Extinction Causes and Conservation Measures Assessment for Mengxin Beavers in China

Xiaoyu Song
Tianjin Yizhong High School, Tianjin, 300041, China

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Abstract: Originating 2 million years ago, the Mengxin beaver is the only kind of species that can be found in China. Due to its rarity and the small size of its exisiting population, it warrants serious investigation, and yet its behavior and its role in the ecosystem are poorly understood and little researched. Mengxin beaver has essential research value as new evidence from a recent field study has shown that they are essential in establishing and maintaining biodiversity in the Wulundu River of Xinjiang Province. However, the population of the species remains relatively small due to climate change and human encroachment on their natural habitat. The main goal of this study is to raise public awareness of the persistent decline of the species as well as their importance to the ecosystem and highlight the need to protect them. The possible methods will be discussed with a particular focus on a multistakeholder participatory approach that involves the government, researchers, the local community, and the general public. The previous protection measures rely too heavily on the leadership of central government. But it fails to incorporate the needs and concerns of local community as protection of natural habitat of beavors often causes conflict to their livelihood. Neither does it recognize the importance of greater public engagement beyond the local community. The protection effort this study envisions will address these gaps and create a synergy of multistakeholders' participation.

1 INTRODUCTION

The Mengxin beaver is a species that survived from the Pleistocene epoch of the Quaternary period 2 million years ago and is widely regarded as a "living fossil of ancient vertebrates" (Brazier et al., 2021). Listed as a first-class state-protected animal in China, Mengxin beavers are the only beaver species living in China and are found only along Ulungur River in Xinjiang's Altay Prefecture. Beavers are often considered one of the keystone species in the natural world. More specifically, beavers work as an ecosystem engineer that creates, changes, or destroys a habitat. River ecosystems rely on beavers to take down old or dead trees along riverbanks to use for their dams. This allows new, healthier trees to grow in abundance. The dams divert water in rivers, creating wetlands that allow a variety of animals and plants to thrive. Therefore, Mengxin beavers are essential in establishing and maintaining biodiversity in wetlands and providing new habitats for other plants and animals.

Yet some studies challenge the positive role of beavers. Some researchers have found that beavers could cause their dams burst, resulting in extensive flood damage (Stringer and Gaywood, 2016). In the U.S., for example, the dams built by the beavers can cause flood in places during the rainy season, and according to estimates, every single year, it costs the U.S. timber industry 22 million dollars to fix the damages which the dams built by beavers caused (Virchow et al., 2001).

But for the Mengxin beaver living in the arid area of Xinjiang autonomous region, this is not the case. The annual precipitation in Xinjiang is only 143 millimetres, as long as the annual precipitation is less than 200 millimetres, it is classified as an arid region. Clearly, beavers cannot cause flood problems. On the contrary, their dams can actually help the arid area raise the water level and keep the steam from drying up, making the whole ecosystem run. The dams and networks of watercourses that they create can store vast amounts of water. This will encourage the growth of the riverbank vegetation. In addition, the dams made by beavers can store more 20% more water than

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the ones without the dams. It can actually decrease the temperature of the water, which can be good for marine animals sensitive to the water temperature.

2 CHARACTERISTICS OF MENGXIN BEAVERS

Mengxin beavers are usually very timid, and they can be scared by anything in nature. They usually come out during the night and only stay around the water because when they are on land, their movement are very clumsy and they have bad eyesight, so they can be caught by predators easily. Besides, their tails are very special, their tails are flat and have scales on it. Tails can not only help beavers to swim, but also help beat the water to catch others' attention. If they felt something was wrong, they would go under the water and hide in the dams they build, which are home to them.

This animal, which feeds on the shrub that grows near the rivers, has a strong sense of territory and won't leave their own surroundings. They have very strict requirements about habitats and only choose for their home an area with abundant food resources. Their food choices vary from season to season. Between April and the end of August each year, their primary feed includes shoreline weeds and grasses, along with a significant amount of willow trees. However, the availability of the shrub keeps decreasing. The lack of food and habitat is the major cause impacting the beavers' reproduction.

