

Institute of Environmental Ecology

Creating a better environment for the future

Message

—For a better environment—

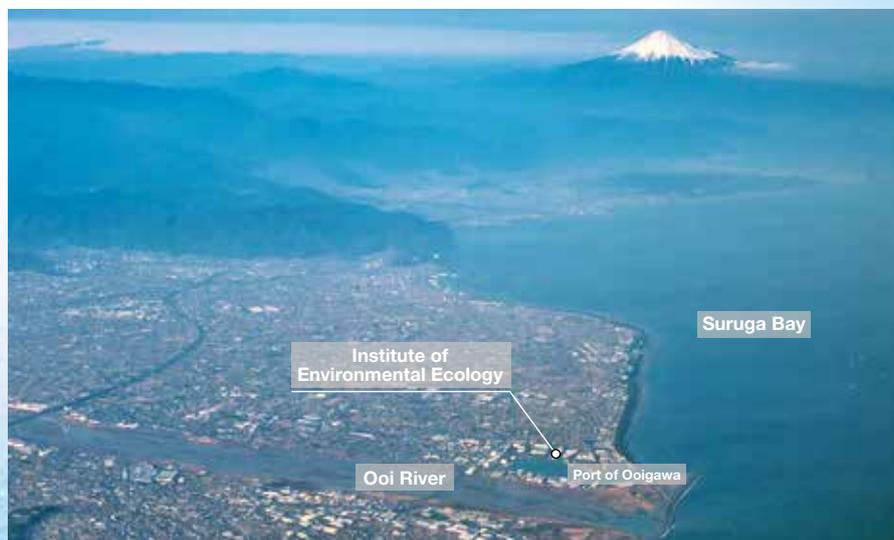
The Institute of Environmental Ecology was established in Shizuoka in 1992. It is the core laboratory that is responsible for developing technologies for the fields of biology, chemistry, and ecology for the IDEA. Since its establishment, as a specialist in biology and chemistry, the organization has constantly introduced the latest facilities and equipment to keep up with scientific technology which advances day-by-day, and has been conducting analysis and research necessary for understanding and creating a better environment.

We have also been actively engaged in other projects such as biological study using breeding facilities where an abundance of natural seawater and groundwater can be obtained, development of methods for assessing and managing environmental risks, and development of techniques and devices that contribute to reducing the environmental burden.

Global problems such as acid rain, global warming, and across-boarder pollution of persistent organic chemicals, have recently become obvious. Thus, there is a growing public concern for the impact of harmful chemical substances released into the environment on human health and ecosystem. People have also rediscovered the importance of a safe and comfortable natural environment, and are therefore depending on innovations in conservation and creation of rich nature and the sustainable use of biodiversity.

We believe that the facilities, technical skills and the extensive experience of our staff in the research fields of environmental ecology, chemistry and risk assessment will greatly contribute to solving global environmental problems and creating a better environment where human activities harmonize better with nature.

The Institute of Environmental Ecology appreciates your continuous support.



Analysis
&
Testing

Environmental
chemistry

Creating a

Research into Ecosystem & Biodiversity

- Contributes to conservation, regeneration, and creation of natural environment.



Research into Environmental Chemistry

- Contributes to accurate measurement and understanding of environmental chemical substances.



Research into Environmental Risk

- Contributes to a safe and secure society.



Ecosystem & Biodiversity

Assessment & Evaluation

Environmental risk

Research & Development

better environment

Research into Ecosystem and Biodiversity

The Institute of Environmental Ecology offers various services pertaining to biodiversity and fresh/saltwater ecosystems, such as biological surveys and experiments.

II Taxonomic identification and quantity of abundance

It is indispensable to closely examine what organisms live in the water area when we evaluate the aquatic environment or biodiversity. Our staff is equipped with expertise in their respective fields, and therefore accurately identifies species and quantities of aquatic biota. We offer an identification of taxonomic species by observation of microstructures with an electron microscope as well as conventional optical microscopes.

