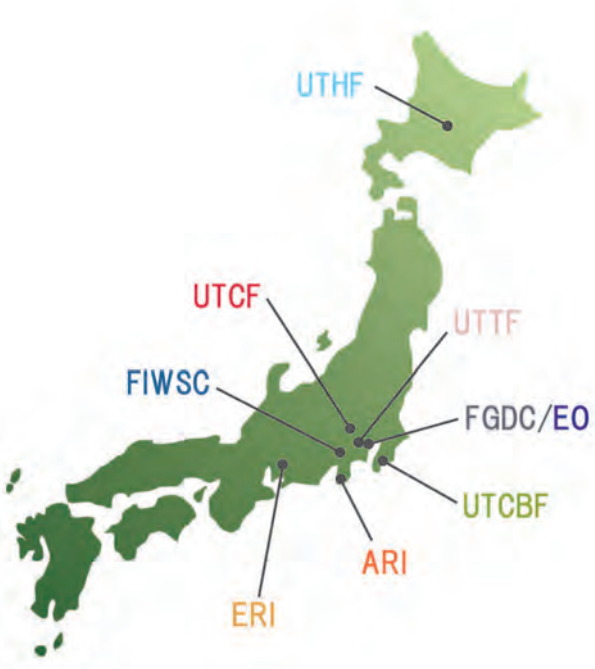
Graduate School of Agricultural and Life Sciences, The University of Tokyo

2025 The University of Tokyo Forests

The University of Tokyo Forests since 1894

Contents



Location map indicating seven regional forests, centers and executive office

The University of Tokyo Chiba Forest : UTCBF
The University of Tokyo Chichibu Forest : UTCF
Ecohydrology Research Institute : ERI
Arboricultural Research Institute : ARI
The University of Tokyo Hokkaido Forest : UTHF
The University of Tokyo Tanashi Forest : UTTF
Fuji Iyashinomori Woodland Study Center : FIWSC
Forest GX/DX Co-creation Center : FGDC
Executive Office : EO

Outline of UTF

1. Vision and mission

The University of Tokyo Forests, Graduate School of Agricultural and Life Sciences, The University of Tokyo (UTF) was established in 1894 as a place for education and research with the aim of developing human resources and technology for forest development and extension. Forest maintenance and management have been conducted over a long period of time to sustainably produce forest resources, contribute to watershed protection and prevention of disasters on state land, nurture biodiversity, and create a rich forest environment for rest and recuperation. Through this process, a human resource network has been established comprising specialists in the natural environment and forests, in particular, technology for forest maintenance and management has been developed, and research on forest formation has been fostered, all to promote the knowledgebase for good forest maintenance in the future. Education, research, and extension missions, and internationalization and forest management visions have been established for the effective utilization of these precious forest environments, technologies, and data.

[Mission]

1. Education: To provide undergraduate and graduate courses on forests, along with optimal fields to achieve this goal.
2. Research: To promote specialist research on the natural environment, specifically forests and their interactions with humans, and provide optimal fields for research organizations, predominantly universities, and records (data) on the dynamics of the natural environment.
3. Extension: To provide the mechanism and field for enriching social education on forests, including school and extended programs, that connect science and society.

[Vision]

1. Internationalization: World-leading education and research forests

   To promote internationalization with a focus on education and research, while playing a leading role in Asian University Forests. Long-term data is a valuable asset for the entire world, the value of which is disseminated as scientific output.
2. Forest management: Forests maintained with reliable technology

   To establish forest management technologies that can be used by subsequent generations.

2. Education

About 20 specialists of various academic fields are affiliated with the UTF, which comprise two research laboratories for cooperative courses in the Department of Ecosystem Studies and Department of Forest Science at the Graduate School of Agricultural and Life Sciences. Lectures conducted by each of the two research laboratories are held for graduate students, and omnibus format lectures on Forest Ecosystem Science and Management are held for undergraduate students. In addition to participating in various lectures and practical training, the faculty members also instruct graduates and undergraduates of the research laboratories, and share the responsibility for specialized education in the Faculty of Agriculture, Graduate School of Agricultural and Life Sciences.

Lectures, including Specialized Seminars, Fieldworks, and Integrated Courses, have been provided in the first two years of undergraduate courses at the College of Liberal Arts (First/Second-year students), and more than 300 students have visited the UTF through ~30 lectures every year. These lessons have great significance for the entire university as they provide an opportunity for practical and intellectual experience related to forests, forestry, and ecosystems as part of a liberal arts education. There are also many programs offered through Hands-on Activities—run by the administrative department of the university—which contribute to experiential learning.

Many courses run by the Faculty of Agriculture (among other faculties of this and other universities) are held in the UTF. Thus, these forests provide expansive practical field areas that extend beyond the boundaries of agriculture and universities. We also take part in the “Open Forest Training” initiative run by the Japanese Association of University Forests, which accepts students from other universities. Other programs, such as the “Summer Programs,” also promote student exchange between Japanese and overseas universities. The university has recently initiated internships from overseas universities, providing the opportunity for students to participate in education and research on forest management and forestry over several months.

Experiment in Basic Forest Science I through forest science specialization

3. Research

Research on the interaction between the natural environment and humans is promoted and implemented through the UTF, which capitalizes on the established forest research fields. The research topics are varied and include natural sciences ranging from the individual level, such as the physiological function and environmental adaptation of organisms, to the community level, such as population dynamics and biodiversity, and much broader watershed levels, such as forest and water resources. Research also includes the social sciences, comprising the history, culture, economics, and policies of forests within human society. More modern branches of research include information processing technology, such as digitization of forest information, and forest evaluation with artificial intelligence. Thus, a diverse spectrum of research is conducted by students and faculty members in the UTF.

There are seven regional forests throughout Japan, each with their own unique characteristics depending on the region, climate, and historical land use; thus, research topics are unique to each area, depending on the local land features. Test sites and survey areas are situated in each of the regional forests, and monitoring surveys on forest dynamics and the water cycle as well as inventory surveys on indigenous flora and fauna have been conducted continuously over several decades. The data are being made widely available through publications and online university resources with the goal of global use.

UTF are open to researchers from institutes both in Japan and overseas, making them a valuable research base in Japan and Asia.

Regular surveys implemented at the test site

4. Extension

The knowledge and technology associated with the UTF are public assets. The aim of the UTF are to foster a mutually beneficial coexistence with “Forests connecting science and society,” with the main goals of ① School education and life-long learning, ② Collaborative projects between local communities and companies, and ③ Information dissemination

① In terms of school education and life-long learning, local elementary schools, junior high and high schools participate in educational activities in regional forests, and lectures are provided in an easy-to-understand format to impart scientific knowledge and promote dialogue with the general public. ② Collaborative projects between local communities and companies invite the involvement of local governments, organizations, and companies wanting to contribute to the protection of the regional forest and promote the education and ethical use of forests. ③ Information dissemination is aimed at distributing the knowledgebase generated at the UTF through various media, including the UTF website, regional forest SNS, PR magazine (morikara), academic journals (“Bulletin of the University of Tokyo Forests”; “Miscellaneous Information of The University of Tokyo Forests”), and book publications to the various layers of society.

While implementing such diverse social projects, we aim to return the knowledge accumulated in UTF to society more effectively, especially by sharing related know-how among organizations and studying with each other, and in particular, to improve our science communication skills. We also actively partner with funding agencies to further develop the UTF and ensure the continued generation of knowledge in related fields of research and education.

Wood-based products from UTF sold at the University of Tokyo Community Center (UTCC)

5. Internationalization

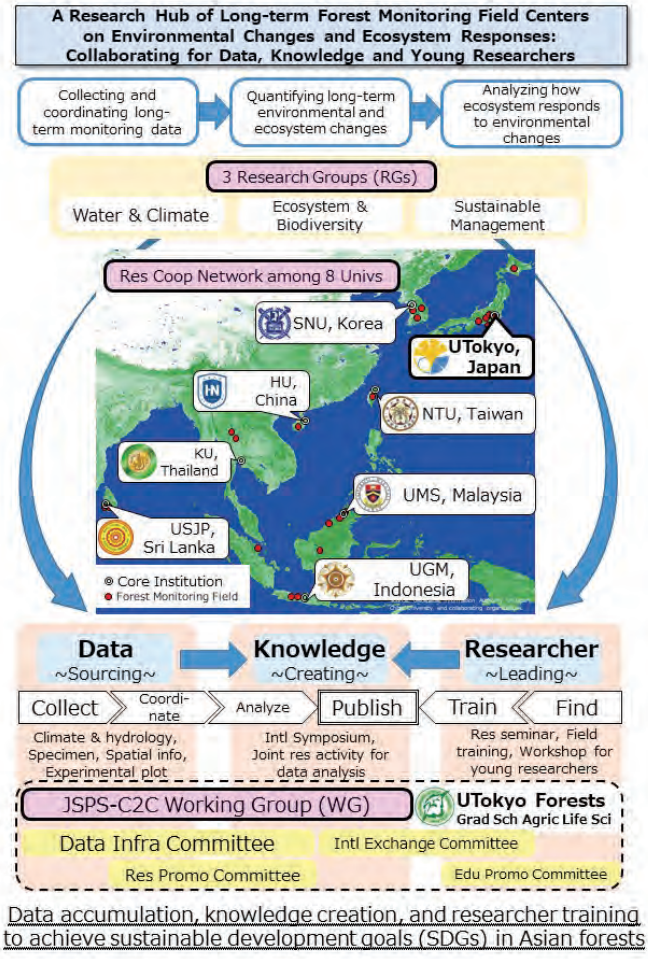
To fulfill a leading role among Asian university forests, we are aiming for internationalization with a focus on education and research. We actively promote the mutual sharing of course material with various overseas organizations, involvement of students and researchers, joint research projects, and establishment of a network among university forests to fulfill a leading role in the sustainable management of forest ecosystems. Initiatives are also underway to disseminate the long-term data accumulated by the UTF to the world.

The Asian University Forest Consortium was formed with

the Seoul National University and National Taiwan University, and joint research is underway in Asia, while the network has been expanded to the Kasetsart University (Thailand), Universiti Malaysia Sabah (Malaysia), Hainan University (China), Universitas Gadjamada (Indonesia), and University of Sri Jayawardanapura (Sri Lanka). University of Philippines, Los Banios (Philippines), and Vietnam National University of Forestry (Vietnam). In collaboration with the FGDC, action has been taken to develop and utilize the network built through the Core-to-Core Program (B. Asia–Africa Science Platforms) of the Japan Society for the Promotion of Science.

In regions outside Asia, we actively contribute to activities implemented by the International Union of Forest Research Organizations (IUFRO), collaborate with forest research organizations worldwide to collect and exchange information on university forest networks outside Asia and participate in the network symposiums.

In addition to actively promoting exchanges between partner universities and research organizations, we are also establishing new exchange agreements with various overseas organizations.



Forest research network among Asian university forests

6. Forest management

Appropriate maintenance and management of the forest are essential for the UTF to offer optimal opportunities for education and research, as stated in its mission. The UTF is a site for implementation of forest management practices, such as forest resource inventory and assessment; plantation- and natural forest-based silvicultural work; forest roads and trail maintenance; and finding countermeasures for forest pest problems (diseases, insects, and wildlife) and weather damage. Forest management operations are carried out mainly by technical staff with specialized knowledge and skills to support education, research, and social outreach activities. Following the UTF vision of "Forests maintained with reliable technology," we are striving to pass on forest management techniques that have been handed down by successive generations of staff and to acquire the latest technology required to do so. To obtain reliable information on forest resources, we systematically perform periodic forest inventories and conduct forest operations such as logging, planting, tending, and raising seedlings. However, damage caused to the forest by diseases, insects, or wildlife can interfere with management operations. We strive to detect these problems at an early stage and have a system in place to respond quickly and appropriately in case of damage. In recent years, an increasing number of typhoon and heavy rain events have damaged forests and forest roads, resulting in rapid disaster recovery becoming an important part of forest management operations. In accordance with the needs of each part of the forest, spatial information such as digitized maps of forest types and silvicultural plans, digital elevation models, and aerial photographs are stored in a central location, managed using geographic information systems, and utilized effectively in day-to-day operations. We are in the process of introducing unmanned aerial vehicles, image processing software, tablet terminals, and other equipment necessary to maintain and utilize spatial information. In addition, staff members are acquiring the necessary qualifications and conducting the training required to obtain and transfer knowledge of basic and advanced technologies related to forest management.

