

**Facility for Education of  
Sustainable Development in Kitakyushu City:**  
**Ways to Attain SDGs**



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Kitakyushu, the Eco-Model City that comprises SDGs into the governmental program to foster a Green Growth City, contributing to the world's sustainability. "Facility for Education of Sustainable Development in Kitakyushu City: Ways to Attain SDGs" explores the effort of creating a sustainable city through the educational sector. As the younger generation can be nurtured to become agents of change towards a sustainable world, Education for Sustainable Development (ESD) needs to be one of the efforts made. The link between the planet, people, and prosperity was brought up as we connected those aspects to promote many different public-focused ESD activities. Those activities require every individual to change their behavior and appeal to society to create a sustainable society. Turning climate change and environmental problems into an opportunity to build people's contribution to the achievement of the SDGs in Asia and the world. This book brings readers to probe the possible efforts made to develop the city into a smart, eco-city with resource circulation and renewable energy.

Kitakyushu, February 2024

**Author**



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## CHAPTER 1 INTRODUCTION

### 1.1. Background

To achieve sustainability and enhance environmental quality, renewable energies and energy efficiency measures must be used, which will reduce energy consumption and air pollution in the long run. It is critical for governments, corporations, organizations, institutions, and universities to implement policies that include practices and technology that support sustainability (Msengi et al., 2019). Kitakyushu city government aims to reach the green economy as one of the solutions to achieve sustainability. The green economy can decide chances for green and sustainable development, which necessitates active participation at both the public policy and implementation levels in the area (Dogaru, 2021). The variety of understandings and problems associated with practical implementation have consequences for how we teach sustainability principles and prepare our students to critically approach matters of sustainability and generate solutions. Green economy initiatives may offer students a critical awareness of sustainability. This book will discuss



various environmental education facilities aimed to educate public citizen on environmental issues and Sustainable Development Goals (SDGs).

## 1.2. The History of Kitakyushu

Kitakyushu City located in Fukuoka Prefecture is the northernmost city in Kyushu. With the second largest population in Kyushu after Fukuoka City, Kitakyushu is one of the major cities. Since the establishment of the state-run Yawata Steel Works in 1901, Kitakyushu City has developed as a manufacturing city, with major industries such as steel, chemicals, ceramics, cement, and electricity. As one of the four largest industrial zones in Japan, the city has contributed to Japan's economic growth. During the rapid economic development of the 1950s and 1960s, Kitakyushu City faced severe pollution problems. The "Dead Sea" is the name of Dokai Bay which has high concentration of toxic substances such as cyanide and arsenic. This problem shows a heavy environmental problem caused by the industrial activity.



**Figure 1. Women's Association Research Presentation**  
(*History of Kitakyushu, 2024*)

Residents, companies, and the city government came together to fix the environmental problems. The mothers who concerned about their children's health voluntarily surveyed air pollution condition and actively campaigned for improvements from companies and government. The companies took proactive steps to improve manufacturing processes, create equipment to collect and treat pollutants, and green their factories. This technique were able to reduce the environmental problem and has economic impact by improving production. Kitakyushu City's government responded quickly to people' concerns. One of them is the creation of an organization that addresses pollution. In addition to constructing a pollution monitoring center to continually monitor the situation of pollution, an organization for scientific study on pollution has been formed. At the same time, the government implemented a series of groundbreaking environmental measures, including the



establishment of financial and regulatory systems to promote anti-pollution measures, the signing of "anti-pollution agreements" with companies to supplement the limitations of the law, the construction of sewage systems and green spaces, waste incineration plants and disposal sites, and victim assistance.



Figure 2. The sky in 1960's



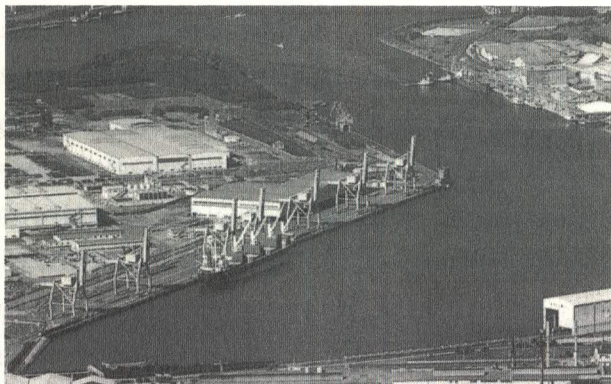
Figure 3. Current Sky  
(*History of Kitakyushu, 2024*)

Thanks to their efforts, the pollution problem has been dramatically improved. By utilizing the experience, technology, and knowledge accumulated through the process of addressing pollution problems, the Kitakyushu City government has promoted comprehensive environmental initiatives, including the Eco-City Project, which aims to promote international cooperation with developed countries in the fields of environment and waste 3R, and projects to realize a low-carbon society (IGES, 2018). By these efforts, Kitakyushu City is able to revive the environment both the sky and the sea.



Figure 4. Sea in the 1960's





**Figure 5. The current sea**  
(*History of Kitakyushu, 2024*)

In recognition of these efforts, Kitakyushu was selected by the Japanese government as an Environmental Model City (2008), Environmental Future City (2011), and SDGs Future City (2018). Proven by winning the UNEP Global 500 Award (1990) and the UN Local Government Honors Award (1992), Kitakyushu's environmental achievements have been recognized internationally. In 2018, Kitakyushu City was selected by the OECD as the only SDGs Model City in Asia (OECD, 2020). Kitakyushu City aims to become the environmental capital of the world.

### 1.3. Education for Sustainable Development (ESD) in Kitakyushu

Education for Sustainable Development (ESD), often known as ESD, "empowers learners of all ages with the knowledge, skills, values, and attitudes to address the interconnected global challenges we are facing, including

climate change, environmental degradation, loss of biodiversity, poverty, and inequality". The Kitakyushu ESD Council was established in 2006 with the participation of local citizens, non-profit organizations, corporations, colleges, and local government agencies. Groups and people from many disciplines have joined together to actively promote a variety of public-facing ESD initiatives. In 2006, the United Nations University in Japan approved RCE Kitakyushu as the fourth Regional Centre of Excellence for ESD (RCE).





## CHAPTER 2 HIBIKINADA BIOTOPE



**Figure 6. Hibikinada Biotope**  
(*Hibikinada Biotope*, 2018)

A biotope is a distinct region or habitat in which certain types of creatures, including plants, animals, fungi, and microbes, exist and interact with their surroundings. It has different physical and biological characteristics such as climate, soil type, terrain, water quality, and vegetation. The term "biotope" is commonly used in ecology and conservation biology to describe the

natural habitat of a certain species or community of species. Hibikinada Biotope is the biggest in Japan. It is part of the Hibikinada Wetland, an important tidal flat region on Kyushu Island's northern shore. A live creature's paradise developed year-round in a garbage.



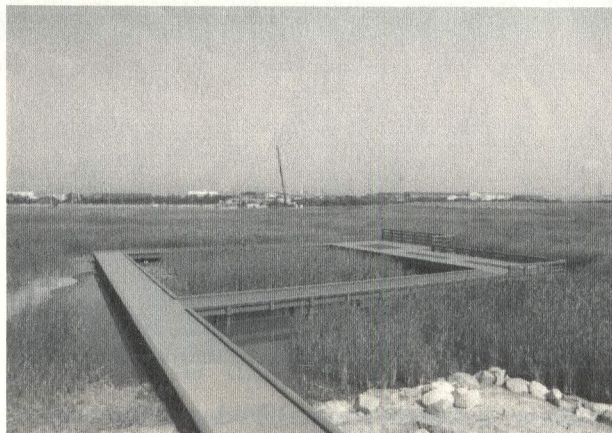
**Figure 7. Birds in Hibikinada Biotope**



**Figure 8. Dragonfly in Hibikinada Biotope**  
(*Hibikinada Biotope in Kitakyushu*, 2022)



The biotope provides a valuable habitat for a variety of plant, bird, and marine species. This 41-hectare biotope is home to around 237 bird species as well as 284 plant species. The Hibikinada Biotope was constructed by employing a diversified habitat that includes marshes, ponds, and grasslands formed by the landfill's uneven terrain. Hibikinada Biotope was created and maintained to protect and rebuild the natural habitat of the tidal flat region, which is critical for biodiversity conservation and the protection of coastal ecosystems. It serves as a breeding and feeding area for migrating birds, including endangered species, and is home to a rich diversity of intertidal flora and animals. Habitat restoration, invasive species control, and environmental education initiatives to promote awareness about the need for coastal ecosystem preservation are among the efforts being made to maintain and manage Hibikinada Biotope.