- * Phyto- and zoo-plankton
- * Benthic macro- and meio-invertebrates
- * Sessile animals
- * Fish and shellfish
(e.g., crustaceans, cephalopods)
- * Seaweeds, sea grasses and fresh-water plants
- * Planktonic fish eggs and larvae



Sorting of benthic invertebrates



We have incorporated various methods other than external observation, such as cultivation of fish eggs to the stage where the species can be identified, as well as biochemical or genomic methods.

- * Cultivation of unidentifiable fish eggs to identifiable larvae
- * Immunostaining with species-specific antibody
- * DNA barcoding analysis with biotic remains (e.g., feces, hair, etc.)



Fluorescent stained short-neck clam larvae

III Experimental study using aquatic organisms

We offer a variety of experimental studies using aquatic organisms, such as estimating model parameters for ecosystem modeling. Experiments using both indoor and outdoor facilities can be carried out, and organisms can be obtained by either lab-breeding or the field collection. Experiments under the conditions that simulate the actual ecosystem (mesocosm experiments) can also be conducted.

- * Bioactivity in bivalves
(e.g., respiration, filtration or burrowing rate)
- * Algal growth potential (AGP)
- * Parameters to design fishpass or measures to prevent straying intrusion
- * Feeding damage of fish on seaweed
- * Breeding methods for test fish or feed organisms
- * Growth rate or photosynthetic rate of seaweed



Measuring of filtration rate of bivalvia



Aquarium breeding of three-spined stickleback (male nesting and egg mass spawned inside the nest)

Experimental research pertaining to ecosystem and biodiversity

We are capable of conducting research on endangered or valuable species that contributes to conservation and/or reproduction of biodiversity. Experiments with aquatic plants can be conducted in greenhouses able to make the most of available sunlight. Also experiments that combine lab-study of limited scale with large scale field trial can be conducted.



Swamp damselflies bred in greenhouse

- * Breeding of endangered species (temporary protection)
- * Assisted reproduction of endangered species
- * Restoration of aquatic plants using buried seeds
- * Cultivation of seaweed seedlings for creating seaweed bed

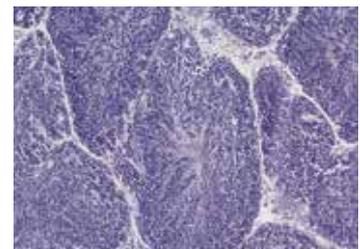
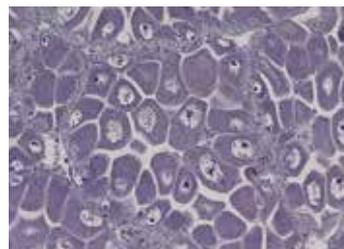


Germination of buried seeds



Cultivation of seaweed seedlings

We also offer supplemental researches such as analysis of gastric contents and histological investigation of gonadal development for fishery species and alien species.



Preparation of gonadal tissue samples of pen shell

Experimental research in subtropical regions

The Research Institute on Subtropical Ecosystems was established in the main Okinawa island in 2010. The organization is engaged in breeding valuable living organisms and other research experiment that contributes to evaluation, conservation, and creation of biodiversity peculiar to the subtropical area.

- * Breeding coral seedlings by sexual reproduction
- * Cultivating and proliferating seaweeds and sea grass
- * Breeding of endangered fish (e.g., endemic species in the Ryukyu Islands)



Coral implanting tool and transplanted juvenile corals



Aquaculture facilities for coral seedlings in Research Institute on Subtropical Ecosystems



Endangered bearded goby *Scartelaos histophorus*

Research into Environmental Chemistry

The Institute of Environmental Ecology has installed the latest analytical equipment, i.e., gas chromatography-mass spectrometer (GC-MS), liquid chromatography-tandem mass spectrometer (LC-MS/MS), inductively coupled plasma-mass spectrometer (ICP-MS), etc., and thus provides reliable chemical analyses and physico-chemical experiments.

■ Persistent organic pollutants (POPs)

We offer precise and accurate analyses of POPs including dioxins and PCBs for various samples. The analyses are conducted with high-resolution GC-MS, under strict quality management, in the analytical laboratory where chemical hazard is controlled.

