Development Knowledge of Toyama City

WORLD BANK GROUP

Tokyo Development Learning Center

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1. Introduction

OBJECTIVES AND MAIN THEMES OF THIS REPORT

Introduction: As no prior comprehensive write-up exists on the development story of Toyama City, the World Bank through the Tokyo Development Learning Center (TDLC) has commissioned this study to undertake a major literature review, conduct key informant interviews with stakeholders involved, and collect relevant maps and diagrams to best illustrate the story for an international audience.

In coordination with Toyama City's Office of Strategic Planning and Resilience (SPR), a series of around 20 stakeholder interviews were undertaken to help inform the report. This included meetings with the honorable Mayor Mori, multi-disciplinary representatives from various Toyama City departments, academia and the private sector.

Aims and Objectives: The overall aim of the study of Toyama City is to report how various urban development challenges were addressed in the past, and how these experiences could be transferred / translated to other cities in the world. In realizing this study aim, several objectives or research areas are listed below.

- To identify key challenges that the city faced, so that it is fully understood how those challenges were resolved and the processes that were required;

- To understand the extent to which a participatory approach of knowledge sharing and consultation with both the public and private sectors contributed to the development of the city;

- To understand the extent to which political will and the vision of key individuals contributed to the city's development;

- To identify approaches and lessons that can replicated to other cities, or the environment (institutional, regulatory, etc) that needs to be created for such approaches;

- To understand the extent to which the driver of Toyama City's urban development strategy was based on the challenge of an ageing population, and therefore the applicability to developing countries with different demographics.

Report Structure: Following this introduction, documentation of Toyama's development knowledge will be introduced under the main areas of comparative advantage put forward by Toyama for the CPP:

- Chapter 2 Compact City Planning;
- Chapter 3 Inclusive Community Planning;
- Chapter 4 Disaster Risk Management; and
- Chapter 5 Waste Management.

In addition, Chapter 6 Effective Resilience Management Approach, profiles more recent achievements of the city through is resilience planning with 100RC as well as an insight into future direction through a summary of the recently prepared 30-year "Resilience Strategy".

Main Themes to be Explored: Through the World Bank's work with Toyama City thus far, the following key themes have been identified that highlight Toyama's experience, successes and key strengths in its urban development approach. They are defined below and examples will be highlighted in each chapter in this report through a selection of case studies:

1. **Vision and Senior Leadership:** Underpinning Toyama's development has been strong leadership with clear vision setting and dissemination to both city departments and the public.

2. **Innovative mindset:** Whilst Toyama may appear to have locational disadvantages being distant from either of the two major economic agglomerations in Japan – Tokyo and Osaka, in fact this has led to a longstanding culture of innovative. Historically Toyama has been an incubator for innovative ideas and entrepreneurs. Toyama also has one of the highest ratios of women in the workforce of all municipalities in Japan. Examples of projects and initiatives that demonstrate an innovative mindset will be showcased.

3. **Strong partnerships with stakeholders:** The report will set out a series of city planning and development initiatives that demonstrate strong connection between the public and private sectors and citizens.

4. **Multiple benefits from one policy:** at the heart of Toyama's urban development planning is seeking multiple payoffs from one policy. Each policy intervention is carefully crafted to have multiple payoffs. For instance, revitalizing public transportation can reduce Greenhouse Gas (GHG) emissions; improve accessibility for the elderly; increase public transportation ridership; revitalize the Central Business District (CBD); reduce city budget costs; and encourage tourism.

5. **Soft power silo-breakers:** The report will showcase Toyama City's unique integrated planning model centering on its Office of Strategic Planning and Resilience (SPR) which has helped reduce "silo" mentality between heads of the city departments, which is an issue that many cities struggle with. Rather than assembling a superpower unit to bring different silos together, Toyama has a very "soft" yet effective approach to string inter-sectoral channels together which will be detailed in this report.

6. **Developing community bonds:** Finally, Toyama's urban development model includes a wide range of priority initiatives that encourage and nourish community bonds, particularly inter-generational bonds in the context of an ageing society. A people-focused approach is also at the core of its resilience planning efforts.

TOYAMA CITY AND WORLD BANK PARTNERSHIP

City Partnership Program Background: Japan is home to a number of cities offering world-class and unique "best-practice" experiences and solutions on a variety of development challenge facing cities around the globe. As part of an ongoing partnership with the Government of Japan to share development experience through the World Bank's Tokyo Development Learning Center (TDLC) TDLC, the World Bank has introduced a new City Partnership Program (CPP). It is one of the first major initiatives directly engaging with multiple subnational entities in a Bank donor country and involves collaboration with selected cities in Japan to conduct joint research, identify good practices, share knowledge and experience, and identify opportunities to link Japanese expertise with project-level engagements in developing countries.

Toyama City and the City Partnership Program: In July 2016, following an open call for expressions of interest and evaluation by a selection committee comprised of technical specialists from the World Bank and relevant Japanese organizations, the cities of **Toyama**, Kitakyushu, Kobe, and Yokohama were selected as the first batch of cities for the new program. For each city, the World Bank and the local government identified a series of thematic experience and solution areas that match the demands of cities in World Bank client countries.

The key thematic areas of comparative advantage put forward by Toyama for the CPP are:

i. Compact cities;
ii. Disaster risk management;
iii. Ageing and accessibility; and
iv. Waste management.

Nonetheless, partnership activities will not be limited to these areas and both sides will seek to expand cooperation beyond these areas.

Memorandum of Understanding (MOU): Then in November 2016, the World Bank and the City of Toyama announced their collaboration plans through the signing of a Memorandum of Understanding (MOU) to intensify collaboration to conduct joint research, identify good practices, share knowledge and experience, and identify opportunities to link Japanese expertise with project-level engagements in developing countries.

Memorandum of Understanding (MOU) Signing

The MOU commits both the stakeholders to document experiences and lessons on various development challenges and solutions areas through joint research and through knowledge delivery and learning activities designed to share experience around specific development solutions. The collaborators will also engage in capturing and documenting practical, "how to" experiences from relevant agencies in Toyama City, and producing outputs such as knowledge notes, toolkits, good practice guides and videos.

Knowledge Exchange Events: One of the first collaborations between Toyama City and the World Bank was the jointly held Technical Deep Dive (TDD) on "Compact but Livable Cities" and the Resilient Cities Summit from October 30 to November 4, 2016 to discuss compact cities, explore policy decisions and share examples of successful interventions. TDDs are an innovative approach to knowledge exchange, comprising workshops, site visits, peer-to-peer knowledge sharing, and action planning, which aim to foster operational development of World Bank-funded projects on specific issues.

The intensive five-day TDD in Tokyo and Toyama on Compact but Livable Cities was in collaboration with the Government of Japan, City of Toyama, Rockefeller Foundation, Singapore's Centre for Livable Cities (CLC), Organization for Economic Cooperation and Development (OECD) and New York University.

Over 55 participants including city government officials, line ministries and others from 12 country delegations and World Bank Urban and Transport Task Team Leaders gathered together with Japanese and global experts to discuss the development of compact cities, explore policy decisions and share good practices for the efficient implementation of compact cities approaches.

A portion of the TDD was held in the City of Toyama, including a series of peer-to-peer learning sessions

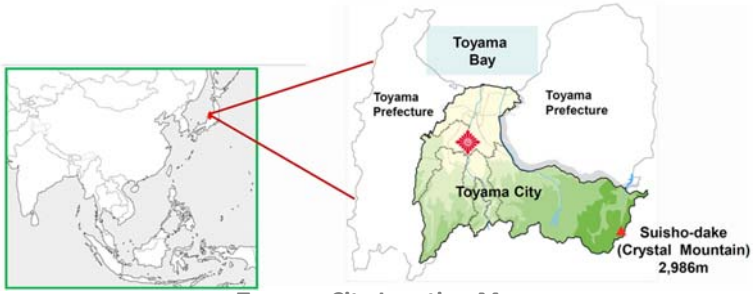
and technical presentations. The aforementioned MOU was also signed during this event. Additionally, the TDD delegation also took part in the Resilient Cities Summit held in Toyama City jointly organized by the 100 Resilient Cities, and attended study tour visits across the city including to the Toyama Eco-Town Industrial Park.

World Bank Technical Deep Dive Event in Toyama

Furthermore, the World Bank and Toyama City collaboration is a reciprocal relationship that also allows for representatives and engineers from Toyama City to visit other cities for knowledge sharing. In particular, Toyama City is benefiting from the World Bank's leading expertise in urban development and resilience.