**Figure 9. Observation Deck**  
(Hibikinada Biotope, 2018)

The biotope also provides leisure activities like as bird viewing and nature walks, which allow visitors to appreciate the area's natural beauty and biological value. The observation deck provides an up-close view of the marsh's water flora and creatures. By visiting a biotope, we can observe the flora and fauna in their natural environment which enhancing the understanding of ecology and environmental science. Other than that, visiting a biotope offer opportunities to recreational activities such as hiking, birdwathcing, and photography.

Address	:	1 Hibikimachi, Wakamatsu-ku, Kitakyushu City, Fukuoka, Japan
Akses	:	30 minutes driving from JR Kokura Station
Business Hour	:	09.00-17.00
Admission Fee	:	100 JPY
Close Day	:	Tuesday

## 2.1 Science Concept learned through Biotope

Learning about biotope provide valuable insights into a variety of subjects, including ecology, biology, environmental science, and conservation. Here are some important learning opportunities that researching biotopes may provide:

- **Biodiversity:** Biotopes are home to a diverse range of plant and animal species, making them ideal for studying biodiversity. Researchers may study species interactions, population dynamics, and distribution



patterns in these settings, which helps us understand ecosystems and species conservation.

- **Ecosystem Functioning:** Biotopes are dynamic systems in which both biotic and abiotic forces interact. Biotope research helps us understand how diverse creatures contribute to the nutrient cycle, energy flow, and other ecosystem processes. This understanding is critical to ecosystem management and restoration efforts.
- **Adaptations and Evolution:** Organisms that live in biotopes have evolved unique adaptations to survive and prosper in their environments. Scientists may learn about evolutionary processes like natural selection and speciation by analyzing these adaptations, as well as how environmental influences impact the features of various species.
- **Habitat Conservation:** Biotopes frequently represent unique or vulnerable environments that must be protected. Learning about biotopes allows you to identify essential habitat features, prioritize conservation areas, and devise methods to combat challenges like habitat degradation, pollution, and climate change.
- **Ecosystem Services:** Biotopes provide important ecosystem services such as water filtration, carbon sequestration, and flood control. Understanding these services and their importance to human well-being may

help guide decisions in land use planning, resource management, and environmental policy.

- **Education and engagement:** Biotopes provide excellent possibilities for environmental education and community engagement. Schools, nature centers, and community organizations may organize field trips, guided tours, and citizen science initiatives to teach people of all ages about ecology, biodiversity, and the value of conservation.

## 2.2 SDGs in learning about Biotope

Learning about biotope might help the students relate to numerous SDGs, including:

- **Goal 15. Life on Land**

Protect, restore, and promote the sustainable use of terrestrial ecosystems; manage forests sustainably; confront desertification; and prevent and reverse land degradation and biodiversity loss. Learning about biotopes contributes to comprehend terrestrial ecosystems, biodiversity conservation, and the need to protect habitats for numerous species.

- **Goal 14. Life below Water**

Conserve and sustainably use the oceans, seas, and marine resources to promote sustainable development. While biotopes are primarily associated with terrestrial environments, understanding them adds to broader



ecological knowledge, such as the connections between terrestrial and aquatic ecosystems, which is pertinent to Goal 14.

○ **Goal 4. Quality Education**

Ensure that excellent education is inclusive and egalitarian, and encourage lifelong learning opportunities for all. Learning about biotopes may be included in environmental education to help students comprehend ecosystems, biodiversity, and the necessity of conservation, hence fostering high-quality education.

○ **Goal 13. Climate Action**

Take immediate action to address climate change and its consequences. Understanding biotopes and their function in climate control, carbon sequestration, and climate adaptation can help mitigate climate change and create resilience.



## CHAPTER 3 THE KITAKYUSHU RIVER MUSEUM



Figure 10. Kitakyushu River Museum

The River Museum was established as a venue for learning about the aquatic environment. It uses interactive displays, educational events, and hands-on activities to teach visitors about the value of rivers, wetlands, and the surrounding environment. There includes an ecological aquarium as well as a section where visitors may observe nature through the eyes of fish, birds, and insects. A large River Observation Window,



measuring 2.3 meters in height and 7.2 meters in width, allows visitors to watch the wildlife that live in the Murasaki River throughout the seasons, including as baby seagulls, black porcupines, and Japanese scabbard crabs. Some collections can be seen in the figures below.

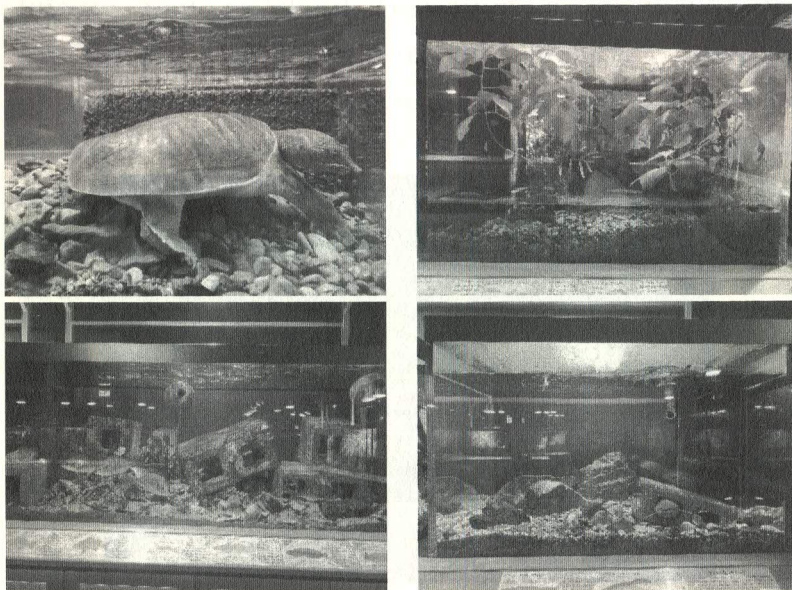


Figure 11. Flora and Fauna Collection in Kitakyushu River Museum

By visiting the river museum, we have an opportunity to learn about the interconnections between different species and how they contribute to the health of river ecosystems. This museum offers various information regarding the river, including its history and culture, geology and geography, conservation and management,

and events pamphlets. You can also take a walk around the river museum as it offers beautiful view of the river.

