# List of Dissertation Abstract　(Department of Natural Environment)

| Name | Supervisor | Title | Abstract |
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| SHOU LU | Kagami Maiko | Phenotypic and genetic diversity within a fresh water diatom species, *Aulacoseira ambigua* | We investigated the intraspecific diversity of *Aulacoseira ambigua*, which is widely distributed in mesotrophic and eutrophic freshwater lakes, by measuring phenotypic traits and evaluating genetic diversity by double-digested restriction site-associated DNA sequencing.Our results revealed the phenotypic and genetic diversity within A. ambigua. The growth rate and susceptibility to parasite were both correlated with morphological traits. ddRAD-seq identified that twenty-six SNPs associated with phenotypes.. The distance-based redundancy analysis based on neutral SNPs explained that relationship between genetic and phenotypic similarity were not significant. |
| Ikariya Taisei | Matsuda Hiroyuki | Improving the accuracy of Yakushika (Cervus nippon yakushimae) population analysis methods and population management models. | On Yakushima Island, which has a rich natural ecosystem, the negative impact on the natural ecosystem and agricultural damage caused by the increasing population of the Yakusika (Cervus nippon yakushimae), an endemic species, are considered problematic. In this study, I estimated the population of Yakushika using a state-space model and examined how to apply pressure to capture Yakushika in specific areas of Yakushima. As a policy for future management of the Yakushika population, it is necessary to apply strong hunting pressure in the southwestern and central areas to reduce the population, and to reduce hunting pressure in the northeastern area to allow the population to recover. |

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| Itagaki Haruka | Ishikawa Masahiro | Distribution and seasonal evolution of supraglacial lakes on the Amery Ice Shelf, East Antarctica | The distribution of glacial lakes on the Amery Ice Shelf in East Antarctica and the seasonal changes in area and volume were determined by analyzing Landsat 8 satellite images.Most of the glacial lakes were formed around the grounding line, around exposed rocks, and below 250 m elevation. The glacial lakes began to form at the end of November, expanded from December to January, and contracted at the end of February. |
| Inoue Risa | Sasaki Takehiro | Reconsidering the food system to mitigate impacts on climate change and biodiversity loss | Beef production has a greater environmental impact than other foods containing protein. In recent years, economic growth has led to an increase in beef consumption, and the accompanying increase in obesity and lifestyle-related diseases has become an issue. In addition, the increase in international trade has made it difficult for consumers to see the environmental impact in the producing countries. In this study, we estimated the effect on the environmental impact of reducing beef consumption to the values proposed in previous studies to realize a sustainable and equitable society, taking trade relations into account and focusing on biodiversity impact, methane emissions, and lost carbon sequestration opportunities. |

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| Kizawa ryo | sakai akiko | Effects of Climate Change on Japanese Pine Communities in the Northern Hakkouda Mountains: Focusing on Changes in Dominant Zone and Growth Rate | In the North Hakkouda Mountains, the distribution area of Pinus pumila has been shifting to higher elevations. High-resolution UAV photo-reading and field observations suggest that the distribution area has expanded by replacing dwarf shrubs such as Empetrum nigrum, and has been reduced by the replacement of subalpine species such as Abies mariessi, sasa kurilensis, and shrubs. The growth rate of the Pinus pumila dropped drastically after 2013. The growth rate was influenced not only by non-biological factors, such as slope direction and elevation, but also by biological factors, such as the presence or absence of competing species. |
| Kiyono Sachi | Hiratsuka Kazuyuki | Transcriptional repression of plant genes using dCas9/sgRNA-based artificial transcription factors | In recent years, attention has focused on high-performance plants with added value, such as disease resistance. Artificial regulation of gene expression is required to produce such plants. Transcriptional repression using the dCas9/sgRNA system, which is cheap, simple and highly accurate, is considered to be a useful tool for this purpose. In this study, we attempted to systematically regulate gene expression by targeting specific genes in plants using the dCas9/sgRNA system and aimed at its application. |