BACKGROUND AND HISTORY OF TOYAMA

Overview: Located nearly 250 km northwest of Tokyo on the central Japanese island of Honshu, Toyama City is a key center for high tech, robotics, banking, and pharmaceutical industries, and is also home to major hydroelectric power industry.



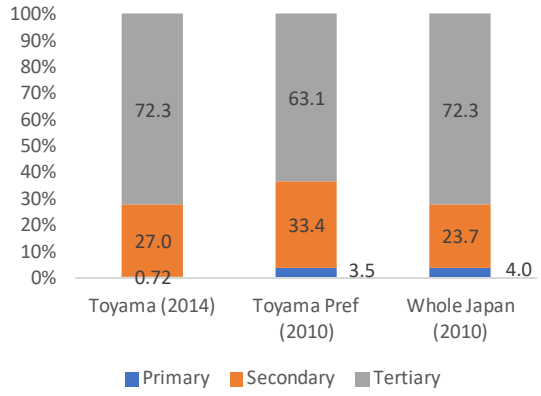
Toyama City Location Map

The City's natural setting is on an alluvial plain, with two major rivers and eight minor rivers, situated between the 1,200-meter-deep waters of Toyama Bay and the 3,000 meter peaks of the Northern Japan Alps. It covers a large area of 1,242 square kilometers with the land ranging from sea level at Toyama Bay to the 3000 meter or 10,000 feet high crest of the Northern Japan Alps, which is only 34 km from the city center. The recorded annual snowfall on the Northern Japan Alps is among the highest in the world. The heavy snowmelt and loose volcanic soils under the city can combine to produce major floods. In addition, 70% of city lands are forested and there are abundant agricultural lands within the city limits.

Socio-Economic Profile: In 2012, the gross domestic product (GDP) of Toyama City was 1,888 billion yen and growth rate was -1.8%. The city income per person was 3.11 million yen, which is more than 10% higher than the national average. After the rapid growth of the 1980s, the income per capita was of approximately 3 million yen stabilized. The majority of income comes from manufacturing (19.6%), services (18.1%), whole sale and retail (13.1) and real estate (12.6%) while earnings from agriculture are minimal (0.5%).

Toyama Prefecture and Toyama City regularly earns high scores in quality of life indicators in Japan. The average income of worker's household per month in Toyama City is always ranked highly. In fact, the income in 2013 was 599,995 yen (national average 523,589 yen), which was the 3rd highest in Japan. The average number of workers in a household is higher in Toyama City (1.97 per household, national average 1.70), which increases at household income. Toyama also has the highest ratio of women in the workforce of all municipalities in Japan.

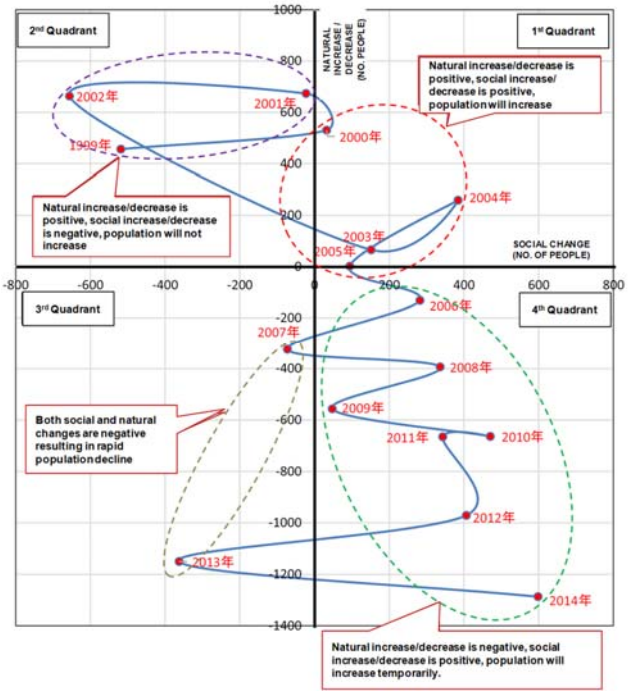
The graph below further outlines the labor characteristics of Toyama City including 72% within tertiary industry which the same as national average and 10% higher than the prefecture average. In addition, Toyama City has 27% working in secondary industries, 6% lower than the prefecture average and 3% higher than the national average. Primary industry only accounts for 0.7% which is around 3% lower than the national picture.



Source: City of Toyama 2014, Japan National Census 2010

Labor Characteristics of Toyama City

Demography: The following figure from the Toyama City Population Vision (2015) analyzes the influence of natural variation and social change on total population, under quadrants plotting the values of each year, with natural change on the vertical axis and social change on the horizontal axis.



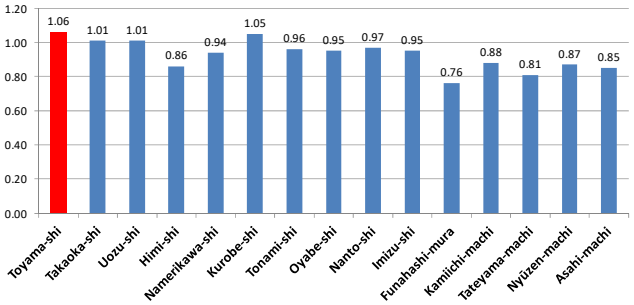
Source: Toyama City Population Vision (2017)

Effect of Natural change and Social Change on Total Population in Toyama

As shown in the “second quadrant”, between 1999-2002 population growth was largely stagnant due to natural increase begin offset by the social change decrease.

From 2003 to 2005, the city moved to the "first quadrant", and the population increased steadily due to synergies of natural increase and social increase. From 2006, it moved towards the "fourth quadrant" and population decline continues. It is said that population deceleration will accelerate by the synergy of natural reduction and social reduction when entering the "third quadrant" which was observed in Toyama in both 2007 and 2013.

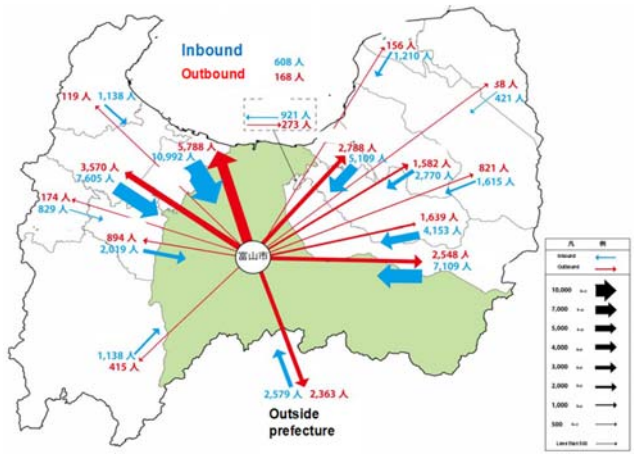
The population ratio in the daytime in Toyama city in 2010 was 1.06 which is the highest level compared to other adjacent cities, towns and villages in the prefecture.



Source: Toyama City Population Vision (2057). Data from 2010 Census.

Ratio of Population in the Daytime and in the Nighttime of Municipalities in Toyama Prefecture

As introduced in the figure below, when comparing commuting patterns (including students), there is a greater proportion of inflow populations from the cities, towns and villages to the city of Toyama. This is especially the case from Imizu City and Tateyama Town, where the inflow population to Toyama City greatly exceeds the outflow population from Toyama City.



Source: Toyama City Population Vision (2015). Data from 2010 Census.

Map of Commuting Patterns (including students), Toyama City

Historical Context: Whilst Toyama may have appeared to have had locational disadvantages such as being isolated due to its geography of severance of the sea and mountains, as well as being distant from major economic agglomerations in Japan, in fact this has led to a longstanding culture and history of innovative.

Known in Japan since medieval period as the “City of Medicine” when it was the center for all traditional medicine in Japan, it has continued to develop as a thriving pharmaceutical, biotech and hi-tech city, and today is one of the foremost coastal cities on the Japan Sea.

During the Edo Period (1603 – 1868), Toyama became the center for traditional Chinese and Japanese medicine which was distributed

throughout the country. This came with a unique marketing system in which a vendor leaves a medicine chest of over-the-counter items at a customer's home on a "use first, pay later" basis. This also contributed to Toyama's longstanding outward looking approach and entrepreneurship.

After the Meiji restoration in 1868 and the modernization of Japan, abundant water and hydroelectric power supported the development of heavy industry, particularly aluminum production and specialized steel products.

Toyama subsequently became the most bombarded Japanese city in World War II, when 99% of the city center was destroyed. However, recovering from WWII, Toyama became a leading city on the Japan Sea Coast.

