Daikin Church Forest Restoration Project in Ethiopia (CFRP)

FY2024 Activity Report

1. Background and Purpose of This Project

The church forests in Ethiopia (fragments of forest surrounding Ethiopian churches) are the last remnant of primeval forests in the country, and are a center of biodiversity for plant seeds, genetic resources, etc. Our focus in this project is these church forests, and we carry out research on the conservation and genetic resources of the church forests as well as afforestation of degraded land using the genetic resources of the church forests. We also aim to restore degraded land into landscapes close to the church forests that bring ecological, cultural, spiritual, social and economic benefits to the region.

2. Overview of FY2024 Activities

Our activities included surveys of vegetation, soil and ecosystem services, raising awareness among local communities, and piloting participation-type afforestation in the Tara Gedam Church Forest and surrounding degraded areas in northwestern Ethiopia. The details are described in the following sections.

2-1. Afforestation of Degraded Land and Schools and Restoration of Imitated Church Forest

2-1-1. Activities in the Nurseries

Our activities at the nursery site that was prepared for afforestation in this project included preparation of compost, leveling the ground (Fig. 1a), mixing soil, preparing nursery beds, filling pots with soil (Fig. 1b), sowing seeds (Fig. 1c), and watering. This year, we grew a total of 15,000 seedlings of eight tree species (Fig. 1d). By adding the soil collected around croton (*Croton macrostachyus*), an important tree species in the church forests, to the nursery soil, we attempted to improve soil microorganisms and produce strong saplings.

Fig. 1 (a) Nursery development under Daikin project, (b) Filling pot with soil, (c) Sowing seeds, and (d) Growing seedlings while shielding them from strong light

2-1-2. Activities at Schools

At the elementary schools, our work in 2023 included preparing the site and planting holes, transporting plants, and planting seedlings. A total of 2,250 seedlings were planted in the project school. This year, throughout the dry season, school guards regularly took care of the seedlings by plowing, fertilizing, and watering them. The survival rate of the seedlings planted at the school was 88%.

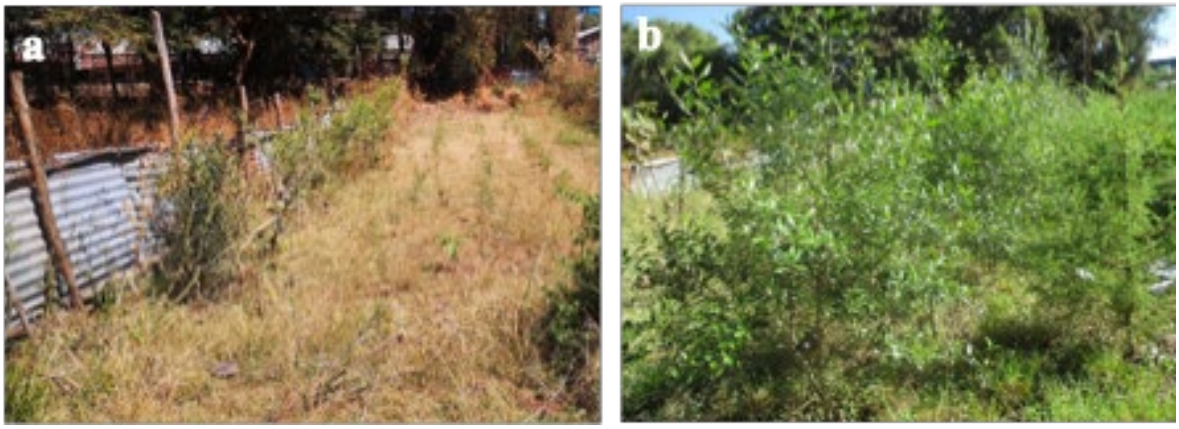

Fig. 2 Saplings transplanted at an elementary school, (a) Photo taken in January 2023, and (b) Photo taken in January 2024

2-1-3. Activities at the Restoration Site

Activities at the DAIKIN restoration site (Fig. 3a) included selecting sites and preparing ditches for water harvesting. A total of 7,826 saplings were planted by the rainy season of 2023. The survival rate of these planted saplings ranged from 70 to 76%. In addition, we established five monitoring plots sized 20 × 20 m to implement regular activities such as monitoring and follow-up, and collecting survival and growth data according to the schedule. We set up two monitoring plots at the top of the slope, two at the bottom, and one in the middle to allow assessment of the entire restoration site (Fig. 3b).

