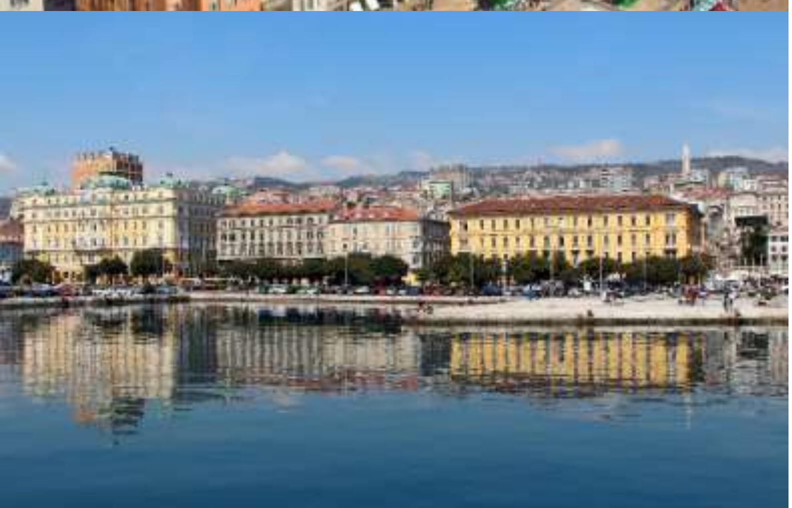
CASE STUDY

Zagreb and Rijeka (HR) - Kawasaki (JPN)

IURC - Asia & Australasia



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Thematic Network(s): Ecological transition - Green deal
Cross-cutting challenge(s): Energy transition- Climate change
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IURC
INTERNATIONAL URBAN AND REGIONAL COOPERATION

Sustainable urban development using local resources and approaches for a decarbonised society.

Urbanisation and industrial transformation are common challenges faced by the industrial cities of Zagreb and Rijeka in Croatia, and Kawasaki, Japan. By making use of their respective unique characteristics and local resources, the three cities are promoting sustainable urban development.
Zagreb and Rijeka gained knowledge into Kawasaki's efficient "waste management" and "business incubation", while lessons learned by Kawasaki included how nature-based solutions (NbS) are being implemented by Zagreb and Rijeka, and the co-benefits approach taken by these cities in terms of climate change action.

EXECUTIVE SUMMARY

Zagreb is a green city which is known for having successfully implemented nature-based solutions (Nbs). Large parks and urban farms located in city districts, serve to mitigate heat island effect and other effects of climate change, such as torrential rainfall. Among other unique measures, Zagreb has established a 'therapeutic garden' to provide access to quiet green space, particularly for children and adults with disabilities.

Rijeka is an industrial city with historic buildings which is located on the coast of the Adriatic Sea. The city puts a great deal of effort in preserving its buildings. The "Benčić Art District", which is now known for its historical museums, was once a district where abandoned factories existed. Another example is "Energina", which is now used as a facility to support start-ups. These facilities are retrofitted using methods with relatively low environmental impact. The retrofits are designed to incur co-benefits by solving the city's administrative issues, as well addressing the challenges of climate change. With the decline of traditional heavy industries, Rijeka is putting more focus on supporting innovative technology and creative industries for the future.

Kawasaki is one of Japan's leading industrial cities, where citizens, businesses and government have worked together since the 1960s to overcome the serious pollution caused by Japan's rapid economic growth. As a result, the city has a high concentration of companies with excellent environmental technology and waste recycling technology, as well as those developing new energy sources such as hydrogen. Such companies tend to work in collaboration with the government and university institutions.

Zagreb and Rijeka urgently require access to knowledge on environmentally friendly recycling and better waste disposal solutions. In this respect, the two cities benefited from learning about Kawasaki's waste management methods, chemical recycling and other technology. For Kawasaki, NbS was a new approach to address decarbonisation which is a major issue. The lessons learned have been used to raise awareness of urban greening among Kawasaki's government officials and citizens.