Urban Planning and Development Context: Toyama City has a highly stable political environment. The city has been led by the current Mayor, Mr. Masashi Mori, since January 2002, having been re-elected for four consecutive 4-year terms.

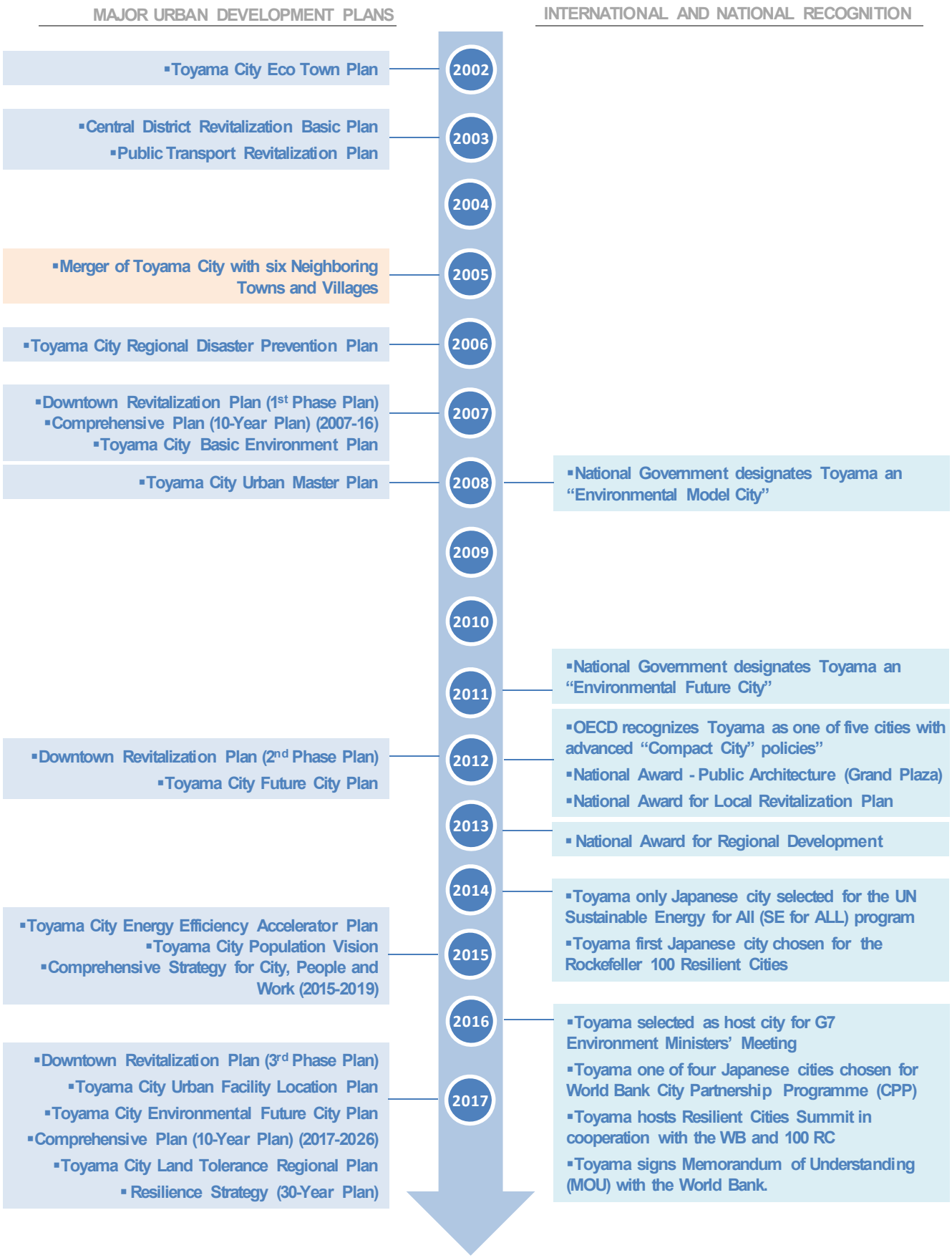
To reduce costs, increase efficiency and transfer more administrative control to the local level, the national government of Japan instituted a program to encourage municipalities to merge, especially in rural areas. Since 2005, Mayor Mori has overseen the development of the newly incorporated greater city of Toyama into a leading compact city. In April 2005, 6 smaller municipalities (Osawano Town, Oyama Town, Yatsuo Town, Fuchu Town, Yamada Village and Hosoiri Village) merged with Toyama City, bringing the population to approximately 420,000 inhabitants.

The new "Toyama City" was established by an equal merger, with the city hall located at the Toyama City Hall and comprehensive administrative centers established in the other six towns and villages.

This consolidation of the original seven municipalities vastly increased the scope of responsibility for the administration of the new city. For example, the largest of the former municipalities, Toyama City, comprised 209 square kilometers and a population of 320,374, while the new consolidated Toyama City had a 30% higher population of 418,000 but covered 1242 km2, an area 5 times larger than the largest of the pre-consolidation municipalities. This presents both a management challenge and an opportunity for government efficiency, financial savings and greater resilience.

The successful merger was also a catalyst for fostering a culture of strong stakeholder partnerships and collaboration, innovative thinking and silo-breaking.

Outline of urban development plans and achievements: Over the past decade, Toyama has set out a series of comprehensive and integrated urban development plans as summarized in the timeline overleaf. The major plans and resulting international and national awards and recognition will be introduced throughout this report.



Toyama Urban Development Timeline – A Selection of Major Plans and Recognition

2. Compact City Planning

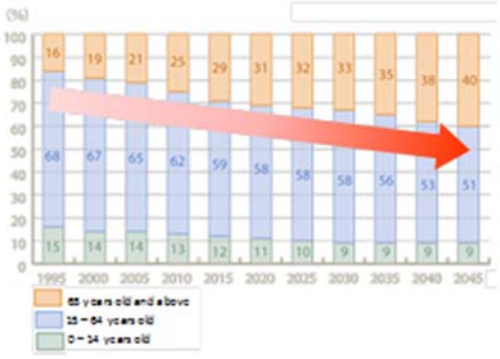
BACKGROUND AND CHALLENGES

Introduction: Comprehensive compact city development goes beyond addressing spatial issues. Compact city development per se is not the end but the means – it is a way to address infrastructure provision in an economically efficient way in an aging society, and can also be a welfare policy and is important for inter-generational integration. It is about bringing together inter-sectoral issues and not only about spatial development. Toyama provides a good case study of this approach as it has set about addressing a diverse range of issues through comprehensive and integrated urban and transportation planning policies. The city's success in these efforts is well-known among policymakers and researchers.

Issues and Challenges: In the 2000s, Toyama City was facing a multi-faceted array of issues and challenges including**:**

(1) Low population density: The city has one of the lowest densities of all prefectural capitals, with a backdrop of a large habitable area across the Toyama plain, a strong road network and marked prevalence of detached housing.

(2) Ageing and declining population: Like other Japanese cities, an ageing society and declining population forced Toyama to rethink its urban planning and development approach.



Toyama City's Ageing Population

(3) Car dependence and poor accessibility: whilst the population has been declining, private car use and dependence has been increasing, resulting in increased CO2 emissions and critically further deterioration of public transport services. For example, Japan Railways (JR) passenger numbers declined by 30% between 1989-2008. The number of bus routes reduced by 70% over the same period. Furthermore, due to the ageing population the proportion of senior citizens with reduced accessibility due to lack of a private car was a growing concern.

(4) Declining CBD and urban sprawl: Greenfield development in suburban areas and weakening of the Central Business District (CBD) reduced the attractiveness of the city as a whole. Combined with increased motorization and urban sprawl, the emptying of centers increased.

(5) Higher administrative costs: Toyama's population decline is likely to result in higher per capita maintenance costs for urban infrastructure and facilities. The city was aware that continued urban sprawl would also lead to higher costs for infrastructure investment and maintenance.

STRATEGIES ADOPTED

Background: Toyama began making progress in 2003 through the preparation of a Central District Revitalization Basic Plan (2003) and Public Transport Revitalization Plan (2007), following by the beginning of the delivery of key projects such as Toyama LRT – "Portram" in (2006).