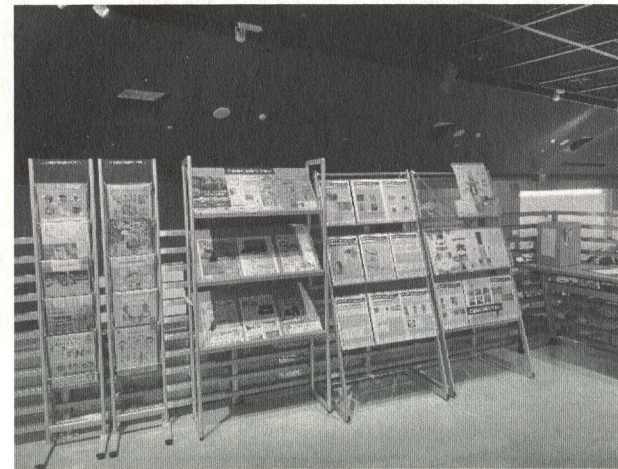


Figure 12. Information Center

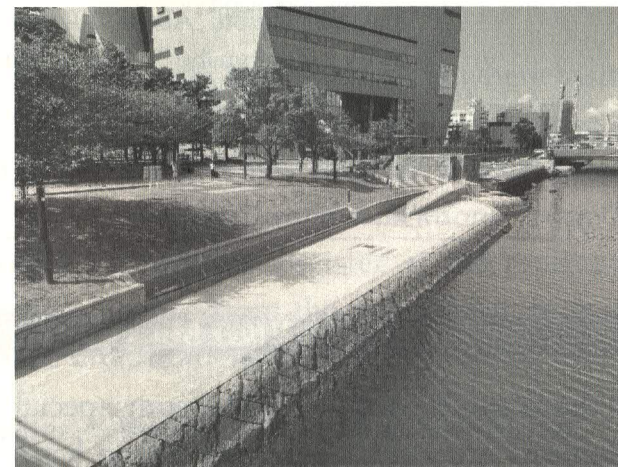


Figure 13. River and its surrounding



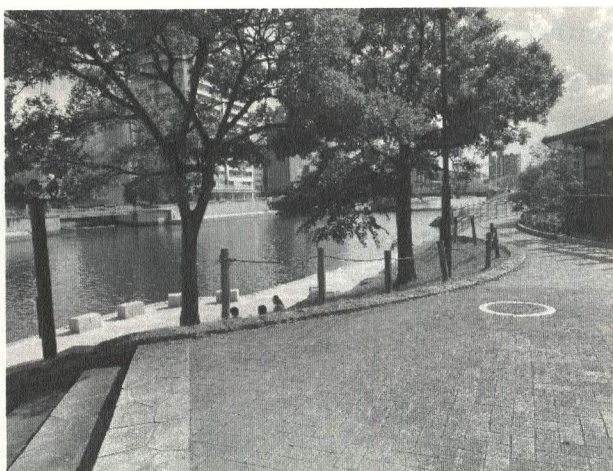


Figure 14. Riverside View

Address	: 1-2 Senbamachi, Kokurakita-ku, Kitakyushu-shi
Akses	: About a 10-minute walk from JR Kokura Station: About 10 minutes from Kitakyushu Urban Expy. Kokuraeki-kita Exit
Business Hour	: 10.00-19.00
Admission Fee	: Free
Close Day	: Tuesday and New Year

### 3.1. Events at The Kitakyushu River Museum

At the Water Environment Museum, special events and exhibitions are held to help everyone learn about river-related matters. The features and activities offered includes exhibition, educational programs, hands-on activities, outdoor exploration, and community engagement. These events are structured to showcase a

wide range of knowledge, from fun learning to learning wise behaviors to support sustainable living.

#### ○ Canoe Experience

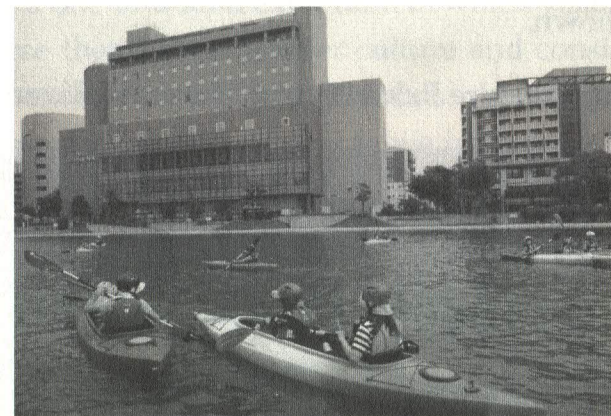


Figure 15. Canoe in Kitakyushu River Museum  
(River Museum, 2024)

The river museum hosts programs where visitors may try canoeing in the city center. This is an event that many people may enjoy because it takes place during the holidays and summer vacations from April to October. Visitors can register at the museum before boarding a canoe from the water stage in front of the Aquatic Environment Centre.

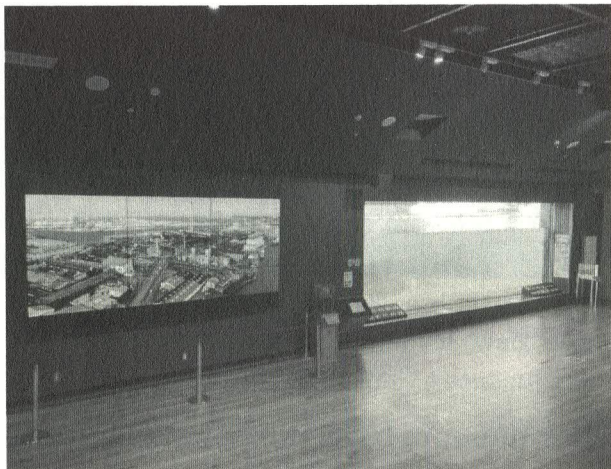
#### ○ Disaster Action and Prevention Exhibition

The disaster prevention workshop and exhibition event aims to produce people with a "zest for life" who can make their own decisions, make decisions, and take the first move when confronted with various calamities.



Participants in this program will learn via experience how to evacuate in the case of a disaster and how to survive after one. As part of disaster prevention, emergency supplies and images of previous disasters are shown.

○ **Living Creature Exhibition at Murasaki River**



**Figure 16. Living Creature Exhibition**  
(River Museum, 2024)

The aquatic life of the Murasaki River is exhibited in the form of photos and aquariums, visitors will be impressed by the ecology of the creatures and gain an understanding of the river environment. The introduction to aquatic life in the Murasaki River took place in partnership with the fish club at Kitakyushu High School in Fukuoka Prefecture. The activity began with a visit to the Murasaki River to observe the river and the species that live in it.

○ **River and Community Culture Exhibition**

Rivers are intimately connected to people's everyday lives, and their flow has provided several advantages. This is a one-of-a-kind exhibition in which visitors may immerse themselves in river culture and consider the link between rivers and humans. Visitors to this program will study and play while immersed in river-based culture. Various river-derived cultures will be showcased, along with a picture display.

○ **Murasaki River Fish-Ladder Operation**

Some spots in the Murasaki River make it difficult for aquatic species like fish to migrate. The construction of the Iwagumi fish ladder, which was designed to promote fish mobility, as well as the research progress, will be displayed. There will also be a picture show documenting the production and research processes. The presentation also includes research on the mechanics of stone fish ladders, how they are constructed, and how they swim upstream. Videos of sweetfish and other fish traveling upstream through the stone fish ladder will also be broadcast on a wide screen.



### 3.2. Science Concepts learned through The River Museum

Visiting a river museum, such as the Kitakyushu River Museum, provides multiple possibilities to learn about diverse scientific ideas connected to rivers, ecosystems, and environmental protection.

- **Hydrology:** Visitors may learn about the study of hydrology, which studies the distribution, transport, and qualities of water on earth. They can learn about the water cycle, river flow dynamics, and how rivers shape landscapes.
- **Ecology:** River museums frequently contain information about river ecology, including the interactions between living species and their surroundings within river ecosystems. Visitors may learn about food webs, nutrient cycling, habitat variety, and how plants and animals adapt to river environments.
- **Water Quality:** Understanding water quality is critical for river health and human welfare. Visitors may learn about the elements that influence water quality, including pollution sources, nitrogen levels, and sedimentation, as well as how water quality monitoring aids in the assessment and management of river ecosystems.

- **Biodiversity:** Rivers provide a diversified ecology that is home to a variety of plant and animal species. Visitors may learn about biodiversity conservation initiatives, the value of riparian zones as animal homes, and the biological functions that various species play in river ecosystems.
- **Geology:** Rivers shape the earth's surface through erosion, sediment transport, and deposition. Visitors may learn about the geological processes that create river valleys, floodplains, and deltas, as well as how human activities affect river geomorphology.
- **Environmental Conservation:** River museums frequently stress the value of environmental conservation and management. Visitors may learn about challenges to river ecosystems such as pollution, habitat destruction, and climate change, as well as the steps people and communities can take to conserve and restore rivers and their surrounding habitats.

### 3.3. SDGs in learning about River

Learning about rivers and associated topics is consistent with various Sustainable Development Goals (SDGs), particularly those concerning environmental sustainability, education, and water resource management.



### ○ **Goal 6. Clean Water and Sanitation**

SDG 6 aspires to provide universal access to water and sanitation, as well as their sustainable management. Understanding rivers entails studying their water quality, ecology, and the services they offer. River education may help maintain and restore freshwater ecosystems, encourage sustainable water usage, and enhance water quality, all of which support SDG 6's goals.

### ○ **Goal 4. Quality education.**

Understanding rivers may be included into environmental education projects aiming at raising awareness, knowledge, and skills connected to sustainability and environmental responsibility.