The beavers, which can build dams, are dubbed as 'engineers' in the animal kingdom. Their dams can store their food, and provide a cozy shelter, but also provide a better living area for other animals living in that part of the area. These dams can change water levels, gather shoals of fish, attract birds to nest and bring insects and small mammals. So, every beaver's dam can provide a new ecosystem for wild animals and lift the biodiversity levels in the area.

3 LOOMING EXISTENTIAL CRISIS

There are four main reasons why Mengxin beaver has become extinct. The first reason is that human activity causes the amount of food for beavers to decrease yearly. For example, people cut down 10 % of the forests, which directly damaged the habitats of the beavers and greatly reduced the living range of these little creatures, all these directly resulting in the decline of the population of Mengxin beavers. Based on historical data and estimates, from 1959 to 1986, the numberof Castor fibers birulai was cut in half. Till 1957, there were only hundreds of them.

Secondly, the disafforestation and diverting rivers for irrigation caused the water level in that area to drop, leading to increasingly bad living conditions for the beavers, especially in winter, causing many beavers to die.

Thirdly, the rarity of Mengxin beavers' fur has rendered the creatures the target for hunters and fur traders As their skull and body color are markedly different from those of other species that have been discovered, Mengxin beavers become the raw material par excellence for felt hat. Besides, the physical structure of beaver fur predisposes it to the felting process, making it a highly desirable fur for felt production. This led to the indiscriminate killing by hunters and the rapid depletion of the species

Finally, one of the lesser-known factors contributing to the decline in beaver populations has been the extraction of castoreum, a substance secreted by beavers. Historically, castoreum has been highly valued as a natural ingredient in products such as vanilla-flavored ice cream and perfumes. Due to its value, there was a significant incentive to trap beavers, especially those considered problematic — those that caused flooding in unwanted areas or damaged crops. These "problem beavers" were often lured into traps using castoreum, then relocated or killed for further castoreum collection. Fortunately, recent advancements have led to the development of more humane methods for collecting castoreum, and for the perfume industry, alternative synthetic chemicals have been successfully integrated, reducing the reliance on natural castoreum. This shift is a positive step towards reducing human-induced threats to beaver populations.

4 EXISTING PROTECTION MEASURES

Various ways have been adopted to prevent the rare species from extinction, but the outcome isn't very satisfying.

4.1 Natural Habitat Protection

The best way to protect species, especially endangered and threatened species is to preserve their natural habitat. In 1980, the Chinese government authorized the establishment of the Xinjiang Burgen Beaver Nature Reserve. This move however, didn't lead to an increased beaver population as had expected. Instead, the size of the local beaver families dwindled even further. From 1982 to 1999, their total number had dropped from 93 to 90 (Chu and Jiang, 2009).

In December 2013, the Nature Reserve was upgraded to a national-level reserve by approval of the General Office of the State Council. This brought a moderate increase to 162 in 2014, but it didn't last very long before the number dropped again to 152 in 2015 (Han, 2018).

4.2 Raising Public Awareness

It turned out that a designated protection area still couldn't immune them from descructive human activities, the biggest threat to their survival. To increase farm land, many trees were cut down. The gradual diminishing of riparian forests led to food shortages for beavers. Diverting rivers for irrigation purposes resulted in reduced water levels, which were crucial for their survival. Poaching beavers were quite rampant as well. To address these problems, a public awareness campaign was carried out to ensure the local community was fully engaged in the conservation effort. Moreover, the local government has organized programs to provide the local herdsman with necessary training on the protection of beavers and offer them information on relevant legislation and regulations. Meanwhile, the local government and the Beaver Reserve have established an incentive system that rewards activities such as reporting poaching, rescuing injured beavers, and protecting their habitats.

In addition, an ecological compensation mechanism was established to encourage local herders to stop grazing their livestock or felling trees in the protected area. In return they will get free forage. These initiatives have proved to be very successful in getting local community to be directly involved in the protection effort.