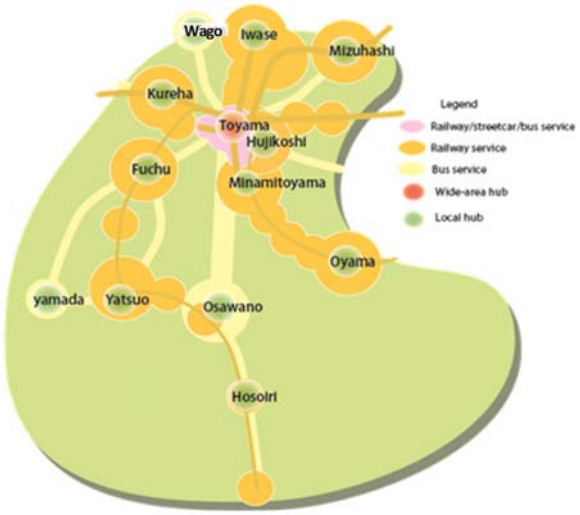
Nationally, the challenges for central urban areas included year on year decreases in resident population, retail sales, pedestrian volumes were growing, and large scale commercial facilities, hospitals etc. were being re-located into the suburbs. Therefore, the "Downtown Revitalization Act" was revised in August 2006 to include the

establishment of a certification system by the Prime Minister (Certified Basic Plan or "Downtown Revitalization Plan") and enhancement of supporting measures.

(1) Downtown Revitalization Plan (1st Phase Plan: February 2007 - March 2012): In response to the amendments of Downtown Revitalization Act in 2006, Toyama City established a Central Urban Area Revitalization Council composed of the Toyama Town Management Organization and Toyama Chamber of Commerce and Industry. The Downtown Revitalization Plan set out the city's compact city goal to create a sustainable, compact future city which addresses the needs of its decreasing and aging society. The associated compact city vision set out three main pillars to:

1) **Establish a compact city based on efficient public transportation** – including revitalization of public transportation and concentrating city functions in the center of the city and along the public transportation lines
2) **Increase the quality and range of civic life amenities** – including reducing private car dependency and creating more opportunities for the elderly to go out.
3) **Take full advantage of the city's strengths –** including nurture local industry - such as the pharmaceutical industry, increase the use of renewable energy, and attracting new businesses & create new industries.

To achieve this, the plan set out Toyama's Compact City model which sought to enhance mobility, improve public transport and concentrate urban functions in the city centre and along railway and bus routes. It defined a dense centre and a series of dense hubs interconnected by strong public transport as below.



Toyama's Compact City Model

On February 8, 2007, Toyama received the first national certification and was then able to promote the projects listed in the basic plan, and citizens, businesses and administrations came together to work towards promoting the revitalization of the central urban area. This basic plan was also then incorporated into the Toyama Urban Master Plan (2008).

Some of the key projects such as "Portram", City Centre Loop Tram Line – "Centram", revitalizing the City Center (inc. Grand Plaza), promotion of residence in the city centre and along public transport lines are set out as case studies in the next section of this report.

From 2006 to 2010 after the Downtown Revitalization Plan approval, the pace of population decrease was gradually alleviated by 1.87% over 4 years (average 0.47% per year).

NATIONAL RECOGNITION

2008 National Government designates Toyama as one of the first seven "Environmental Model Cities" due to its compact city policy and efforts to reduced CO2 emissions
2012 National Award - Public Architecture (Grand Plaza)
2012 National Award for Local Revitalization Plan

INTERNATIONAL RECOGNITION

2012 OECD recognizes Toyama as one of five cities, (along with Melbourne, Vancouver, Paris and Portland) with advanced "Compact City" policies.

(2) Downtown Revitalization Basic Plan (2nd Phase Plan: April 2012 to March 2017): Following the end of the planning period of the first phase plan, Toyama newly formulated the second stage Toyama city Downtown Revitalization Plan, submitted to National Government in February, 2012, and subsequently approved in March 2012.

In the second phase of the plan, Toyama aimed to further revitalize the central urban area by encouraging private investment by increasing public investment in urban renewal. It also continued focus on essential facility development for the city.

The plan recognized the advantages of private enterprises, non-profit organizations (NPOs), universities, and community based organizations (CBOs) to cooperate with the government on both soft and hard infrastructure projects that are carried out to further enhance the effectiveness of the city's facilities.

NATIONAL RECOGNITION
2013 National Award for Regional Development

INTERNATIONAL RECOGNITION
2014 Toyama first Japanese city chosen for Rockefeller 100 Resilient Cities Program
2016 Toyama City selected for the World Bank City Partnership Program (CPP) with Compact City planning identified as one of its areas of comparative advantage

(3) Downtown Revitalization Basic Plan (3rd Phase Plan: April 2017 to March 2022): Toyama City has most recently formulated the third phase "basic plan for Downtown Revitalization in Toyama City", receiving national certification on March 24, 2017.

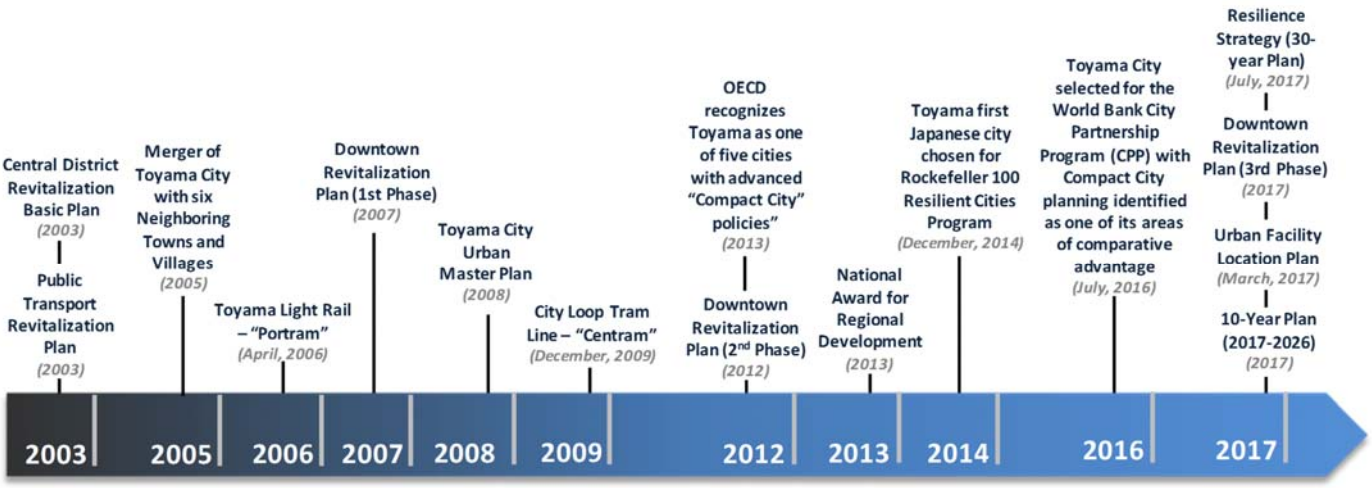
In this 3rd plan, the city will promote integrated town development on both the north and south sides of Toyama Station, and improving the north-south connectivity of the tram network and therefore mobility of the entire central urban area. It will also continue to strengthen collaboration among stakeholders including private business operators and NPO corporations.

In addition, it also looks to maximize the growing strengths in Toyama of more convenient public transportation with more concentrated medical institutions, shopping districts, cultural facilities. This accumulation of urban facilities enables every generation to participate with peace of mind in employment and social activities, such as choosing a good quality of living according to their respective life stages, from the perspective of "extension of healthy longevity" and "quality of life (QOL)."

(4) Urban Facility Location Plan (2017): Nationally, it is also recognized that medical and welfare facilities, commercial facilities and residences should be located together and that residents including the elderly need optimum access to services by public transport. The Government emphasized the importance of a comprehensive and integrated planning for welfare and transportation, proceeding with the idea of a "compact city plus network".

Against this backdrop, the amendment of the *"Urban revitalization special measures law"* was enacted in August 2014 to promote compact city planning through partnerships with residents and the private sector and the *"Urban Facility Location Plan System"* was established. Municipalities, based on the provisions of "Urban revitalization special measures law" Article 81, paragraph 1, can decide the optimized location of housing and urban function enhancement facilities (necessary facilities for common welfare or conveniences such as medical facilities, welfare facilities, commercial facilities and other urban facilities, which greatly contributes to the promotion of urban functions) and create an *"Urban Facility Location (location optimization) Plan".*

The **Toyama City Urban Facility Location Plan** was formed in March 2017, and Toyama City is playing a model city role for this national system. In this way, in response to these national laws, and other times of its own accord, Toyama City has made significant progress and successes in creating a stronger urban center, delivering a step-change in accessibility and reducing sprawl.