"Waste management is a pressing issue in Zagreb. Kawasaki City has been working on this issue for decades and is a leader in waste management. The knowledge gained from this programme can be used as an inspiration for our own efforts." **Darko Sisko, Deputy Director, Strategic Information and Research Department, Department of Economic and Environmental Sustainability and Strategic Planning, City of Zagreb.**

MAIN CHALLENGE AND SOLUTION

Kawasaki City

As one of Japan's leading industrial cities, Kawasaki was the hub for mass production and mass disposal during Japan's high economic growth in the 1960s. In 1990, Kawasaki City declared a "state of emergency for waste" when its waste incineration facilities and landfill sites were approaching the limits of their capacity. Ever since, the city has worked vigorously to reduce waste and convert it into resources. Kawasaki is home to many companies with outstanding environmental technology, and is also known for its systematic sorting and collection of waste. The municipality has been working on this problem for more than 30 years and is trying to solve it with a waste management system that requires a high level of cooperation between the citizens, local businesses and the government.

Figure 1: Kawasaki City recycling and treatment facilities

In Kawasaki, where incineration used to be the main method of disposal, efforts are being made to significantly reduce the amount of waste disposed through vigorous efforts to reduce the volume and to convert it into resources. It is notable that in 1990, there were 554,000mt of waste for a population of 1.17 million, but in 2021, despite the increase in population to 1.54 million, waste has notably decreased to 348,000 mt.

Figure 2: Waste treatment facilities (Ukishima Treatment Centre)

Kawasaki City is working to reduce and recycle waste by subdividing waste and resources. Household waste is sorted into eight categories and collected in nine categories. Resource materials such as plastics undergo intermediate treatment and are recycled by private companies. For incinerated waste, thermal energy is recovered and reused in public facilities. Incinerated ash is significantly compacted to 1/20th of its volume and landfilled at sea.

In the Kawasaki waterfront area, the delegation from Zagreb and Rijeka visited Resonac, a private company with chemical recycling technology that supports the resource recycling of plastics. This company has technology to extract clean hydrogen from plastics, and the extracted hydrogen is used at nearby hydrogen stations and hotels. The hotel (Kawasaki King Sky Front Tokyu REI Hotel) is implementing a project to operate 100% on clean energy by utilising energy from biogas power generation derived from food waste in addition to hydrogen. The municipality support such initiatives and maintains good relationships with the operators.

Figure 3: Resonac with chemical recycling technology

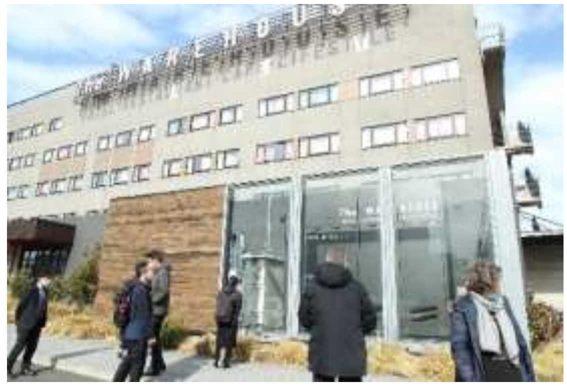

Figure 4: Hydrogen Hotel (Kawasaki King Skyfront Tokyu REI Hotel)

A rapid rise in the number of public private partnerships that incubate superior environmental technologies can be seen in Kawasaki’s industrial cluster district. More than 550 research institutions are located in the city, and the former hub for manufacturing has been transformed into an R&D hub. Among these, large companies and venture companies working on ‘Deep tech', such as life sciences, environment and energy, and AI/IoT, are concentrated in Kawasaki.
At Shin-Kawasaki Souzou no Mori, one of Kawasaki City's industrial clusters, officials from Zagreb, Rijeka, and Kawasaki exchanged views on incubation. The three cities have similar urban and industrial structures, which suggests the possibility of future linkages for business matching and business collaboration.