4.3 Technology Improvement

Mengxin beaver is a nocturnal animal, so it is hard for the conservation staff to observe them in the wild at night when visibility is poor. The traditional way is no longer useful for Mengxin beaver. Instead of monitoring by people, experts installed infrared cameras in the beavers' protected area (Liu et al, 2015). It is a better way to obtain the activity information of the beavers, including the difference of daily activity intensity in different times of day and night and among different seasons. This is an important tool for non-invasive investigations that will not affect the beavers.

5 PROPOSED PROTECTION MEASURES

5.1 Effective Protection Measures for Reference in the near Future

The above-mentioned participatory approach, which features a partnership between the local government and the community, is very targeted and effective. But in this increasingly digitalized world where people are becoming more interconnected than ever before, recruiting and engaging diverse stakeholders through modern communication technology seems to be more powerful and efficient (Palmer and Rosell, 2010; Gibson and Olden, 2014 & Palmer and Rosell, 2010).

A good case in point is the phenomenal success of a public participation project initiated by Chu Wenwen, a young and passionate wildlife conservationist from China's Xinjiang Uygur Autonomous Region. During the past four years, through the popular social media platform Douyin (Chinese version of TikTok), the program has attracted more than 1 million post-1990s volunteers joining the natural conservation campaign for the Altai Mountains in Xinjiang. In 2018, she initiated another program, the beaver canteen, which attracted over 1 million internet users to donate their snack money. A super-canteen of about 400,000 willow shrubs was built with the snack money from those post-1990s and even post-2000s netizens. She was called "princess beaver" by her followers on social platforms. 410,000 saplings of that shrub were planted for beavers facing a severe food shortage. According to the data throughout this activity, the Mengxin beavers' population had increased from 500~600, and the family number had also risen by 37.

The project also provides the local herders training on expertise, skills and job opportunities through capacity building. Later, when the beavers'

population survey was launched, they were enlisted for help, and they made deals with the herders so they could better regulate the overgrazing practices. Chu uses the power of the internet to galvanize public support for the protection of endangered species. In addition to Chu and her team, some businesses also contributed by releasing products printed with Mengxin beavers or even creating versions of cartoon characters for the beavers. For example, a toy company called Pop Mart unveiled a series of blind boxes of cartoon characters based on the Mengxin beaver, which let more people know about this creature.

5.2 Proposed Protection Measures

To protect the beaver, raising public awareness is certainly important, but it is only the first step towards synergizing actions for real change. In this process, volunteering work from young people plays a significant role, as the generous donation for beaver canteen program has demonstrated. That's because young people growing up exposed to the concept of animal welfare are more passionate about animal protection than any previous generation. Meanwhile, the advancement of ICT technology, such as social media, can easily reach out to them and engage them in meaningful volunteer work. In the case of Mengxin beaver protection programs, over 3 million internet users have donated their snack money to secure food sources for the cute animal. Among them, a majority are young people born after 1990s and even after the 2000s. According to the estimates of the program initiator Chu Wenwen, over a million young people were actively involved in the program from 2019 to 2021 (Hubei Changjiang Business Daily, 2022). The same young people have gone to the field to help with the rescue of beavors as well as the planting of willow shrubs, the favorite food for beavers during winter when food supplies are scarce. The success of the program reminds us the power of young people in delivering social good. Therefore, the future protection effort should tap into young people and make full advantage of their talent and their commitment to biodiversity conservation.

There is another workable plan to protect the Mengxin beaver through a business partnership. More specifically, using the images of them, people can have cooperation with industry companies to launch a series of co-branded ips, such as the clothes printed with pictures of the Mengxin beaver and some daily living equipment that people cannot live without it. In the future, scientists will invent new eco-friendly materials. When producing the products, the special raw material that has been used can reduce waste.