Toyama Urban Development Timeline – Compact City Planning

CASE STUDIES AND LESSONS LEARNT

CASE STUDY (1) – TOYAMA LIGHT RAIL TRANSIT (LRT): "PORTRAM"

- ✓ *Multiple benefits from one policy*
- ✓ *Strong partnerships with stakeholders (private sector)*
- ✓ *Innovative mindset*

Background: The local JR Port Line (Toyama-ko Line) originally opened in 1924. During and after WWII, the line ran from JR Toyama Station to Toyama Port along the Fugan Canal, a key transport route for cargo from the port. However, over the years it became ill-favored and had declining passengers due to mainly to infrequent services.

Therefore, in 2006 as part of Toyama's efforts to revitalize public transportation through compact city planning, the JR Toyama-ko Line was revitalized as a tram line and re-introduced as Japan's first full scale Light Rail Transit (LRT) system – "Portram".

Portram, Toyama City

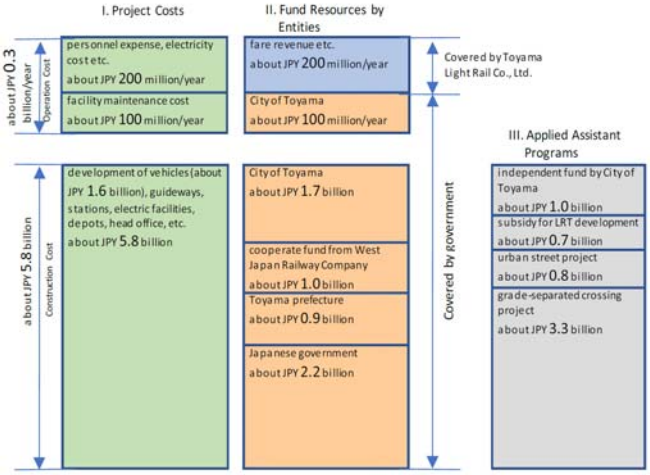
The formation of the LRT network aimed to deliver a shift from the current automobile dependency and create a city where key amenities are all within walking distance.

Approach: In 2006, following the responsibility for the Toyama-ko line being transferred from West Japan Railways Company to the semi-public sector, Toyama Light Rail Co., Ltd, it was re-introduced as Japan's first full scale LRT system – "Portram". Stretching from Toyamaeki-kita to Iwasehama, it comprises a total length of 7.6 km with 6.5 km railway and a section of 1.1 km tramline and the travel time of the route is approximately 25 minutes.

The delivery of the LRT was achieved by adopting a two tiered public-private partnership in which the public sector assumed the entire expense for the railway facilities and train cars (installation and the cost of maintenance after opening) and the private sector was responsible for operations.

The public sector covers all the construction costs of the LRT system, including vehicles, railways, and depots. A subsidy from the central government was used for construction costs to reduce the city's burden. Initial investment for the Toyama-ko line from the prefectural government amounted to 16% and that from the city government was 33%. The national government also subsidized the line significantly as it is considered a project of the Ministry of Land Infrastructure and Transport (MLIT). The maintenance cost of these facilities also covered by the public sector.

The transit operator, Toyama Light Rail Co., Ltd., was founded by several local governments and private companies and it recovers operation costs from fare revenues. The city filled the capital funding gap by arranging the national government's road improvement programs, contributions from transit companies. The city also saved the land acquisition costs with the former JR railway's right of way.



Source: Urban development department, City of Toyama

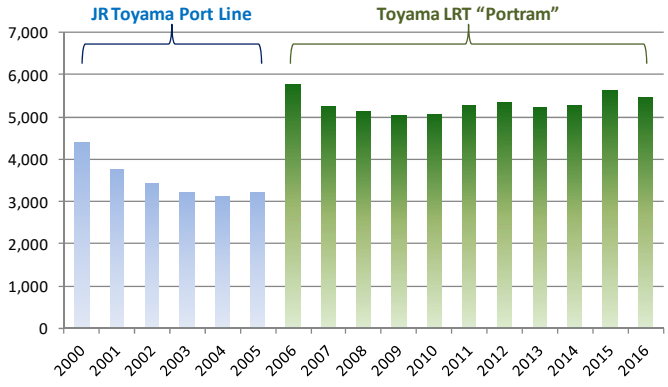
Cost breakdown and allocation of Toyama LRT

A sizeable step-change in service and operation levels was delivered: super-low floor cars were introduced; five new stations were added; service hours were extended; and service frequency was increased nearly 3.5 times. Other improvements were introduced included barrier-free infrastructure at stations, vibration reduction and green verge, staffed stations, IC card tickets and a flat fare system.

In addition, supporting projects to improve accessibility to the LRT such as a feeder bus system connecting to the LRT every 30 minutes on weekdays and every 60 minutes on weekends, park and ride, and bicycle parking at stations was also

delivered. Furthermore, in collaboration with public transport operators, the city has introduced a discount "Odekake" pass for people aged 65 years and older.

Whilst the passenger numbers are relatively modest and have seen little increase over the projects lifespan thus far, after the opening of the Toyama Light Rail, weekday users did significantly increase by around 220%, and by around 315% on holidays. As of 2016 daily ridership has increased to 5,479 (3,203 before LRT).



Ridership (Passengers per day)

Toyama City's surveys have also shown that mode shift has been achieved with around 12% of users having moved out of their cars. The number of senior citizens using the LRT has also increased, particularly during the daytime, suggesting a change in lifestyle and increased activeness and mobility. In addition, in the early years of the project Toyama City surveyed migration patterns along the corridor between 2003-2009 and migration into the target area increased from 6.7% to 10.6% (OECD, 2012).

Lessons Learnt: Toyama City's "Portram" provides the first complete LRT network in Japan and first public/private tram line, therefore demonstrating a good example of strong partnerships with stakeholders. Importantly, it is a strong policy measure that is delivering multiple benefits including: reducing Greenhouse Gas (GHG) emissions; improving accessibility for the elderly; increasing public transportation ridership; reducing the dependence on the private car supporting compact city development; revitalizing the Central Business District (CBD); reducing city budget costs; and encouraging tourism.

Whilst the project requires subsidy from the government, it is a focal point of the compact city policy of Toyama and part of a holistic and inclusive approach to sustainable urban development and accessibility for all.

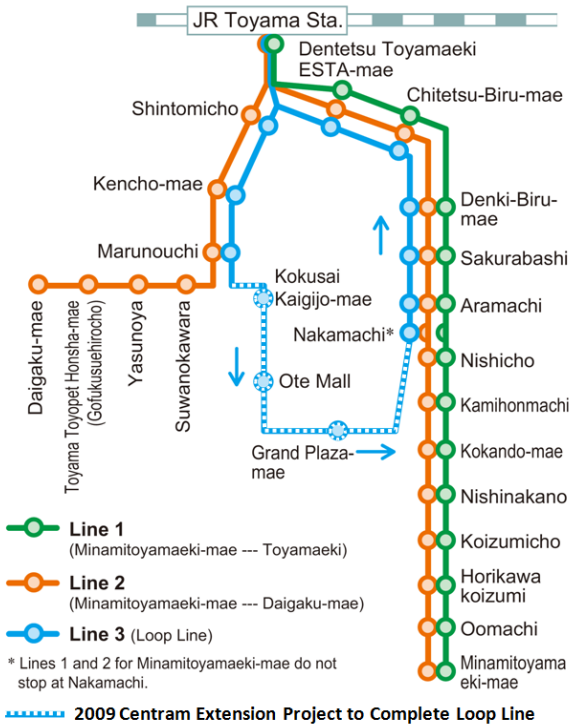
CASE STUDY (2) – TOYAMA CITY TRAM LOOP

LINE: "CENTRAM"

- ✓ *Multiple benefits from one policy*
- ✓ *Strong partnerships with stakeholders (private sector)*
- ✓ *Innovative mindset*
- ✓ *Soft power silo-breakers*

Background: Toyama's vision to establish a compact city through development of efficient and accessible public transportation led to further development of the network. The goal was to deliver a shift from the current automobile dependency and create a city where key amenities are all within walking distance. Following the implementation of the aforementioned Toyama Light Rail (Portram), the strategy then moved onto extending the existing city centre tram line to form a loop line to enable the downtown to become more convenient, accessible and desirable.

Approach: The "Centram" city tram loop line was created by providing a 0.9 km tram line extension with three new stations in order to reactivate the central downtown area and make it more accessible for citizens. The existing two tram routes were then supplemented by an additional 3.4 km anti-clockwise loop service as shown below. The Loop Line started operating in December, 2009.



Centram Network (inc. Loop Line), Toyama City

Integrating the tram line with the existing road space was an important aspect of the design to create a more attractive urban space. Three new

low-floor trams were also put into operation to allow access for all.