Figure 5: AIRBIC in Shin-Kawasaki Souzou no Mori

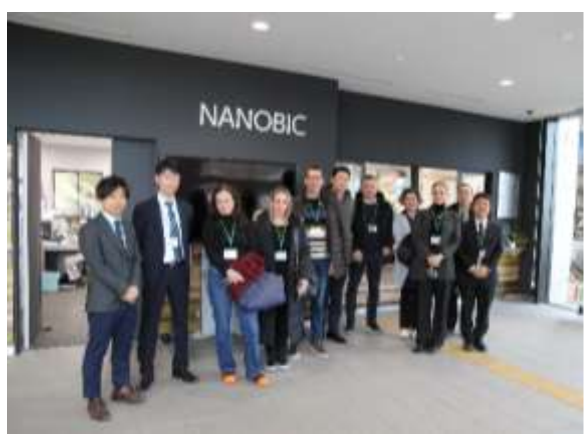

Figure 6: NANOBIC in Shin-Kawasaki Souzou no Mori

Ikuta Ryokuchi, in the northern part of Kawasaki City, is a cultural park that includes an old farm garden and an art museum. Citizens are actively involved in the management of the park. Based on the Japanese concept of 'satoyama', this is a space between pristine nature and the city, where a mixture of settlements, secondary forests and farmland is created. This Japanese way of involving people in nature and park management with strong citizen involvement was one of the lessons learnt by the Croatian cities.

Figure 7: Ikuta Ryokuchi

The city of Zagreb

The city of Zagreb is one of the model cities in Europe for combating climate change, having been selected as one of the EU's 100 climate-neutral smart cities. A typical initiative is nature-based solutions (NbS), which take advantage of the city's green local characteristics.

Maksimir Park is located close to the city centre of Zagreb. This historic park was opened in 1794 and covers 316 ha. It is a place where citizens can enjoy greenery. It also serves as green infrastructure that absorbs carbon dioxide and filters rainwater. The park functions as an ecosystem conservation system as it is equipped with facilities for biological protection.

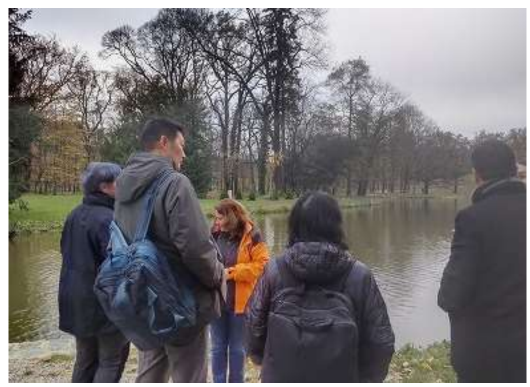

Figure 8: Maksimir Park.

Figure 9: Therapeutic Garden

Figure 10: Activities in the Therapeutic Garden.

There are 14 urban farms in Zagreb that are available for shared use by citizens. The farm in the Sesvete neighbourhood on the outskirts of Zagreb is one of these, and has been developed as a therapeutic garden, particularly for the use of children and adults with disabilities. The land and buildings were used as a factory, before it closed and the municipality bought it for community activities. The 5,000-square-metre farm opened in May 2021. The use of the farm is free of charge, and facilities are designed to provide a safe place for families who are caring for members with disabilities.The Therapeutic Garden is managed and operated under the non-government organization "Small House", which was established with the involvement of the City of Zagreb. The organisation is financially subsidised by the city. The entire garden is filled with lush green nature. It is used in numerous educational programmes for kindergartens and schools such as field trips, workshops, classes and tree plantings experiences.

Through its activities, the City of Zagreb continues to work on implementation of the proactive energy policy of the city administration, raising the level of responsibility and awareness of its employees and citizens in the process of combating global warming and climate change, thus showing that the city government has a clear global vision of Zagreb as an energy-efficient, green city. Projects that contribute to this goal include solar collectors for energy production that have been installed in a total of 35 facilities, and technical documentation was drafted for another 38 buildings. 87 public buildings have been retrofitted to provide better energy efficiency, and Zagreb is among the 100 cities that have joined the EU Mission for climate neutral and smart cities by 2030.

