Study on afforestation in the Huangtu Plateau, China

(Green Earth Network)

§ Background

The Huangtu Plateau is a semi-arid area that receives only 400mm of annual precipitation. Furthermore, two-thirds of the total precipitation occur in July and August, when land with little vegetation suffers from soil erosion. Deterioration of the soil makes the land more unsuitable for crops and plants, consequently accelerating the speed of desertification. Local farmers are keen to plant trees on this land; Their main purpose is to reduce the speed of soil erosion and desertification, followed by the potential for earning future income from these trees. Huangtu Plateau has a total area of 520,000km2, about 1.4 times that of Japan. To afforest this vast semi-desert region, the Chinese government is currently undertaking a large-scale afforestation project.

§ Outline

1) History of the Afforestation Project and its Challenges

Early Chinese civilization developed on the Huangtu Plateau, and it's estimated that in prehistoric times vast forests existed there. Over the last 50 years in Datong – a source of water for Beijing as well as the origin of sandstorms -- various kinds of afforestation projects have been carried out in accordance with the local geographic conditions. Although younger trees grow satisfactorily while they still require little water, they cease to develop after the point when they need more water for further growth. As a result, most of the mature trees in the region are aged but small.

2) Local Farmer's Sentiment Towards Afforestation

About 900 local farmers from 21 villages responded to a questionnaire survey regarding their sentiment towards afforestation. Three major issues were apparent from the results:

- Farmers take the soil erosion and desertification seriously. They strongly feel the need for afforestation.
- Many farmers pointed out some technical delays in current afforestation projects.
- Farmers living in rural villages isolated from one another do not have an objective view of their circumstances.

3) Global Warming

The local average temperature has risen 1 degree Celsius in the last 30 years, and the increase in the lowest temperatures is especially prominent. The area has low precipitation, and spring rains have decreased; Meanwhile, autumn rains that come after the growing season are increasing. Many wells and springs have dried up as a result, leading to extraordinary water shortages. Accordingly, many villages are beginning to face difficulties just in order to secure their daily drinking water.

4) Survey on Artificial Pine Wood Growth

The surveyors discovered that the growth of a pine trunk depends largely on precipitation from autumn to spring. For ten or more years after afforestation the amount of growth increases every year, but subsequently there is a tendency for the growth rate to stabilize or decrease. The reason for this has not yet been determined. More study will be needed on this subject to determine whether the slowing of pine growth volume arises from the recent increase in dry weather or something more fundamental.

Data from this survey was also used to calculate this forest's estimated volume of stored carbon.

5)Vegetation Survey of Natural Forests

There is a natural forest of deciduous broadleaf trees in some regional mountains, far from human habitation, and here we organized a vegetation survey. Cutting down a few trees as samples, we analyzed their growth rings. Trees in this forest had been cut down by villagers for use as firewood over a long period of time, but after pines were afforested close to the village 20 years ago, people began using these latter trees' lower branches for their firewood. Since then, the forest in the mountain has regenerated. Deciduous broadleaf trees are very effective for retaining water and soil, an important factor for fostering sustainable forests.

6) Cost Survey

In this kind of low-income area, an inexpensive labor force (about 200 yen/day) and cheap seedlings (about three yen each) can be easily obtained. The money spent would be a precious cash income for the locals and will help vitalize the village.

7) Baseline

In this area, no vegetation will regenerate without afforestation, due to the local customs of cutting trees for firewood and grazing sheep and goats (which eliminates the few sprouting plants). Therefore, afforesting with seedlings and closing the area is the only way for the forest to regenerate. In another words, no forest close to human habitation will regenerate naturally. This means that the baseline is zero and all forest absorption would be counted as a net earning.

§ Planning and Assessment of the Project

1) High Cost Performance

If the project were to include planting 3,300 pines/ha along with the same number of fertilizing trees per ha, and 100 ha were afforested annually for five years, with ten years of maintenance the total cost would come to only 30 million yen, about 60,000 yen/ha. All of the seedlings are two to three years old. Younger

seedlings have a higher survival rate, and are easier to plant with a relatively low labor burden on the farmers – translating to high cost performance.

2) Changes in the Volume of Stored Carbon

Since young pines' early growth volume is low, for the first six years after planting their stored carbon volume is small. For example, the total volume of stored carbon for young Mongolian Red Pines（P. sylvestris Linn. var. mongolica Litv.） is only 105 kg/ha. After six years, the annual volume increases rapidly, but even after 12 years (the upper limit of this survey), it does not exceed 1.1 t/ha. The exponential increase of timber mass and stored carbon volume only occurs after 14 or 15 years.

§ Conclusion

1) Although afforestation in arid or semi-arid regions is very important, due to the insufficient stored carbon volume cost performance for the maximum survey period of 12 years, it is difficult for the Huangtu Plateau to become the subject of a CDM Project. If we venture to make it one, we must change our policy and try planting older seedlings, or seedlings of trees that grow faster. These alternatives, however, go against the local situation.

2) Tendencies such as rising temperatures and decreasing spring rains have become conspicuous in this area. If global warming proceeds, even those forests existing in the area may be lost.