鳥取大学

Daikin Church Forest Restoration Project in Ethiopia (CFRP):
業務実施報告書(2023)

1. Assessing vegetation diversity and composition of Church Forests

Vegetation survey was conducted in Church Forest **(Fig. 1a)**, Community Forest **(Fig. 1b)**, State forests **(Fig. 1c)** and Degraded land **(Fig. 1d)**. In the forest, tree, sampling, and seedlings were assessed using a systematic grid and pre-defined plots. A total of 86 plots (10 m radius) were used in church forest (22 plots), community forest (29 plots), state forest (23 plots), degraded land (12 plots).

Figure 1. Partial views of the Tara Gedam church forest (a), community forest (b), state forest (c) and degraded land (d) habitats used for vegetation and soil survey.

2. Study status of soil nutrients, water dynamics and carbon stock of Church Forests

A total of 218 soil samples were analyzed from church forest, community forest, state forests and degraded land. The analysis included various soil properties such as pH (H2O), electrical conductivity (EC), cation exchange capacity (CEC), total nitrogen (TN), organic carbon (OC), available phosphorus (Av. P), calcium ions (Ca++), magnesium ions (Mg++), potassium ions(K^+), sodium ions (Na^+), and soil texture. Additionally, a total of 109 soil bulk density results are now available for further statistical analysis and interpretation.

3. Identification functional based mycorrhizal inoculum to assist seedling growth and survival in degraded lands

For this activity, a total of 218 soil microbial samples were collected, and DNA extraction and sequence were done for soil fungi and bacteria. Functional soil microbe identification and additional analysis are caried out in Tottori university (MSc student; Biazen E.) as per the established timetable.

4. Evaluation of the ecosystem service, social and cultural values of church forests

Questionnaires were developed and checked to evaluate of the ecosystem service, social and cultural values of church forests. In addition, activities including forest composition (dominant, extinct and endangered species), function of trees and information on history of deforestation in the project area were collected though key informant and group discussions. However, further data collection and survey activities are still suspended due to the ongoing security problem in the area.

5. Establishment of forest stands close to church forest composition at Tara Gedam and Aba Gerima sites.

a. Nursery activity

In the nursery site, regular tasks including compost preparation, land leveling, clearing, soil mixing, seed bed preparation, pot filling, seed sowing, and watering were conducted (**Fig. 2**). A total of 40, 000 seedlings were raised for 9-different species. These seedlings were assisted with uniform amount of soil from *C. macrostachyus* tree.

Figure 2. Pot filling (a), seed sowing (b), seedling preparation (c) and watering (d) activities DAIKIN nursery site from.

b. School activity

In the elementary school activities such as training, site and pit preparation (**Fig. 3a**), fencing (**Fig. 3b**), transportation (**Fig. 3c**) and planting (**Fig. 3d**) seedlings were conducted. In each school, 650-850 seedlings were planted. Throughout the dry season, seedling management was performed by Environmental Club (EC) members, which involved activities like hoeing, manuring and watering seedlings on a regular schedule. The survival rate of the seedlings planted in schools were ranging from 84% to 94% (**Fig. 4**).

Figure 3. Site and pit preparation (a), fencing (b), seedlings transportation (c) and planting (d) in schools at Tara-Gedam by environmental club members June 2023.