### ○ **Goal 5. Sustainable Cities and Communities.**

Rivers frequently run through urban areas, and understanding their management and conservation may help to build more sustainable and resilient cities and communities.

### ○ **Goal 14. Life Below Water.**

Rivers are linked to marine ecosystems, and their health affects the health of the oceans and seas. Learning about rivers can help to maintain marine biodiversity and encourage sustainable fishing.

### ○ **Goal 15. Life on Land**

It emphasizes the importance of rivers and riparian zones for terrestrial ecosystems and biodiversity. Learning about rivers can help to preserve biodiversity and promote sustainable land management techniques.



## CHAPTER 4 FIREFLY MUSEUM



For more than 30 years, residents of Kitakyushu City have worked to safeguard fireflies. The Kitakyushu City Firefly Museum promotes environmental protection and has been designed as a place for studying, learning, and researching firefly, other marine species, and their ecosystems. Kitakyushu City's firefly conservation efforts began when 100 firefly larvae were released into the Okumano River in 1980, followed by 20 flying fireflies in 1981. Kitakyushu City Hotarukan was built by rebuilding a former kindergarten school in this site into a facility that can also be utilized for individuals who like the river to communicate and share knowledge. The Kitakyushu Firefly Museum Plan Formulation Committee was formed to develop the plan. Its members include representatives of citizen volunteers involved in firefly breeding and protection, as well as waterfront conservation activities, local residents, academic experts, government officials, and others. Fireflies are housed year-round at the Kitakyushu City Firefly Museum, allowing visitors to view both adult and larvae fireflies' illuminating behaviors.



Figure 17. Seseragi Channel at Fireflies Museum  
(Firefly Museum, 2024)

The Kitakyushu Firefly Museum includes three sections: a structure, an outdoor experimental canal, and a babbling waterway. The Kitakyushu Firefly Museum teaches visitors about the riverbank habitat in which fireflies dwell and how to nurture them. The experimental waterways are formed like rice paddies, and you can see a variety of living organisms. The Seseragi Channel is an artificial waterway that mimics the natural flow of water, allowing you to enjoy the riverside surroundings.

Address	: 2-5-1, Kumagai, Kokurakita-ku, Kitakyushu City, Fukuoka
Business Hour	: 09.00-17.00
Admission Fee	: Free
Close Day	: Tuesday and New Year



## 4.1 Science Concepts learned through The Firefly Museum

Visiting a Firefly Museum provides a unique opportunity to learn about numerous science ideas concerning fireflies (also known as lightning bugs) and their habitats. Here are some scientific principles that guests may acquire during such an experience:

- **Entomology:** Firefly museums frequently give information about the biology, behavior, and life cycle of fireflies. Visitors may learn about firefly' anatomy, taxonomy, and role in ecosystems as predators and prey.
- **Bioluminescence:** Fireflies are known for their bioluminescent light output. Visitors may learn about the biological mechanisms that drive bioluminescence, such as the role of luciferase enzymes and the chemical reaction that generates light. Understanding bioluminescence can spark conversations regarding its ecological purposes, such as communication and defensive processes.
- **Ecology:** Fireflies live in a variety of environments, including woods, grasslands, and wetlands. Visitors may learn about firefly' biological needs, including habitat preferences, food sources, and interactions with other creatures. Understanding firefly ecology helps

demonstrate the significance of habitat protection and ecosystem maintenance.

- **Biodiversity:** Fireflies are a varied group of insects found all over the world. Visitors may learn about the many firefly species, their distribution patterns, and the issues that affect their numbers, such as habitat loss, pollution, and climate change. Exploring firefly biodiversity can help people appreciate insect variety and the value of biodiversity protection.
- **Environmental Conservation:** Firefly museums frequently promote the significance of environmental preservation and care. Visitors may learn about risks to firefly populations, such as habitat degradation, light pollution, pesticide usage, and climate change, as well as what people and communities can do to safeguard fireflies and their ecosystems.
- **Citizen Science:** Firefly museums may include visitors in citizen science programs that monitor firefly numbers and ecosystems. Visitors may learn about scientific research methodologies, data gathering strategies, and how citizen scientists contribute to scientific understanding and conservation activities.



## 4.2 SDGs in learning about Firefly Conservation

Learning about firefly conservation supports various Sustainable Development Goals (SDGs), including those connected to environmental sustainability, biodiversity conservation, and education. Here are three SDGs that are very helpful for learning about firefly conservation:

### ○ Goal 15. Life on Land

Fireflies serve as markers of ecosystem health and biodiversity. Learning about firefly conservation helps to maintain terrestrial ecosystems, prevent biodiversity loss, and encourage sustainable land management techniques.

### ○ Goal 14. Life Below Water

Firefly larvae are found in many aquatic species, and their existence signals water quality. Learning about firefly conservation may help people understand the value of freshwater habitats, the dangers of water pollution, and the significance of sustainable water management.

### ○ Goal 4. Quality Education

Education regarding firefly conservation increases awareness, knowledge, and skills in biodiversity, ecology, and environmental stewardship. It promotes

lifelong learning and enables people to help safeguard fireflies and their habitats.

### ○ Goal 12. Responsible Consumption and Production

Firefly conservation entails mitigating environmental problems like as habitat loss, light pollution, and pesticide usage. Learning about firefly conservation can lead to more sustainable consumption and production habits that have less detrimental effects on ecosystems and biodiversity.

### ○ Goal 13. Climate Action

Climate change threatens firefly habitats and populations. Learning about firefly conservation may help people understand the effects of climate change on biodiversity, as well as the significance of reducing greenhouse gas emissions and adapting to changing climatic circumstances.

### ○ Goal 11. Sustainable Cities and Communities

Urbanization and development can harm firefly habitats. Learning about firefly conservation may help with sustainable urban design, green infrastructure, and community participation in habitat restoration initiative.





## CHAPTER 5 AINOSHIMA



Figure 18. Ainoshima Guide Map

Japan has a handful of islands known as "cat islands". Cat islands are popular tourist destinations because cats outnumber people for some reason. Ainoshima is a tiny island in Kokura Kita Ward, Kitakyushu City that floats northwest of the Kanmon Strait. It takes about a 40-minute cruise from Kokura via Umashima Island. Ainoshima is a small isolated island in Kitakyushu City with a

circumference of about 13 km and an area of 0.68 km<sup>2</sup>. The island's population is roughly 250 and it is also well-known for having nearly as many cats as people. Many people come to the island to admire the cats. Originally, the reason of the increasing number of cats is because the main industry of the island is fishing, and the residents on the island have taken good care of the cats, which catch the mice that make holes in the fishing boats.



Figure 19. Cats in Ainoshima

It takes about 40 minutes to walk from the terminal in the south of the island to the farthest north, and the cats mostly stay around the residential area from the terminal to the elementary school. There are no complicated roads, and as you walk towards the residential area, you can see the cats one after another. There is a pictorial signboard which shows the route that you can see as soon as you arrive on the island. For tourists who want to feed the cats,



do it at the place where the posters are placed. The cats also gather and live around the houses where the posters are, and when tourists drop by, there will be many cats around.

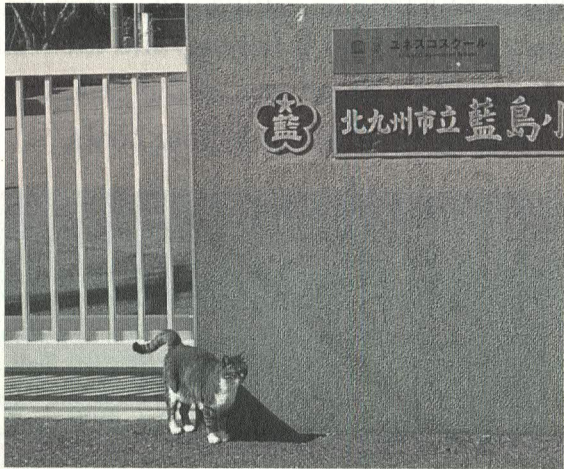


Figure 20. Ainoshima Cat

It takes about 10 minutes on foot to the historical site from around the tunnel, and it takes about 40 minutes to the observation spot. Since there is no public transportation on the island, it is important that you walk while thinking about your body strength and the time required to take the ferry back. There are volunteers who come to AinoShima twice a week to observe the status of the cats from the mainland. There are no shops or restaurants on the island, but there are some drink vending machines. For those of you who want to have lunch on the island, bring some food with you when you

leave Kokura. It is recommended to eat around the terminal, not on the street in residential areas.