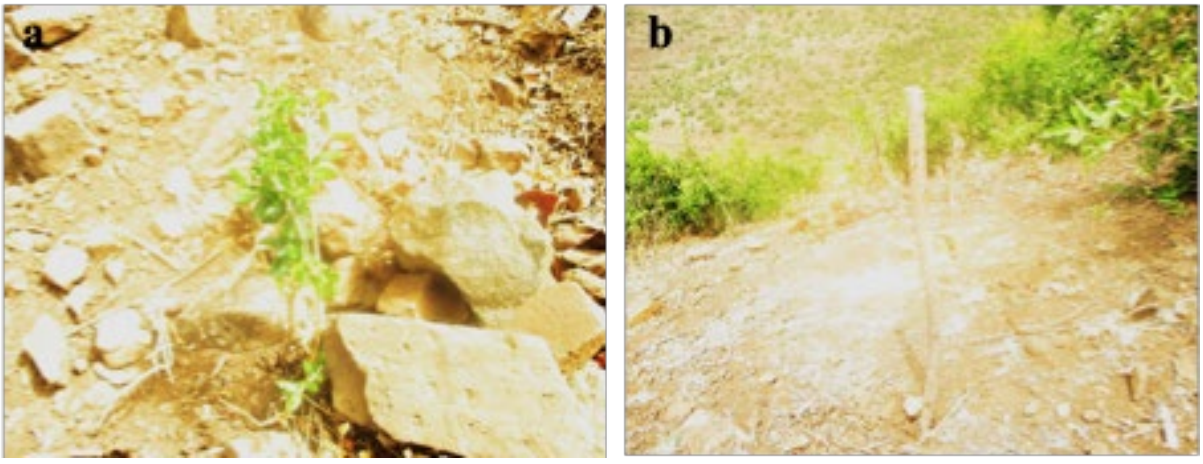

Fig. 3 (a) Growth of planted saplings at the afforestation site (March 2025), and (b) Monitoring plot

2-1-4. Development of Technology to Promote the Survival and Growth of Saplings

In order to promote the survival and growth of the saplings, we selected shrubs and trees to function as nursing trees for the saplings. In the future, we plan to prepare olive saplings in the nursery and transplant them inside and outside the nursing trees at the Daikin restoration site. A total of 160 saplings are to be planted in this planting experiment.

2-1-5. Inoculation Experiments with Mycorrhizal Fungi to Support the Growth and Survival of Saplings in Degraded Land

We collected soil samples from the periphery of three types of trees (*Teclea*, *Olea*, and *Albizia*) that grow naturally in the Tara Gedam Church Forest, and prepared saplings of *Olea* and *Albizia*. We prepared four treatment plots (Fig. 4) and plan to start experiments in July 2025. In addition, we collected and transported to Japan a total of 25 kg of peripheral soil of the *Teclea*, *Olea*, and *Albizia* trees in the Tara Gedam Church Forest for a similar test at Tottori University.