Every year, the reservation will monitor the number of beavers family staff can give them a name and post their pictures online so the reservation can hold a "online adoption". When people choose one beaver that they like, the staff from the reservation can install some cameras that don't disturb the beavers' normal life, and staff will send a qualification and access to the camera to live stream the beaver's life for the people who had adopted a beaver, they will be kept updated about the beavers they have adopted. Besides these, staff will also take photos of the beavers and send them to their adoptors. For the donation, staff could use it to buy more trees to store more food for them.

6 CONCLUSION

The plight of the Mengxin beaver, a unique species whose existence stretches back two million years, mirrors the broader challenges faced by many endangered species across the globe. As this study highlights, the Mengxin beaver not only plays a crucial ecological role as a biodiversity engineer in the arid ecosystems of Xinjiang but also faces numerous threats largely attributable to human activities. While climate change, habitat destruction, and direct exploitation have led to a precariously dwindling population, this study underscores the critical need for a multifaceted conservation strategy that goes beyond traditional governmental approaches.

Emphasizing participatory conservation efforts is essential. By involving local communities, leveraging modern technology, and harnessing the influential power of social media platforms, conservation initiatives can cultivate broader public support and more effective engagement. Particularly inspiring is the innovative use of participatory projects like the "beaver canteen," which not only fosters community involvement but also directly contributes to the sustainability of the beaver's habitat.

Moreover, this article advocates for the integration of young people into conservation efforts, tapping into their dedication and digital savviness to propel awareness and action. The success of initiatives spearheaded by conservationists like Chu Wenwen illustrates the potential impact of blending traditional conservation methods with modern

technological outreach. By creating educational campaigns that resonate with the public and developing innovative products that promote the Mengxin beaver, these efforts can create sustainable revenue streams that support ongoing conservation work.

In conclusion, securing the future of the Mengxin beaver demands an adaptive, inclusive approach that embraces the complexities of ecosystem management, human-wildlife coexistence, and community engagement. As this study shows, when local communities, governments, and conservationists work collaboratively, there is a greater chance for not just preserving a species but also enhancing the ecosystems they inhabit. The fate of the Mengxin beaver is not just a matter of ecological importance but a poignant symbol of our broader relationship with the natural world, urging us to act thoughtfully and swiftly.

REFERENCES

Brazier RE, Puttock A, Graham HA, Auster RE, Davies KH, Brown CML. 2021. Beaver: Nature's ecosystem engineers. WIREs Water.

Stringer, A.P. and Gaywood, M.J. 2016, The impacts of beavers Castor spp. on biodiversity and the ecological basis for their reintroduction to Scotland, UK. Mam Rev, 46: 270-283.

Virchow, D. R., Hobbs, J. M., Fryda, R., & Hygnstrom, S. E. 2001. G01-1434 Controlling Beaver Damage.

Chu H , Jiang Z. 2009. Distribution and conservation of the Sino-Mongolian beaver Castor fiber birulai in China. Oryx, 43(2):197-202.

Han S P. 2018. Mengxin beaver a "living fossil" of paleontology is being protected in action. Xinjiang Forestry, 4.

Liu Dongzhi, Huang Xiaowen, Chu Hongjun, et al. 2015. Activity rhythms of Sino-Mongolia Beaver (Caster fiberr birulai) measured with infrared camera traps in Xinjiang, China. Arid Zone Research, 32(1): 205-211.

Campbell-Palmer, R. And Rosell, F. 2010, Conservation of the Eurasian beaver Castor fiber: an olfactory perspective. Mammal Review, 40: 293-312.

Gibson, P.P. and Olden, J.D. 2014, Ecology, management, and conservation implications of North American beaver (Castor canadensis) in dryland streams. Aquatic Conserv: Mar. Freshw. Ecosyst., 24: 391-409.

Róisín Campbell-Palmer, Frank Rosell. 2010. Conservation of the Eurasian beaver Castor fiber: an olfactory perspective. Wiley Online Library. 29.

Hubei Changjiang Business Daily. 2022, Chu Wenwen and millions of young people rescued and protected the beaver in 4 years, planting more than 400,000 trees to build a "beaver canteen". https://baijiahao.baidu.com/s?id=1721895360384790303&wfr=spider&for=pc.