

Wood Use in Mongolia

: From the photographs of the late 19th and early 20th centuries

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I. Introduction

After the so-called democratization and liberalization, fieldworks from various fields of research have been launched in Mongolia. Environmental research is one of them. From Japan, experts in various fields such as climatology (for example, Morinaga and Shinoda 2003, Shinoda and Morinaga 2005), botany (for example, Fujita 2003), soil science (for example, Tamura 2003, Tamura 2018), and hydrology (for example, Sugita 2003, Tsujimura 2013) have started research based on field surveys. In addition, interdisciplinary teams from Tokyo University of Agriculture, Tsukuba University, Kyoto University, Tottori University, and others have conducted comprehensive researches and had accumulated achievements (for example, Fujita et al. 2013, Yamamura et al. 2013, Yamanaka et al. 2018). Research on agriculture including pastoralism has also continued from the perspective of international development (for example, Komiyama 2016, Suzuki 2016).

Although the degradation of vegetation is often pointed out in these environmental studies, it is difficult to reconstruct former vegetation with the same accuracy as the current level of technology. For this reason, proxies or indirect indicators such as pollen analysis can be used, as well as memories from interviews, even if they are vague. In order to address this issue, namely how to reconstruct the past vegetation, we started a joint research project¹ in which we effectively use photographs taken by previous expeditions. This paper is a preliminary report on some results of this research.

In the past, photographs have been used in articles and books as supplementary material. Nowadays, photo archives are being organized in many countries, and in parallel, a series of photo books have been published from Mongolia (Chuluun et al. 2015,2017,2018,2019). Hence, the potential for more active photographic research on Mongolia is growing. The authors are therefore pursuing international collaboration², and this paper is based on such photo-driven area studies and the application to environmental research.

Especially, from the aforementioned photo collections published with great effort, we have been impressed by the remarkable use of wood in Ulaanbaatar in the past. The

aim is to reconsider the image of the Mongolian plateau, which has been perceived solely as steppe and desert.

In this article we concentrate on wood, lumber and log. We should distinguish these words from each other, excluding the quoted parts. Here wood means the trees as resources and also the area of small forest. Lumber is the wood cut and prepared for various materials including firewood. Log is a tree only peeled off and belongs to the wide range of lumber.

In the travelogue of A.M. Pozdneyev (1851-1920)'s *Mongols and Mongolians*, there is a great deal of details about lumber including lumber trade, because his trip in 1892-1893 was originally commissioned as a commercial survey. However, twenty years later I.M. Maisky (1884-1975) was concerned mainly with the livestock industry, and did not mention wood industry (Maisky 1921). Therefore, we refer quite often to the description by Pozdneyev, adding some information within the square bracket.

On the other hand, there are photographs taken by many travelers. All website citations were accessed on 30 January 2021.

II. The use of wood in Ulaanbaatar

In the capital city of Ulaanbaatar with board fences of *ger* district have always attracted people's attention as a unique sight. The city's landscape has been characterized by wooden fences since the time when it was known as Ikh Khüree (in Mongolian *ikh khüree*, a large enclosure), called Khure in and Urga (from Mongolian *örgöö*, a palace) in Russia and the West. Previously however, the wooden fence was not necessarily made by boards as we know them today, but rather log enclosure that were prominent as follows.

As for the population of Urga, Pozdneyev notes that the number of lamas in the central part of the city was 13,200 in 1877 and 13,850 in 1889 (Pozdneyev 1971:52); after the city was named Ulaanbaatar in 1924 and the lamas and foreigners were removed, the population dropped to 10,385 in 1935. At the end of the 19th century and the beginning of the 20th century, the city had a population of about 10,000.

1. Larch log enclosure

Fig. 1 is an illustration from the English translation of the travelogue by I.M. Przhevalsky (1839-1888) (Prejevalsky 1876:14). The illustration, based on hearsay information, further emphasizes the fence surrounding the tent.