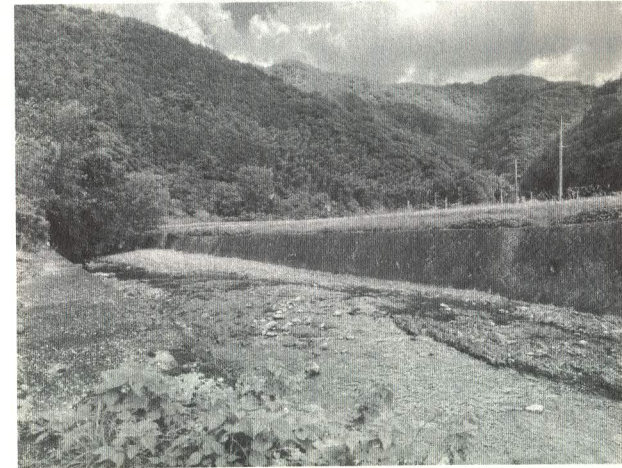


Figure 21. Nakatani

Other than ainoshima, there is a place called Nakatani, a neighborhood that were surrounded by forest that allows us to enjoy the nature and learn about environmental sciences. We can experience fresh air while admiring the beautiful scenery as we walk through the riverside.





**Figure 22. Riverside Walking in Nakatani**



**Figure 23. Fall in Nakatani**

There is also a strawberry farm where we can pay and picking our strawberry directly from the tree. It gives a new and fresh experience as we can eat the strawberry. We can taste the high quality Japanese strawberry which sweet and big.



**Figure 24. Strawberry farm in Nakatani**



**Figure 25. Fresh strawberry from the tree**



Both Ainosshima and Nakatani offers stress reduction activity as we observe the nature closely. This activity may also helps us to enhance environmental awareness and conservation to adopt sustainable lifestyle practices.

### 5.1 Science Concepts learned through The Cat Island

Visiting Cat Island (Ainosshima) may help you learn about a variety of scientific themes, including ecology, animal behavior, biodiversity, and conservation. Here are some scientific principles that guests may acquire during such an experience:

- **Ecology:** Cat Island's ecology provides insight into how animals interact with their surroundings. Visitors may discover the island's flora and fauna, including the plants and animals that feed the feral cat population.
- **Biodiversity:** While cats are the major attraction, Cat Island also has a diverse range of fauna, including birds, insects, and marine life. Visitors may learn about the island's biodiversity and the necessity of maintaining habitat variety for ecosystem health.
- **Animal Behavior:** Observing feral cat behavior can provide information about animal behavior, such as hunting techniques, social relationships, and territorial behavior. Visitors may learn about the adaptations that help cats flourish in their surroundings.

- **Population Dynamics:** Cat Island is a real-world example of population dynamics, including birth rates, death rates, and population expansion. Visitors may learn about the problems of regulating wild animal populations, as well as the possible effects on ecosystems.
- **Human-Wildlife Interactions:** Cat Island investigates the ethical implications of feeding and engaging with feral animals. Visitors may learn about responsible tourism and the necessity of reducing human influence on wildlife habitats.
- **Conservation:** Cat Island emphasizes the importance of conservation efforts that safeguard both species and their environments. Visitors may learn about the problems of managing feral cat populations, as well as the larger implications for biodiversity protection and ecosystem health.

### 5.2 SDGs in learning about Cat Island

Learning about Cat Island (Ainosshima) can help you meet various Sustainable Development Goals (SDGs), particularly those connected to environmental sustainability, biodiversity protection, and responsible tourism. Here are few SDGs that are very useful for learning about Cat Island:



○ **Goal 15. Life on Land**

This target aims to maintain, restore, and promote the sustainable use of terrestrial ecosystems. Learning about Cat Island's environment and population helps to safeguard biodiversity and natural areas.

○ **Goal 14. Life Below Water**

Although Cat Island is well known for its feline population, it is bordered by marine habitats. Understanding the connection of terrestrial and marine ecosystems emphasizes the significance of preserving both land and sea habitats.

○ **Goal 12. Responsible Consumption and Production**

Learning about Cat Island promotes responsible tourist activities that have a minimal negative impact on the ecosystem and animals. Promoting sustainable tourism contributes to SDG 12 by lowering resource use and environmental damage.

○ **Goal 4. Quality Education**

Learning about Cat Island's ecology, biodiversity, and conservation increases understanding and respect for the natural environment. Providing chances for experiential learning can help people make educated decisions and take action to protect the environment.


○ **Goal 13. Climate Action**

While not directly relevant to Cat Island, recognizing the larger context of climate change and its effects on ecosystems underlines the importance of reducing greenhouse gas emissions and adapting to changing environmental circumstances.

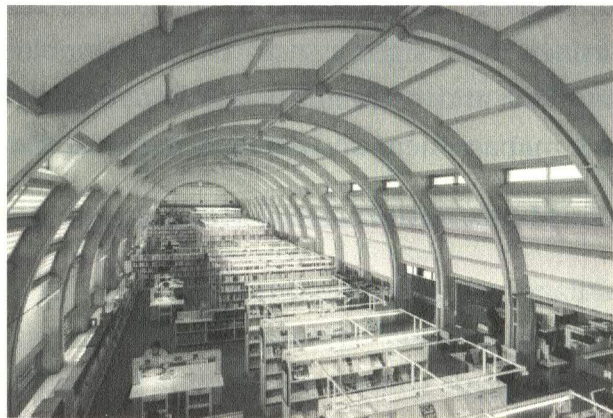
○ **Goal 11. Sustainable Cities and Communities**

The appeal of Cat Island as a tourist attraction emphasizes the significance of sustainable urban development and community participation in natural resource management and ecosystem protection.





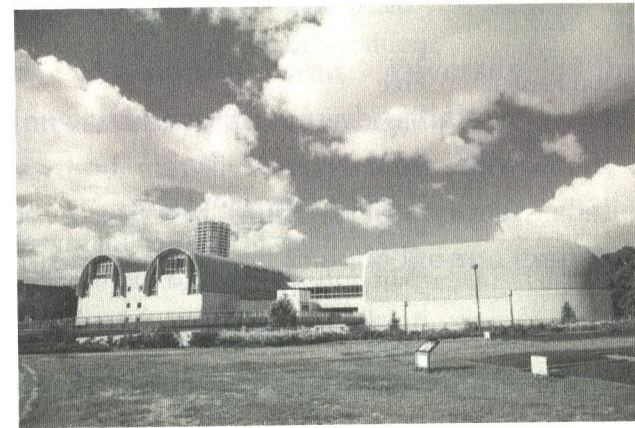
## CHAPTER 6 KITAKYUSHU CENTRAL LIBRARY



**Figure 26. Kitakyushu Central Library**  
(*Central Library, 2024*)

Isozaki Arata, a well-known Japanese architect, designed the library, which was finished in 1974. The library features the external and interior curves that are common in Isozaki's works, and it has previously used as a film set. When you enter the library, you'll see the arched ceiling supported by curving beams. You may select from 500,000 books. The general part contains various novels and practical books, while the Kitakyushu Repository

houses specialist literature and supplies. Study rooms are also accessible. There is also a library for mothers and children, as well as an audiovisual center. It's an excellent way to unwind and spend the day.



**Figure 27. Kitakyushu Central Library Building**  
(*Central Library, 2024*)

In Kitakyushu central library, there are extensive collection of books, periodicals, multimedia materials, and digital resources covering various subjects and genres. We can also find comfortable reading spaces that includes reading rooms, study carrels, and areas for group discussion or quiet contemplation. The library offers computer and internet access. Allowing visitors to browse online resources, conduct research and access digital literacy databases and e-books. Kitakyushu central library oftens hosts a variety of events, workshops, and educational programs in collaboration with the



community. These efforts promote literacy, lifelong learning, and civic engagement among residents.