UTF technical staff responsible for forest management

7. Organization and basic data

1) Organization

7 Regional Forests (total area 32,278 ha), 2 Yayoi offices (center, Executive Office)

	Founding year	Land area [ha]	Elevation [m]	Climate
The University of Tokyo Chiba Forest (UTCBF)	1894	2,169	50–370	Warm temperate
The University of Tokyo Hokkaido Forest (UTHF)	1899	22,708	190–1,459	Cool temperate/Boreal
The University of Tokyo Chichibu Forest (UTCF)	1916	5,812	530–1,990	Cool temperate
The University of Tokyo Tanashi Forest (UTTF)	1929	8	60	Warm temperate
Ecohydrology Research Institute (ERI)	1922	1,294	2–692	Warm temperate
Fuji Iyashinomori Woodland Study Center (FIWSC)	1925	40	990–1,060	Cool temperate
Arboricultural Research Institute (ARI)	1943	247	10–520	Warm temperate

Seven ad hoc committees (Education, Research, Extension, International Affairs, Forest Management, Environment, Health and Safety, and Operation Management)

2) Number of teaching, technical and administration staff (as of 31 March 2024)

99 (23 teaching staff [4 professors, 4 associate professors, 5 lecturers, 10 assistant professors], 61 technical staff, 15 administrative staff)

3) Number of students (as of 31 March 2024)

39 (10 Doctoral students, 20 Master's students, 7 Undergraduate student, 2 Research students)

4) Number of courses offered at the University of Tokyo (FY2023)

Junior Division, Faculty of Liberal Arts, 40 subjects (38 Thematic courses, 2 Integrated courses)
Faculty of Agriculture, 15 courses (7 lectures, 8 laboratory-based/experimental/practical courses)
Graduate School of Agricultural and Life Sciences, 29 courses (20 Master's courses, 9 Doctoral courses)

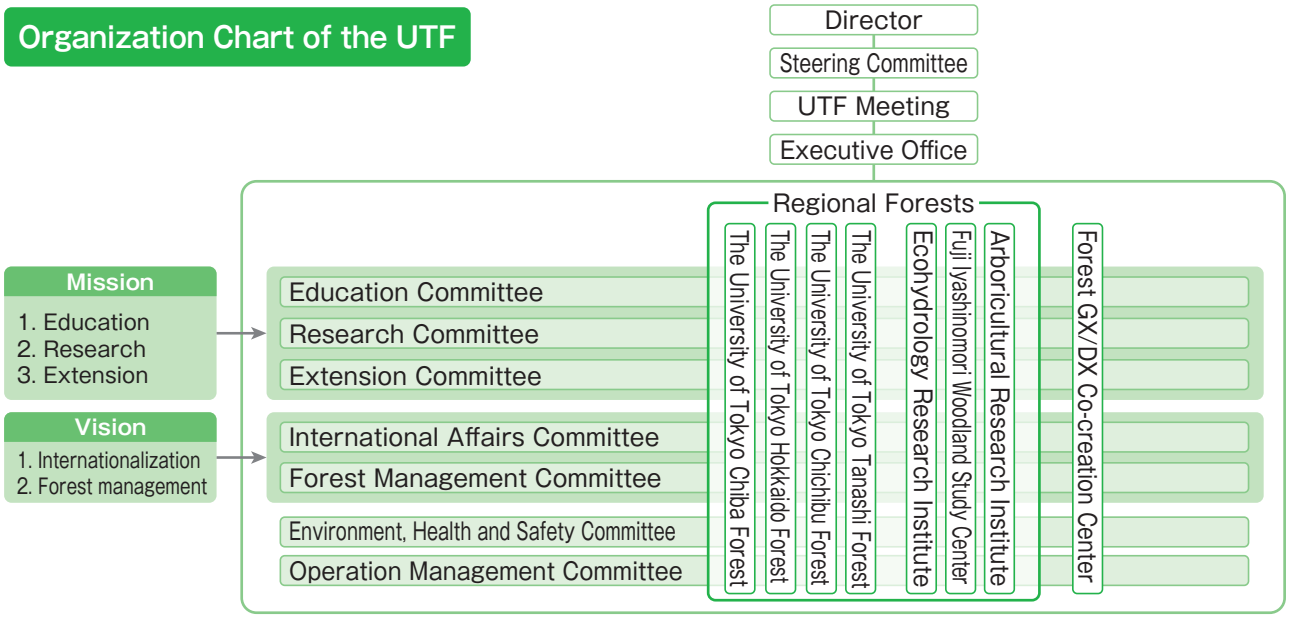
5) Number of users (FY2023)

Number of uses: 1,151 (Faculty of Agriculture, UTokyo: 577 uses, other faculties in UTokyo: 71 uses, other universities: 144 uses, other: 359 uses)
Total number of users: 14,049 (Faculty of Agriculture, The UTF: 5,536 users, other faculties in UTokyo: 754 users, other universities: 1,078 users, other: 6,681 users)

6) Forest resources, carbon stock (FY2023), absorbed amount (FY2023)

Total accumulation: 9,323,202 m^2, total carbon stock: 3,652,471 tons C, absorbed amount: 117,762 tons $Year^{-1}$

Organization Chart of the UTF



Executive Office

The Executive Office of the organization is located in the Yayoi Campus. The office is in charge of planning and coordination within and outside the Experimental Forest (university education, research, extension, international affairs, forest management, environmental safety, administration, human resources, finance, etc.). The office promotes mutual cooperation between the Regional Forest and Forest GX/DX Collaborative Center. Additionally, the office is responsible for providing guidance to students who are supervised by the teaching staff of the UTF and spend their time at the Yayoi Campus. Furthermore, the office participates in events organized by the Faculties and Departments of GALS.

Forest GX/DX Co-creation Center

The Forest GX/DX Co-creation Center (FGDC) was established at the Yayoi Campus in April 2024 with the aim of creating the University of Tokyo (UTokyo) model to help realize decarbonized society by implementing activities performed in the University of Tokyo Forests to date, including research and development related to long-term forest observation data, industry-university co-creation, social co-creation, human resource development, and international collaboration.

As part of the Nature-based Solutions (NbS), FGDC will be involved in education, research, social and international collaboration on Forest Green Transformation (GX) and Forest Digital Transformation (DX).

The Forest GX necessary to realize a decarbonized society includes the following five items: (1) large-scale, high-precision forest data development; (2) refinement and visualization of carbon sink estimates; (3) forest management, including soil carbon sequestration; (4) GX/DX human resource development; and (5) collaboration with companies and local communities.

As part of Forest DX, which is the maintenance of forest information infrastructure, we are developing and releasing a database of forest observations spanning more than 100 years from seven regional training forests. We are also working to establish an international long-term forest observation system in collaboration with overseas base universities.

Collaboration with several stakeholder is necessary to promote Forest GX/DX. Hence, to create a platform for green investment in forests, FGDC, as part of its social collaboration activities, is working with local governments and industries and performing joint research and exchange activities with various research institutions in Japan and abroad. In line with the recent increase in public interest in GX, the FGDC has concluded agreements with local governments using the keyword “decarbonized society” and is actively accepting joint research and academic guidance on GX research with companies.

Additionally, the FGDC will contribute to the promotion of the “UTokyo Green Transformation,” the University of Tokyo wide initiative, by developing Forest GX/DX research using the University of Tokyo Forests.

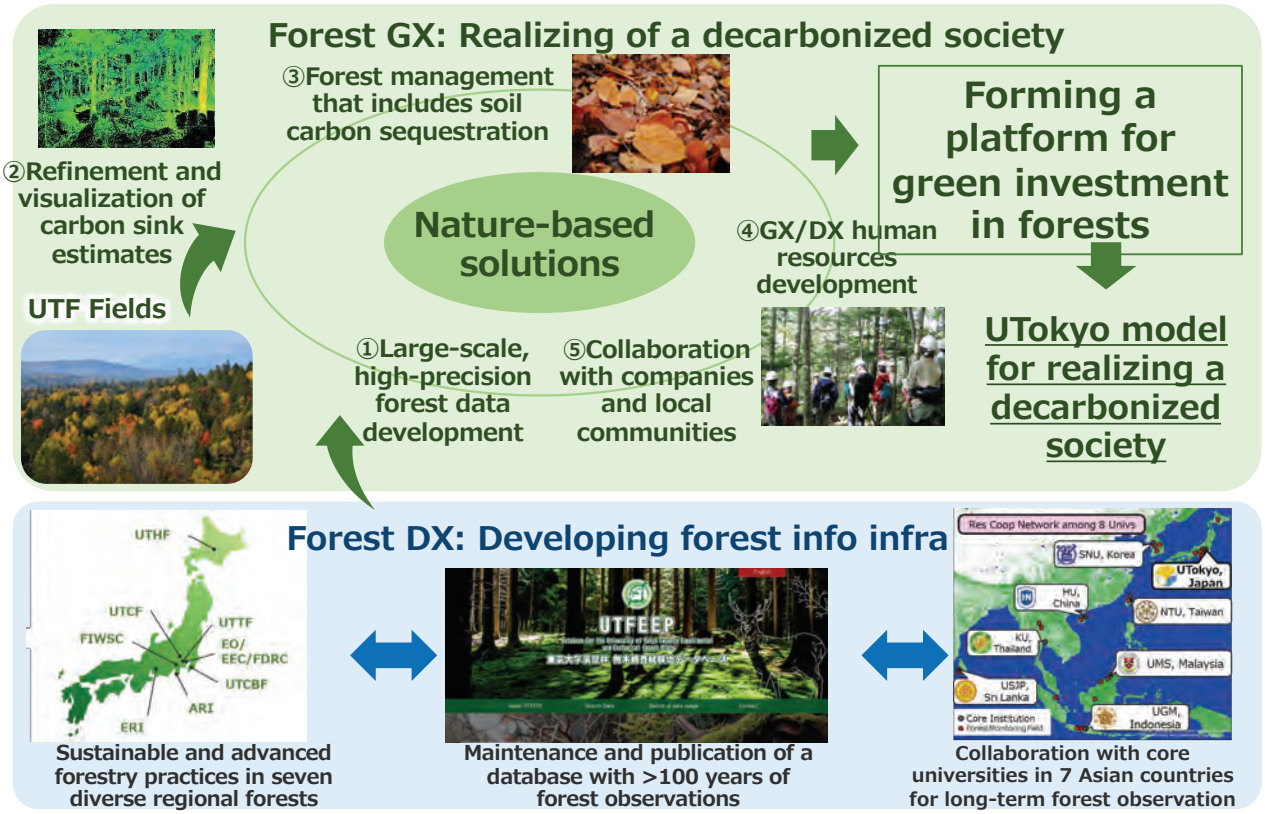


Figure 1: Forest GX/DX Co-creation Center

• Forest GX

The FGDC is working on an analysis to combine point cloud data acquired using aircraft LiDAR and machine learning to improve the accuracy of carbon accumulation estimation in the University of Tokyo Forests. As part of the Forest GX research to promote the "UTokyo Green Transformation, the desks and shelves used in the living rooms of the FGDC are made of wood from the University of Tokyo Hokkaido Forest.

Photo 1: Preliminary survey for estimating soil carbon stocks

Photo 2: FGDC room with wood from the UTokyo Forests

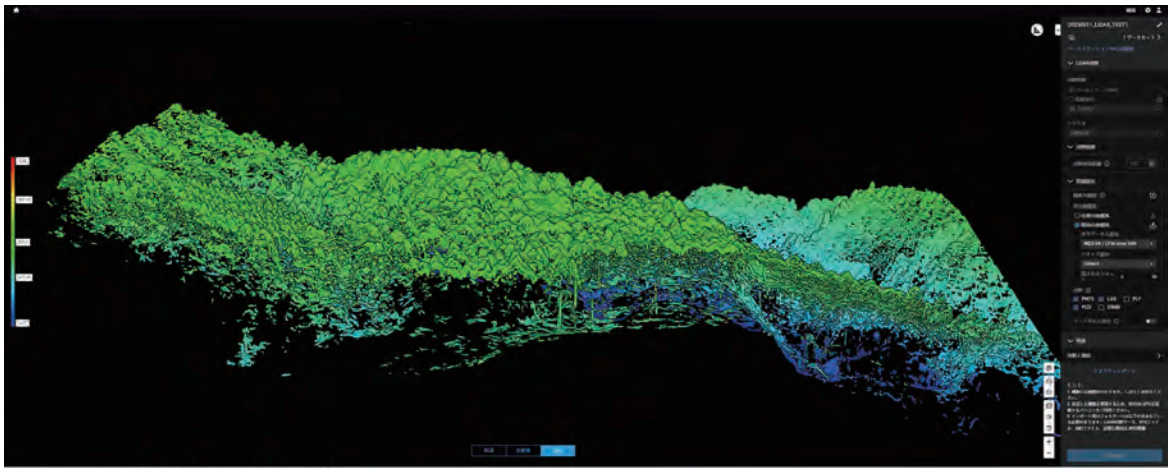


Figure 2: Point cloud data from unmanned aerial vehicle (UAV) LiDAR

• Forest DX

Several documents, including drawings, photographs, and archival documents spanning over 100 years are stored in the University of Tokyo Forests. These documents are valuable academic materials and their preservation and utilization have important roles to play in the University of Tokyo Forests. As part of the Forest DX research, the FGDC is working to digitize these materials and make the data publicly available. Additionally, the FGDC provides comprehensive support for research and education activities and streamlined management operations, such as the introduction of electronic field ledgers.

Photo 3: Academic materials of the UTokyo Forests released at the Archives

Photo 4: Field survey using an electronic field book

The University of Tokyo Chiba Forest

1. History and overview

The University of Tokyo Chiba Forest (UTCBF) was established in 1894 as Japan's first university forest. At the time, the forest area was 334 ha, and only incorporated the forest surrounding the Seicho-ji temple. However, in 1897, the northern Okuzan area was added, bringing the land area close to its current size. The Godai nursery opened in 1900, followed by the Fudago nursery in 1903. The current land area is 2169 ha, and the woodlands are divided into 47 management compartments.

During the more 130 years of its history, basic information on plantation development and natural forest maintenance has been systematically collected and organized, thereby serving as a central education and research facility for forest science. In recent years the forest has provided optimal fields for education, research, and extension, and the basic policies promote forest education and research, forest use, and the collection, organization, and publication of data on the dynamics of the natural environment.

2. Location and environmental characteristics

UTCBF is located in the southeastern part of the Boso Peninsula, at the eastern end of the Boso hill range, approximately 100 km southeast of Tokyo. The forest range extends from 35°8′25″ to 35°12′51″ N and 140°5′33″ to 140°10′10″ E. The northern part is situated in Kimitsu city and the southern part in Kamogawa city. The Chiba Prefectural Route 81 runs north to south, and the forest surrounds local villages and private land.

The southern part of the Boso Peninsula has a generally warm and rainy coastal climate. The average annual temperature between 2011 and 2020 at the Fudago observatory (elevation 206 m) was 14.1°C, and the average annual precipitation was 2474 mm, making it the region with the highest precipitation on the Boso Peninsula.

The main ridgeline of the Boso hill range (highest elevation: 377 m), which traverses the UTCBF east to west, forms a watershed, dividing the region into a southern side with the Futama River basin flowing into the Pacific Ocean and northern side with the Obitsu River upper basin flowing into Tokyo Bay. Although the altitude of this University Forest is not very high (approximately 50 to 370 m), the terrain is steep and complex.

Photograph 1 Dozawa natural mixed conifer-hardwood forest

The geological structure consists of marine deposits from the Neogene period, partially covered by non-marine deposits from the Quaternary period. There are many faults in the area. The underlying rock consists of sandstone, conglomerate, mudstone, and tuff, and the soil mainly consists of brown forest soil.