- * Ambient samples
(e.g., water, sediment, air, soil, and wildlife)
- * Diet samples
- * Biological samples
(e.g., blood, milk, and laboratory animal)
- * Waste (e.g., exhaust gas, soot and dust)



Blood samples



High-resolution GC-MS



Sample pretreatment



Cell/Tissue disruptor

■ Other environmental trace-chemicals

We offer analytical services for trace organic substances which are prescribed in the Environmental Quality Standards for protecting human health and for conservation of the living environment, and other various chemical compounds which are of human health and/or ecosystem concerns.

- * Pesticides
- * Harmful air pollutants
- * Pharmaceutical products
- * Estrogens
- * Non-ionic surfactants



GC-quadrupole MS



LC-MS/MS



VOC measuring equipment

■ Chemical metabolites in biological sample

We offer analysis for metabolites of chemical substance and biomarker substances, which is useful to understand and assess the effect of chemical exposure on human health and in biological samples. The analysis using high sensitive analytical instruments is applicable to a small amount of sample such as blood and urine.

- * Metabolites of nicotine, plasticizer, pesticides, etc. in urine
- * Stress markers in blood



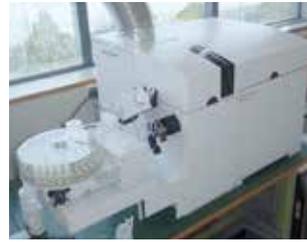
Biological sample freezer



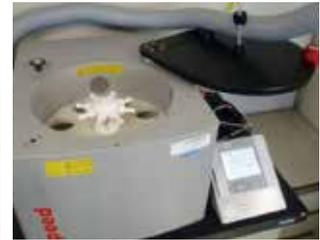
LC-MS/MS

Trace elements

We offer multi-element analysis using ICP-MS for food and biological samples as well as environmental samples. To conduct accurate and prompt analysis, we have been examining pre-treatment and analytical methods according to the needs and the properties of various samples. In addition, a quantitative analysis of chemical forms using LC/ICP-MS for the elements (e.g., arsenic), with different toxicity for each chemical form, is practicable.



ICP-MS



Microwave digestion system

Radioactivity (Radioactive substance)

We offer analysis of radioactive substances (i.e., iodine, cesium, and strontium) for environmental samples such as water, sediment, and soil. A highly sensitive analysis using well-type germanium semiconductor detector of radioactive iodine and cesium is also available for samples of small amount (e.g., blood, urine).



Well-type GE semiconductor detector



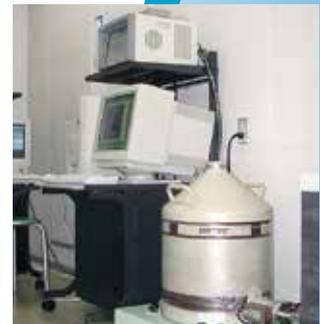
Gas flow α/β -ray counter

Sediment age dating

We offer precise dating of deposition, using the Pb-210 method together with the Cs-137 method, for marine, lake and marsh sediment. An additional measuring of harmful substance concentrations in each deposition layer is useful to understand the history of sedimentary environment or the change of pollutant loads in the sediment.



Slicing of sediment core



GE semiconductor detector

Search for unknown compounds

Various unknown chemical substances exist in our surroundings. The GC/time-of-flight-MS (GC/TOF-MS) offers encompassing analysis of chemicals in environmental samples and biological samples such as blood.



GC/TOF-MS

Experimental examination on eutrophication

We also provide experimental examination which is necessary for estimating eutrophic conditions in particular areas. Various experiments can be conducted under conditions simulating the environment of survey area.

- * Nutrient leaching from sediment
- * Sediment oxygen consumption
- * Denitrification in sediment
- * Organic matter decomposition in water column



Experiments for estimation of nutrient leaching and denitrification rates

Research into Environmental Risk

The Institute of Environmental Ecology offers extensive services concerning environmental risk of harmful chemicals on ecosystem and human health, such as toxicity testing and analytical research using aquatic organisms and risk assessment based on existing knowledge.

Regulatory chemical eco-toxicity testing

We offer toxicity testing for acute and chronic toxicity including endocrine disruption, on not only freshwater species but also on saltwater species, for chemical substance. Eco-toxicity tests are performed based on the standardized test guideline of the OECD or the Chemical Substances Control Law (CSCL) and the regulatory test in compliance with the GLP is also available.