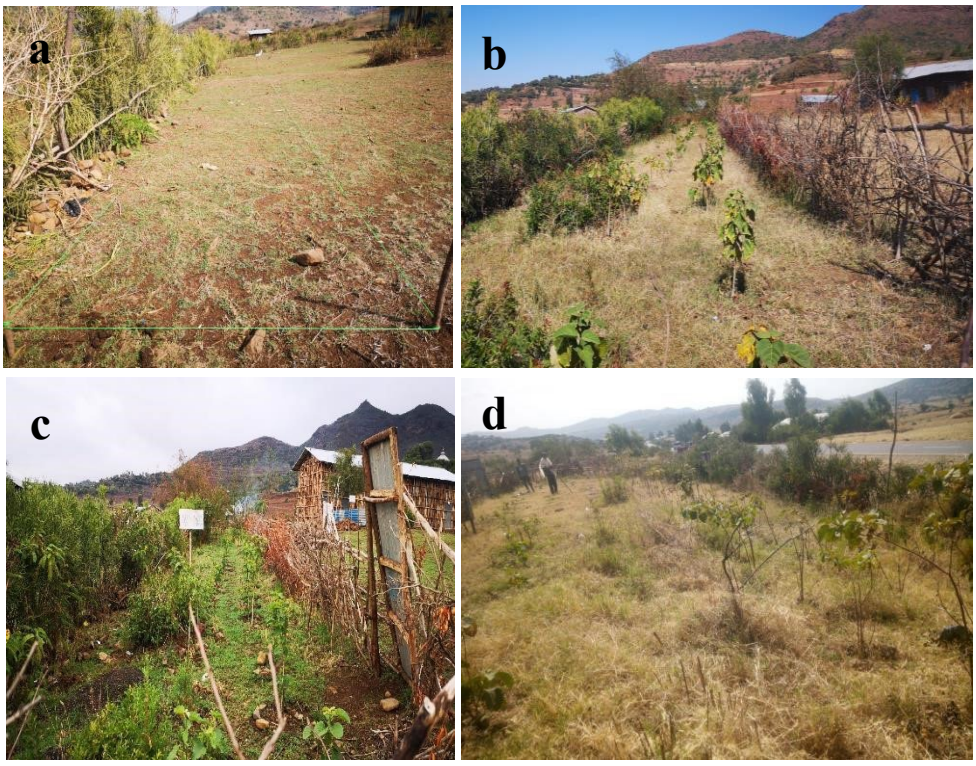

Figure 4. Planted seedlings status at Dakia elementary schools in June 2023 (a), February 2023 (b), June 2023 (c) and February 2024 (d).

c. Restoration site activity

In the DAIKIN restoration site (**Fig. 5a and b**), activities such site selection, pit preparation, plantation for more than 12,000 seedlings were conducted in 2023 rainy season. The survival rate of planted seedlings was ranging from 78–80 % in this site (**Fig. 5c**). Moreover, routine activities such monitoring and follow up, survival and growth data collection were caried out based on the schedule.

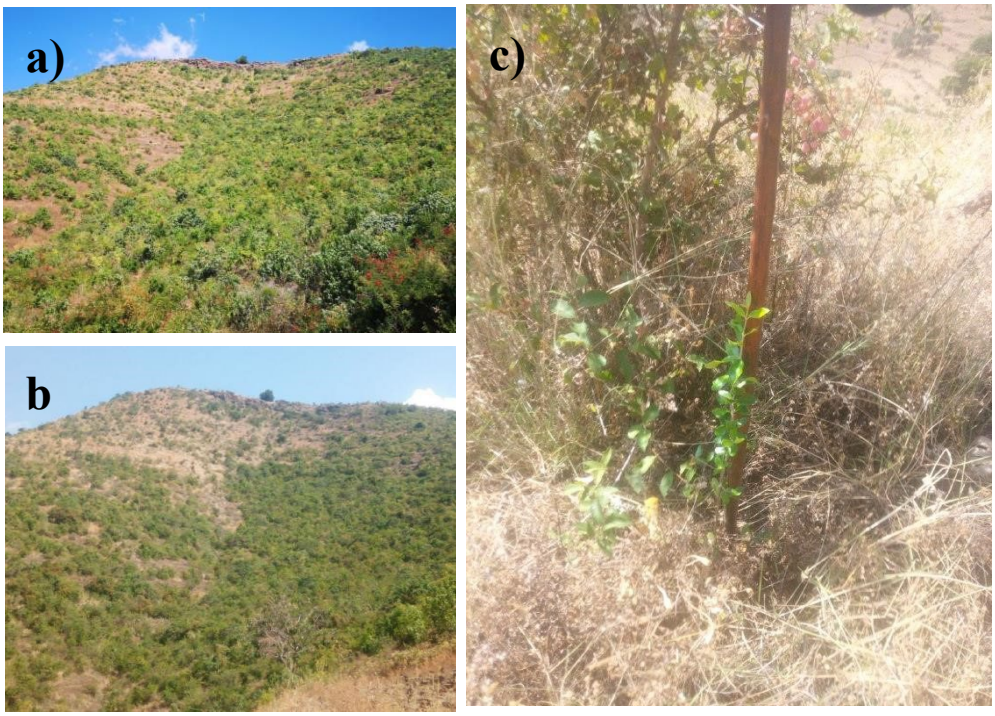

Figure 5. Status of restoration site across years; February 2023 (a), February 2024 (b) and performance of *Olea* seedlings (c) at field condition.

d. Tara Gedam and Aba Gerima churches activity

In Tara Gedam churches; 2000-*Eucalyptus* seedlings and Aba Gerima churches; 5000-*Cordia african*, 2000-*Olea europaea* and 200-*Cofee arabica* seedlings were planted (**Fig. 6**).

Figure 6. *Olea* and *Cordia african* seedlings at Aba Gerima.