Address	: 4-1 Jonai, Kokurakita-ku, Kitakyushu City
Business Hour	: 09.30-19.00 * 09.30-18.00 on Saturdays, Sundays and public holidays
Admission Fee	: Free
Close Day	: Monday (next day if it falls on a public holiday) Dec 29 - Jan 3 *1 Library inventory day *2 December 28 is closed for inventory *3 In principle, the last day of each month (If it falls on a Sunday, Monday, or public holiday)

## 6.1. Concepts learned through The Central Library

Central libraries provide a diversity of materials and services to support learning across disciplines. While its primary focus is on reading and education, patrons may learn about a variety of topics via their contact with library items and services. Here are some topics that visitors might learn in the central library:

- **Literacy and Language Skills:** Central libraries encourage literacy by offering books, newspapers, magazines, and other reading resources. Patrons can enhance their reading comprehension, vocabulary, and language abilities by studying literary and informational books.

- **Critical Thinking:** Libraries provide materials that promote critical thinking and analysis. Engaging with varied thoughts and perspectives teaches patrons how to assess information, identify biases, and generate well-reasoned conclusions.
- **Cultural Awareness and Diversity:** Libraries' collections and programming highlight many cultures, histories, and views. Patrons may learn about many cultures, traditions, and socioeconomic challenges, which promotes cultural knowledge and empathy.
- **History and Social Sciences:** Central libraries provide collections of historical records, primary sources, and reference materials that allow patrons to research history, sociology, anthropology, and political science. Patrons can learn about historical events, social movements, and cultural changes that have influenced society.
- **Technology and Information Literacy:** Libraries offer computers, internet access, and digital materials, encouraging technology literacy and information fluency. Patrons can learn about digital technologies, internet research methods, and data management abilities.
- **Health and wellbeing:** Libraries provide information about physical and mental health, nutrition, exercise, and wellbeing. Books, workshops, and educational



events provide patrons with information on healthy lifestyle choices, illness prevention, and self-care techniques.

- **Environmental Sustainability:** Libraries promote environmental education and sustainability by providing materials on environmental science, conservation, and eco-friendly behaviors. Patrons can learn about environmental concerns, renewable energy, and sustainable living practices.
- **Creative Arts and Expression:** Central libraries frequently have collections of art books, music records, films, and creative materials. Patrons can investigate artistic methods, cultural trends, and creative expression in a variety of mediums.
- **Communiti engagement and civic participation:** Libraries function as community hubs, encouraging civic involvement, social responsibility, and community development. Patrons can take part in civic education programs, community forums, and volunteer opportunities.

## 6.2. SDGs in providing Central Library

Creating and supplying central libraries supports various Sustainable Development Goals (SDGs), particularly those linked to education, literacy, access to information, and community development. Here are three

SDGs that are specifically relevant to establishing central libraries:

- **Goal 4: Quality Education**

Central libraries play an important role in encouraging lifelong learning and ensuring equal access to excellent education for everyone. They provide tools and activities to promote literacy, skill development, and formal and informal education efforts.

- **Goal 9: Industry, Innovation, and Infrastructure**

Central libraries help to construct resilient infrastructure and promote sustainable industrialization by facilitating access to information and technology resources. They encourage innovation, research, and entrepreneurship, hence promoting economic development and technical improvement.

- **Goal 10: Reduced disparities**

Central libraries foster social inclusion and decrease disparities by offering free access to information, education, and cultural resources to all members of society. They help to close the digital gap while also promoting equitable learning and personal development possibilities.





○ **Goal 11: Sustainable Cities and Communities**

Central libraries help to build inclusive, safe, resilient, and sustainable communities by providing public venues for learning, collaboration, and civic involvement. They promote communal cohesiveness, cultural variety, and social well-being.

○ **Goal 16: Peace, Justice, and Strong Institutions**

Central libraries promote information access, freedom of speech, and the rule of law to help institutions become more open, effective, responsible, and inclusive. They promote democratic principles, civic involvement, and informed citizenship.

○ **Goal 17: Partnership for the Goals**

Central libraries require collaboration and partnerships among governments, civil society groups, the commercial sector, and other stakeholders. These relationships help to ensure the long-term growth of library infrastructure, resources, and services.



**Figure 28. Kitakyushu Manga Museum**  
*(Kitakyushu Manga Museum, 2024)*

**T**racing the history of Kitakyushu City, since the establishment of the government-run Yawata Steel Works in the Meiji period, people from all over the country have gathered here, and there have been diverse cultural exchanges. In addition, Moji Port developed as an international trading port, and exchanges with foreign countries flourished, bringing goods and information from both home and abroad. As the economy developed,



people became more relaxed and became more interested in culture. After the war, Kitakyushu had the largest number of rental bookstores and movie theaters in Japan, indicating that it was an environment that fostered artistic culture that satisfied people's sensibilities and intellect.

Within this cultural backdrop, many famous manga artists connected to Kitakyushu were born, including Leiji Matsumoto, Seizou Watase, Jun Hatanaka, Ako Mutsu, and Tsukasa Hojo. These artists and their works are an important asset to Kitakyushu. It is our role as people living in the present day to preserve and pass on to the future in a living form, and connect it to the education of the sensibilities of the next generation. Manga conveys information through a combination of three elements: images, text, and panel layout, thus developing "information literacy (media literacy)" unknowingly, and at the same time, manga also has an introspective power similar to literature. Therefore, it is also useful for enhancing "imagination, expression, and creativity".



**Figure 29. Manga Character Exhibition**  
(Kitakyushu Manga Museum & Aru Aru City, 2018)

The Kitakyushu City Manga Museum collects and preserves a wide variety of manga works and related materials, mainly from manga artists with local connections, and conducts research to convey the characteristics and appeal of manga. The results of this research will be used for exhibitions and screenings, and we will play a role in cultural promotion by conveying the charm and characteristics of manga to the next generation. By becoming a gathering place for various generations, from children to adults, we hope to help create individuality, charm, and liveliness in the city. Various activities can be done at this museum, including:

#### 1) Looking around the exhibition collection

There is a corner for manga artists with local connections, a special exhibition corner, etc. In addition, there are special exhibitions that include original



exhibitions, large-scale traveling exhibitions across the country, joint exhibitions with other museums. There are also permanent exhibitions covering the history of manga, manga artists with local connections, Leiji Matsumoto corner.

## 2) Reading manga

A manga viewing corner where you can see about 70,000 manga books, from representative works of the past to popular works of today.

## 3) Drawing

This corner has the functions of creation, development, and exchange. Manga classes, exchange rooms, etc. Manga experience (how to draw) classes for elementary school and junior high school students, manga courses by manga artists and editors, joint projects with doujinshi manga organizations, exchange rooms, etc.

### 7.1. Concepts learned through The Manga Museum

The Manga Museum in Kitakyushu provides an unforgettable educational experience focused on the art and culture of manga, the Japanese comic book and visual novel form. While the focus is mostly on manga, visitors may learn about a variety of themes outside comics. Here are some themes that visitors may discover throughout their stay at the Manga Museum:

- **Art and Illustration Techniques:** Visitors may discover the many art styles, illustration techniques, and storytelling approaches utilized in manga development. This involves a grasp of character design, panel layouts, pace, and visual narrative.
- **Cultural and Historical Context:** The Manga Museum frequently discusses manga's beginnings, evolution, and relevance in Japanese culture. Visitors may explore how manga has influenced popular culture, art, entertainment, and worldwide media.
- **Literacy and Language Skills:** Manga can help improve reading comprehension, vocabulary growth, and language learning. Visitors may also learn about Japanese language and culture by reading manga translations, cultural allusions, and language usage in comics.
- **Storytelling & Narrative Structures:** Manga uses a variety of narrative structures and storytelling strategies to captivate readers. Visitors may learn about story arcs, character development, plot techniques, and genre conventions that are typical in manga.
- **Social and Psychological Themes:** Manga frequently covers a variety of social, psychological, and philosophical issues, such as friendship, love, identity, social justice, and existentialism. Visitors may learn



about these subjects and debate how they are portrayed in manga.

- **Digital Media and Technology:** The Manga Museum may have displays about digital manga, webcomics, and the use of technology in manga development and dissemination. Visitors may learn about digital art tools, internet publication platforms, and how digital media affects the manga business.
- **Cross-Cultural Exchange:** Manga has a global readership, influencing artists and creators all over the world. Visitors may learn about the cross-cultural interaction, adaptation, and localization of manga in many nations and cultural settings.
- **Creative Expression and Self-Identity:** Manga promotes creative expression and self-identity by allowing artists and readers to explore their interests, passions, and opinions. Visitors may learn about the various voices and experiences depicted in manga, as well as how it shapes individual and social identities.