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| Satake Yoshitaka | Yamamoto Shinji | Sr and Y analysis of apatite in zircon from Jack Hills, Western Australia -Estimation of host rock of zircon and apatite for investigation of the origin of Earth's water- | Various studies have been conducted to elucidate the origin of water on the earth, but a unified view has not been obtained. However, three candidates have been considered, which have different hydrogen isotope ratios. In this study, hydrogen isotope analysis of apatite in zircon, which is the oldest material on earth, was carried out to elucidate the origin. In addition, apatite in zircon crystallized from different magmas, each with different hydrogen isotope ratios. In order to estimate the magma from which apatite and zircon crystallized, these trace elements were analyzed. |
| Seto Tomohiro | Koike Fumito | Invasive plant eradication and subsequent vegetation restoration on Anijima, Ogasawara Islands, Japan. | The Ogasawara Islands, which are oceanic islands, were inscribed on the World Heritage List in recognition of their unique ecosystem and scientific value. About 10 years ago, each management agency took the lead in implementing invasive plant control measures to preserve the endemic forest ecosystem. In this study, I analysed the growth environment and invasion status of major invasive plants on Anijima, and the vegetation transition before and after invasive plant eradication, using data obtained from the invasive plant control project. As a result of the analysis, it was found that native forests acted as a barrier to the establishment of some invasive plant species, and a new importance of native forest conservation was found. In addition, it was found that there was a difference in successional trends after invasive plant eradication, depending on the species eradicated. |

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| Takeuchi Ryunosuke | Koike Fumito | Insect Food Breadth and the Invasive Alien Species Problem. The case of Fabaceae and Asteraceae | In recent years, the invasion and establishment of exotic plants and other alien species have had a major impact on ecosystems. Most insects are unable to utilize non-native plants due to their high host specificity, but if a non-native plant is successfully utilized, the insect species may experience an outbreak because defense mechanisms on the plant side have not developed along with coevolution. Therefore, we investigated the impact of non-native plants on insects at the community level and by use of the plants and the insects that utilize them in the Fabaceae and Asteraceae families. As a result, a trend toward large populations and outbreaks of non-native insects was observed. However, the reason for the particularly large populations of exotic insects in combination with exotic plants is unclear and may become clearer when we trace the history of the development of parasitic insects and changes in their population control after they become wild in many dominant exotic plants.No tendency was detected for exotic plants to be less susceptible to parasitism than native plants, as there was no trend toward predominant insect populations. However, a trend toward greater use of exotic plants by nectar-sucking insects was detected. This may be due to the relatively low host-specificity of nectar use, which may result in higher use of non-native plants.Translated with www.DeepL.com/Translator (free version) |

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| Tsuchihashi Yui | Sasaki Takehiro | Vegetation change in mountain wetlands since the early Showa period: analysis focusing on the nested structure of species distribution | Plants change their vegetation over time. Therefore, we conducted a vegetation survey of mountain wetlands scattered in the Hakkouda Mountains area of Aomori Prefecture, Japan, to estimate ecological processes in past and present marshland communities based on changes in the spatial distribution patterns of species. The results suggest that the spatial distribution patterns have changed and that the marshland has become homogenized from the past to the present. The results also suggested that the habitats of woody and non-wetland species are expanding. |
| Nakai Hiromi | Hiratsuka Kazuyuki | Screening for novel compounds that act on jasmonate signaling pathway | Plants have various defense mechanisms to protect themselves from biotic and abiotic stresses. Activation of these defense mechanisms by chemicals is expected to lead to plant protection and highly efficient material production using plants. However, there are still few chemicals that act on jasmonate signaling pathway, one of the defense mechanisms. In this study, we developed a system to screen novel compounds that activate jasmonate signaling pathway. |

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| NAKAZAWA KENTA | NAKAMURA TATSUO | Mechanism of cancer cell death by hyperthermia using magnetic nanoparticles | This study examined the dispersibility of magnetic nanoparticles as a medium for MHT and the mechanism of cell death after HT. Magnetic nanoparticles were able to control the secondary particle size to less than 1 μm by using originally devised ultrasound. Furthermore, when cancer cells were subjected to hyperthermia, they were found to be in apoptosis, and since the HT effect was thought to be related to heat shock protein (HSP), measurements were made and HSP was found to be predominantly increased. |
| Nakamura Ai | Oikawa Hiroki | Are satoyama conservation activities covered by a "sense of stagnation"? | With the institutionalization of citizen participation, citizen groups are said to be covered by a "sense of stagnation. In order to clarify the degree and existence of a "sense of stagnation," I conducted a survey of one civic group as a case study, focusing on the decline in "enjoyment. As a result, no "sense of stagnation" was identified in this survey. It was also found that there was a positive aspect as an effect of institutionalization. |