3. Forest characteristics

At its inception, the area was comprised mainly of evergreen broad-leaved trees, such as oaks (*Quercus* spp.), Sudajii chinkapin (*Castanopsis sieboldii*), Japanese bay tree (*Machilus thunbergii*), and Japanese cleyera (*Cleyera japonica*), and mixed forests made up of Momi fir (*Abies firma*) and southern Japanese hemlock (*Tsuga sieboldii*) in the top layer. Today, approximately 40% of the entire forest is occupied by planted forest, mainly consisting of Japanese cedar (*Cryptomeria japonica*) and cypress (*Chamaecyparis obtusa*). The forest is home to a rich diversity of flora, with approximately 300 and 720 species of naturally occurring woody and herbaceous plants (including approximately 120 species of fern), respectively. Many animals inhabit the forest, including around 20 species of mammals. The southern part of UTCBF is designated as a Class 3 Special Area of Minami-Boso Quasi-National Park (part of which is a Class 1 Special Area), while the northern part is designated as a Class 3 Special Area of Yorokeikoku-Okukiyosumi Chiba

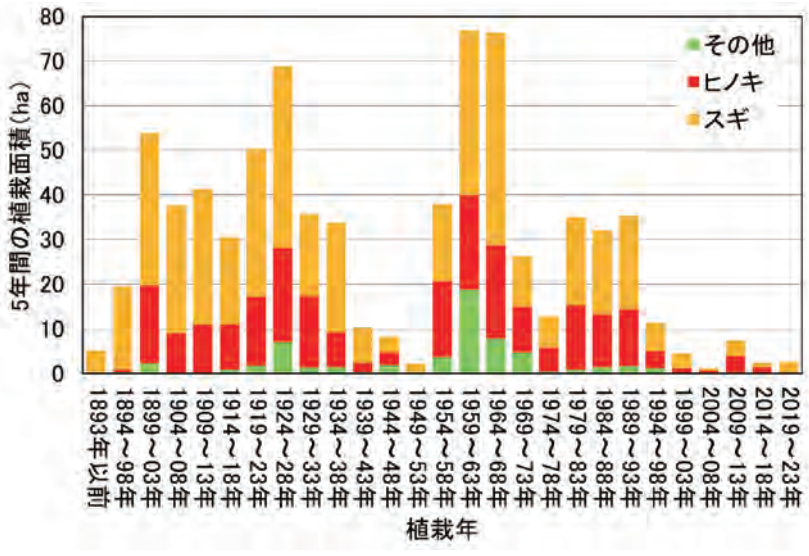


Figure 1 Plantation area per 5 years

Prefectural Park. The entire area is designated as the Chiba Prefectural Kiyosumiyama Wildlife Reserve (part of which is a special protection area).

UTCBF comprises a natural warm-temperate forest, which is divided into a natural mixed conifer-hardwood and broad-leaved forest, and a planted forest of mainly cedar and cypress. The three types of forests are classified as below:

(1) Natural mixed conifer-hardwood forest (279 ha)

An old forest containing a mixture of coniferous forest with mainly Momi fir and southern Japanese hemlock, and evergreen broad-leaved trees, such as oak, Sudajii chinkapin, and Japanese bay tree. The University Forest and surrounding forest is the only remaining tract of forest on the Boso Peninsula, making it a scientifically valuable asset.

(2) Natural broad-leaved forest (1015 ha)

Former coppice and secondary forests comprising mainly of evergreen oaks, Sudajii chinkapin, Konara oak (*Quercus serrata*), Japanese zelkova (*Zelkova serrata*), and maples (*Acer* spp.), much of which was left untended when firewood and charcoal production ended. Some old broad-leaved forest is distributed through this area.

(3) Plantation (866 ha)

There are many high-age class plantations, with half the stands being 80 years or older, and a quarter being more than 100 years old. Old Japanese cedar forests include the oldest forest Sakuragao (planted in 1835), Imasumi (planted in 1859), Gotagura (planted in 1894), Minamizawa (planted in 1896), and Gobozawa (planted in 1905), while old cypress forests include Obera (planted in 1900) and Metaki (planted in 1903).

Various other tree species have also been planted as sample forests for research and education. Rare tree species such as coast redwood (*Sequoia sempervirens*, the world's tallest tree), which is native to North America, and dawn redwood (*Metasequoia glyptostroboides*) are also found in the foreign tree species sample forests.

4. Facilities

The Amatsu office is located 300 m from the Awa-Amatsu Station on the JR Sotobo Line, and the Kiyosumi Branch and Kiyosumi lodging facilities are located in the southern part of UTCBF in Kamogawa city. The Fudago Branch and Godai Branch are located in the northern part of UTCBF in Kimitsu city. The Kiyosumi lodges are used for student training, research, and so on. The Godai nursery is situated within the Godai Branch premises, and has recently also been used for field experiments.

Photograph 2 Permanent plots for growth measurement in the Gobozawa Japanese cedar plantation

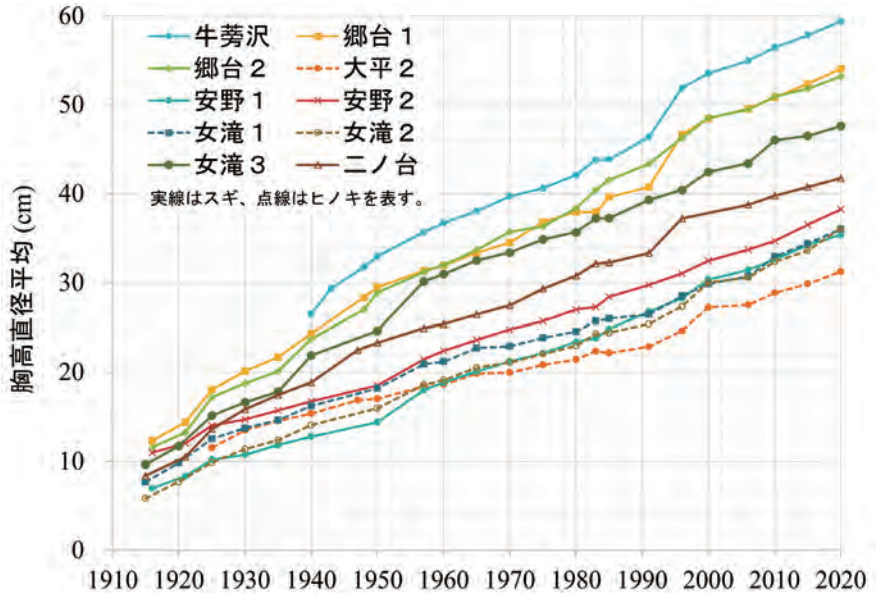
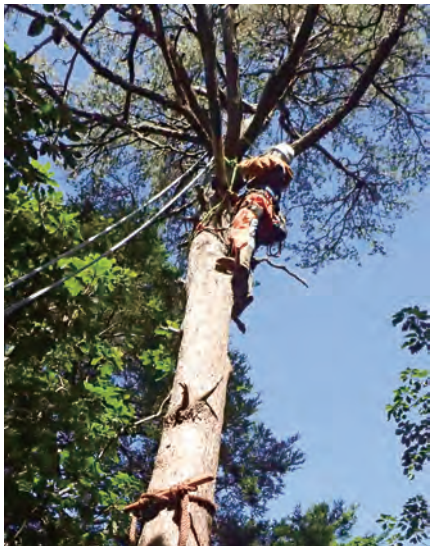


Figure 2 Diameter growth measured continuously for more than 100 years since reforestation of cedar and cypress

5. Education

UTCBF has long been utilized as a place for practical training in forestry plantation management, from planting through to harvesting. Training in silviculture was started by Assistant Professor (at that time) Seiroku Honda in 1895, and is still provided today, more than 130 years later, as "Basic Practice in Forest Science I". In addition to conducting training for the Graduate School of Agricultural and Life Sciences, Faculty of Agriculture, and seminars are also offered for first- and second-year undergraduate liberal arts students. Practical training provides students with hands-on experience of planted forest management, as well as offering multifaceted practicals, such as in evergreen forest dynamics and the impact of humans and animals on forests. The characteristic stratum structure of the Boso Peninsula is also used as a geological training ground

Photograph 3 Tree planting as part of student practical training



Photograph 4 Staff climbing a Japanese white pine to conduct surveys

for students of the Faculty of Science of the University of Tokyo, Chiba University, and Kyoto University. UTCBF is also used by undergraduate, graduate, and postgraduate students as part of their field research.

6. Research

Various research on planted forests and natural warm-temperate forests is underway in UTCBF, and systematic surveys and research are conducted specifically on the following three major topics:

Management of cedar and cypress planted forests

In Japan, little knowledge exists on the growth or changes in the stand structure of old planted forests. On the other hand, planted forests have been established and managed in UTCBF for more than 130 years, which comprises forests and datasets of varying ages, locations. In the future, we will continue to survey the growth and stand structure of old planted forests to provide basic information used for predictive research. Research has also used unmanned aerial vehicles (UAVs) to efficiently survey forest resources and verify the economic value of forest carbon credits.

Dynamics and conservation of warm-temperate ecosystems

The Momi fir and southern Japanese hemlock in UTCBF occur close to the southern limit of their natural distribution, away from other distribution areas. Therefore, these trees may face a decline and lack of regeneration due to global warming. Long-term monitoring of the growth of individual trees and renewal dynamics of natural mixed conifer-hardwood forests is conducted in UTCBF to promote predictive research and the conservation of Momi fir and southern Japanese hemlock.

Photograph 5 Japanese sika deer

A rich ecosystem is maintained in the forests of UTCBF, with many flora and fauna found only in these forests within Chiba Prefecture. In 2021, an accord was reached for the cooperation and collaboration with the Natural History Museum and Institute, Chiba, to promote the identification of biota in these forests.

Efforts are also underway to survey the population of Sika deer (*Cervus nippon*) and Reeves' muntjac (*Muntiacus reevesi*), which affect understory vegetation dynamics, and conserve Japanese white pine (*Pinus parviflora*).

Establishment of forest tree breeding and propagation techniques

Selection of pine trees resistant to pine wilt disease (PWD) has been conducted independently since the 1970s. Recently, inspections have been conducted jointly by national and prefectural research institutions; in 2021, two cultivars of resistant Japanese red pine (*Pinus densiflora*) from UTCBF were registered. We also aim to establish a cloning propagation method using cuttings to preserve the stock of PWD resistant cultivars and Japanese white strains.

Photograph 6 Rooted pine cutting seedlings

7. Extension

UTCBF is used for integrated studies and extracurricular activities in elementary and junior high schools based on the regional exchange agreement concluded with Kamogawa and Kimitsu city, Chiba prefecture. Seminars on forests and oceans are held for high school students in collaboration with the Marine Biosystems Research Center, Chiba University. Some of the forest roads and trails in UTCBF are open to the public as Kanto Fureai no Michi (Metropolitan Area Nature Trails). Of these trails, the "Momi Fir and Southern Japanese Hemlock Trail" are

Photograph 7 Open day

open to the public year-round, but the "Hydrangea Trail" has been closed due to collapse of the forest road.

8. Others

1) Forest Museum

The Forest Museum is situated on the grounds of the Kiyosumi Branch. The museum has a permanent exhibit of specimens of animals and plants, lumber, charcoal, and woodwork products, picture scrolls depicting the forestry industry during the Edo period, disks of a giant tree that once grew on the grounds of the Seicho-ji temple and in UTCBF, and old forestry tools, including imported items, and also provides explanations on varied topics.

The Forest Museum is used for the practical training of students, and may be visited for a fee by approved groups. Groups wishing to visit the museum should contact the UTCBF Amatsu office. There are also days when the museum is open to the public. Please check the UTCBF website.

Photograph 8 Forest Museum

2) Published data

Fundamental data are collected for education and research. Data related to the UTCBF, including on flora, fauna, weather, hydrology, and water quality, are published at https://www.uf.a.u-tokyo.ac.jp/chiba/research/open_data.html.

3) Publications

Japan's Oldest University Forest - All about The University of Tokyo Chiba Forest

Published to commemorate the 120th anniversary of UTCBF. This book provides an in-depth understanding of UTCBF.

Guidebook on the Creatures of The University of Tokyo Chiba Forest

This book includes photographs of the plants and animals that live in the forest and provides easy-to-understand explanations. The photographs in the guidebook were taken by UTCBF members.

"Forest trip" - 100 highlights of The University of Tokyo Forests

This publication introduces highlights from the seven University of Tokyo Forests.

Please email or phone the office to purchase these publications, which can also be purchased online from Amazon. https://www.uf.a.u-tokyo.ac.jp/chiba/about/goods.html

The University of Tokyo Hokkaido Forest

1. History and overview

The University of Tokyo Hokkaido Forest (UTHF) was established in 1899 when 23,597 ha of national forest was transferred from the Ministry of Home Affairs for northern forestry and forestry research and education, and the site was established as a field test site for the College of Agriculture, Tokyo Imperial University. After additional forest transfers and acquisitions, conversion to cultivated land, and land sales, the forest area stood at 22,708 ha in April 2025. A business-scale experiment of the stand-based silvicultural management system ("Rinbun Segyo-ho" in Japanese) has been continuously conducted for more than 60 years, starting in 1958. The 14th plan for education and research (2021–2030) is aimed at contributing to natural forest management both in Japan and around the world, and includes a diverse range of educational and research activities.

2. Location and environmental characteristics

UTHF is located in the center of Hokkaido Island, situated southwest of the Tokachidake mountain range in the upstreams of the Sorachi river within the Ishikari river system (43º10´–21´ N, 142º23´–41´ E). The area comprises two main river basins, Nunobe river in the northern half and Nishitappu river in the southern half, and the basin boundary runs east to west through its center. Elevation ranges from 190 m at the lowest point of the Nunobe area at the north-west end to 1,459 m at the highest point of Mt. Dairoku at the north-east end. The terrain has a mostly gentle slope, but some steep slopes have appeared as the result of erosional dissection. The geological features are the result of eruptions from the Daisetsu mountain system during the Quaternary Period, which covered the area from Mt. Dairoku in the north-east to the central part of UTHF. The left part of UTHF is covered by metamorphic rocks from the Hidaka mountains in the south and sedimentary rocks, such as pillow lava, chert and sandstone, from the Yubari mountains in the west. The majority of the soil in the conifer-broadleaf mixed forest zones at altitudes of 700 m or lower is Brown forest soil, while Black soils occur at higher altitudes, with podzols found in some areas. The climate is continental, with large seasonal temperature variation, and is often influenced by the climate from the Sea of Japan. The mean temperature at the arboretum (230 m) is 6.6 ºC, with maximum and minimum temperatures of 35.9 ºC and –25.7 ºC, respectively, (10-year mean from 2011 to 2020). The mean annual precipitation is 1,196 mm, with a mean maximum snow depth of 85.6 cm. Snow cover usually appears at the end of November and lasts until the beginning of April.

Photograph 1 Mixed conifer-broadleaf forest dominated by Sakhalin fir
This forest type is representative of mid-to-low altitude areas of UTHF and is a mixture of boreal evergreen conifers and cool-temperate deciduous broad-leaved trees.