## 7.2. SDGs in providing Manga Museum

Creating and operating a Manga Museum can help achieve various Sustainable Development Goals (SDGs), particularly those linked to education, cultural preservation, creative industries, and community development. Here are three SDGs that are especially important to establishing a Manga Museum:

### ○ **Goal 4: Quality Education**

Manga museums encourage lifelong learning and equal access to excellent education by providing opportunities for cultural enrichment, artistic expression, and creative inquiry. They function as instructional tools for promoting literacy, critical thinking, and intercultural understanding.

### ○ **Goal 9. Industry, Innovation, and Infrastructure**

Manga museums help to establish sustainable infrastructure and foster innovation in the culture and creative sectors. They celebrate Japan's rich cultural legacy while also helping to preserve, promote, and spread manga and kindred creative forms across the world.

### ○ **Goal 11. Sustainable Cities and Communities**

Manga museums help to create inclusive, safe, resilient, and sustainable communities by providing as cultural centers and public venues for creative expression, entertainment, and community interaction. They promote cultural variety, social cohesiveness, and urban redevelopment.

### ○ **Goal 16. Peace, Justice, and Strong Institutions**

Providing manga museums fosters information access, freedom of speech, and cultural heritage preservation, all of which are necessary for the development of



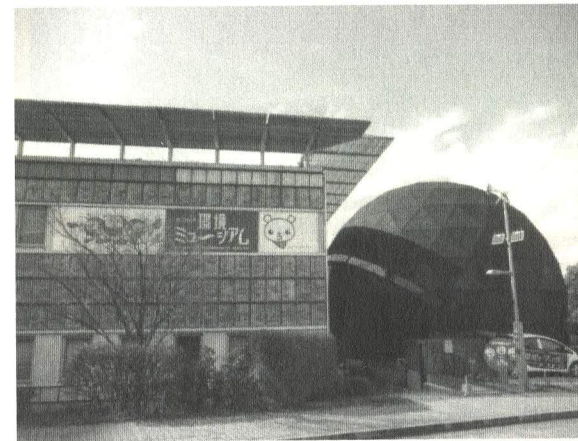
transparent, responsible, and inclusive organizations. They promote cultural understanding, conversation, and social inclusion, which helps to maintain societal peace and stability.

○ **Goal 17. Partnership for the Goals Establishing**

Manga museums necessitates collaboration and collaborations among governments, cultural institutions, corporate sector organizations, and civil society groups. These collaborations help to ensure the long-term growth of cultural infrastructure, resources, and programs while also encouraging cultural diversity, creativity, and innovative thinking.



## CHAPTER 8 KITAKYUSHU ENVIRONMENTAL MUSEUM



**Figure 30. Kitakyushu Environmental Museum**

*(Kitakyushu Environment Museum, 2024)*

*(Source: <https://www.gururich-kitaq.com/en/spot/environment-museum>)*

**K**itakyushu was nicknamed the "Sea of Death" because the sky was filled with "seven colors of smoke", and Dokai Bay was so polluted that fish could not survive there. At the Kitakyushu Environmental Museum, visitors can learn about Kitakyushu's past history of pollution and the steps that have been taken to regain its blue skies and



seas. The museum also provides fun and practical information on how to live a more eco-friendly life.



Figure 31. Information on Garbage Recycling

There are informations on how to classify the garbage based on the materials, the discharge schedule, and the specific plastic bag color for every type of garbage. The day of discharge varies according to the plastic bag colors. In Kitakyushu, Monday is to discharge plastics and packages in a green plastic bag. Tuesday and Friday is to discharge blue plastic containing household garbage. Wednesday is to discharge cans, bottles, and plastic bottles that must be put in the orange plastic bag. The collection time is before 09.30. There will be a punishment charge for those who did not follow the rules. There is also an exhibition on how these garbage were transformed into an art as we can see in the figure.



Figure 32. Art from Garbage

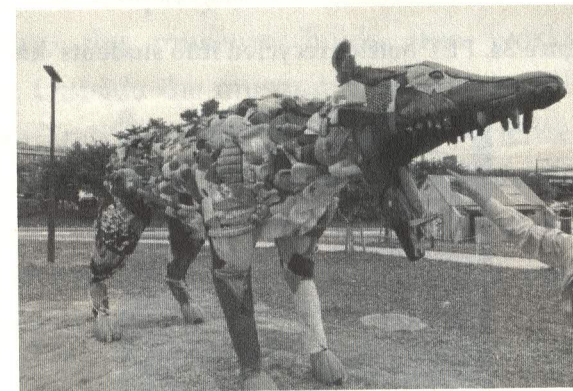


Figure 33. Art from Garbage

In this museum, you can find interesting information on how the garbage were recycled based on their materials. Plastic bags can be recycled into textiles and clothing, electronics, automotive parts, furniture,



stationery, toys, and household products. Most kindergarten students' hats were made of recycled plastics.

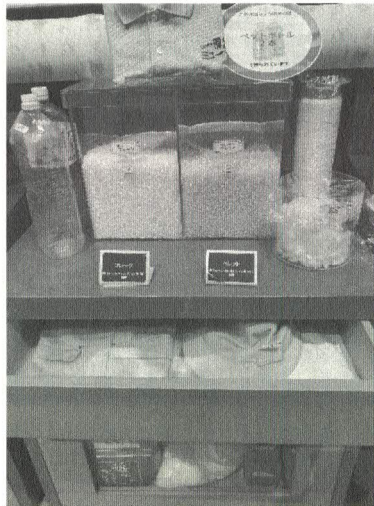


Figure 34. PET bottles recycled into students' hat



Figure 35. Recycled Products



Figure 36. The History of Pollution in Kitakyushu  
(Kitakyushu Environment Museum, 2024)

You will surely be amazed by the environmental technology of Kitakyushu, a city that has been in the spotlight for its progressive environmental initiatives. Every day, the museum holds free workshops on recycling. Outside the museum building, you'll also find the "Earth Trail", where visitors can experience the story of our planet, from its birth to the present day. Stop by and experience the great mystery and wonder of planet Earth, a story written by Kuramoto So, one of Japan's most famous playwrights.



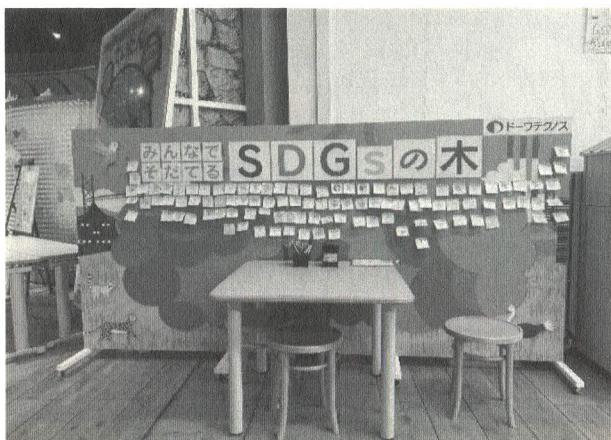


Figure 37. Learning Corner

Kitakyushu environmental museum provide a learning corner where visitor can write their idea regarding the accomplishment of SDGs. It is usually used by the students. By doing this activity, we can enhance their critical thinking, communication skills, problem-solving skills, and improve their environmental awareness.