Since 75% of administrative zone of the City of Zagreb is green, it is important that these areas are preserved and maintained to ensure continuity of green infrastructure and to provide a healthy environment for the citizens. This is done through national and local legal and strategic framework. Legally protected green areas in Zagreb belong to four categories: one nature park, 8 special reserves, 3 monuments of park architecture and 3 significant landscapes. In the city area there are six areas categorized within Natura 2000 Ecological Network.

The city of Rijeka

Rijeka has a different history from the city of Zagreb, even though they are both in Croatia. It was placed under various suzerain states and so this historical background of the city has led to its beautiful streets lined with historical buildings of various architectural styles, making it one of Europe's leading cultural cities, having been selected as the 2020 European City of Culture.

Figure 11: Benčić Art District

The Benčić Art District, located in the city centre, is named after Rijeka entrepreneur Rikard Bencic. The area is home to a cluster of museums. A sugar factory was renovated into a historical museum, and the surrounding buildings were converted into a children‘s museum and contemporary art museum. The district is being developed in an integrated manner. These are all historic buildings and the method used is to leave the external walls of the building and rebuild the internal components once they have been removed. The co-benefits for this method include the preservation of the historic townscape and the effective use of resources and waste reduction.

Figure 12: Incubation centres, Production Park Torpedo

Production Park Torpedo is a former torpedo manufacturing plant that has been refurbished as an incubation facility. The surrounding area used to be a prosperous industrial area, but many of the factories are now closed. The municipality is working on an industrial revitalisation by renovating the former factory into an incubation facility. The building can house 15 businesses, and includes a shared laboratory, and a 3D printer.

Rijeka is also home to “Energana”, a converted paper mill, which is currently under construction. Efficient use of brownfield sites, such as abandoned factories to promote a new industry was one of the take-aways from the tour.

With the decline of traditional heavy industries, Rijeka has sought new policies that encourage the development of innovative technologies and creative industries. For example, a network of start-up incubators, which initially targeted young participants under 30 years old, now offers specialized open-type educational programs for a wide age group. It offers financial support to the best teams in each age group, and has succeeded in expanding its mentoring network. The start-up incubators are: Startup Lite, Startup Creative and Startup Green.

Startup Lite consists of a series of workshops on ‘entrepreneurship’, and is intended for participants hoping to become entrepreneurs, entrepreneurs who have freshly started, and entrepreneurs who want to acquire new or additional knowledge about a particular topic.

Startup Creative is intended for entrepreneurs and future entrepreneurs in the field of cultural and creative industries. Unlike the regular incubation program, participation is lenient, without any criteria required for access to workshops. Participation in the programs, incubation, is completely free.

Startup Green is a program which offers a series of workshops in the areas of: clean and green industries; environmental protection; energy and energy saving; and sustainable development. The program is intended for entrepreneurs who want to develop new business in these areas, or improve their business models by applying the principles of sustainability and social responsibility, and/or through innovative applications, new solutions for energy efficiency.

Figure 13: Start-up incubators in Rijeka

RESULTS AND IMPACT

Kawasaki City

After the study tour, a training workshop on NbS was held targeting Kawasaki officials working on greening. Twenty-three officials attended and this led to their awareness of the topic. NbS has also been taken up by the Decarbonisation Working Group within the Construction and Green Policy Bureau, which is examining measures to decarbonise by promoting green infrastructure such as parks, introducing renewable energy to public spaces and facilities, and adopting environmentally friendly materials, among others.