- * Fish acute toxicity test (OECD TG203, CSCL TG)
- * Daphnia acute immobilization test (OECD TG202, CSCL TG)
- * Daphnia magna reproduction test (OECD TG211, CSCL TG)
- * Algae growth inhibition test (OECD TG201, CSCL TG)
- * Amphibian metamorphosis assay (OECD TG231)
- * Fish short-term reproduction assay (OECD TG229)
- * Saltwater fish and Penaeid shrimp acute toxicity test
- * Marine algae growth inhibition test



Test fish breeding



Algal and fish toxicity testing apparatus

*Oryzias latipes**Daphnia magna**Xenopus laevis*

Effect evaluation on ecosystem using bioassay

We offer bioassays of freshwater and saltwater organisms, and evaluation of the effect (safe or hazardous) of industrial products and wastewater, etc on environment and ecosystem. An assay conducted under the conditions which simulate an actual environment is readily available.

- * Safety evaluation testing on aquatic organisms for sediment improving material
- * Eco-toxicity testing of industrial wastewater (Whole effluent toxicity test)
- * Evaluation testing of tolerance to acute effect of low dissolved oxygen or turbid water on fish



Whole effluent toxicity test (daphnia reproduction test)

Non-clinical testing for veterinary medicine

We offer non-clinical testing on aquaculture species required for approval of manufacturing of aquatic veterinary medicine.

- * Safety evaluation test with fish for aquaculture (in limited species)
- * Residual evaluation test with fish for aquaculture (in limited species)
- * Challenge test

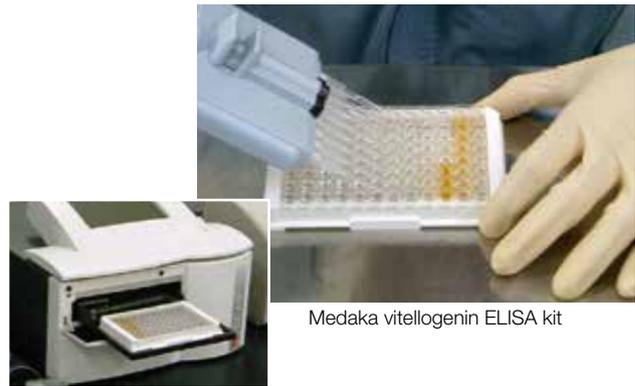


Safety test of veterinary medicine (in closed testing laboratory)

Alternative non-animal testing

We also offer evaluation of biological effect of chemical substances and environmental samples using *in vitro* methods based on cellular or molecular reaction.

- * Reporter gene assay
- * Enzyme-linked immuno sorbent assay

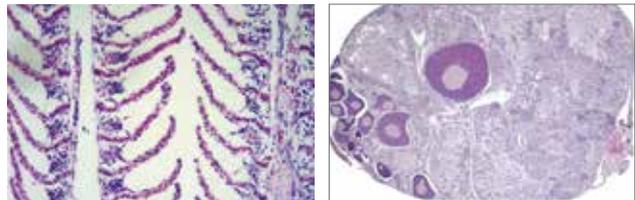


Medaka vitellogenin ELISA kit

Microplate reader

Histopathological evaluation

We also offer histopathological examination that contributes to detailed evaluation of chemical effect such as endocrine disrupting effect on specific organ or tissue on biological samples by toxicity testing or field survey.



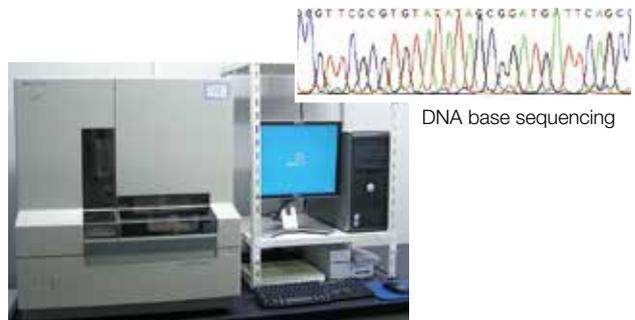
Gill filaments of carp

Estrogen induced testis-ova in *Xenopus tropicalis*

Genetic analysis

We genetically analyze biological samples collected in wildlife surveys and evaluate disturbance (or preservation) of ecosystem and biodiversity at the genetic level.