3. Forest characteristics

UTHF, located in the central part of Hokkaido, is situated in a hemiboreal mixed conifer-broadleaf forest zone, which is a transitional area from deciduous forests in the cool-temperate zone to coniferous forests in the boreal zone. Areas along the streams and on flat areas of the UTHF, at altitudes of 650 m or less, are covered by broadleaf forests, mainly comprised of Manchurian ash (*Fraxinus mandshurica*), Japanese elm (*Ulmus davidiana* var. *japonica*), Japanese alder (*Alnus japonica*), and willow trees (*Salix* spp.). The mountain slopes are covered by mixed conifer-broadleaf forest mainly comprising of Sakhalin fir (*Abies sachalinensis*) and cool-temperate deciduous broad-leaved trees. The vegetation changes as the altitude increases, from coniferous forests dominated by Yezo spruce (*Picea jezoensis*) and Sakhalin fir mixed with cool-temperate broadleaves and Erman's birch (*Betula ermanii*, from 650 to 900 m), to forests mainly comprising Yezo spruce, Sakhalin fir, and Erman's birch (from 900 to 1,100 m), to sparse forests with a mixture of Erman's birch, Sakhalin fir, and Sakhalin spruce (*Picea glehnii*, from 1,100 to 1,250 m), and finally to alpine vegetation comprising Dwarf Siberian pine (*Pinus pumila*, altitudes of 1,250 m and above). As of the end of 2013, 806 species of angiosperms (including 161 species of woody plants), 8 species of gymnosperms, and 80 species of ferns and fern allies, naturally occurring vascular plants have been identified, totaling 415 genera and 894 taxa. Other predominant tree species include Japanese linden (*Tilia japonica*), painted maple (*Acer pictum*), Monarch birch (*Betula maximowicziana*), Japanese oak (*Quercus crispula*), elms (*Ulms* spp.), and castor aralia (*Kalopanax septemlobus*).

Photograph 2 Communities of Dwarf Siberian pine mixed with scattered Sakhalin spruce trees deformed by wind near the summit of Mt. Dairoku, and the surrounding area includes dwarf shrub communities, such as rhododendron (*Rhododendron aureum*), Lingon berry (*Vaccinium vitis-idaea* L.), crowberry (*Empetrum nigrum*), and bog bilberry (*Vaccinium uliginosum*). Forest reserves encompassing 1,540 ha were established in UTHF to preserve a variety of nearly virgin forest vegetation, as well as five special plant protection zones.

Man-made plantations were established in 1907 and now extend over 3,300 ha, incorporating mainly Sakhalin fir, as well as Yezo spruce, Sakhalin spruce, eastern white pine (*Pinus strobus*), European spruce

Photograph 3 Old-growth planted forest of European spruce
This forest was planted to restore the area destroyed by a forest fire in 1911. In these planted forests, efforts are made to develop nursery technology to promote natural regeneration and the establishment of multi-storied mixed forests.

Photograph 4 Secondary forest, after fire, dominated by Monarch birch
The forest cover after forest fires regenerated to up to 1,050 ha; some of this area is dominated by Japanese oak. Efforts are being made to develop technologies to cultivate high-quality large broad-leaved trees by adjusting tree density and promote regeneration of successor trees.

Photograph 5 Yezo deer in early spring
The population density of these deer has increased in recent years, resulting in obvious forest damage. An important task of UTHF is to elucidate the ecology of wild animals and their roles in forest ecosystems, as well as to explore better symbiotic relationships between humans and wild animals.

Photograph 6 Black woodpecker being fed
The Black woodpecker, a nationally protected species, lives in natural forests with abundant large trees, which it needs for nesting and foraging. The species has become endangered due to the decline of natural forests in its habitat range. UTHF provides a safe habitat for these rare species, thereby balancing the conservation and use of forest resources.

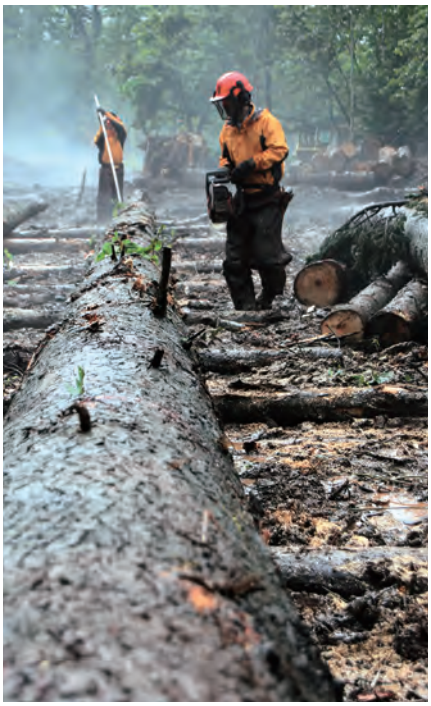
(*Picea abies*), and Japanese larch (*Larix kaempferi*). Regenerated forests, mainly comprising Monarch birch established at forest fire sites in 1911 and 1914, are representative forest types in this area.

4. Facilities

The base facilities for this university forest are the Yamabe office in the Yamabe district of Furano city, lodging facilities, arboretum, and nursery, as well as a seminar house and a Forest Museum in the Rokugo district. The Yamabe office functions as the headquarters for education, research, management and administration, and is also equipped with a lecture room and laboratory. The arboretum manages a sample forest of various tree species, produces seedlings of major conifers for planting, and is equipped with greenhouses. The seminar house, a facility for training, is equipped with classrooms and lodging facilities.

5. Education

UTHF offers "General Practice in Forest Science" for two forest-related majors in the Faculty of Agriculture at the University of Tokyo, is available as a training center for the Japanese Association of University Forests, and provides training for undergraduate and graduate students both inside and outside the university. UTHF promotes field experience-based education, such as University-Wide Experience Seminars for the Faculty of Liberal Arts (first- and second-year students), Hands-on Activities held by the headquarters, as well as distance



Photograph 7 Processing through harvesting by staff
Approximately 24,000 m^3 of trees are felled in the UTHF each year, which are used for lumber and paper manufacturing. Harvesting of approximately 1,000 m^3 of these trees is processed by the staff of UTHF. During logging, the current state of the forest is surveyed and the silviculture policy is considered for each forest stand. The harvesting business is also a place for developing new forestry techniques and marketing methods.

Photograph 8 The high-quality hardwood Monarch birch
High quality hardwood trees in the natural forests, including mainly Monarch birch, castor aralia, Japanese oak, Japanese linden, and Manchurian ash, are managed individually. Work is underway to systematize management of these trees, and develop long-term cultivation methods.

Photograph 9 University-Wide Experience Seminar
Hoofprints of Yezo deer in the snow are tracked to observe their use of the forest. A diverse range of educational programs is being developed, making use of the abundant natural resources and forests created through forest management as well as expertise accumulated over many years.

Photograph 10 Public seminar
Various efforts are underway to promote public knowledge on University Forests activities while promoting familiarity with forests and nature.

education, which provides a simulated field experience through ICT. UTHF also cooperates with projects promoting science and mathematics education in high schools and with specialist courses.

6. Research

The main themes of the 14th plan for education and research are "Hemiboreal Forest Ecosystems" and "Natural Forest Management." Systematic research activities are being conducted for three research fields: forest ecology, forest management, and forest ecosystem management.

In the **field of forest ecology**, we work on topics elucidating the regenerative and maintenance mechanisms of forests, ascertaining the genetic characteristics of trees and conserving genetic resources, describing and monitoring the dynamics and biodiversity of wild animals, and determining ecosystem responses to climate change to identify the structure and dynamics of forest ecosystems in northern coniferous-broadleaf mixed forest zones.

In the **field of forest management**, we work on topics enhancing the scientific and technological basis of the stand-based silvicultural management system, establishing natural forest regeneration technology through forest renewal and nurseries, developing methods to manage and cultivate high-quality broad-leaved trees, developing a diverse range of planted forest management techniques, developing efficient forest operation and civil engineering technology, and creating added value for forest products and developing marketing methods to provide empirical and exemplary theories and methods for the sustainable and adaptive management of mixed conifer-broadleaf forest zones in East Asia, including Hokkaido.

In the **field of forest ecosystem management**, we work on topics evaluating the impact of forest operations on ecosystem processes, evaluating the forest recovery process after large-scale disturbance, establishing methods for conserving rare species and managing invasive alien species, and evaluating ecosystem services such as carbon fixation and streamflow regulation to provide methods for the management and conservation of boreal forest ecosystem functions, while using the forest resources.

UTHF is also extensively utilized as a research field for various researchers, undergraduate students, and graduate students at the University of Tokyo and other universities and research institutions.

7. Extension

Various efforts are being made to promote regional exchange and extension. Various public events and resources are provided, such as open seminars, the Mt. Dairoku hiking event, Jinja-yama Nature Observation Trail, Forest Museum, Mt. Shiratori walking path, and arboretum, which provide spaces for experiencing the forest and nature and disseminating related information. UTHF is working on creating and implementing forestry study programs for local elementary and junior high schools in collaboration with Furano city. Furthermore, UTHF actively accepts training of forest engineers from various public institutions and organizations to promote the communication of the latest research results and technical information.

8. Others

Sustaining the power of the forest ~ The stand-based silvicultural management system by the UTHF ~

UTHF manages natural forests with a unique method, i.e., the "stand-based silvicultural management system," which classifies forests based on various factors, such as the density, species, and size of the trees, and the status of natural regeneration (Figure 1). This method is highly acclaimed both in Japan and overseas as a method to harmonize economic functions using renewable timber resources while conserving the forest ecosystem.

At first glance, Photograph 11 appears to be an untouched forest, but has in fact been exposed to six events of selection cutting over the past 60 years. Once every 10 to 15 years, selected trees are harvested (corresponding to 7–17% of the growing stock [stem volume of trees that comprise the forest]). In 1969, the growing stock of this forest was 301 m^3 per hectare. In 2018, this increased to 417 m^3, demonstrating that the growing stock of the forest had increased despite repeated harvesting (Figure 2). This is assumed to be because moderate tree removal improves the light environment in the forest, which promotes tree regeneration and growth.

The stand-based silvicultural management system is known to be an effective method for sustainably and adaptively managing diverse and complex forests. In addition to accumulating scientific knowledge on forest ecosystems, stand-based silvicultural management system practices are supported by experienced UTHF staff (Photograph 12) and advanced spatial information technology.

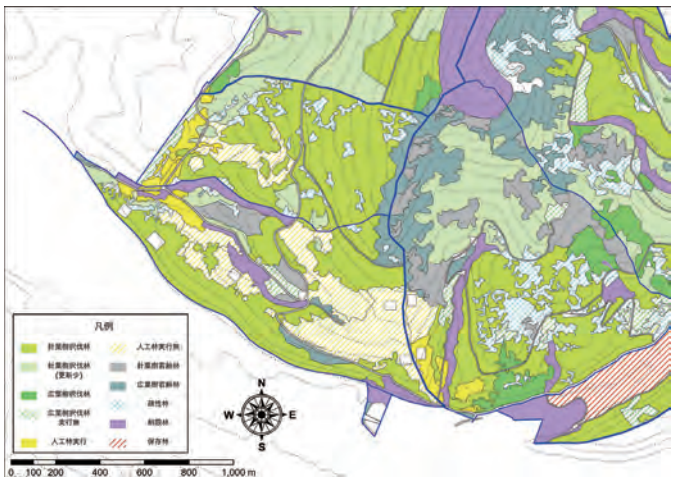


Figure 1 Forest type classification map (forest compartment 51).

Photograph 11 A natural forest that has undergone repeated single-tree selection cutting (forest compartment 51). Refer to the natural forest silviculture test site (P5137) in Figure 2 for the change in the growing stock of this forest stand.

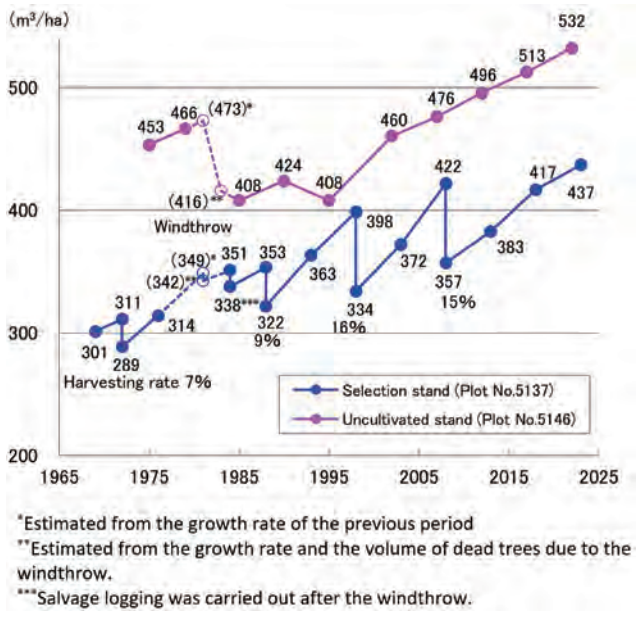


Figure 2 Change in forest biomass in forest compartment 51 with selection cutting (Plot No. 5137). The change in the growing stock of an uncultivated forest (Plot No. 5146), which has not been logged since 1927, is shown for reference.

Photograph 12 Data input in the field using a tablet terminal.

The University of Tokyo Chichibu Forest

1. History and overview

The University of Tokyo Chichibu Forest (UTCF) was established as a University Forest in 1916 by the purchase of a private forest of about 6,000 ha in Otaki Village (currently Chichibu City), Saitama Prefecture—situated in a cool temperate region—as an education and research facility affiliated with the Faculty of Agriculture of the University of Tokyo. After subsequent land transfers, the total area of the university forest now stands at 5,812 ha. At the time of establishment, the management policy was to expand the planted forests, but, from 1971, the policy combined research on the ecology of natural forests with management of the planted forests. From 1991, the policy shifted to long rotation and regeneration cutting of the planted forest was suspended. Education and research on cool-temperate forest ecosystems was set as the main priority since 2011.

2. Location and environmental characteristics

UTCF is located in Chichibu in the western part of Saitama Prefecture bordering the Tokyo Metropolitan area and 3 prefectures— Yamanashi, Nagano, and Gunma. The forest is located in the upstream area of the Arakawa river at altitudes ranging from 530 to 1,990 m above sea level. It is made up of two sections: the Ochigawa District (932 ha) is 22 km to the west of Chichibu City, while the Tochimoto District (4,875 ha) is 40 km to the west. The entire area of both districts is designated as the Chichibu-Tama-Kai National park. The terrain is marked by very steep slopes resulting from deep erosion, and deeply carved V-shaped valleys. The geology comprises a Mesozoic Jurassic accretionary complex in the Chichibu belt and Cretaceous accretionary complex in the Shimanto belt. The soil is comprised of dry weakly podzolized soil distributed on mountain ridges at and above 1,000 m and mountainsides at and above 1,700 m, while brown forest soil is widely distributed in areas at lower elevations. Tephra-derived black soil is distributed on gentle slopes. The climate is a typical Pacific Ocean climate, with high rainfall in the summer and little snow in the winter. Weather recordings at the

Photograph 1 Source of the Arakawa river
The Arakawa river starts as a Class A river at the confluence (meeting point) of the Akasawa and Irikawa tributaries.