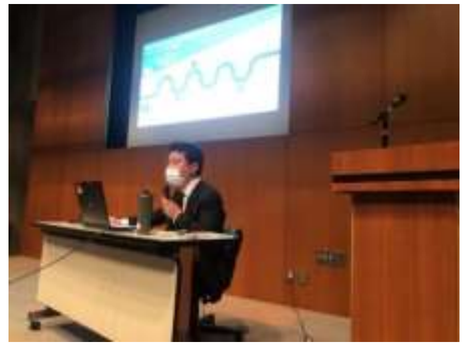

Figure 14: Kawasaki Training Workshop for government staff members

The Kawasaki Environmental Research Institute has been raising awareness on how to prevent heat stroke and its relation to climate change adaptation. As part of this activity, a seminar for citizens held in October 2023 on the topic of NbS. This year, the institute has started research studies to gain scientific knowledge on the benefits greening might have on heat effects.

On the occasion of the city's 100th anniversary in 2024, Kawasaki City will hold the ``National Urban Greening Kawasaki Fair'' as a symbolic project to disseminate ``Kawasaki-like greenery'' to the whole country. The fair will be held throughout the city with full participation from three venues in the city, and approximately 1.6 million people are expected to visit throughout the period. We aim to realize wellbeing by maximizing potential.

The Kawasaki Fair will be a significant opportunity to raise awareness of the importance of greenery and to encourage citizens to take action." The knowledge about Nbs gained from the study tour led the municipality to create new connections between local groups and the children and young people who will be responsible for the future of town planning.

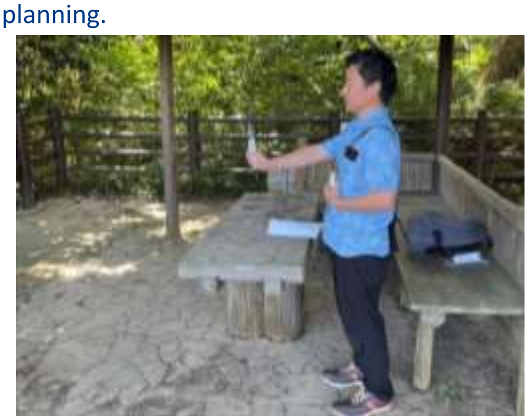

Figure 15: Survey of heat index in the green shade of Ikuta Green.

Figure 16: Collaborative flower seedling growing initiatives in Kawasaki

'Kawasaki will celebrate its centenary in 2024 with a major greening event. We want to use this milestone as an opportunity to realise the co-benefits

of climate change action and urban greening, drawing on lessons learned from Croatia." **Tetsuro Yoshida, Director, International Cooperation and Research Promotion Section, Kawasaki Environmental Research Institute**

The city of Zagreb

Shortly after the study tour, the City of Zagreb has organized a presentation to share the learnings from the visit, and from Kawasaki's experience. Experts from all relevant city departments (waste management, green area management, clean energy and others) were present to learn about the practices in Japan.

Since Zagreb is in a process of establishing a new system of waste management, that relies on recycling and reduction of communal waste, the experience with waste management in Kawasaki was very educational and well-timed.

In October 2023, the Mayor has signed a Letter of Intent with the European Investment Bank (EIB) and Zagreb Public Transport Company to provide technical assistance for the implementation of the transport decarbonization project in Zagreb. Three institutions will work together on the project, whereby the technical assistance will include an analysis of the public transport system of the City of Zagreb and a multi-year plan for the decarbonisation of the bus fleet. The goal is to switch the entire fleet of city buses to either electricity or liquid hydrogen in the coming years, using the funds from the European Commission.

The concept of productive urban/rural landscape – Satoyama, was very inspirational, as were the advanced technology examples and lessons from the visit will certainly continue to be applied in the future.

Figure 17: Presentation of the Kawasaki Study Tour upon the delegation's return

Figure 18: Presentation of the Kawasaki Study Tour upon the delegation's return

The city of Rijeka

After the study tour, the City of Rijeka discussed the learnings from Kawasaki, especially on their success in combining new technology, cultural heritage and nature for expanding the use of renewable energy sources.