Fig. 2 is an illustration from a travelogue by the French traveler, Victor Meignan (Meignan 1876:284). The subtitle of the book states "with a map and 15 engravings by L. Breton, based on sketches and photographs by the author", but it is not clear what kind of

photographs were taken. Corresponding to the description in the travelogue, there are the pavilion with the large Mani-wheel, and the flags along the fence surrounding the tent, as well as standing trees. The fence is depicted as a wall of pointed logs.

At the same period, photographs were also taken. We hope that photographs would make these specific aspects clearer.

Photo 1 is taken by A-N.E. Boyarsky in 1874. So far it is considered to be the oldest photograph of Ulaanbaatar. Unfortunately, the quality of the wall is unclear, but a tentative fence made of lumber (narrower lumber) is visible (right). It appears to be an arrangement of lumbers in the foreground (left).

Photo 2 is a landscape of Urga from the travelogue of Pozdneyev, “Khamba Street in Khure (Entrance to Khure)”³. It shows, in the fence, flag and tree depicted in the illustration in Figure 2. However, the fence is not clear neither. It is also possible to see the wood piled up on the wall around the gate, as described below. The photographer is Fyodorov, who ran a photo studio in Khyakta and worked as an assistant to the famous photographer Chalushin⁴, who accompanied G.N. Potanin (1835-1920) (Konagaya 2021:532).

Pozdneyev describes the appearance of Urga by dividing it into three parts: the central temple district called Khure, the Gandan district to the west of Khure, and the Han Chinese trade center to the east called Maimacheng.

The following is what he said about Khure.

...when you enter the Khüree, you can see nothing but fences (khashaa) and gates(üüde). The fences, for protection against thieves, are always built very high of upended larch logs, and the small folding gate is always painted red and crowned with a tablet with the *om* carved on it, over which a wind-driven khürde is also attached. To make it still more difficult to climb over the fence, the rich construct a penthouse against it on the inside, and on the top of these penthouses they pile wood, so that a fence three and a half sages [2.133 x 3.5 = 7.5 metres]⁵ in height can by no means be regarded as a rarity at Urga (Pozdneyev1971: 64).

As for the Gandan temple district, he says that the structure is the same as in Khure, with the main temple and square, and monks living in the vicinity (Pozdneyev1971:76).

And also, as for the Maimacheng, unlike the above-mentioned temple area, it was spacious, and the Mongols began to live in the area originally reserved for Han Chinese.

The Chinese section of the Mai-mai-ch ‘eng consists exclusively of shops, and the prosperous ones have the following external form: Their outer fence facing the street is constructed, as in the Khüree, of larch log fixed upright, usually coated with clay, so that the entire Mai-mai-ch ‘eng has the appearance of being constructed of clay. In its very center a broad gate leads into the courtyard, the doorposts of which are sometimes pillars of bricks and ornamented with pilasters, but more often simply wooden beams, set directly against the clay fence (Pozhdneev1971: 79-80).

He then goes on to describe the Mongolian settlements as follows.

Even from the street the dwellings of the Mongols differ from those of Chinese. Their fences are not faced with clay and present the appearance of palisades of larch logs. The gate of every house, which are without the penthouses that the Chinese always have, are painted red with monotonous regularity and, in complete contrast to those of the Chinese, are never open. The Mongols never ride in carts, and it is for this reason, properly, that they have no need of a gate. They enter themselves or drive their livestock or lead their saddle horses through wide wickets, which are lacking in the Chinese houses. Behind the fence the Mongols always have a large courtyard, but they never build many outbuildings in them, and for the most part these are confined entirely to sheds along the fence, under which stand the carts if the proprietor of the house is in the carrier's trade, and, if not, boxes, vats, and so on are kept here. In the middle of the courtyard there are one or two yurts, exactly identical with those we saw in the dwellings of the lamas of the Khüree. Here the Mongols spend the winter. A baishing [fixed house] is built behind the yurts, in which the Mongols live in summer. Well-to-do Mongols have two or three baishings, though it is unnecessary to give a description of them, as they are all built in the same style, both in the case of the Chinese and of the Mongols (Pozdneyev 1971: 85).