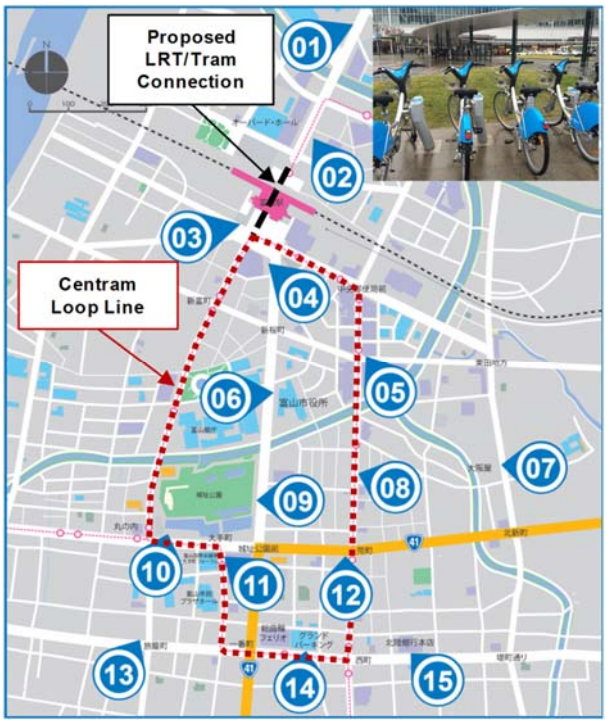
"Centram" Tram Loop Line, Toyama City

Furthermore, the project was Japan's first two-tier system where the city government funded the installation including laying railroad tracks and buying new tramcars, while the private sector (Toyama Local Railway Ltd.) was responsible for operation.

Now that the line has become established it has increased ridership and accessibility in the downtown area, and contributed to the revitalization of both the city centre and the entire city tram system. Since the loop line opened, overall tram use in Toyama city is up 10%. Approximately 70% of Loop Line passengers are female. On weekdays, the number of elderly female passengers has greatly increased. The Loop Line has become a dependable means of daily transportation, especially for elderly female passengers.

Toyama is also taking steps to deliver public transport integration and further revitalization. By 2019 a project to connect the Portram with the Centram under the elevated structure of the Shinkansen station is planned, in order to offer a fully comprehensive an integrated system and maximize north-south connectivity.

Another integration measure was the development of Japan's first full scale bicycle share scheme. Subsidized by the Ministry of the Environment and operated by Cyclocity inc, there are now 20 bicycle stations around the City Tram Loop Line contributing to revitalizing the centre, improving accessibility and reducing CO2 emissions.



Bicycle Share Scheme and City Tram Loop Line

Lessons Learnt: The City Tram Loop Line project is an important policy measure and underpins Toyama's holistic approach in creating a sustainable, resilient and compact city. It is helping to address the aforementioned three dimensions of sustainable development of Toyama's Compact City Strategy in:

a) creating "environmental value" through reducing CO2 emissions and supporting modal shift;
b) creating "social value" through improving accessibility and mobility and increasing social inclusion; and
c) creating "economic value" through improving access to jobs and revitalizing the city centre.

Therefore, similarly to the Portram project example, it is seeking multiple payoffs from one policy.

It could also be concluded, that projects such as the City Tram Loop Line as part of downtown revitalization provide a platform for silo-breaking, since they are projects that provide a tangible focal point for integrated planning and require cross sector working to be successfully delivered.

CASE STUDY (3) - REVITALIZING THE CITY CENTER

- ✓ *Multiple benefits from one policy*
- ✓ *Strong partnerships with stakeholders*
- ✓ *Developing community bonds*

Background: In addition to delivering comprehensive public transport improvements including a step-change in accessibility in the CBD, another core component of Toyama's Compact City approach is revitalizing the city centre making it a more attractive and an active hub. Similar to other regional cities, Toyama's city center experienced some degradation in the past as the city's population decreased and sprawl to the suburbs grew.

Approach: Therefore, Toyama has taken steps to provide integrated development in the downtown area including large commercial centers and multipurpose and all-weather plazas, and other key facilities. These have been delivered alongside the aforementioned public transport and accessibility improvements. A selection of showpiece examples is introduced below.

(1) Grand Plaza: In 2007, the city developed an all-weather multipurpose open space named the "Grand Plaza". It is equipped with a large-sized screen, an elevating stage and has become a focal point for large diverse events and culture in the downtown area. In fact, more than 100 events are held at the Grand Plaza each year.

Grand Plaza and the Centram Loop Line

The Grand Plaza initiative integrated two subprojects: "Sogawa-dori South District Urban Redevelopment Project (Daiwa Toyama Department Store, Sogawa Ferio)" and "Nishicho / Sogawa Area Urban Redevelopment Project (shops / multilevel parking lot)." The Grand Plaza project also has key soft components as well. The city, as the maintenance body, has worked on holding a "Grand Plaza Matching Project" where they ask "idea-rich" citizens to join the project such as individual shopkeepers etc. as business proposer, who want to do corporate PR through social contribution as the sponsors. This type of program of strengthening partnerships among citizens and the private sector continued over 3 years.

(2) Toyama Glass Art Museum and other facilities: The Glass Art Museum Development was first identified in concept form in 2001 as part of the plan for the "Basic Idea of Glass Museum of Toyama" and was then later included in plan for "Toyama City as Glass Town Planning" in 2009. In 2010 the "Basic Concept on Improvement of Public Service Project in Nishicho Area" was formulated and subsequently in 2012 the "Nishicho-Minami District Utility Facility Improvement Plan" was agreed. Then in 2015 the Toyama Glass Art Museum was opened.

Located 2 minutes' walk south east from the Grand Plaza, the museum designed by Japan's famed architect Kengo Kuma, was opened in August 2015. It is a mixed use building including Toyama Glass Art Museum, Municipal Library, and a private bank. As the largest glass art museum in Japan, the museum exhibits a monumental installation by the American contemporary glass art virtuoso Dale Chihuly.

Toyama Glass Art Museum

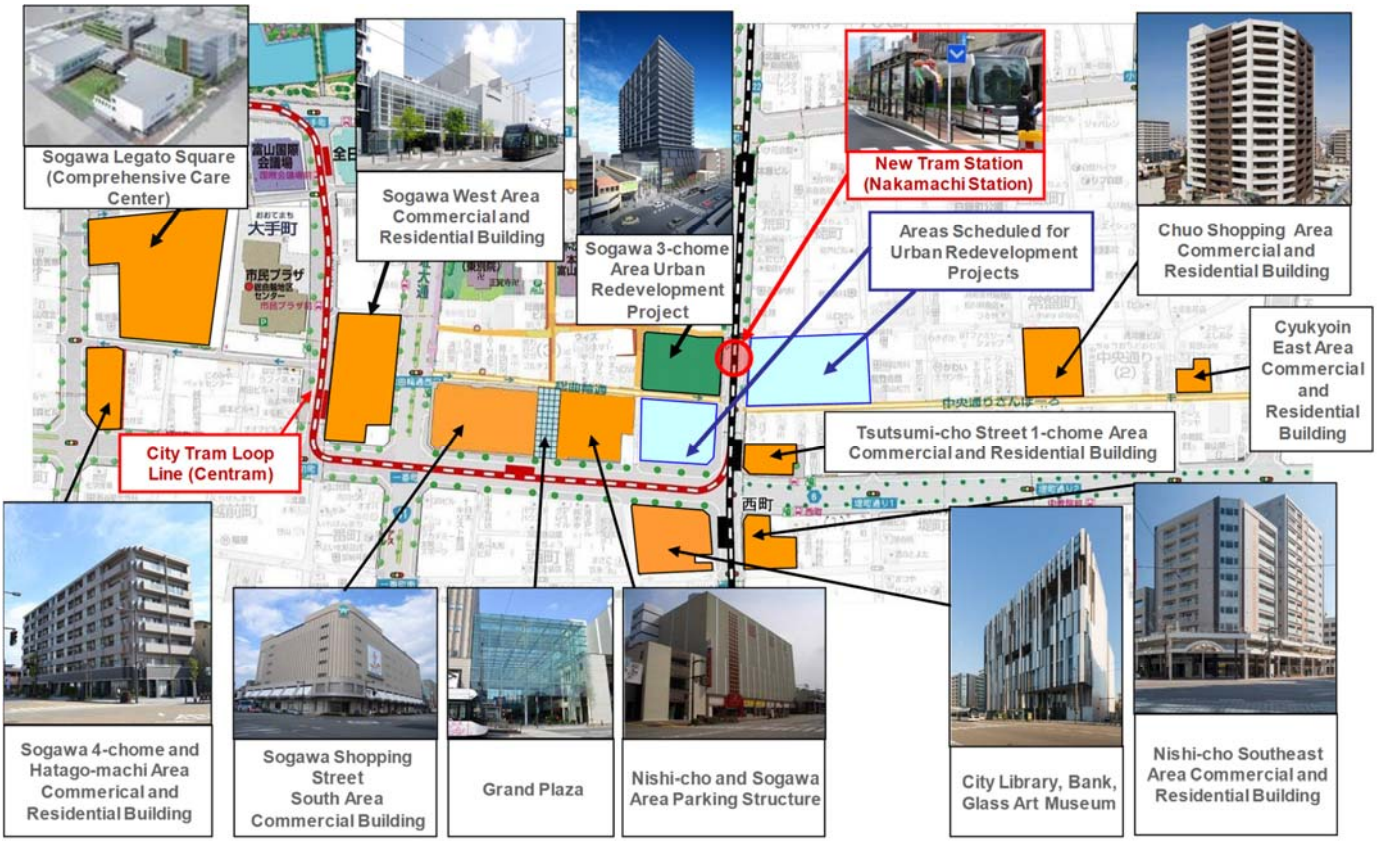
The development of glass art in Toyama reflects a longstanding cultural heritage of glass making coming from medicine bottles. In the Meiji and Taisho era, the City excelled in handmade medicine glass bottle manufacturing, boasting the top share of glass medicine bottles in Toyama Prefecture, and at its peak there were more than 10 glass factories with melting furnaces around the Toyama station before WWII. In 1981, Toyama City began working on the creation of a new glass culture aiming for the promotion of education, art culture, and industry in the new era.