In July 2023. the City of Rijeka, together with the County of Primorje-Gorski Kotar and the Technical Faculty in Rijeka, signed an agreement to cooperate on the development of smart systems for energy decarbonization. The goal is to create a CO_2-neutral area, and to reduce dependence on energy imports in the long term. Activities should include strategic energy planning to decarbonize the energy sector, actions that promote sustainable use of local natural energy resources, efficient use of energy, and actions that reduce the impact of fossil fuel use on the environment. Learnings from Kawasaki's waste treatment facilities, hydrogen related facilities and R&D, for example, will be referred and incorporated to match the local characteristics.

Kawasaki's entrepreneurial start-up infrastructure and programs were also an inspiration for Rijeka's future policies.

Learning of the waste management methods and business incubation initiatives from Kawasaki was a great stimulus for Zagreb and Rijeka. The knowledge gained from this study tour in the area of energy decarbonization, also had an impact on Rijeka and lead to the formulation of a new project for a CO_2-neutral area.
The NbS that Kawasaki learnt from the Croatian cities also had an impact on raising awareness of the city's greening staff and on the citizens of Kawasaki. Such momentum will be linked to the National Urban Greening Fair in Kawasaki to be held in 2024-2025.

KEY FIGURES.

Kawasaki City

23 people
The number of Kawasaki officials in the Greening Section who received training on NbS.

86 people
Number of participants in citizen seminars on climate change adaptation, including NBS.

3 venues
The number of large venues at the National Urban Greening Fair in Kawasaki to be held in 2024-2025.

1.6 million people
Estimated number of visitors to the National Urban Greening Fair in Kawasaki scheduled to be held 2024-2025.

1.5 million
Cumulative number of trees planted through Kawawsaki's citizen tree-planting campaigns by 2024.

80.2 %
Awareness of 'decarbonisation' among Kawasaki officials working in the area of construction and greening.

The City of Zagreb

1886 garden plots
in 15 urban gardens in the City of Zagreb

75 people
in Zagreb have learned about the practices of Kawasaki through the IURC programme

50 MW
by first quarter of 2025 of energy provided by the photovoltaic power plants on public buildings in the City of Zagreb

The City of Rijeka

10,000 customers
of thermal energy that will use district heating on fossil-free fuels in the future in Rijeka

770 users
of start-up programs in Rijeka that are open to cooperation

3096
New trees and bushes which will be planted in parks and on the roadside of Rijeka

LESSONS LEARNED

The City of Zagreb is in the process of upgrading the waste management system. Visiting the advanced waste separation and disposal methods in Kawasaki provided a useful reference and a learning opportunity for waste management in Zagreb.
- Officials of the City of Zagreb

Kawasaki has seen significant urbanisation in recent years. NbS is one of the most effective methods, in terms of climate change adaptation, the use of green infrastructure and co-benefits.
The approach of linking nature, including greenery, to the solution of various problems is one of the lessons learned this time.
Kawasaki City official

Rijeka and Kawasaki have a similar industrial structure and other similarities, and the collaboration between academia, business and government in incubation initiatives was impressive.
The potential for future linkages, such as business matching, was felt.
Officials of the City of Rijeka

The utilisation of brownfield sites such as former factory sites is a major issue in Kawasaki, which is also an industrial city. We felt that the renovation and flexible use of brownfield sites by Croatian cities could be effective in Japanese cities, including Kawasaki.
Kawasaki City official

THE IURC PROGRAMME.

The International Urban and Regional Cooperation (IURC) programme enables cities in different global regions to link up and share solutions to common problems. It is part of a long-term strategy by the European Union to foster sustainable urban development in cooperation with the public and private. Through engaging in IURC, cities will have the chance to share and exchange knowledge with their international counterparts, building a greener, more prosperous future.

The IURC programme is an opportunity for local governments to learn from each other, set ambitious targets, forge lasting partnerships, test new experiences. Its activities will support the achievement of policy objectives as well as Its activities will support the achievement of policy objectives as well as major international agreements on urban development and climate change, such as the EU Urban Agenda, the UN Sustainable Development Goals, and the Paris Agreement.

Authors: (in alphabetical order)

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