Thus, even in different areas, the Mongolian settlements were uniformly surrounded by logs of deciduous pine, or larch (*khar mod* in Mongolian, *Larix sibirica* in scientific Latin name). For example, here is a photograph from photographic archives of the National Museum. Photo 3, taken by S.L. Pälsi (1882-1965), an archaeologist and photographic expert who travelled to Mongolia with G.J. Ramstedt (1873-1950) from Finland in 1909. A log-wall can be seen in the background of the people in the photograph entitled "Beggars in Urga".⁶

In the case of the Han Chinese settlement, on the other hand, the enclosure is clearly characterized by being covered with mud. The pile of logs for firewood on top of the mud wall is more clearly shown in a Photo 4, taken in the 1890s by A.A. Lushnikov, tea traders in Kyahta⁷, on a trip to Urga (Chuluun and Ivanov 2015:228).

Among the log enclosures, the prison in particular attracted the attention of visitors because of the dignity caused by the height of its logs. R.C. Andrews (1884-1960), for example, says of a typical log fence;

It seemed that here in Mongolia we had discovered an American frontier outpost of the Indian fighting days. Every house and shop was protected by high stockades of unpeeled timbers, and there was hardly a trace of Oriental architecture save where a temple roof gleamed above the palisades (Andrews 1921:62-63).

Furthermore, he said the following about the prison;

Not far beyond the Custom House is what I believe to be one of the most horrible prisons in the world. Inside a double palisade of unpeeled timbers is a space about ten feet square upon which open the doors of small rooms, almost dark (Andrews 1921:80).

This is exactly what is shown in Photo 5. It was taken by Mrs. Andrews; Yvette Borup Andrews (1891-1959).

As described above, there were many log enclosures or fences of peeled lumber in city of Ulaanbaatar in the past, rather than the board fences that dominate the ger areas today. It is fair to say that the log fence was more harmful than the board fence, as it consumed the forest resources much more.

2. Use of firewood

As for the landscape of the city, Pozdneyev referred to the piles of firewood on the walls of the fences or enclosures, as mentioned above. In some of the photographs, the firewood piled up on the wall is more impressive than the enclosure itself. For example, the aforementioned Lushnikov left a series of four photographs of lumber merchants (Chuluun and Ivanov 2015:179-183). Photographs numbered 56 to 59 show the removal of lumber by ox cart. In the photo numbered 58 of this series (Photo 6), thick lumber can be seen stacked on the ground and thin lumbers stacked on the wall. The one piled up on the wall is too short to be used for building, so it is probably used for firewood. There is also a square-shape pile which looks like a pile of boards.

The square-shaped piles can also be seen in other photograph (Photo 7), taken by the Danish doctor Krebs, C.I. (1889-1971) in the 1920s. It shows a corpse being eaten by dogs in the outskirts of the city, behind it firewood is piled up in the shape of a square column. In Pozdnev's "*General view of Urga (Khure) from the west*", the dark area at the bottom right of the picture is presumably a pile of firewood (Photo 8).

The scene was also depicted in a painting by Jugder in 1912(Fig. 3)⁸.

The species of trees used for firewood is not specifically mentioned by Pozdneyev, but about the Mongolian works around Uriyas city in west Mongolia the following descriptions are recognized.

Firewood is never sold at the lumberyards in Uliyastai, and Chinese never engage in collecting it. This is a speciality for the employment of Mongols in the vicinity. Mongols fell timber for firewood mainly in the mountains which border the banks of the Bogdoin goul, and they transport this firewood in ox-drawn wagons (Pozdneyev 1971: 175-).

Here all of them are engaged in the cutting of firewood and its delivery to the city for sale. Some burn charcoal, but this is infrequent and on an extremely small scale (Pozdneyev 1971: 244).

There is also a place called *Baga Modchin* about three kilometers from the riverbank of the Tuul River after the ferry crossing, and further south is a place uphill called *Ikh Modchin* where there are Mongols who specialize in the sale of firewood. *Modchin* means a man of wood. *Baga* and *Ikh* mean small and large respectively. They are introduced as follows.

About two and one-half or three versts distant from the Tuula is situated an ail which is known by the general name of “Baga-modchin.” This is the first and smaller settlement of Mongols required by their obligations to supply firewood for heating the government and office buildings in Urga; besides this, the mountains above and along the Tuula River (Pozdneyev 1971: 396).