Address	: 2-2-6 Higashida, Yahatahigashi-ku, Kitakyushu City
Akses	: About a 5-minute walk from JR Space World Station
Business Hour	: (Exhibition Area) 09.00-17.00. Last entry 30 minutes before closing. (Information Library/Reuse Corner/Multipurpose Hall) 09.00-19.00 *Close at 17.00 on weekends and public holidays).
Admission Fee	: Free
Close Day	: Monday and New Year

### 7.3. Concepts learned through The Environmental Museum

The Kitakyushu Environmental Museum offers visitors a unique chance to learn about environmental science, sustainability, and conservation. Here are some significant themes that visitors may discover throughout their stay at the museum:

- **Ecosystems and species:** Visitors may learn about many ecosystems, including forests, wetlands, and seas, as well as the species they sustain. They may investigate topics such as food webs, ecological niches, and the interconnectedness of living creatures within ecosystems.
- **Environmental Pollution:** The museum may educate visitors about numerous types of environmental pollution, such as air pollution, water pollution, soil contamination, and noise pollution. They can learn about the causes, consequences, and mitigation options for various forms of pollution.
- **Climate Change:** Visitors may learn about the science of climate change, including the greenhouse effect, global warming, and weather variability. They may look into the effects of climate change on ecosystems, weather patterns, sea levels, and human cultures.
- **Renewable Energy:** The museum may exhibit renewable energy technology such as solar, wind,



hydropower, and biomass. Visitors may learn about the advantages of renewable energy sources, including their role in mitigating climate change and lowering reliance on fossil fuels.

- **Waste Management and Recycling:** Visitors may learn about waste management techniques such as recycling, composting, and waste reduction initiatives. They may investigate topics like the circular economy, resource conservation, and sustainable consumption and production.
- **Environmental Conservation:** The museum may showcase conservation initiatives to preserve natural areas, endangered species, and biodiversity hotspots. Visitors may learn about conservation biology, habitat restoration, and the value of protecting ecosystems for future generations.
- **Sustainable Development:** The museum may advocate ideals of sustainable development such as social fairness, economic prosperity, and environmental care. Visitors may learn about sustainable agriculture, green urban planning, and sustainable transportation options.
- **Environmental Policy and Advocacy:** Visitors can learn about environmental laws, regulations, and international agreements designed to solve environmental issues. They may also look at advocacy

techniques for increasing environmental awareness, activism, and policy change.

#### 7.4. SDGs in providing Environmental Museum

Creating and operating an Environmental Museum supports various Sustainable Development Goals (SDGs), particularly those connected to environmental sustainability, education, and community development. Here are three SDGs that are specifically relevant to creating an Environmental Museum:

- **Goal 4. Quality Education**

Environmental museums encourage lifelong learning and offer possibilities for environmental education and awareness. They provide educational programs, displays, and tools to increase understanding of environmental concerns, biodiversity, and sustainable development.

- **Goal 6. Clean Water and Sanitation**

Environmental museums may help visitors learn about water conservation, pollution avoidance, and sustainable water management methods. They emphasize the significance of clean water and sanitation to human health, ecosystems, and sustainable development.



○ **Goal 7. Affordable and Clean Energy**

Environmental museums demonstrate renewable energy technology and encourage energy conservation and efficiency practices. They educate tourists on the advantages of switching to clean and renewable energy sources to combat climate change and reduce environmental impact.

○ **Goal 11. Sustainable Cities and Communities**

Environmental museums help to develop more sustainable cities and communities by encouraging green urban design, sustainable transportation, and community resilience to climate change. They raise awareness about the environmental difficulties that cities face and demonstrate new solutions for urban sustainability.

○ **Goal 12. Responsible Consumption and Production**

Environmental museums promote responsible consumption and production practices by emphasizing the environmental consequences of consumerism, waste creation, and resource depletion. They advocate for sustainable living, recycling, and trash reduction measures.

○ **Goal 13. Climate Action.**

Environmental museums enhance understanding of climate change's effects on ecosystems, communities,

and economy. They advocate climate mitigation and adaptation techniques, renewable energy alternatives, and climate policy advocacy.

○ **Goal 14. Life Below Water and Goal 15. Life on Land**

Environmental museums educate visitors on the value of maintaining marine and terrestrial ecosystems, biodiversity conservation, and natural habitat preservation. They fund initiatives to promote sustainable fishing, conserve endangered species, and rebuild degraded habitats.

○ **Goal 17. Partnership for the Goals**

Creating and operating an Environmental Museum requires collaboration and partnerships among governments, non-governmental organizations (NGOs), educational institutions, and the commercial sector. These collaborations help to establish educational programs, displays, and projects that raise environmental knowledge, sustainability, and action.





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## AUTHOR PROFILE



**Liandha Arieska Putri, M.Pd.** She was born in Bandung, June 7, 1998. She was graduated from International Program on Science Education (IPSE) study program in Universitas Pendidikan Indonesia (UPI) in 2020. In the year of 2021, she was awarded a scholarship called Program Magister menuju Doktor Untuk Sarjana Unggul (PMDSU) by the Ministry of Education and Culture and Technology, and completed her master in science education in 2023. She continues her study at doctoral degree of science education in UPI. Her research area includes STEM education, Education for Sustainable Development (ESD), Learning Style, and multiliteracy.



**Indriyani Rachman, Ph.D** is a postgraduate lecturer at Pakuan University, but is currently a researcher at the Matsumoto Laboratory, Environmental Systems Postgraduate Program, Kitakyushu University, Kitakyushu Japan, since completing her PhD in 2016. She has mostly worked in the fields of environmental education and environmental management. After studying for a bachelor's degree in the Curriculum and Education Technology program at the

Indonesian Education University, he continued his master's and doctoral studies at The University of Kitakyushu. Currently concentrating on collaborative research among several areas of expertise, including the Kitakyushu Low Carbon Center and Indonesian Bilateral Environmental Management. More than hundreds of students and educators have been given the opportunity to explore waste management and Kitakyushu's history as a World Model Environmental City. Apart from her academic routine, Indriyani actively volunteers in cultural and language interactions such as the Kokusai Association, Kitakyushu Education for Sustainable Development, and the Fukuoka International Exchange Foundation, she continues to inspire the younger generation with nature-based practices and the implementation of SDGs in environmental management, environmental education, and environmental mitigation.



**Prof. Toru Matsumoto**, is Professor in Graduate Programs in Environmental Systems, Environment and Ecological Systems Course, The University of Kitakyushu, Now, Prof. Matsumoto is Head of the Research Center for Urban Energy Management Institute of Environmental Science and Technology, The University of Kitakyushu. He is researching the relationship between environmental problems and social systems such as urban



cities, community, consumption, business models, developing countries and recycling systems.



**Prof. Dr. Ida Kaniawati, M.Si.** She was born in Bandung on July 3, 1968. She earned a bachelor's degree in physics education from IKIP Bandung in 1991 and pursued her master's studies in physics at Institut Teknologi Bandung. She completed her PhD degree in science education at Universitas Pendidikan Indonesia (UPI). She majored in science education and authored various works, including journal articles and copyright. Her published subjects are diverse, including STEM education, project-based learning, and education for sustainable development. Currently, she holds the position of Head of Science Education study program at UPI.



**Prof. Dr. Anna Permanasari, M.Si.** With 35 years of research experience, she specializes in STEM education, and low carbon education. She was born on July 12, 1958, and at the age of 42, she earned her professor in chemistry education. She got her doctorate in Analytical Chemistry from the Institute of Technology Bandung (ITB). She earned a bachelor's degree in chemistry from Universitas Pendidikan Indonesia (UPI) in

1982 and a Master of Science in Chemistry from ITB in 1992. Throughout her career, she has conducted funded research on Transcript Based Learning Analysis (TBLA), Low Carbon Education (LCE), STEM-ESD, and learning models for scientific literacy.



**Prof. Dr. Diana Rochintaniawati, M.Ed.** She was born on September 19, 1967. She has 29 years of research, teaching, and community service expertise in Science Education, particularly Biology Education. Her study focuses on thinking skills, argumentation, IT-based media, and web-based learning. She actively participated in a variety of community service activities, which allowed her to meet many stakeholders and form close relationships to collaborate, mostly at the junior high school level. She earned a bachelor's degree in biology education from Universitas Pendidikan Indonesia in 1991, a master's degree in science education from La Trobe University in 1996, and a doctorate in curriculum development from Universitas Pendidikan Indonesia in 2010.



To achieve sustainability and enhance environmental quality, renewable energies and energy efficiency measures must be used, which will reduce energy consumption and air pollution in the long run. It is critical for governments, corporations, organizations, institutions, and universities to implement policies that include practices and technology that support sustainability. Kitakyushu city government aims to reach the green economy as one of the solutions to achieve sustainability. The green economy can decide chances for green and sustainable development, which necessitates active participation at both the public policy and implementation levels in the area



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