Photograph 2 V-shaped valley
Mameyakizawa valley seen from the Mameyakibashi Bridge in front of the Karisaka Tunnel

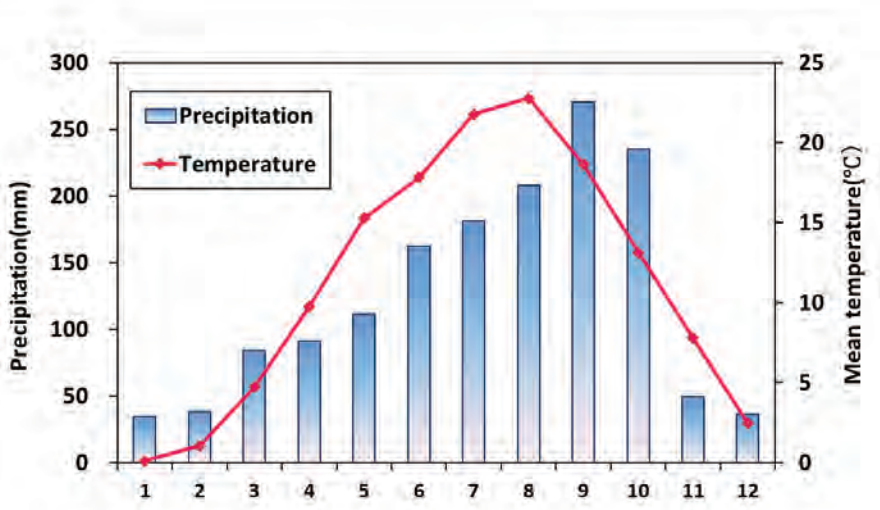


Figure 9 Monthly average temperature and precipitation at Tochimoto Observatory from 2011 to 2020

Tochimoto observatory (760 m above sea level) from 2011 to 2020 indicated an average annual temperature of 11.3 °C and average annual rainfall of 1,501 mm. Although the snow depth varies widely from year to year, it is usually 20–30 cm.

3. Forest characteristics

At the establishment of the UTCF, hardwood felling sites or secondary forest for charcoal and fuel wood comprised about 2,000 ha. The remaining 3,800 ha or so were occupied by untouched primary natural old-growth forest, while plantations occupied only a small area (18 ha). At present, natural forest occupies 87.5% of the entire area (5,013 ha, natural forest of old-growth: 37.7% [1,887 ha], secondary forest: 62.2% [3,118 ha]), while planted forests occupy 12.5% of the entire area (713 ha, Japanese cypress: 36.7%, Japanese larch: 27.5%, Japanese cedar: 24.8%, Sawara cypress [*Chamaecyparis pisifera*]: 3.9%). UTCF covers a wide range of elevations, ranging predominantly from montane to sub-alpine vegetation zones, so the forest has a diverse range of tree species. There are approximately 250 species of naturally growing trees belonging to 118 genera and 56 families, characterized by a large number of maple species, with 20 of the 28 Japanese maple species growing in this area. The montane vegetation zone occupies elevations of 600–1,600 m, with evergreen coniferous forests dominated by southern Japanese hemlock covering the dry mountain ridges, *Fagus crenata* and *Fagus japonica* occupying mesic habitats on mountain slopes, and deciduous broad-leaved forests dominated by *Fraxinus platypoda* and *Pterocarya rhoifolia* in riparian forest habitats on concave slopes or along valleys. There are also stands of natural cypress forest in habitats drier than where *Tsuga sieboldii* dominates. Higher elevations in the sub-alpine zone (at and above 1,600 m) are covered by evergreen coniferous forests dominated by *Tsuga diversifolia* and *Abies veitchii* (at and above 1,800 m), and natural *Larix kaempferi* forests are also present.

4. Facilities

There is a field station in Ochigawa District, and a field station and lodging facilities in Tochimoto District. There is also an office at Hinoda in the town area of Chichibu City, nursery and lodging facilities at Kagemori, and an experimental site established at Kuroishi. The Tochimoto District Kawamata student dormitory may be used by many students, including those from the University of Tokyo and other universities, conducting practical forest-related training. Seismic retrofitting of the facilities was completed in 2022. In the Tochimoto District, the Wasabizawa Exhibition Room is open to the general public to provide PR for UTCF.

5. Education

Since it is possible to access various types of natural forest stands, ranging from mountainous areas to sub-alpine zones with diverse elevations and terrains, the UTCF is in high demand as a field site for ecological education. UTCF maintains planted forests and nurseries for the basic curriculums of Forest Science Courses, and offers many different field training courses for students of the Forest Science Course and Field Science Course of the Faculty of Agriculture, the University of Tokyo, as well as for students from other faculties of the University of Tokyo and other universities. Fieldwork programs are available to undergraduate students in their first two years at the College of Arts and Sciences, which includes liberal arts education, taking full advantage of the nature around the Oku-Chichibu mountains and the mountain village culture.

6. Research

Although the UTCF is located near a metropolitan area, it retains the primeval natural environment formed by the headwaters of the Arakawa River. Comprehensive research has been conducted on cool-temperate forest ecosystems, including conservation and management of the forests within UTCF and collaboration with local communities, which capitalizes on the characteristics of various natural and planted forests that change at different

Photograph 3 Experiment in Basic Forest Science III
Plants are collected to prepare pressed leaf specimens as part of practical training in the field of dendrology.

Photograph 4 Fieldwork program for first/second-year students at the College of Liberal Arts
The aim of this program is to get students to think about forestry and forest ecosystem issues through hands-on experience.

Photograph 5 Tree census
Tree trunk diameter is measured every year for the continuous monitoring of changes in the forest

altitudes. The three critical themes for research are set out below.

(1) Forest ecosystem processes

Long-term data on forest dynamics have been accumulated from large plots and at permanent experimental plots at many locations in the natural forests. Long-term changes in forest ecosystem processes, such as forest regeneration and litter decomposition, are also monitored. These data are used to elucidate how forest ecosystem structures and functions respond to environmental changes. In planted forests, the research focuses on changes in ecosystem processes associated with final cutting and thinning, and induction of natural forests in unsuccessful plantations. Research is also conducted on the watershed protection function of forests and environmental sensing.

Photograph 6 Attempt to convert unsuccessful plantations into natural forests
Natural regeneration four years after clear-cut logging (top: June 2022) and just after cleaning cutting (bottom: December 2022).

Photograph 7 Bark-stripping damage caused by deer
Certain tree species, such as the Nikko fir (*Abies homolepis*) in the photograph, are preferentially stripped of bark, which causes them to wither and die.

Photograph 8 Public lecture - Collecting insects in the University of Tokyo Forests
Collection site (left) and prepared specimen (right)

(2) Conservation of biodiversity

UTCF and the surrounding Oku-Chichibu Mountains have a high level of biodiversity resulting from various geographical factors, such as the broad range in elevation and limestone outcrops, and is inhabited by many rare animals and plants. Work is underway to conserve biota and genetic resources. In particular, the Kagemori nursery has been established to perform ex-situ conservation of endangered species, such as the Chichibu birch (*Betula chichibuensis*), which are endemic to the Oku-Chichibu Mountains. We are also working with the local community to establish arboreta for flora and fauna unique to the area (e.g., maple).

(3) Adaptive management of the ecosystem

The increasing population density of sika deer severely impacts the forests in the Oku-Chichibu Mountains and the understory vegetation is in decline, which are expected to have various impacts on ecosystem processes, including forest regeneration, biodiversity, and material circulation. Therefore, deer exclusion fences have been installed at different altitudes, and long-term observation is underway to assess the effect of herbivore pressure on the forest ecosystem. We are also conducting research on deer ecology and density estimation, with the aim of managing deer density in cooperation with the local community and private companies.

7. Extension

UTCF concluded a local exchange agreement with Chichibu City in 2019, which is promoting collaboration in various fields, such as nature protection, forest conservation, forest and environmental education, and forest resource utilization. UTCF holds public lectures with the cooperation of the Saitama Entomological Society as a forum for communicating research results to the public and help local residents better understand the activities implemented by the UTCF. Guided tours are also held by the volunteer organization “Shioji-no-kai,” which supports UTCF. Furthermore, scientific information and research data are available through the website and the Wasabizawa Exhibition Room.

The University of Tokyo Chichibu Forest

○ Monorail

Forestry monorails have been established at three locations in the forest (Bakemonozawa, Iriyama, Nakayamazawa) to allow access to locations high in the mountains of the UTCF, with its multitude of steep slopes. The Bakemonozawa monorail allows access to altitudes ranging from 1,050 m to 1,550 m within about 45 minutes.

Bakemonozawa Monorail

○ Wasabizawa Exhibition Room

This exhibition room introduces the research and flora and fauna of the UTCF and is located on the second floor of the rest area (national highway facility), close to the Saitama side exit of the Karisaka Tunnel. Mounted specimens of mammals and photographic panels of the plants that inhabit the Chichibu mountains are on display. The display is changed in the spring and fall. Anyone who would like a tour of the exhibition should contact the management office on the first floor of the rest lounge.


Wasabizawa Exhibition Room

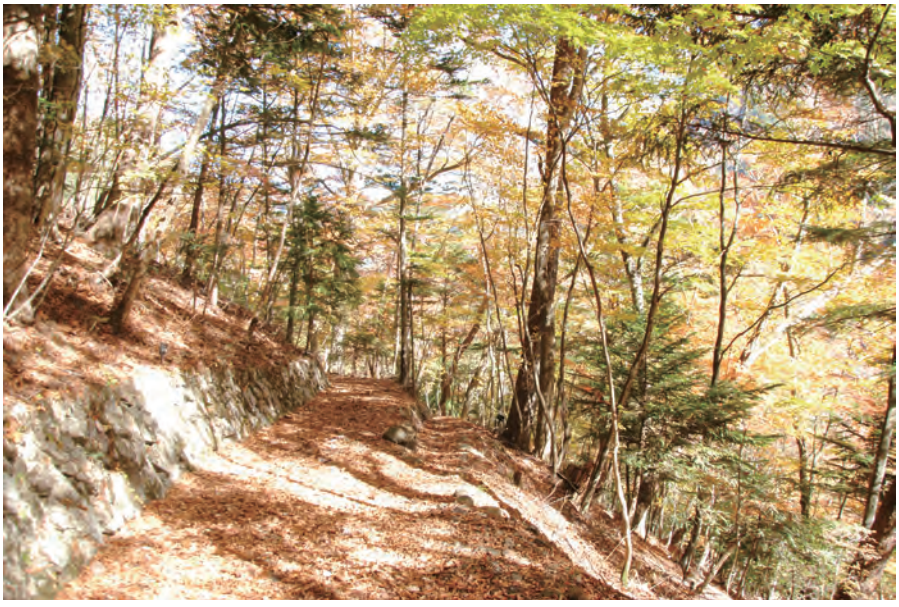
○ Flow-measuring weirs

There are two weirs in the forest (Bakemonozawa, Yatakezawa) where the volume of river runoff is measured. It is challenging to measure the volume of river runoff in mountain river basins, which tend to have large fluctuations in water volume and considerable movement of sediment. With these weirs, we have obtained valuable data not available elsewhere.


Bakemonozawa weir (left) and nearby Wasabizawa Meteorological Observatory (right)

○ Arboretum

The arboretum was established in 1940 by transplanting trees from the surrounding area, or introducing tree species from Hokkaido or overseas into a predominately natural forest. Tree labels have been attached to approximately 70 tree species.


Arboretum

○ Kagemori nursery

The Kagemori nursery has an area of 1.6 ha and is situated in the city of Chichibu. The nursery is used for field experiments and as a conservation site for forest plants. Lineage of the birch genus from Chichibu, Japanese beech by provenance, and Monarch birch by provenance are also maintained in the nursery.

The University of Tokyo Tanashi Forest

1. History and overview

The University of Tokyo Tanashi Forest (UTTF) was established in 1929 by the Department of Forestry Second Course (Laboratory of Silviculture) as the Tanashi Nursery, Department of Forestry, Faculty of Agriculture, Tokyo Imperial University (or Tama Nursery). Its origin can be traced back to a nursery of the Department of Forestry, established in 1893 in Komaba, which was the Faculty of Agriculture, Tokyo Imperial University, at that time. In 1956, the management and administration of the nursery was transferred from the Department of Forestry to the University Forest; in 1963 the name of the site was changed to Tanashi Experimental Site and the organizational structure was expanded. In 1982, the entire area was transferred from the Department of Forestry to the University Forest. In 2000, the University Forest was attached to the Graduate School of Agricultural and Life Sciences, with increased prioritization of graduate school education by the Faculty of Agriculture. Since establishment of the Institute for Sustainable Agro-ecosystem Services affiliated with the Graduate School of Agricultural and Life Sciences Faculty of Agriculture in 2010, faculty and staff of the Tanashi Experimental Site also work at this institute. In 2011, the name of the Tanashi Experimental Site was changed to the UTTF as part of an organizational restructuring of the entire University of Tokyo Forests, and the formal name of the site became the University of Tokyo Forests, Graduate School of Agricultural and Life Sciences, The UTTF.

There are also laboratories and field sites at the Institute for Sustainable Agro-ecosystem Services and Asian Research Center for Bioresource and Environmental Sciences, Graduate School of Agricultural and Life Sciences, The University of Tokyo at the Tanashi Campus, where the UTTF is located, which forms a hub for research and education with the Graduate School of Agricultural and Life Sciences in Nishi-Tokyo.

2. Location and environmental characteristics

The UTTF is situated conveniently in Nishi-tokyo, the Tokyo metropolitan area, about 1 hour from the Hongo campus of the University of Tokyo. This site is used by many faculty members and students as a research and education field site. The UTTF is located almost in the center of the Musashino area and, although the surrounding forests have been lost to residential development, vestiges remain of the secondary forest, which is characteristic to this area. This area is considered by the local residents to be a precious green oasis in the city.

The forest's total area is approximately 8.3 ha, with an altitude of 60 m. It is located on flat terrain in the Musashino terrace (Musashino side) of the Musashino Plateau. Its geological features are made up of a gravel bed (Musashino gravel layer) topped with a volcanic ash layer of 6 to 8 m thickness (loamy layer of the Kanto district). Black soil, formed from volcanic ash, is distributed on the loamy layer with a thickness of 50 to 60 cm. An annual mean temperature of 14.8 °C and annual mean rainfall of 1,575 mm were recorded from 2011 to 2020.