From the point at which the road to Donkor Manjusirin-khid cuts off, the Choirin route begins to rise noticeably onto a level and gently sloping elevated area, which has the name of the nomad lands of the Yekhe Modochins because laid out here are the yurts of the main body of the Mongol woodsmen, who were obligated to supply fuels to the offices in Urga (Pozdneyev 1971: 398).

Thus, there were Mongol settlements that lived on cutting down trees from the surrounding mountains upstream of the Tuul River and supplied larch and other trees as firewood to the city. In addition, the place where the Mongols sold firewood in Urga is depicted in the lower part of the above picture (Fig. 3). It corresponds to the present-day Bömbögöl shopping mall in Ulaanbaatar⁹.

According to Idshinnorov, in that place “at the end of the 19th century and the beginning of the 20th century, the number of urban inhabitants constantly increased and the demand for firewood was high. The people of Khangai, who were blessed with forests, sold a lot of firewood on the urban market, while the people of the Gobi and steppes sold a lot of dung and *khargana*¹⁰” (Idshinnorov 1986:41).

Photo 9 shows a man carrying cut lumber, and Photo 10 shows a survey team using camels to carry firewood (shrubs of fuel).

3. Export of lumber

Photo 11 shows a pile of thick logs on the ground, about 20-30 cm in diameter. This is not the kind of firewood that Pozdneyev refers to, but rather the product of a lumber merchant.

In describing Urga, Pozdneyev gives the history of its establishment as a temple town, and then, following the appearance of the town, he describes the commercialization of lumber in detail. With some exaggeration we can say that he is rather describing lumber trade (Pozdneyev1971: 83-84). This article is divided into sections with headings and partial extracts to give an overview.

<The number of lumber dealers>

Here too, in the south and especially in the southeast sections of the Mai-mai-ch ‘eng, the Urga timberyards are concentrated. It should be noted that the timber trade is one of the rather large branches of Chinese industry at Urga, and in the Urga Mai-mai-ch ‘eng and Khüree together there are nearly a hundred offices dealing in this item.....

The total annual value of timber exported from Urga is as much as one hundred thousand rubles or a little more.

<Logging area>

The timber is prepared in the vicinity of Urga, mainly north of here, at a distance of about eighty versts [1.0668km×80=85km].

<Forest use contracts and labor contracts>

The prosperous timber firms negotiate for this with the hoshuns [banners] and rent from the hoshun authorities separate tracts of timber for felling which belong to the latter and are situated in the mountains. They then send their Chinese workmen there, although they also hire Mongols to assist the latter, and together these workmen prepare the wood for market. For their work in hewing the timber, the Mongol workmen receive from ten to twenty shara tsai [It means literally yellow tea, and equals to one thirty of the brick tea, or 2 kopecks], per log from the Chinese firms, depending upon the length and thickness of wood. Less prosperous firms buy lumber in small lots from the Mongols, who long ago learned from the Chinese how to make timbers in the form they require and in the accepted dimensions. These timbers are always of the same length and width, namely seven Chinese ch 'ih [1 ch 'ih is almost 30cm] in length and one ch 'ih in width; the thickness, however, varies, and is reckoned by so-called "marks." Each mark comprises two Chinese ts 'un [1 ts 'un is almost 30mm], the length and width as described above. A lumber is from five to nine marks in thickness.

<Export>

The sale and export of lumber from Urga is carried on almost the entire year round and diminishes to a certain degree only in spring. The principal export trade is with Khökhe Khoto, Kalgan, and to a certain extent, Doloon nuur. The lumber is transported in summer on ox-drawn carts and in winter by camels used as pack animals. Special caravans taking lumber from Urga, however, are very seldom fitted out. It is picked up and taken from here on the return trip by carries bringing manufactures from Khökhe Khoto, tea from kalgan, and flour from Doloon nuur. Of course, the first concern of these drivers is always to take back the easiest load, for example, hides, wool, hair, and other raw materials. If, however, they do not find these articles they will also take lumber, in order not to take their camels or carts back empty. There are, however, drivers from Khökhe Khoto and Feng-cheng who, before leaving home, when they accept an order to deliver manufactured goods to Urga, at the same time contact to bring lumber back to Khökhe Khoto. The number of such drivers is always of critical importance in fixing the price for the delivery of lumber from Urga to the south.