Finally, the museum's outreach is strengthened by two related publicly owned facilities:

- **Toyama City Institute of Glass Art:** Opened in April 1991, it is the first public glass specialized educational institution in Japan. Under the guidance of excellent facilities and international faculty members, students and creators gather from all over the country and abroad to work together to produce professional glass creations of distinction.
- **Toyama Glass Studio:** It provides various activities as a base facility for establishing glass as a new local industry. Citizens are encouraged to visit and knowledgeable staff explain and demonstrate the attraction of glass art. It also provides equipment to glass artists.

Lessons learnt: Toyama was struggling to attract urban renewal in the city centre and so set about its compact city strategies which included a number of new facilities to help revitalize the city center. Presently, the Grand Plaza demonstrates excellent partnerships with the private sectors and citizens. The glass art museum is rather new and evaluations are yet available, but at least with the strong concept rooted in Toyama's history and culture, the facility is highly appreciated by the citizens of Toyama.

These projects also form part of wider proposals for stimulation of private investment through urban redevelopment projects as shown in the map below. Toyama has succeeded in inducing investment from the private sectors by leading the way from public investment.



Stimulation of Private Investment in Urban Redevelopment Projects Induced by Public Investments

CASE STUDY (4) - PROMOTION OF RESIDENCE IN THE CITY CENTRE AND ALONG PUBLIC TRANSPORT LINES

✓ *Multiple benefits from one policy*
✓ *Innovative mindset*

Background: As shown in the previous sections, Toyama City has delivered a step-change in public transport provision to help deliver its compact city policies. Rather than strengthening regulations for the realization of compact urban development, the city chose to gradually guide residence by raising the attractiveness around each station. For this reason, the city provides supports for housing construction, purchase, etc. in the city centre and along public transportation lines in residential promotion districts.

Approach:

(1) Community Development Promotion Project a) Machinaka Development (City Centre Zone):

In order to promote the residence in the downtown area that was set out in the Toyama City comprehensive plan, the city supports business operators who build new high-quality apartment housing and citizens who newly build, purchase or lease housing. The ***Machinaka*** is one such development area in the city centre of about 436 hecatares and borders Shinonome street to the east, Azami Street to the south, Keyaki Street to the west and Hokuriku Shinkansen, Itachi river, Boulevard, Fugan Canal Park to the north. The Machinaka Development (City Centre Zone) is also shown in the map overleaf.

In order to accommodate high quality housing and living in the town center (Machinaka), the city has set up "Housing and Living Environment Guidelines" (HLE Guidelines) and provides support when new housing is acquired according to the guidelines.

The main policies and subsidies targeted at supporting developers/construction companies include:

- **Promoting the construction of apartment housing:** assists businesses whose newly build apartment housing conforms to HLE Guidelines. *[1 million yen / house]*
- **Regional high quality rental housing improvement expenses subsidy:** In accordance with the certification of regional high quality rental housing in Toyama City, it assists developers who develop "residential housing for senior citizens with services." *[1.2 million yen / house]*
- **Support for installation of biological wastewater treatment system:** subsidies for disposer drainage systems to be installed in co-houses or detached houses for the housing with the certification of "Toyama City Community Planning Housing Promotion Project", *[50,000 yen / house]*
- **Support for the facilities of the residence to be installed at the house:** Machinaka support projects for housing with commercial and other facilities. If new apartment building or housing that conforms to the HLE Guidelines, it assists those who register at the lower floors and provide medical and welfare facilities. *[20000 yen per m 2]*
- **Machinaka housing conversion support project:** Promoting diversion from business and commercial use buildings into housing to assist converting unused business and commercial buildings into communal residences that conform to HLE Guidelines. *[1 million yen / house]*

The main policies and subsidies targeted at supporting citizens who wish to buy or rent include:

- **Promotion of housing acquisition - Machinaka housing purchase support project:** It assists those who acquire single-family homes and condominiums with a certain quality inside Machinaka. *[500,000 yen / house]*
- **Rent subsidies for rental housing:** Home rent subsidized to households for moving into rented apartments in Machinaka area from outside of Machinaka *[10,000 yen / month (3 years)]*
- **Machinaka reform assistance subsidies:** It assists those who will acquire secondhand houses in Machinaka and reform to reside themselves, or those who will reform the houses, which are currently lived, in order to respond to the increase the number of households *[300,000 yen / house]*

(2) Community Development Promotion Project b) Transit Station Buffer Areas:

In order to promote living in the "**Residential Promotion Along Public Transport District" (RPPT)** that is stated in the city master plan, the city supports business operators who build new high-quality apartment housing and citizens who build and purchase new houses. RPPT districts are located within a 500 m radius of rail / tram stations, within 300m of bus stops on high frequency corridors.

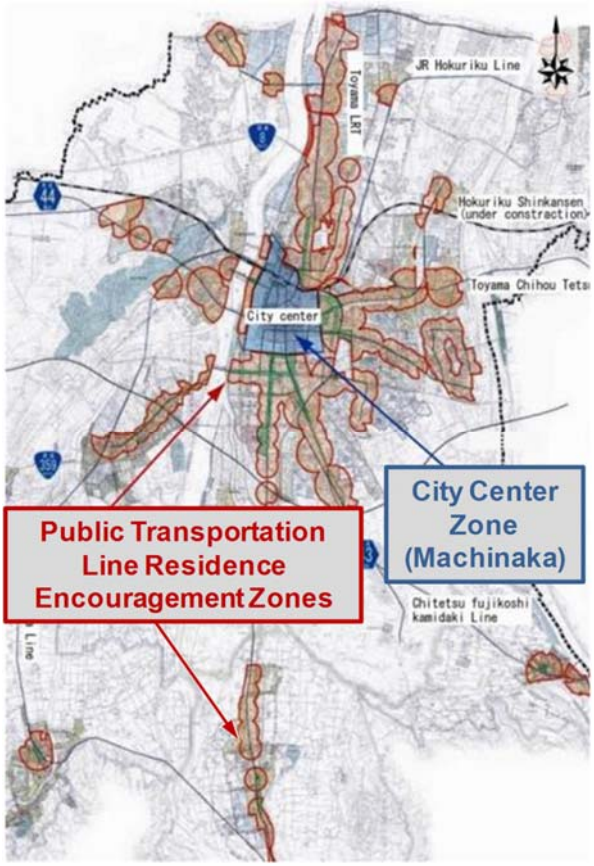
The city provides citizens with assistance when they acquire new houses that conform to ***"Housing along the public transportation / living environment guidelines"*** for housing along public transportation corridors.