- * Identification of species, genetic stock or individual
- * Inspection of causative bacteria and virus of the diseased fish



DNA base sequencing

DNA sequencer

Food inspection service

We offer food inspection services to provide consumers with a sense of safety/security, in cooperation with the Food Life Science Laboratory, Osaka (established in 2010).

- * Food functionality (e.g., anti-oxidizing power)
- * Food nutrient components
- * Food radiation
- * Detection of mixing foreign species of glass eel and spitchcock



Food products inspection

Eel species Identification by PCR-RFLP method

Assessment of environmental risk on human health

We conduct investigations to estimate the exposure levels of harmful chemical substances which may impact human health (e.g., dioxins concentrations in blood). Also we provide consulting services concerning the risk of hazardous chemical pollution on human health.



Blood collecting in human exposure survey (conducted with medical doctor or nurse)

Facilities

Multipurpose Lab



Eco-toxicity testing room, fish breeding room, and high precision temperature-controlled rooms, etc. are arranged.

Greenhouse



Experiments involving aquatic plant and invertebrate in freshwater and brackish water can be conducted under natural light.

Bio Experiment Lab



Equipped with outlets for seawater, groundwater and aeration supply to enable various experiments with aquatic organisms.

Ecological Research Bldg.

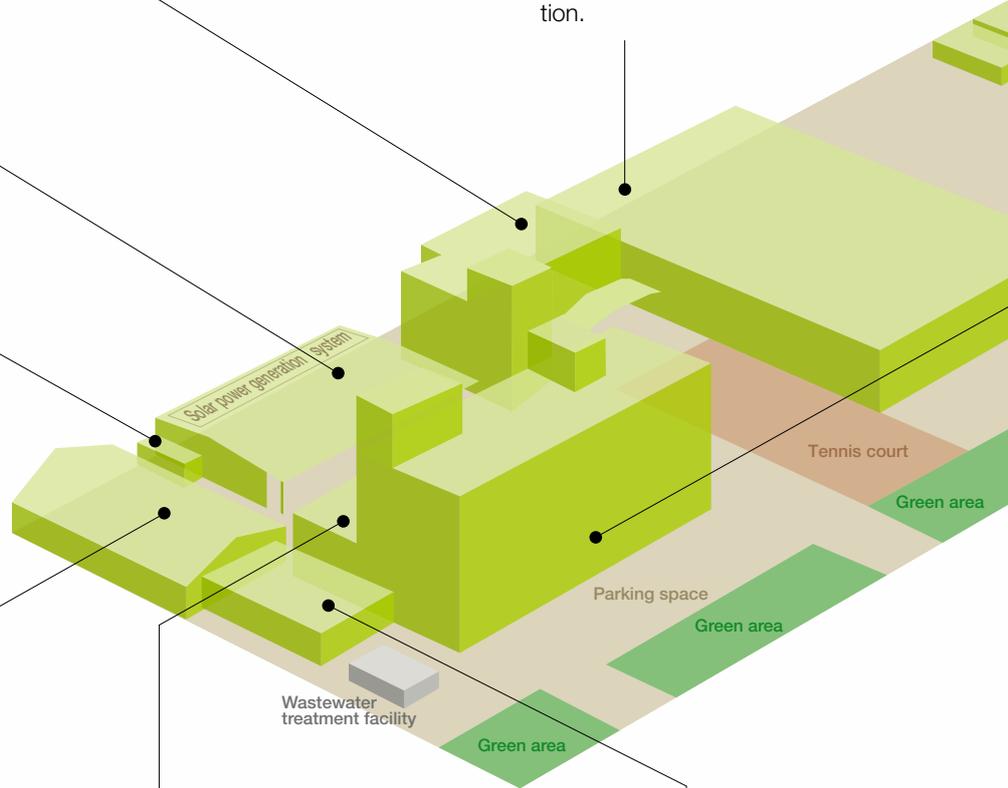


Staffs with expertise in biology and ecology are working on analyzing of aquatic biota.