<Export volume>

Yearly, the amount of lumber sent out of Urga is as follows: from one thousand to sixteen hundred cartloads and nearly two thousand camel loads to Khökhe Khoto, and , if we take the average for each cart camel at twenty-eight marks, from eighty thousand to one hundred thousand marks; from one thousand to fifteen hundred cartloads and from two thousand to three thousand camel loads to Kalgan, that is , from ninety thousand to one hundred forty thousand marks; only fifteen thousand to twenty thousand marks are computed as exported to Doloon nuur....

<Lumber prices>

It is rather difficult to ascertain the cost of timber for the Urga merchants themselves who rent it from the Mongols for felling. The price is set by the Mongols according to the size of the tract, at from five to fifteen bales of tea a year, with the tract being measured only approximately. Payment for the lumber is also for the most part made in tea, although

there are cases of the Chinese paying both in silver and in merchandise. The less prosperous firms buy lumber from the Mongols at a rate of from twelve to fourteen shara tsai, that is, from twenty-four to twenty-eight copecks, per a mark.

...

<Square lumber>

The majority of the average and less prosperous firms dealing in lumber in the Mai-mai-ch 'eng, and all lumbermen without exception who do business in the Khüree, in addition to selling lumber, also deal in various wood manufactures such as carts, dishware, household furniture, utensils, and so on. These are sold mainly to the local Urga Mongols as well as to the Mongols of the plains, and not a single firm does a business of less than forty bales of tea in various kinds of wooden articles.

<Charcoal>

The shops at Urga that deal in lumber do not engage in charcoal burning: this trade is concentrated for the most part in the hands of the Mongols themselves, although in the Mai-mai- ch 'eng there are also two or three associations of Chinese workmen who make their living from the manufacture and sale of charcoal, for which purpose they rent forest tracts in the same hoshuns.

In the painting entitled *One day in Mongolia*, drawn by Sharav in the 1910s, the upper left-hand corner shows people cutting wood. They are all naked on top (Fig. 4). In the same time, about half of the people working on the farm are also depicted naked on top, and almost none of the people working on the cattle are naked. These distinctions suggest that the nudity of the upper half of the body might be a representation of the Han Chinese. At the very least, the carpentry tools used for felling and the frame saws for sawing are all of Chinese origin, indicating that the techniques of felling and sawing were not domestic.

Furthermore, it is interesting to note above that the charcoal was manufactured by Mongols. Sharav's painting *One day in Mongolia* also depicts charcoal making in a kiln, although this has not received much attention (see Fig. 4)¹¹. Andrews who went into the forests nearby Urga for hunting to make stuffed animals watched the remains of charcoal pits, that is kiln in the forest, and ox cart carrying trees, as exactly as Sharav draws.

As yet this land has been but lightly touched by the devastating hand of men. A log road cuts the forest here and there and sometimes we saw a train of ox-carts winding through the trees; but the primitive beauty of the mountains remains unmarred, save where a hillside has been swept by fire. In all our wanderings through the forests we saw no evidences of occupation by the Mongols except the wood roads and a few scattered charcoal pits. These were old and moss-grown, and save for ourselves the valleys were deserted (Andrews1921:168).

The activity of the lumber trade described above is made clearer by photographs. Photo 6 shows the pile of wood on the wall taken in the West Damnuurchin (in Mongolian, *damnuurchin* means balance-bearer.) It appears to be a north-south view of a street

running north-south through the middle of the Yesön Gudamj district (in Mongolian *yesön gudamj* means nine streets).

Photo 12, taken in the city by Mrs. Andrews, confirms that the ox-carts were loaded with both logs and planks. This type of ox carts is unique to Mongolia, which is also depicted in Sharav's paintings (Lomakina 1974: 91), and are called *Khasag* carts in Mongolian, and are axle-rotating (fixed to the rotating wheels), with the body on the axle (Umesao 1990: 597-598).