3. Forest characteristics

The Musashino forest has a long history of human intervention. Although the original vegetation communities only comprise a small part of the forest types, there are small scattered areas of coppice (secondary forest) containing a mixture of *Carpinus tschonoskii, Styrax japonicus, Zelkowa serrata,* and *Cornus controversa* within the Tanashi Forest, where the dominant trees are Japanese red pine *(Pinus densiflora), Quercus serrata* and *Quercus acutissima*. There are also many shrubs and climbing plants, including *Rhus javanica, Euonymus hamiltonianus, Aralia elata, Viburnum dilatatum, Celastrus orbiculatus*, and *Lonicera japonica*, as well as a wide variety of herbaceous plants on the forest floor, representing the variety of flora that grow in Musashino. There are also exhibition forests (foreign varieties of pine, cedar, and bamboo), an arboretum (approximately 244 species, including 63 species of coniferous trees and 181 species of broad-leaved trees), a research forest (improved poplar trees, Dawn redwood, *Quercus myrsinifolia*, and a seed orchard and scion garden. The forest, which occupies two-thirds of the total area is now a valuable urban forest.

4. Facilities

① Nursery

The Tanashi Forest was originally a forest nursery attached to the Laboratory of Silviculture, and has thus been used for student practice and research on plant nursing since its inception. The nurseries occur in three locations; Nursery No. 1 is 0.52 ha, Nursery No. 2 is 0.14 ha, and Nursery No. 3 is 0.18 ha, corresponding to a total area of 0.84 ha. Of these, Nursery No. 1 is the most utilized for growing Japanese red pine (*Pinus densiflora*), black pine (*Pinus thunbergii*), sugi (*Cryptomeria japonica*), and hinoki (*Chamaecypris obtusa*) seedlings for practice and research. Trees are also grown using

Photograph 1 View of the forest at the UTTF
The forest has the appearance of an island floating in the city.

Photograph 2 Practical training for students in Nursery No.1
Practical training transplanting pine seedlings

cuttings and grafting, and various types of seedlings are grown for research.

② Laboratories

Indoor laboratories including a UTF sample preparation room and two UTF laboratory rooms are shared by students and faculty of the UTF. The sample preparation room is 57.2 m^2 equipped with a central laboratory table and nine small incubators. This sample preparation room is used exclusively for primary processing of field samples and for breeding and culturing insects, etc. The laboratory rooms are 86.6 m^2 equipped with two central benches, incubators, autoclave, dissecting microscopes, fluorescence microscope, freezing microtome, PCR equipment, and a high-speed microcentrifuge, etc. These laboratory rooms can be used for molecular biology, biochemistry, and microbiology experiments.

③ Seminar House

Seminar House is a precious wooden building, built as the Tanashi Nursery office in 1932. Since then, it has been used as the office and laboratory for the Tanashi Experimental Site and UTTF. In March 2021, the office and laboratory functions were transferred to the main Tanashi building. Seismic retrofitting work was implemented the same year, and now the Seminar House is used as a lecture room and can be rented to the public for a fee.

5. Education

Given its history under the management and administration of the Laboratory of Silviculture, Forestry Department, the UTTF has always been used for forestry studies, in particular by students for practical training in the field of plant nursing. The UTTF is now also used for practical training by other laboratories and universities, focusing on field experiments and observations. The UTTF also holds practical training for students in liberal arts courses, centered on hands-on activities in urban forests. The forests and nurseries are made available to undergraduate and graduate students, both from the University of Tokyo and outside the university, for research assignments focusing on related specializations and majors, and the students may also use the laboratories as appropriate. The UTTF sells seeds and seedlings of tree species, including Japanese red pine and black pine, as well as the branches and leaves of various standing trees, and also responds to requests for use of the forest for tree felling.

6. Research

The University of Tokyo Tanashi Forest has forests, including various research forests, and also maintains indoor and outdoor research facilities, such as nurseries and laboratories, thereby providing a research environment that integrates field sites and laboratories for university and non-university researchers. Work is ongoing to improve the research environment and upgrade the equipment that underpins the research. In 2014, wireless LAN and power supply stations were installed. Data are collected daily, including meteorological data, flora and fauna, and historical data on forest land management. In addition to this research base, urban forest research is also promoted, as discussed below, making full use of the location of the forest.

Photograph 4 Survey of habitat animals using camera
Sensor cameras are installed in the forest to survey the animals inhabiting the forest (raccoon dogs are pictured in the photo).

Photograph 3 Jizo Gate
The entrance to the UTTF field and seminar house. It is located along Shin-Tokorozawa Kaido, which is easily accessible.

Photograph 5 Laboratories
There are two laboratories, the UTF sample preparation laboratory and the UTF Laboratory in Tanashi main building.

① Research on urban forest planning

Information on existing urban forests is collected and organized to explore the functions required for new urban forests at the present and in the future. The research is aimed at formulating a plan to implement the necessary functions, establish an urban forest, and evaluate and verify the functions. Long Term Ecosystem Research (LTER) sites, which have been largely unmanaged since their establishment in 1992, are regarded as abandoned urban forests and are used as controls for the evaluation of functions. Measurement equipment is provided to facilitate research and use of the forests. The forest functions correspond to the ecosystem services, and their research require collaboration with the adjacent Institute for Sustainable Agro-ecosystem Services(ISAS), to evaluate the impact of these functions on agroecosystems.

② Research on urban forest management

This research will cover the management of urban forest density, pruning, and forest hygiene, and will also promote research on managing genetic resources, such as trees used for planting, propagation methods, and seedling growing methods. More specific examples include empirical research to verify the accuracy of tree vigor determined non-destructively the through reanalysis after felling standing trees, and establishing propagation techniques for various trees, including landscaping and greening trees. Eradication measures need to be developed for Japanese oak

wilt disease and pine wilt disease, which occurred sporadically around 2020, which require further scientific verification.

③Research on urban forest utilization

This field promotes research on exploring unused resources, surveying the amount of resources, and developing utilization methods, particularly for urban forests. With the current trends in population aging, it is vital to find mechanisms to involve older people in the use and independent management of urban forests. It is also necessary to investigate how the interests of various stakeholders can be coordinated. Possible research topics could include harvesting, characterization, and sale of timber and non-timber products from urban forests, and research on learning, recreation, and volunteer activities in urban forests.

7. Extension

From the perspective of contributing to the local community, lifelong education, and support for primary and secondary education, the forestry education activities have been conducted at the UTTF in cooperation with various organizations by holding public lectures such as the "Junior Arborist Certification Program". The UTTF is also used as an off-campus field by many nearby elementary and junior high schools, and accepts junior high school students for work experience. In addition to opening the premises to the general public for nature observation on weekdays, the museum is open to the public several times a year during the season of fresh greenery and beautiful autumn leaves, attracting as many as approximately 2,000 visitors annually. Signs with QR codes are posted to provide academic information and emergency contact information for the safety of the many visitors. The tour route is routinely patrolled for fallen branches, and dead branches are removed as necessary using an elevating work truck. Forest partner systems started in 2022 and they assist elementary and junior high school students in forestry education-related classes.

Photograph 6 Complete enumeration
Changes in species composition and biomass for each forest type throughout the UTTF is surveyed every 5 years.

Photograph 7 Experiment in Basic Forest Science I
Practical training for students is implemented several times a year.

Photograph 8 "Kids Tree Expert" program
We hold a "Kids Tree Expert" program every spring and fall.

Spring

Common bluebottle
(*Graphium sarpedon*)

Gentiana zollingeri

Dove tree
(*Davidia involucrata*)

Summer

Marasmius pulcherripes

Jewel beatle
(*Chrysochroa fulgidissima*)

Scarlet bottlebrush
(*Callistemon speciosus*)

Autumn

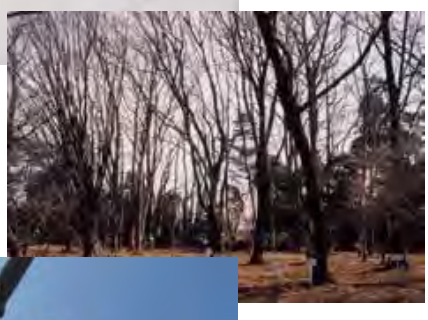
Sympetrum baccha matutinum

Arboretum of Autumn Leaves

Dawn redwood
(*Metasequoia glyptostroboides*)

Winter

Snow-covered nursery



Arboretum in winter

Wintersweet
(*Chimonanthus praecox*)

Ecohydrology Research Institute

1. History and overview

Ecohydrology is an interdisciplinary field that studies the interactions between water and ecosystems, including the balance, temporal changes, processes, and mechanisms of water, nutrients, carbon, soil, sediment, and energy flow into, within, and out of ecosystems. In 2011, The University Forest in Aichi was renamed as the Ecohydrology Research Institute (ERI), which drives research on ecohydrology within the Tokyo University Forests.

The research forest and test site of the ERI, affiliated with the Faculty of Agriculture, Tokyo Imperial University, was established in 1922 on a degraded hill as an experimental and research training site for forest hydrology and erosion control engineering for the University of Tokyo. From the outset, various types of erosion control construction were implemented, and through land exchanges with Seto city and Inuyama city in Aichi prefecture, almost all of the 1,294 ha of hills are now covered with vegetation.

In 2022, we celebrated the 100th anniversary of our founding. We initiated joint research projects with several companies in 2024. Long-term observation data has become an indispensable foundation for research and education.

A video introducing the Ecohydrology Research Institute can be viewed with the QR code on the right.

2. Location and environmental characteristics

ERI has an administration office with a research laboratory located in Goizuka-cho, Seto city, 20 km northeast of Nagoya, and three research forests. The Akazu Research Forest (AKRF, 745 ha) is situated in the eastern part of Seto city, spreading over the Owari district from the foothills of Mt. Mikuni along the border of Gifu prefecture in the north to Mt. Sanage in the south, while the eastern edge borders with the Mikawa area. The Inuyama Research Forest (IRF, 442 ha) is located in the eastern part of Inuyama city, approximately 20 km north of Nagoya. The Ananomiya Research Forest (ANRF, 77 ha) is located to the north of Seto city.

Photograph 1 Akazu Research Forest

AKRF and almost all of ANRF lie on deeply weathered Mesozoic granite. The average inclination is 25° in AKRF (altitude 244–692 m) and 19° in ANRF (altitude 130–272 m). The majority of the Inuyama Research Forest (altitude 70–218 m) is situated on Neogene strata, and Palaeozoic sandstone is found in some of the upper areas.

Based on the records collected at the Shirasaka Meteorological Observatory in the AKRF over the past 45 years (1976–2020), the average monthly temperature in January, the coldest month, is 1.6 ºC and in August, the hottest month, is 24.7 ºC. The annual average temperature is 13.0 ºC. Annual average precipitation is approximately 1840 mm, indicating that the climate is warm and humid.

3. Forest characteristics

When the research forests were first established, the ridgelines in the AKRF were almost bare land, while both the IRF and ANRF were almost completely bare with only a few trees bordering mountain streams. Since then, cypress and cedar have been planted as part of erosion control and forestry. The forest is broadly divided into naturally regenerated (76%) and planted forest (24%). In the naturally regenerated forest, jolcham oak, Japanese red pine (*Pinus densiflora*), cypress, and

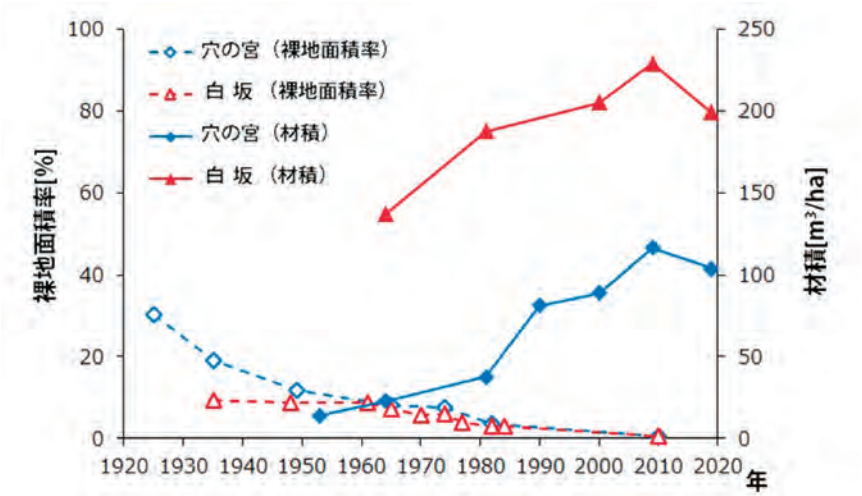


Figure 1 Reduction in the area of bare land (dotted line) due to reforestation and transition from denuded hills and increase in accumulation (solid line).
Red = Shirasaka watershed, blue = Ananomiya watershed

Sielbold Maple (*Acer sieboldianum*) are found in the upper layer, while evergreen broad-leaved trees such as Japanese camellia (*Camellia japonica*) East Asian eurya (*Eurya japonica*), and Japanese cleyera are found in the middle and lower layers.

4. Facilities

The AKRF lodging facilities have lodging and lecture rooms for student practical training, which can also be used by researchers at the AKRF. Long-term dormitories are also available on the grounds of the Goizuka office for researchers.

5. Education

The ERI is a base for educational programs of both natural and social sciences dealing with the interactions between forests, water, and humans, for both undergraduate and graduate students at the University of Tokyo. This institute promotes and supports lectures and practical training, and research guidance for bachelor, master, and PhD theses. As the only research organization at the University of Tokyo that handles research on the interactions between forests, waters, and humans, this institute also contributes to education for undergraduate students of the Junior Division, College of Arts and Sciences, through graduate schools, faculties, and research institutes outside the Graduate School of Agricultural and Life Sciences, Integrated Courses, and University-Wide Experience Seminars.

Education is also offered for both undergraduate and graduate students at other universities.

6. Research

ERI promotes research on the effect of forest processes and material circulation (such as water, nutrients, and carbon) at the watershed scale. This research is aimed at comprehensively evaluating forest ecosystem services and develop technology to enhance ecosystem functions by characterizing the state of water, soil, and sediment; the relationship between society the forest and water; and the position and trade-offs with other ecosystem services. Research often considers the intersections between natural sciences, humanities, and social sciences to assess the history, current status, and future of use of forest ecosystem services by society.

To this end, various facilities and survey fields have been established at the ERI.