Closed Testing Lab



Equipped with closed circulatory culture system for aquatic organisms, thus enabling testing in the isolated condition.



Annex Lab



Laboratories for reference sample preparation, physico-chemical and biochemical experiment, etc. are available.

Water supply facilities



Natural seawater (taken from the port of Ooigawa and filtered) and groundwater (drawn from 120m depth) are supplied continuously to the laboratories of the institute.

Greenhouse



Seaweed, algae, and aquatic plants in both seawater and freshwater can be cultivated under natural light.

Main Research Bldg.



Staffs with expertise in chemistry are working on micro-analysis in chemical-hazard controlled laboratory.



Equipped with TV conference system; technological meetings are held on a regular basis at the company level.

Site area 12,522m²
Building area 4,206m²
Total floor area 6,522m²



Institute of Environmental Ecology



- Experimental study of aquatic organisms
- High precision analysis of chemical substances
- Chemical risk assessment and support of control
- Device development for environment improving

Overseas

CSD IDEA (Beijing) Institute of Environmental Innovation

- Monitoring and assessment of environmental pollutants.
- Research and consultation pertaining to chemical substances

Human resources and Technical Cooperation

Food Life Science Laboratory

- Composition analysis for food
- Analysis of residual pesticides and radioactive substance in food

Environmental chemistry division (at the Head Office)

- Chemical and radioactivity analysis for environmental ambient, biological, and drinking water samples.
- Evaluation of analytical results

Research Institute on Subtropical Ecosystems

- Research on evaluation, conservation, and creation of subtropical ecosystems.
- Endangered or valuable species breeding

Domestic

Office Location and Cooperation

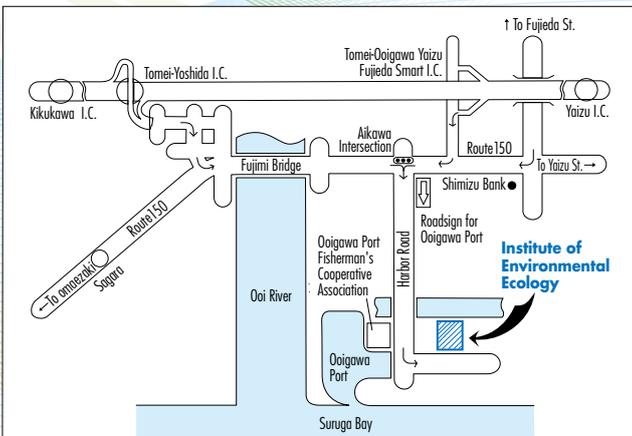
Registration/Accreditation/Certification

- ▶ Measurement certification business operators
 - Measurement certifications of concentration for chemical substances in air, water or soil (registration: Shizuoka Pref.)
 - Measurement certification for concentration of dioxins in air, water or soils (registration: Shizuoka Pref.)
- ▶ Contractor certification for environmental measurement of dioxins (certified by Ministry of the Environment)
- ▶ ISO/IEC 17025 accreditation (analysis of dioxins; Cd, Pb, Hg, Se, and Mn in Whole blood)
- ▶ Working environment measurement agency (registration: Shizuoka Labor Bureau)
- ▶ Building drinking water quality inspection (registration: Shizuoka Pref.)
- ▶ Sanitation inspection facility, biochemical inspection (registration: Shizuoka Pref.)
- ▶ Chemical substances GLP (certified by Ministry of the Environment)
- ▶ ISO14001 (Self-declaration of conformity)

(as of June 1st, 2017)

Institute of Environmental Ecology

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Transportation

- By car from Tomei Express Way : Exit at Ooigawa Yaizu Fujieda Exit ⇒ Route 150 towards Omaezaki (1.8km) ⇒ Aikawa Intersection ⇒ Turn left into Harbor Road towards Ooigawa Port (3.4km) ⇒ Turn left after passing Fisherman's Cooperative Association.
- By train : Fujieda St. ⇒ 20minutes by taxi



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