As the quotation above clearly shows, during the tea trade between Russia and China, the forest resources were the main source of cargo for the return journey. It is not an exaggeration to say that Ulaanbaatar was a city of wood, including its own consumption of firewood by the Mongols.

III. Conclusion

The photographs and descriptions in the travelogue confirm that Urga and Ulaanbaatar were, surprisingly, the major centers of lumber consumption (including export) on the Mongolian plateau.

Table 1 shows a history of the temple's various locations which was the center of former Ulaanbaatar until it was fixed in its present location, and also shown on the map (Fig. 5). It can be seen that the temple moved from one place to another usually on the border between forest and steppe, gradually approaching to its present location.

In the past, the major capital cities of the nomadic world were located in the middle of the grasslands and played a central role in the functioning of the city, whereas the temples as center of Tibetan Buddhism have always moved around the periphery of the forests. At the moment, it is speculated that this may be due to the need for fuel to produce the Buddha statues. It became fixed due to the crossing of the Russia-China trade road and became a center of huge consumption of forest resources, not only for its domestic consumption as firewood but also for the export of lumber. As a result, it is not difficult to imagine that the forest resources receded. As early as 1930s A.D. Simkov was concerned about the depletion of forest resources (Batjargal 2007: 59, Konagaya et.al 2008: 113-115).

Maisky mentions S.A. Kozin, a financial advisor sent by the Russian Empire to Mongolia in 1914 (Maisky 1960:227). Kozin laid down the regulations on forest use, ever since "the forest use tax is still called *goojin* in Mongolian after Kozin's name" (Idshinnorov 1986:43). However, its economic importance has since been ignored just like Maisky's neglect of forest resources. For the Soviet Union, the forest resources probably were provided by wide Siberia within their own large territory.

Of course, the significance of the steppe forest on the Mongolian plateau has long been recognized, as *Khangai* is associated with the Mongolian verb *khangakh*, meaning to satisfied. Amongst other things, Ulaanbaatar is located in a place where, if you approach from the south after crossing the Govi you can finally see the green of the trees, and if you approach from the north after passing between taiga forests you can finally see the plains. In short, the site has been chosen as one of a contact point where the forest and grassland areas meet.

Nevertheless, the study of forests and lumber has been neglected in comparison with grasslands and livestock. This may reflect the fact that Mongols themselves have not been universally engaged in these activities, even if they have been partially or regionally involved. In the future, however, it will be necessary to pay more attention to the significance of forests to influence the choice of centers on the Mongolian plateau, as we have shown in this paper.

In this paper we have not dealt with the woodwork described by Pozdneyev. Since it is possible to correlate the market with a number of photographs, it is appropriate to address this issue again in the context of the reconstruction of Urga or the history of the development of Ulaanbaator. On the other hand, aspects that require quantitative analysis, such as the export of lumber, we will have to wait for the opportunity to explore the archives. As for environmental studies, we would like to deal with specific cases of deforestation, using Simkov's research reports from the 1930s as well as Pozdneyev's.

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List of illustrations and captions

Fig. 1 Urga's street in the English translation of Przhevalsky's book (Przhevalsky 1876:14) According to the list of illustrations in the book, it was borrowed from the *Tour de Monde*. The golden roof and wooden fence of the palace of the Bogd are impressively depicted.

Fig. 2 The streets of Urga in V. Meignan's travelogue (Meignan 1876:284) It is a record of a trip to Urga in 1874. It features a log fence, flags, standing trees and a mani-wheel shed, drawn according to the description.

Fig. 3: Enlargement of a part of the picture drawing of Urga (Manibadar 1946). In the southern part of the commercial area between the central temple territory and the Gandan temple to the west, a square chimney-like structure is depicted, which, in contrast to the photograph, is understood to be a pile of firewood.

Fig. 4: Filling and sawing works in *Mongolian one day* drawn by famous Sharav.

Fig. 5: Ulaanbaatar migration history (prepared by SUZUKI Kohei based on Teleki 2015). The satellite image is downloaded from NASA Visible Earth.

