Women and their key role in carbon management of rangeland ecosystems of alpine areas in China

Zhanhuan SHANG

International Centre for Tibetan Plateau Ecosystem Management, Lanzhou University, China
E-mail: shangzhh@lzu.edu.cn

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Outlines

1. Current status of women in alpine region
2. Female labor in pastoral areas of the Tibetan plateau
3. Women role in carbon management of alpine meadow ecosystem
4. Conclusion
Within the population of the Tibetan Plateau, the number of women is about the same as men, but women play a more active role in the day-to-day life, providing the majority of productive labor. However, female education is even worse. In addition to the diminished educational opportunities in the remote areas, the labor requirement in livestock production is too arduous.

<table>
<thead>
<tr>
<th>Area</th>
<th>Literacy rate at age &gt;15 (%)</th>
<th>Infant mortality rate (%)</th>
<th>Work in education, hospital and research (%)</th>
<th>Non-agricultural population(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lahsa</td>
<td>64.88</td>
<td>6.14</td>
<td>0.627</td>
<td>4.291</td>
</tr>
<tr>
<td>Rikaze</td>
<td>34.11</td>
<td>11.27</td>
<td>0.174</td>
<td>0.989</td>
</tr>
<tr>
<td>Shannan</td>
<td>52.62</td>
<td>10.02</td>
<td>0.206</td>
<td>0.926</td>
</tr>
<tr>
<td>Linzhi</td>
<td>59.11</td>
<td>9.00</td>
<td>0.402</td>
<td>2.143</td>
</tr>
<tr>
<td>Ali</td>
<td>34.10</td>
<td>12.03</td>
<td>0.491</td>
<td>1.932</td>
</tr>
<tr>
<td>Nagqu</td>
<td>24.19</td>
<td>11.77</td>
<td>0.224</td>
<td>0.861</td>
</tr>
<tr>
<td>Chamdo</td>
<td>17.83</td>
<td>7.57</td>
<td>0.162</td>
<td>0.713</td>
</tr>
</tbody>
</table>
• In alpine grassland areas, women have been involved in carbon management through management of animal by-products, fuel management, and so on. Their daily labors are the key to maintaining the well-balanced carbon cycle in alpine grassland ecosystems.

• The purpose of ecological feminism is to advance effective process management and the care of women in natural ecosystems, and to actively promote respect for women, gender equality and to care for ecosystems to achieve sustainable development.

• To fully understand the importance of the role of women in carbon management of alpine grassland ecosystems, the social status of women in traditional Tibetan families should be considered.
2. Female labor in pastoral areas of the Tibetan plateau

Daily labor of a household and women’s labor in a typical pastoral family on the Tibetan plateau (Lu, 2002)

- 9:00 P.M. The sons and younger daughter, who have been tending the herds, drive back the livestock. The mother and eldest daughter milk the breed cows. At home, the younger daughter makes tea and cooks supper.

- 4:00 P.M. Gathering the livestock

- 2:00 P.M. Collecting the dung and dry chess.

- 12:00 noon The mother makes the noon meal. After eating, the mother and the [eldest] daughter tether the calves and milk the cows. About an hour later, they tether the ewes among the sheep and milk them, taking about three hours to do so. After returning home, they boil milk and make yogurt and milk curds.

- 9:30 P.M. The family has supper. 10:00 P.M. The entire family goes to bed.

- 4:30 A.M. The eldest daughter gets out of bed and fires up the stove.

- 5:00 A.M. The mother gets up and, together with the eldest daughter, does the milking (twelve milch cows and six breed cows), which requires about an hour. Then they separate the lambs from the sheep in the sheep pen.

- 7:00 A.M. The two eldest sons get out of bed and eat something before going out to tend the livestock. After breakfast, the eldest daughter churns yak butter, taking about three hours to do so. The mother changes the water in the bowl of sacred water offered to Buddha, and then performs miscellaneous household chores.

- 8:00 A.M. The father gets out of bed, takes breakfast, and starts to twist wool yarn.
Comparison of men and women in daily labor and decision making in pastoral families of the Tibetan plateau (According to Lu, 2002)
3. Women role in carbon management of alpine meadow ecosystem

- Carbon accumulation by animals has two ways of re-entering the carbon cycle. The first is through decomposition of the body of the livestock directly into the carbon cycle. The other is through the input of carbon via products (e.g. meat, milk, fur etc.).
- The women play a role through the production of dairy products from livestock. This is an output from plant photosynthetic carbon through the plant-livestock-atmospheric system in the alpine grassland ecosystem.
- The output of carbon products can eliminate carbon redundancy by the accumulation of excessive animal carbon products in the alpine grassland carbon cycle, which is an important part of a negative feedback mechanism.
In the alpine region of China, the proportion of local residents using livestock dung as fuel is much higher than in other areas of the Himalayan region. (Sharma, 2010)

Local women collecting yak dung as fuel accounted for 91.4% of the entire fuel use. (Sharma, 2010)

The more dung fuel is used, the fewer native shrubs are cut and lower levels of fossil fuels are imported.

This is equivalent to reducing carbon dioxide emissions because the carbon emission from the burning of yak dung is from the grassland ecosystem.
The amount of yak dung burnt per person and the equivalent quantities of local shrubs (area), coal and emission of CO$_2$ at different altitudes in alpine meadow ecosystems in China (Part from Yu, 2010).

- In alpine grassland ecosystems, through processing and burning yak dung as fuel, female labor not only significantly reduces carbon emissions through reducing the introduction of external fossil fuels.

- From 2500 to 4700m, local resident burnt from 590 to 9200 kg of dung fuel per person per year. This is roughly equivalent to reducing burning of coal by about 332 to 5189 kg, reducing carbon emissions (CO$_2$) by about 847 to 13,258 kg. (Yu, 2010)
4. Conclusion and Suggestions

- In conclusion, female labor is an important mechanism to maintain the carbon cycle in alpine grassland ecosystems and to maintain the function of the alpine region as a carbon sink, an important practical role in maintaining the globe as carbon neutral.
- Therefore, women play a key role influencing the carbon cycle of grassland ecosystems, as a real ‘God’s hand’.
- Carbon management issue is an important method to address the gender equality, but that need more study to address it accurately.
- The Government should play a key and important role in the social investment should be addressed to the social problem of women, on the other hand, social organization of women can focus on the building capacity of women population through the carbon issue.
- Strengthening the education of women groups in the alpine region, which should make sure young women completing the enough education inevitably they premature to assume the heavy labor work.
- Technology and media system should pay attention to the publicity of the status of women, and men should fully aware of the important role of women in the ecosystem, and gradually improve the care activity of women.
Thank your attention and suggestions!