● Hydrological, meteorological, and water quality observations at the AKRF and ANRF

Runoff monitoring using measuring weirs (facilities for measuring the volume of water in a river) have been ongoing for more than 90 years in the AKRF Shirasaka and Higashiyama Experimental Watersheds as well as in the ANRF, resulting in the accumulation of long-term runoff data. Combining these data with meteorological data, such as rainfall and temperature, observed over the same period can be

Photograph 2 Measuring practice as part of student experiments

Photograph 3 Students removing sand from the weir

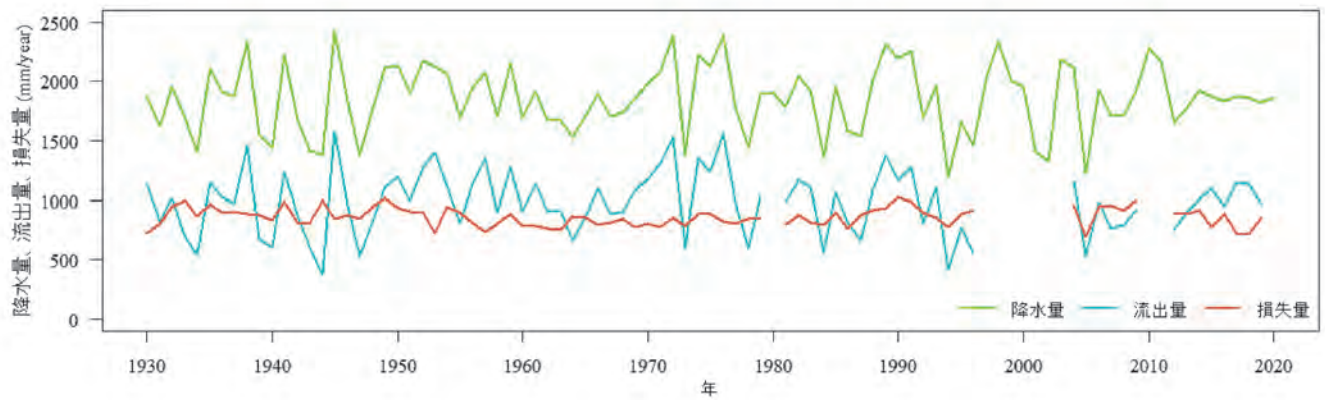


Figure 2 Long-term fluctuations in the annual precipitation, runoff, and water loss in the Shirasaka Experimental watershed.
Green = precipitation, blue = runoff, red = water loss. The volume of water loss is calculated as the precipitation minus the runoff, roughly indicating the amount of evapotranspiration from the forest.

used to clarify the effect of climate change and changes in forest vegetation on the forest water balance. Stream water quality surveys are also being conducted in the AKRF Shirasaka watershed to clarify the impact of forest disturbances, such as disease and insect damage, on water quality.

● Forest ecosystem surveys in AKRF

The Shirasaka Small Watershed Fixed Test Site (2.67 ha) has been established in the AKRF, and a 1 ha quadrat within this site has been registered as a core site for forest and grassland surveys as part of the Ministry of the Environment Monitoring Sites 1000. Various surveys on the forest ecosystem are conducted within this quadrat, including tree censuses (identification of tree species and measurement of tree trunk diameter) and litter/seed traps surveys, as well as research to elucidate long-term changes in the forests.

● Large-scale AKRF field experiment sites in the AKRF and IRF

Runoff and vegetation research are being conducted simultaneously at two adjacent small watersheds in the AKRF. Future research plans include clarifying the impact of economic operations, such as tree felling, in one of the small watersheds. In the IRF, research is being conducted to determine how runoff changes during rainfall and with low river levels by thinning an unmanaged Japanese cypress plantation in a small watershed. Although the scale of the IRF study is smaller than that at the AKRF study, the IRF has a slope-scale lysimeter field test facility, which investigates the flow of water on the surface of the soil, flow of water in the soil, and amount of evapotranspiration from plants and the soil.

7. Extension

The ERI has concluded local exchange agreements with Seto City and Inuyama City, and regularly holds events for local residents. Public events are also regularly held by the ERI support group “Shidekobushi no Kai” and Inuyama Research Forest User Council. The institute also promotes the communication of knowledge to the community of research commissioned by Toyota city, a neighboring municipality, which assesses the impact of forest management processes, such as thinning, on the watershed protection function, and environmental impact assessments of rivers in Seto city.

Photograph 4 Shirasaka flow-measuring weir

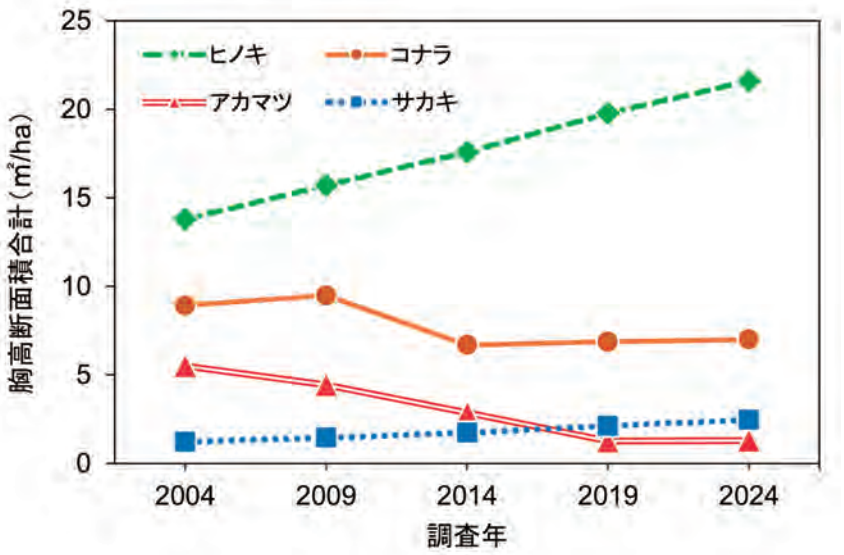


Figure 3 Changes over time in the total basal area at breast height (m^2 ha^{-1}) for four main tree species in the Shirasaka Small Watershed Fixed Test Site 1 ha quadrat.
green = Cypress, orange = jolcham oak, red = Japanese red pine, blue = .Japanese cleyera A large number of jolcham oak died due to oak wilt disease between 2009 and 2014.

8. Others

1) Forestry Heritage: Gorge Construction Buildings Designed by Dr. Kitaro Moroto, the pioneer of modern erosion control in Japan

The ERI was originally established to restore bare mountain slopes, which had become common throughout Japan, especially in western Japan, during the Meiji and early Showa period. The devastation of forests and frequent flooding at that time was regarded as a national problem, which was tackles by Dr. Kitaro Moroto (Professor, Tokyo Imperial University), the founder of modern erosion control engineering. Dr. Moroto applied the knowledge he acquired while studying in Austria and France through theoretical techniques to the conditions in Japan, and contributed greatly to the dissemination of these techniques and development of human resources in this field. The University Forest in Aichi was Dr. Moroto's most influential experimental field.

The erosion control infrastructure implemented in the Oguro district in the 1930s is a model for small-scale mountain stream conservation throughout Japan. Therefore, site visits to the Oguro district have been incorporated into the Degraded Land Technology Seminars run by the Ministry of Agriculture and Commerce and in practical training courses at universities. The present day Inuyama forest was regenerated by Dr. Moroto's erosion control practices and subsequent efforts of the University Forest in Aichi.

The Gorge Construction Buildings Designed by Dr. Kitaro Moroto, the Founder of Modern Sabo in Japan, which contributed to facilitating Dr. Moroto's erosion control engineering system and training of many engineers, was registered as Forestry Heritage sites by the Japanese Forest Society in 2017.

2) Ecohydrology Research Institute archives

Approximately 4,000 documents and photographs collected by the ERI since its inception in 1922 are available in the archives on the ERI website, including photographic records of erosion control and greening construction, water volume and meteorological measurements, and student practical training; there are also many contemporary photographs taken of the area near the eastern part of the Owari hills, which has changed dramatically since 1922.

Photograph 5 Forest compartment 10 in the Inuyama Research Forest in 1951

Photograph 6 Forest compartment 10 in the Inuyama Research Forest in 2020

Photograph 7 Earth-fill weir with concrete drainage channel (photograph taken in 1929)

Photograph 8 Ecohydrology Research Institute archives website

Figure 4 Location of the Gorge Construction Buildings
Certification targets: Earth-fill weir with concrete drainage channel, wire gabion weir × 17, earth-fill weir, bridge × 2 (including ruins)

Photograph 9 Location of Kitomura erosion control works (established in the early Showa period, starting in 1929)

Fuji Iyashinomori Woodland Study Center

1. History and overview

The Fuji Iyashinomori Woodland Study Center (FIWSC) was established in 1925 as the University of Tokyo Fuji Forest following the donation of approximately 12 ha of land originally owned by the Sengen shrine and residents of Yamanakako. In 1926, land was entrusted to the site by Yamanashi Prefecture, thereby establishing the base for the University Forest. The state-owned land was subsequently transferred to Yamanakako village, and the leased land was returned, resulting in the current 40 ha site, which is a combination of land owned by the University of Tokyo Forests and leased land owned by Yamanashi Prefecture. The name of the site was changed to Fuji Iyashinomori Woodland Study Center ("Iyashinomori" means forest with amenity) in 2011, and the center focuses on research for creating forests with excellent recreational and restoring functions and the development of communities that are friendly to forests.

Photograph 1 The FIWSC surrounded by Mt. Fuji and Yamanaka Lake

2. Location and environmental characteristics

The FIWSC is located in one of the most popular resort areas in Japan, Yamanakako village, Minamitsuru-gun, Yamanashi Prefecture, on the shores of Lake Yamanaka at the foot of Mt. Fuji. The FIWSC can be reached by transit bus from Mt. Fuji Station on Fujikyu Railway, or Gotemba Station on the JR Gotemba Line, or by the Chuo Highway Bus from the Shinjuku Expressway Bus Terminal in Tokyo. One should get off at the "Yamanakako-mura Yakuba-mae" bus stop for all bus routes, from where it is around a 3-minute walk.

The FIWSC extends over gently sloping land on the shores of Lake Yamanaka, ranging in altitude from 990 to 1,060 m. The soil is immature and composed of volcanic gravel, and the forest is located at the transition between the oceanic climate of Omote-Fuji and the inland climate of Ura-Fuji. The climate in the region is cold with slightly high humidity. The average annual precipitation from 2014–2023, recorded at the nearby Yamanaka Automated Meteorological Data Acquisition System (AMeDAS) observatory, was 2,260 mm, while the average annual temperature was 10.3 ℃, with the lowest temperature reaching –18.6 °C. The maximum snow depth is usually around 30 to 40 cm.

Photograph 2 The Fuji Iyashinomori Woodland Lecture Room in the field

Photograph 3 Self-catering dormitory which can also be used for long-stay research

3. Forest characteristics

The forest is in the upper part of the cool temperate zone, where larch forests planted since the 1920s dominate the canopy, while various broad-leaved trees occupy the understory and shrub layers, and the forest is transitioning to a deciduous broad-leaved forest. There are also test sites of different tree species including European spruce, eastern white pine, Sakhalin fir, Sakhalin spruce, Japanese larch. As of 2013, approximately 400 species of vascular plants have been identified.

4. Facilities

The FIWSC has the Fuji Iyashinomori Woodland lecture room (Lecture Room) and self-catering dormitory, while The University of Tokyo Yamanaka Ryo Naito Seminar House (Yamanaka Hall), run by the Athletic Foundation of the University of Tokyo, is located in the forest. These facilities are used for practical training, seminars, extracurricular activities, and laboratory seminar and training camps.

The Lecture Room is equipped with Wi-Fi and a large touch screen, so it can also be used for online meetings. Self-catering dormitories are equipped with a kitchen and a prefabricated bathroom, making them suitable for

Fuji Iyashinomori Woodland Study Center

Photograph 4 The University of Tokyo Yamanaka Ryo Naito Seminar House

Photograph 6 Practical learning about forest landscape management

long-term stays.

The Yamanaka Ryo is a lodging facility of The University of Tokyo. It has three training rooms of varied sizes, and is also fully equipped with Wi-Fi access; thus, this facility can be used not only for education and research activities but also various types of training.

5. Education

Educational field sites at the FIWSC occur either on flat or gently sloping land, making it optimal for students with entry-level field experience. Although planted Japanese larches are the dominant species, the forests also have abundant understory vegetation, so it is possible to observe a diverse range of plants and vegetation as well as animal tracks. The FIWSC itself is not very large, but there are facilities and field sites in the surrounding area, which can further enhance educational activities. The Yamanaka Ryo is located in the forest, and offers comfortable accommodation, so educational activities can be spread over a number days. There is easy access to the site from central Tokyo, so day-trip practical training is also possible.

Indoor facilities such as the Fuji Iyashinomori Woodland Lecture Room and seminar rooms in the Yamanaka Hall are also available, which allow for programs that combine field work with indoor exercises. The Yamanaka Ryo are suitable for international students, because they are ideal for overnight stays. Use of the self-catering dormitory, managed by the FIWSC, is recommended for long-term research, such as for graduate thesis research.

The FIWSC also runs lectures and practical training on the theme of “Iyashinomori”, mainly for students studying liberal arts.

Photograph 5 Effective use of dead wood using a wood-burning stove

Photograph 7 Forest surveys using a drone

6. Research

The FIWSC conducts multifaceted research on technology and social mechanisms associated with forests with outstanding functions.

(1) Forest management of the "Iyashinomori”

The foundation of forest management is determining the current condition of the forest, but there are virtually no established methods that focus on the recreational and restoring functions of forests. Basic research for the management of “Iyashinomori” is aimed at developing methods for observing and evaluating forest landscapes using demonstration forest plots. Applied research is being conducted into specific forest management techniques that address various risks, including climate change and damage from wild animals.

(2) Recycling and use of resources

Effectively using withered trees and branches, among other materials, may promote forest management while simultaneously facilitating "Iyashinomori". This research considers recycling of low-quality materials that are not distributed in the general market, as well as suitable technologies to achieve this end. In particular, we are building a firewood utilization system that operates in conjunction with forest management and evaluating the contribution of this system to forest management and the local community. We are also working on developing educational and hands-on programs that deal with the knowledge and skills required to better utilize materials from the forest and forest spaces in the local community.

(3) Social design

Involvement and cooperation of stakeholders that will benefit from Iyashinomori is vital for autonomously maintaining "Iyashinomori" in the local community. The research will examine the ideal conditions for autonomous forest governance in the region and consider usage rules and norms to ensure that everyone can fully and comfortably enjoy an open "Iyashinomori".