Table 1: Ulaanbaatar migration history (prepared by SUZUKI Kohei and HOTTA Ayumi based on Teleki 2015)

Photo 1: Bogd Khan Palace, taken by Boyarsky in 1874. (Album of Russian Scientific Commercial Expedition to China in the collection of the National Library of Brazil, from the World Digital Library online database. <https://www.wdl.org/en/item/2128/>)

Photo 2: Entitled “Hamva Street in Khure (Entrance to Khure)”, taken by Fyodorov in 1892 (Pozdneev 1896:98).

Photo 3: The log-wall can be seen behind “The Beggar at Urga”, taken by Pälsi in 1909. (From the website of the Department of Photographic Archives of the National Library of Finland, https://www.kuvakokoelmat.fi/pictures/view/VKK156_123)

Photo 4: Firewood piled up on the wall of the enclosure of a Han Chinese merchant’s house, taken by Lushnikov, probably in 1898. Kunstkamera photo reference number 1368-112. (Chuluun and Ivanov 2015:228)

Photo 5: Prison in Urga, taken by MS Andrews, September 1919. (Image241839, American Museum of Natural History Library)

Photo 6: Two different ways of stacking firewood can be seen, taken by Lushnikov, probably in 1898. Kunstkamera photo reference number 1368-58 (Chuluun and Ivanov 2015:180-181).

Photo 7: Firewood piled up like a chimney (left), taken by the Danish doctor Krebs in the 1920s. (Brae and Chuluun 2020:119)

Photo 8: “General view of Urga (Khure) from the west”, taken by Fyodorov in 1892. (Pozdneev 1896:73)

Photo 9: Thin wood is cut down and carried in. From the Mongolian Photo Archive.

Photo 10: Transporting fuel by camel, 1926, taken by the survey team photographer Clark (Image268585, American Museum of Natural History Library).

Photo 11: A pile of logs in front of the Hanjin shop, taken by Lushnikov, probably in 1898.

Kunstkamera photo reference number 1368-98 (Chuluun and Ivanov 2015:214-215).

Photo 12: Export of lumber by ox cart, taken by Mrs. Andrews, July 17, 1919 (Image241794, American Museum of Natural History Library).

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¹ Tottori University Arid Land Research Center Joint Research Project 02B2001 “Environmental Research using Old Photographs” (KONAGAYA Yuki)

² The website of our project is as bellow.

<https://historicimages.mn>

³ The photograph was copied from the original Russian book (Pozdneev 1896:98).

⁴ There is a biography of Charushin by a local historian using diaries and letters, and the part on Urga (Sergeyev 2001:46-59) has been translated into English available on the website in note 2 above. As follows. <https://historicimages.mn/sites/default/files/202007/V.%20D.%20Sergeev%202001%2C%20Charushin.pdf>

⁵ These figures seem somewhat exaggerated, which is probably the result of the piling of firewood. As for the height of the enclosure itself, in the case of the Living Buddha’s Great Palace, Andrews says “The whole area is surrounded by an eight-foot fence of white pillars with the edges painted red” (Andrews 1921:68).

⁶ The website for the collection is as follows. <https://museovirasto.finna.fi>

There are other clear photographs of log enclosures available on Urga. In addition, there are a number of photographs available online, including A collection of photographs from Kozlov's 1923-1926 survey (Chuluun and Medvedeva 2017:267), and Andrews' photograph of the Maidari festival on September 1, 1918 (online from the American Museum of Natural History, 241623/241637).

⁷ It is also the family home of the wife of G.N. Potanin.

⁸ Jugder’s painting is displayed in the Bogdkhahn Museum. In the Ulaanbaatar City Museum, there is a replica drawn by Manibadar in 1946.

⁹ The current lumber shops have been relocated from the city center (Sukhbaatar Square) to Khangai Market, about 6km to the west, and Tsize Market, about 4km to the east, exactly reflecting the expansion of the city center.

¹⁰ Legume shrub, *Cargana pygmaea* in Scientific Latin Name.

¹¹ In her commentary on this scene of the painting, Lomakina misinterprets this kiln as a cavern where Mongols live in the woods (Lomakina 1974:88-91).