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| Nakamura Kaho | Kazuyuki Hiratsuka | Probing the Dynamics of Oxytocin in the Brain Tissue | Oxytocin is a type of peptide known for its strong central actions, in addition to the long-known peripheral actions. Despite increasing realization of its importance, dynamics and sites of action of oxytocin in the brain are poorly understood due to a lack of appropriate probe. To this end, we conjugated oxytocin with “alkyne-tag” via a widely applicable simple coupling reaction. In this research, we developed a novel strategy and found region-specific binding sites and dynamics of oxytocin in the brain tissue. |
| Nitta Saya | Koike Fumito | Do vegetation boundaries contribute to plant diversity as spatial structures? | Boundaries" such as the boundary between a road and a grassland or between bare land and a grassland are special environments. Few studies have focused on plants native to the boundaries of grassland vegetation at small spatial scales, and the differences in species composition from the interior and their ecological characteristics have not been elucidated. In this study, we attempted to detect trends in species occurrence at "boundaries". The results showed that boundaries contribute to diversity and that multiple ecological characteristics are related to the tendency of occurrence at boundaries. |

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| Fukumaru Fumika | Hiratsuka Kazuyuki | Characterization of a novel compound that activates a wide range of defense responses | Plants are exposed to various pathogens in the environment and have their own defense mechanisms to protect themselves from them. Plant activator, the subject of this research, are agents that protect plants by activating Induced Systemic Resistance (ISR), one of their defense mechanisms. In this study, I have characterized the actions of a Plant activator candidate compound that induces a wide range of disease responses, which was discovered by our original screening system, using methods such as gene expression analysis. |
| Maehara Kaho | Sasaki Takehiro | Plant and soil microbial community assembly processes across urban vacant lots | Plant and soil microbial communities can play an essential role in maintaining ecosystem functions and services in urban ecosystems. However, community assembly in human-dominated urban ecosystems is not well known. In this study, we investigated plant and soil microbial community assembly processes in 69 vacant lots in Yokohama, Japan, which were developed for residential use. Our results suggest that plant community assembly processes in urban vacant lots are determined by dispersal limitation and that soil microbial community assembly processes are stochastically determined due to their ubiquitous dispersal capacity. |

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| Yamada Hayami | Nakamura Tatsuo | Phenotypic analysis of candidate alkaline response-related genes using gene disruption Arabidopsis thaliana | More than 7 % of the world's total land area, comprising about 1.128 billion hectares of land, is affected by saline alkaline stress. Alkaline salt stress causes more severe damage to plants than neutral salt stress under high salinity and pH conditions, but how plants sense salt stress and alkaline stress signals is not yet fully understood. Detailed phenotypic analysis was performed on gene disruption Arabidopsis plants that were found to have alkaline stress-related responses based on previous studies using GWAS. |
| Yamamoto Sumire | Sasaki Takehiro | Consequences of urbanization on long-term changes in biotic communities in remnant habitats in the Tokyo metropolitan area | Little research has been conducted to show the consequences of urbanization on long-term changes in biotic communities in several remnant habitats. In this study, I collect rare biota inventories and discuss the consequences of urbanization on from several years to decades changes in biotic communities in 15 remnant habitats in the Tokyo metropolitan area. Regarding changes in number of species, the change in number of native plants was reflected to that of all plants. However, nonnative plants were also increased in most of the sites where both all plants and native plants were increased. Regarding changes of species composition and their factors, there is a possibility that the change of nonnative plants with allochory caused the change of birds. In addition, the larger the remnant green space is, the smaller the change of native plants is. |

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| Yoshimura Moe | Hiratsuka Kazuyuki | Search for factors that improve Agrobacterium-mediated transient gene expression | The soil bacterium Agrobacterium is often used to produce transgenic plants. However, when a gene transfer into a plant, a phenomenon may occur in which the gene expression efficiency of the transgene is reduced. In this study, I searched for new compounds that improve Agrobacterium-mediated transient gene expression. As a result, 16 potentially useful compounds were discovered. |
| Heikkinen Mirka | Sasaki Takehiro | Overlooked diversity of spontaneous plants in urban streetscapes in Oulu and Yokohama | In this study, urban street vegetation was investigated in Oulu, Finland, and Yokohama, Japan, to explore how plant species richness and species composition change among various street habitat types. The species richness and the contributions of native and exotic species were evaluated, and the plant species composition was examined. In Oulu, native species contributed more to the total diversity, whereas in Yokohama, native and exotic species had similar contribution to the total diversity. There was overlap in species occurrence among habitat types, but also many habitat-unique species. Therefore, we propose that the streets including various habitat types may thereby create biodiverse urban streetscapes. |