7. Extension

The FIWSC is working on joint projects based on a regional exchange agreement with Yamanakako village that focus on interactions between the forest and local residents and industries, providing information on the relationships between forests and tourism, health, and education. The FIWSC also holds events, such as public lectures for local residents.

Activities aiming to foster a culture of familiarity with the forests in the region are held regularly in conjunction with the "Iyashinomori no Kai", a volunteer organization comprised of local residents. The FIWSC also collaborates with an organization working on afforestation, mainly in the northern region of Mt. Fuji, thereby endeavoring to contribute to afforestation and culturing familiarity with the forests.

Photograph 8 Concert in the forest

Photograph 9 Conducting comfortable online meetings surrounded by the forest

Photograph 10 Chainsaw workshop for local residents

Fuji Iyashinomori Woodland Study Center

Guide to highlights of the forest

① Practical training and long-term research area

The area incorporates test sites planted with various tree species and long-term research sites.

② Public open area

The areastarts from the Yamanaka Ryo, moves through a walking path in the forest, a lawn area on the lakeside, a sports ground, a meadow, and returns to the self-catering dormitory and the Lecture Room. From 2024, it is open to the public, in principle, from 9:00 to 16:00 on weekdays. Mt. Fuji is visible from the lakeside square.

③ Iyashinomori projects

A

Cold-region tree species growth test site

Tree species collected from cold regions overseas and Hokkaido have been planted to identify suitable tree species for afforestation in cold climates. The trees have been planted on a trial basis, and the growth of the planted trees is measured periodically.

B

Nature observation trail

The trail in the forest is used not only for researches on trees and plants, it is also used to observe wild animals, including wild birds. This photograph is of an Asian black bear captured by camera trap.

C

Long-term ecological research plot

Three 0.25 ha plots have been set up to record natural succession of the forest over the long term, and measurements are taken once every 5 years.

D

Lakeside square with an arbor

A lawn area facing Yamanaka lake. Views of the lake and greenery can be enjoyed from this area. The arbor walls are made of firewood logs from dead trees.

E

Kozaigahara (the picture on the right shows the statue in front of the library of the Faculty of Agriculture)

This meadow was named after Professor Yoshinao Kozai, the tenth president of the Tokyo Imperial University. The FIWSC was established during Professor Kozai's tenure as president. The background details of the naming process are not known.

F

Fuji Iyashinomori Lecture Room and self-catering dormitory

This is a wooden structure built using Tsugabushin (construction using a luxury wood called Tsuga [*Japanese hemlock*]) around 90 years ago, and it retains the atmosphere of when it first opened. It is still in use, while undergoing careful renovation. The interior of the lecture rooms is fitted out with Japanese larch from the FIWSC.

G

Office

The office is heated with a wood-burning stove. All firewood is collected from dead trees in the forest. There is also a workshop in the back with various tools.

H

Japanese red pine forest

Once a year, all the fallen leaves on the forest floor are collected and burnt in a bonfire to maintain the clean and refreshing landscape of the Japanese red pine forest.

I

Iyashinomori projects - Demonstration forest plots for landscape management

Three sections with different management conditions have been prepared in the forest to evaluate the impact on the landscape and people and survey the vegetation. This photograph is a 3DCG image of the forest using laser survey data.

Arboricultural Research Institute

1. History and overview

The Arboricultural Research Institute (ARI) is one of the seven University of Tokyo Forests. It was established in 1943 with the purchase of 241 ha of privately owned forest in Aono, present-day Minamiizu Town, as a research facility for special-purpose plants from the tropics and subtropics. In 1944, 0.6 ha of land was leased in Kano, present-day Minamiizu Town, and construction of a large wooden greenhouse and the director's office building was completed in 1947. The following year, in 1948, the office was relocated to Kano, and a hot spring that gushes out naturally from 149 m below the ground was dug up and started to be used as a heat source for the greenhouse. In 2020, the Shimogamo-ryo lodging facility was transferred from Athletic Foundation of the University of Tokyo and are used for practical training and other purposes.

Currently, we grow a variety of special-purpose plants in our 247 ha outdoor field, the Aono Field Station and the Kano Forest, as well as in our large greenhouse and No. 2 greenhouse, and provide these plants for education and research.

2. Location and environmental characteristics

The geology of Minamiizu Town, where the ARI is located, is composed of the Neogene Miocene Shirahama Group, with quartzite and andesite as the base rock, and intrusive rocks as the base rock, and brown forest soil that is somewhat dry. The elevation is about 100-500m in the Aono Research Forest, and the topography is complex and steep.

The climate is characterized by an annual mean temperature of 15.8°C for the past 10 years (2013-2022) at the Aono field station observation point (100 m elevation), and an average of 17 days (first day December 9 to last day March 26) with an annual record of 0°C or less. Average annual precipitation is 2,289 mm, with very little snowfall.

3. Forest characteristics

The forests of the ARI belong to the warm-temperate evergreen broad-leaved forest zone, and the potential vegetation is Japanese chinquapin and evergreen oak. The forest was used for firewood and charcoal, which was abandoned since around 1960. The forest contains a mixture of trees, including *Castanopsis sieboldii, Quercus glauca, Quercus salicina, Neolitsea sericea, Camellia japonica, Neolitsea aciculata, and Cinnamomum yabunikkei*. In the sparsely vegetated open area, there are many deciduous broad-leaved trees such as *Quercus crispula, Cerasus speciosa, Cerasus jamasakura, Toxicodendron succedaneum, Alnus sieboldiana, Cornus controversa, Mallotus japonicus* and *Zanthoxylum ailanthoides*. The forest floor is covered with ferns, such as *Arachniodes standishii, Gleichenia japonica,* and *Pteris wallichiana*, as well as *Maesa japonica, Rubus buergeri, Ardisia japonica*, and *Damnacanthus*

Photo 1 Kano Office

Photo 2 The Grand greenhouse

Photo 3 Hot Spring for greenhouse heating source

Photo 4 Shimogamo-ryo lodging facility

Photo 5 Aono Field Station

Photo 6 Exterior view of the evergreen forest in the Aono Research Forest

Photo 7 Landscape in a camphor tree plantation forest

indicus.

Coniferous planted forests such as cedar and cypress account for 23.0% of the Aono Research Forest, while broadleaf planted forests such as *Cinnamomum camphora, Eucalyptus* genus, and *Vernicia cordata* account for 27.6%. The camphor tree plantations, which cover approximately 48 ha, are approximately 115 years old, while most of the others are less than 70 years old.

4. Facilities

There is an office, the grand greenhouse, the No. 2 greenhouse, a lecture room, a laboratory building, an accommodation facility in Shimogamo-ryo lodging facility, and a hot spring in Kano, and the Aono field station is located in the Aono Research Forest, 8 km away from Kano Forest.

The grand greenhouse is 260 m^2 in area and 7 m high, and uses hot spring water as its heat source to keep the indoor temperature at 17°C or higher. Currently, approximately 250 species of tropical and subtropical plants are cultivated and displayed in the greenhouse, which offers a variety of activities using familiar tropical plants such as cacao, vanilla, coffee, and cassava. The greenhouse also provides greenhouse plants as research materials and conducts joint research with other organizations and individuals. 2 greenhouses have two 36 m^2 rooms (one heated with hot spring water), which are used for seedling trials of *Eucalyptus* spp. and other species. The lecture room is a 14-mat Japanese-style room that can be used for university education. The Shimogamo-ryo lodging facility can accommodate up to 29 people when ARI is used for various education program, research, and training programs.

The Aono field station serves as a base for research forest management and users. Lecture rooms in the field station can be used for lectures, internal work, and rest areas during field activities.

5. Education

University-Wide Experience Seminars

The ARI plans and conducts several times a year a program using special-purpose plants grown in the research forest and greenhouse as teaching materials, and conducts a university-wide hands-on seminar for liberal arts undergraduate students.

Forestry Practicum (International Sustainable Agriculture Development, Faculty of Agriculture)

Students learn how to conduct volume and vegetation surveys of camphor tree plantations to learn basic methods of surveying trees and forests, as well as how to plan management and predict forest transitions.

We also accept other specialized training from the Faculty of Agriculture, the department of Forest Science of the Graduate School, other faculties, and other universities.

6. Research

Research on fast-growing tree species

Through field adaptation tests conducted over the past several decades, we have selected species of the genus *Eucalyptus* that we have evaluated as vigorous growers and created new test sites consisting of approximately 100 individuals of each species to evaluate their silvicultural characteristics and forestry productivity. In addition, several species of mature *eucalyptus* trees have been provided for material and physical property testing.

Tests on special-purpose trees

In an camphor tree forest planted 115 years ago for camphor collection, clear-cutting sprouting and regeneration tests have been conducted, showing that even individuals reaching 100 years of age can sprout and regenerate after harvesting, and ongoing research is being conducted.

We are conducting research on

Photo 8 Vanilla flowers (left) and fruits (right)

Photo 9 Educational program on chocolate processing

oilseed plants such as *Vernicia cordata, Camellia japonica*, and *Toxicodendron succedaneum* with the aim of developing educational programs that use these plants as teaching materials. Oil extraction tests have been conducted on *Vernicia* and *Camellia*, and we are working to improve oil extraction methods as necessary, and to utilize the oil obtained in educational programs. For *Toxicodendron* tree, we are working on cultivation trials for stable harvesting of the fruit.

Greenhouse Plants

In the greenhouse, our research is conducted primarily with the development of educational materials in mind.

Cacao conducts basic research on phenology such as flowering and fruiting, as well as surveys on the number and size of fruit harvested. We are also engaged in research using harvested fruit to explore the use of domestic cacao as a product.

As for vanilla, we aim to produce high quality vanilla beans using a new and simplified curing method of capsule fruit.

We are also engaged in propagation trials for the use of cassava, pepper, neem, coffee, para rubber tree, sandalwood, ylang-ylang, and safflower as educational materials.

7. Extension

In 2024, we signed an agreement for mutual collaboration and cooperation to contribute to the development of agriculture and forestry in Minami-Izu Town and the promotion of education and research at the university. Since 2019, we have been conducting exchange programs between Athletic Foundation of the University of Tokyo and Minamiizu Town children during their summer vacation. We are supported from t the Minamiizu Town Furusato tax payment.

We also regularly hold other open lectures for local residents in cooperation with neighboring municipalities.

Photo 10 *Eucalyptus saligna* sprouting survey

Photo 11 Monitoring survey in a former coppice forest

Photo 12 Educational program on bamboo charcoal making

Photo 13 Educational program using oilseed plants

Photo 14 Experiencing bamboo thinning at a public lecture

Arboricultural Research Institute

List of plants for special forest products

Aono research forest

technical name	Japanese name	family name	use
Ginkgo biloba	Ichou	Ginkgoaceae	fruit: medicinal
Pinus thunbergii	Kuromatsu	Pinaceae	resin: adhesive, seed: medicinal
Metasequoia glyptostroboides	Metasekoia	Cupressaceae	wood: street tree
Sequoia sempervirens	Ichiimodoki	Cupressaceae	wood: building materials, park tree
Castanea sieboldii	Sudajii	Fagaceae	bark: dye
Eucommia ulmoides	Tochuu	Eucommiaceae	bark: herbal medicine, leaf: fiber
Cinnamomum camphora	Kusunoki	Lauraceae	wood, branch, leaf: camphor
Cinnamomum okinawense	Nikkei	Lauraceae	bark: edible
Trachycarpus fortunei	Shuro	Arecaceae	fiber: palm rope
Camellia japonica	Yabutsubaki	Theaceae	fruit: oil
Eurya japonica	Hisakaki	Theaceae	fruit: dye
Prunus soeciosa	Ooshimazakura	Rosaceae	leaf: edible
Aleurites cordata	Aburagiri	Euphorbiaceae	seed: oil, abrasives
Mallotus japonicus	Akamegashiwa	Euphorbiaceae	leaf: edible,dye,medicinal
Zanthoxylum ailanthoides	Karasuzanshou	Rutaceae	fruit: herbal medicine
Rhus succedanea	Hazenoki	Anacardiaceae	fruit: wax
Eucalyptus sp.	Yuukari	Myrtaceae	wood: essential oils, medicinal, pulp
Diospyros japonica	Ryuukyuumamegaki	Ebenaceae	fruit: preservative
Styrax japonica	Egonoki	Styracaceae	fruit: detergent
Clerodendrum trichotomum	Kusagi	Lamiaceae	fruit: dye, young leaves: medicinal

Greenhouse

technical name	Japanese name	family name	use
Pinus merkusii	Merukushimatsu	Pinaceae	resin: adhesive, fragrances
Agathis australis	Kaurikopaaru	Araucariaceae	resin: topcoat, copar
Coffea arabica	Arabiakoohiinoki	Rubiaceae	seed: coffee
Azadirachta indica	Indosendan	Meliaceae	wood, branch, leaf: Insect repellent
Dimocarpus longan	Ryuugan	Sapindaceae	fruit, seed: edible, herbal medicine
Hevea brasiliensis	Paragomunoki	Euphorbiaceae	resin: natural rubber
Jatropha curcas	Nan-youaburagiri	Euphorbiaceae	fruit: oil alternatives
Manihot esculenta	Kyassaba	Euphorbiaceae	potato□tapioca starch
Santalum album	Byakudan	Santalaceae	heartwood: essence, sculpture
Eucalyptus citriodora	Remon-yuukari	Myrtaceae	wood: essential oils, fragrances, pulp
Melaleuca leucadendron	Kayupute	Myrtaceae	branch, leaf: essential oils, medicinal
Psidium guajava	Guabaa	Myrtaceae	fruit: edible
Mangifera indica	Mangoo	Anacardiaceae	fruit: edible
Derris guineense	Toba	Fabaceae	root: insecticides
Haematoxylum campechianum	Akaminoki	Fabaceae	heartwood: dye
Acacia catechu	Asen-yakunoki	Fabaceae	wood: tannins, medicinal, dye
Synsepalum dulcificum	Mirakurufuruutsu	Sapotaceae	fruit: changes in taste
Teobroma cacao	Kakaonoki	Malvaceae	seed: chocolate, fruit: edible
Dryobalanops aromatica	Kapuuru	Dipterocarpaceae	resin: Insect repellent
Piper nigrum	Koshou	Piperaceae	seed: pepper
Cinamomum verum	Seiron-nikkei	Lauraceae	bark: cinnamon, medicinal
Cananga odorata	Iran-iran	Annonaceae	flower: fragrances, medicinal
Vanilla planifolia	Banira	Orchidaceae	fruit: vanilla, fragrances, medicinal

NOTE

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