of grassland degradation, a complete grazing ban has been sparingly introduced, during which it is prohibited to graze or harvest fodder so that the land can self-restore.

The herders affected by such a move are provided with subsidies and financial compensation to protect their income. Some implement new modes of animal husbandry while the land is restricted including feeding livestock in-house and producing grass artificially. Others temporarily migrate to find production work elsewhere.

Regulation of the grassland is regarded by the authorities as an effective means of relieving damaging human pressure on the grassland and promoting ecological restoration. For them, it is a step towards more sustainable land management. Herdsmen are awarded compensation for each mu

of land affected by the restrictions but the amount varies depending on the condition of the grassland.

New ways of rearing livestock have developed as restoration of the grasslands is underway. During the grazing ban, locals can grow perennial fodder plants in places with better soil conditions and irrigation but on a small scale - otherwise this could undermine the purpose of the restrictions. In some of these areas, people have set aside a small slice of land for collecting grass rather than planting fodders. This is then turned into hay and stored for periods under the grazing ban to feed the animals in pens.

Herdsmen living on the outskirts of Xilinhot City have developed a partnership approach to managing the grassland during the ban. Each household here is allocated pieces of land which fall into different categories of grassland such as highly productive meadow and arid land on mountain ridges. Locals have decided to pool together their land so they can manage it collectively. If they didn't take this approach, the grassland could be adversely affected by livestock from one household trespassing onto another because there are so many separately-worked pastures. Working together, the herdsmen set aside all of the grassland in a poorer condition such as that on the mountain slope. On the rich soil, however, they jointly grow fodder plant to enrich the soil and ensure everyone has equal profits and benefits from the land.

These co-operatives jointly invest in machinery to help them plant, water, harvest and process the fodder plants. This is partly due to efficiency but also because of a shortage of labourers as many young people leave the area in search of better job opportunities in the city.

**Question to consider: What new practices have developed in your area or country to cope with climate impacts or the ensuing adaptive measures?**



## Stakeholder Engagement: Capturing Local Wisdom

(Documentary 24:36-28:30)

The experiences of local herdsman are an important part of the research taking place within Inner Mongolia...

and scientists have found that their perception of climate change often mirrors meteorological data. Herdsmen used to wear heavy clothes and shoes in the past, for example, and no longer require such clothing because of temperature increases.

The researchers pay regular visits to the households of herdsman to find out more about their perception of climate change and how they are adapting on the ground to issues concerning water, livestock sheds, animal feed and fodder planting.

**"We are more interested in how the large natural grassland is used, and more specifically, if rotational grazing, the seasonal grazing plan, and the division of grassland are in place,"** said Wang.

"We understand that herdsman are now aware of climate change. On the one hand, they have realised themselves that without such practices the situation would get worse, and therefore voluntarily adopted what we call 'autonomous adaptive measures'. In other cases, where the government takes the lead, officials and scientists tell herdsman what to do and help them realize why we are doing this."

Bao Lu, from the Development Research Centre of Inner Mongolia Development and Research Commission, is part of a wider team which provides policy consultation and research in agriculture and husbandry in the region. Part of the work involves collecting the views of local herdsman through discussion groups and understanding how they are coping with the environmental changes.

"The vulnerability of herdsman is mainly a result of water scarcity and lack of infrastructure," said Bao. "By letting herdsman rank the natural disasters in terms of their damage to the grassland husbandry, it also sheds lights on some areas that we knew little about. For example, in the past we thought snow was the single most devastating disaster. But herdsman actually see snow as desirable as Inner Mongolia is very dry in winter, with large evaporation. Snow, in this case, can relieve drought, and is good for plants to burgeon in the next spring. Therefore, as is revealed by the herdsman, contrary to the common belief, snow is a good thing as opposed to a disaster."

Professor Su Hao, from the Sociology Department of Inner Mongolian Academy of Social Sciences, carries out similar research visiting the households of herdsman. Each household is visited twice – 12 months apart – for comparison purposes.

The study has revealed that herdsman are employing their own adaptive measures to counteract the effects of climate change including storing fodder plants to feed their livestock during times when it can't be grown due to the harsh weather conditions or through the grazing ban, reinforcing sheep pens for more severe winters and establishing co-operatives so they can get the best out of the land they jointly own.

The new adaptive measures vary from place to place. In Siziwang Banner, for example, the grass doesn't grow as well as it does in Xilingol and during drought there's no other solution other than to ship fodder in to feed livestock from elsewhere.

It has become clear through the study that there is no universal cure to the problems brought by climate change but storing fodder has become one of the more widely applicable solutions.

## Case Study

**Herdsman Zhamusurong was born and raised in Xilinhot. In 2004, the local community established a co-operative to grow fodder plant to help protect the grasslands from further degradation. Collectively, the residents have 1,200 mu of fodder plant field and use machinery at every stage of the farming process from sowing the seeds to harvesting to boost yield.**

"Xilinhot was chosen as one of the first areas banned from grazing because the grassland here was severely degraded," he said.

"The most noticeable signal of climate change is drought. If it doesn't rain, grass won't grow, which is bad for husbandry. Drought also creates problems for the herdsman's livelihood. There are more sandstorms, but less snow in winter."

"We established the fodder plant production base to solve the problem of feed shortage. In other words, we use one small piece of land more effectively, in order to protect more land."

"We are building more infrastructure for livestock and creating more fodder plant fields, which are irrigated, and thus can produce fodder to sustain the animals through winter when it is extremely dry. This is how we offset the impact of natural disasters."

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## The future

**The researchers based in Inner Mongolia are already working with other countries including the US, Canada, Australia, New Zealand and Argentina to exchange information and help each other better plan for the effects of climate change. Inner Mongolia has been one of the pilot provinces for the UK-Swiss-China project, Adapting to Climate Change in China.**

Some of the adaptation processes being utilised in Inner Mongolia could be of considerable value to other countries struggling to adapt to climate change. For example, researchers have discovered significant co-benefits to protecting the grasslands. Their studies have shown that the grassland in Inner Mongolia can absorb a vast amount of carbon. The increased density of livestock and people and the effect this has on grassland productivity will reduce this sequestration process and increase the amount of greenhouse gases released into the atmosphere. These findings will help to influence policy decisions elsewhere in the world and allow leaders to draw on evidence to develop solutions.

More locally, herdsman will directly benefit from the constant source of data being fed through to the community by the research teams. Advice is already being distributed via radio and television so they can prepare better such as when is the best time to harvest grass and when is a good time to move their animals to another piece of land for grazing. The implications are that with more evidence-backed data and information, herdsman will have the best knowledge available to improve their financial prospects.



## BIBLIOGRAPHY

This Resource File has been developed by the INTASAVE Partnership for the Adapting to Climate Change in China project, based on the transcripts of on-the-ground interviews, undertaken for the ACCC documentary. Other sources used to develop this Resource File include:

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