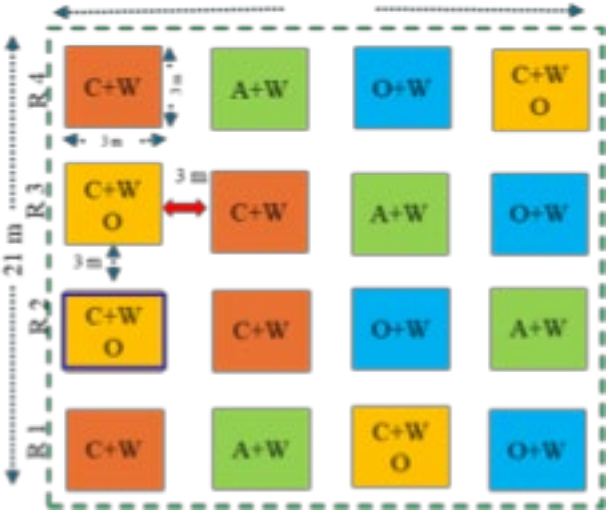

Fig. 4 Layout of planting experiment field in Ethiopia

2-2. Cooperation with Local Communities in Environmental Education, Reforestation and Afforestation

2-2-1. Holding Training and Conferences on Sapling Management and Afforestation

We provided training to six experts representing local agricultural offices and nursery managers on data collection and tree planting management at school sites and restoration sites (Fig. 5). To encourage proper planting, we are also working on and drafting guidelines for growing seedlings suitable for environmental restoration.

Fig. 5 (a) Data collection training, (b) and Nursery managers

2-2-2. Improvement of Feed Production

As part of our efforts to reduce tree felling, we selected 15 farmers who indicated their intention to use part of the land for improved grass production, and provided a training session on grass planting, management and maintenance. In the nursery, we prepared two types of pasture grass (napier grass and Desho grass), and set up everything to distribute a total of 40,000 grass stubs to the selected farmers (Fig. 6).

Fig. 6 (a) Napier grass and (b) Desho grass in nursery, (c) and (d) Feed production training for agricultural producers

2-3. Assessment and Conservation of Ecosystem Services such as Carbon Sequestration and Cultural Values

2-3-1. Assessment of Ecosystem Services, Social and Cultural Values Provided by the Church Forests

We held a workshop for farmers living in the vicinity of church forests and a forest managed by the local community (Fig. 7a). We selected nine knowledgeable farmers from six sites to discuss the characteristics of each forest, including identifying dominant tree species, and assessing past and current forest use patterns, desired ecosystem services, and the non-market values provided by forest expansion (Fig. 7b). We then conducted a preliminary survey on 40 farmers to collect data, and eventually had nine trained surveyors conduct the main survey at eight sites while following the 2-day training program (Fig. 7d and e). We collected data from the following 400 households (Table 1), and were able to conduct an assessment on socio-economic and institutional variables, forest preferences and perceptions of ecosystem service use.

Table 1. List of household survey sites

No.	Surveyed district (site name)	Number of households	Percentage of total
1	Debark (Walidiba)	50	12.5
2	Gondar Zuria (Ambo-ber)	50	12.5
3	Mirab Belessa (Gond T/hayimanot)	50	12.5
4	Libo-kemkem (Tara-gedam)	50	12.5
5	Fogera (Alem-saga)	50	12.5
6	Zegie	50	12.5
7	Banja (Askuna-abo)	50	12.5
8	Goncha siso enesie (Bahire-Georgis)	50	12.5
Total		**400**	**100**

Fig. 7 (a) Workshop to assess ecosystem services of church forests, (b) Training of surveyors, (c) Selection of selection cards, (d) At some interviews, and (e) Location map of survey sites

2-4. Other Activities

We visited the Ethiopian Biodiversity Research Institute (EBI) in Addis Ababa, the Addis Ababa Forestry Agricultural Research Center (FRC), and the Addis Ababa National Soil Laboratory (NSL) to collect information in order to conduct experiments using plants and soil in Japan. We exchanged views on how to obtain seeds for research purposes and on exporting plants and soil materials to Japan.

We also visited Hawassa University in southern Ethiopia, where we observed their research facilities to analyze soil physics, chemistry, and microorganisms, and exchanged information.

Fig. 8 (a) Facilities of Addis Ababa National Soil Laboratory, (b) Preparation of *Rhizobium* bacteria for inoculation in plants with charcoal as a carrier

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