The main policies and subsidies targeted at supporting developers/construction companies include:

- **Promotion of construction of joint housing along public transportation project:** The city will assist businesses building new apartment housing that conform to "Housing along the public transportation / living environment guidelines". *[700,000 yen / house]*
- **Area High quality rental housing development Subsidy:** With the approval of the supply plan for the area's high quality rental housing in Toyama City, the city will assist those who build new "Housing for senior citizens with services" in RPPT Districts. *[700,000 yen / house]*
- **Promotion of housing land development project along public transportation**: The city will assist people who develop a high quality residential section in RPPT Districts. *[500,000 yen / compartment]*

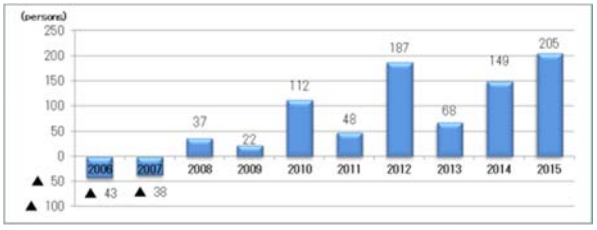
The main policies and subsidies targeted at supporting citizens who wish to buy or rent include:

- The city will assist people who acquire high quality single-family houses and condominiums in RPPT. *[300,000 yen / household]*
- In case of transfer from outside the area, additional assistance *[100,000 yen / household]*
- In the case of households living together with elderly people, additional assistance *[100,000 yen / house}*

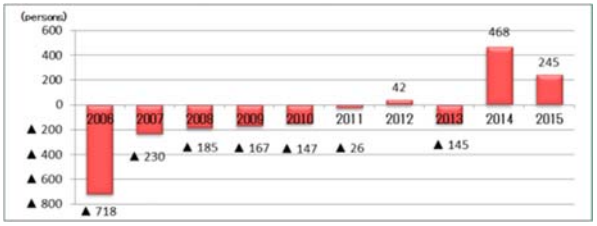


Residence Encouragement Zones

Lessons learnt: The compact city related residential policies have provided citizens with increased opportunities to live in the central areas with the many subsidy options. This is rather a unique approach for a Japanese city and demonstrates the innovative mindset of Toyama. The emerging results from Toyama City show a favorable population shift to city center, and to transportation corridors:



Population Shift Back into the City Center



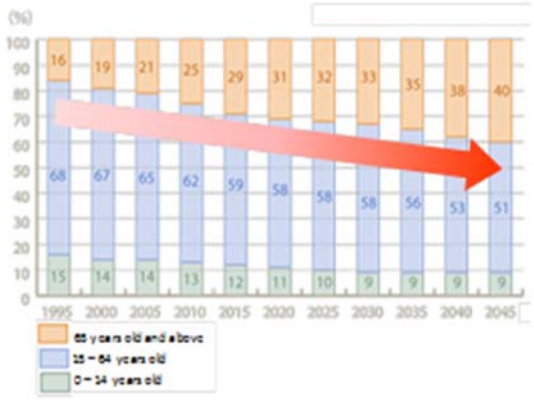
Population Shift to Transportation Corridors

3. Inclusive Community Planning

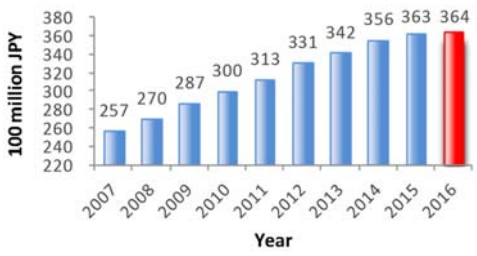
BACKGROUND AND CHALLENGES

Ageing Population and Increased Levels of Nursing Care: Forecasts in Japan estimate that by 2025 one in three people will be aged 65 or over, one in five will be over 75 and one in five people who are aged 65 or over are expected to have dementia. In addition, single elderly, elderly couple and elderly parents only households are expected to increase. Furthermore, regional care systems that provide holistic care to local community including nursing care, medical care, care prevention, living support are needed. Reflecting the national picture, Toyama currently faces an aging and declining population.

The proportion of the population aged 65 or over is predicted to increase from 29% in 2015 to 40% in 2045. The aging population also means increased healthcare costs. In fact, nursing care costs in Toyama increased by 42% between 2007 and 2016.



Toyama City's Ageing Population



Expenditures for Long-Term Care (100 million yen)

Change in Childcare Environment: Providing adequate childcare is becoming more challenging and consequently putting additional pressures on families. The childcare environment has changed and providing childcare services to meet more varied needs from the diversification of working forms and lifestyle balance including a rise in single parent families requiring support is an issue.

Meanwhile, as the nationwide concern over child abuse increases, it is necessary to progress preventive measures, to make efforts to detect and promptly deal with abuse, and to enhance support for abusing children and their families.

Accessibility and Mobility: In the context of an ageing and declining population, as well as the low population density of Toyama, accessibility for all – especially senior citizens has been a longstanding concern for the city.

Furthermore, the deterioration of public transport services and a growing number of senior citizens with reduced accessibility, as well as a declining CBD, urban sprawl and higher administrative costs were compounding factors.

Accessibility was therefore a key policy focus of Toyama's aforementioned compact city development. Toyama's compact urban form contributes to enhanced mobility, accessibility and independence of senior citizens and has been delivered through revitalizing public transportation, revitalizing the downtown area and encouraging residence along public transport corridors.

STRATEGIES ADOPTED

Introduction: Toyama City has implemented a comprehensive and holistic array of strategies for more inclusive community planning, including a range of innovative solutions for an ageing population and to address health and welfare issues.

This section provides an overview, reflecting the 10-Year Plan 2017-2026 which reaffirmed and developed these key strategies. Specific case study examples are included in the next section.

Preventive Measures to Reduce Nursing Care Needs: The overarching goal is to reduce the number of older people needing nursing care and to encourage physical mobility. This is being achieved through the provision of preventive care facilities in the downtown area as part of wider care management and local community care networks.

Welfare and Community Facilities: Toyama City has implemented a variety of unique measures for welfare improvement and the revitalization of local communities, with the aim of realizing a safe and inclusive society for all. It has the highest level of participation in senior citizen clubs at 33.6% of senior citizens, among core cities in Japan.

Furthermore, in the context of an ageing population the City has made strong efforts to help facilitate and foster intergenerational exchange and nurture family bonds, through innovative community activities and initiatives. The city is also working to train nursing care prevention promotion leaders.

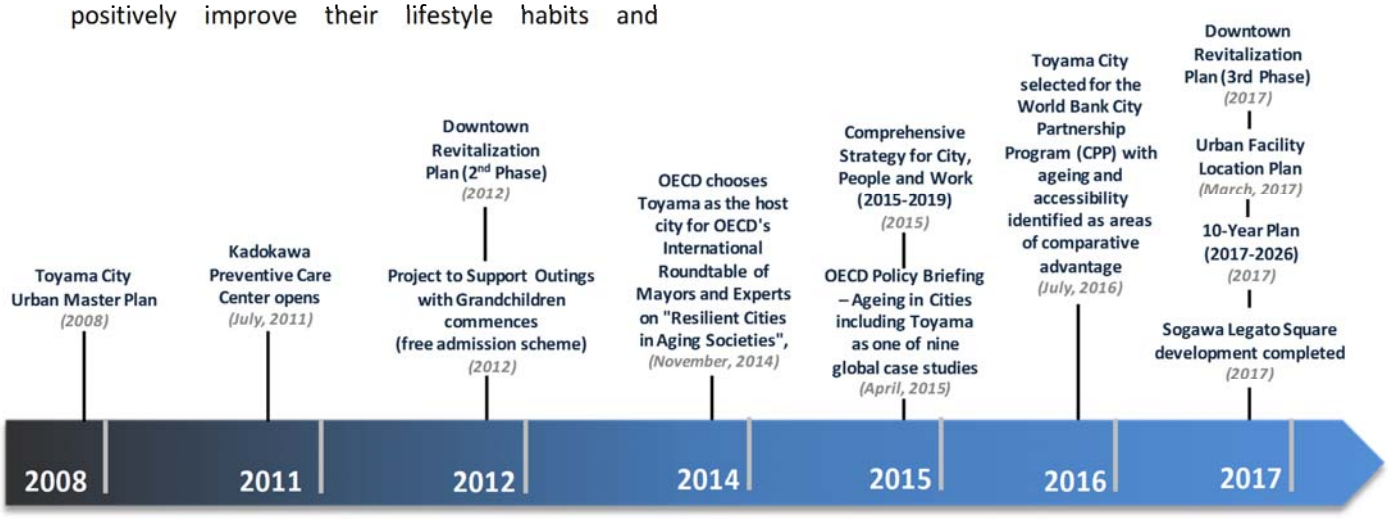
Promotion of Physical Health Awareness: Awareness raising of health management is pursued by providing various types of health information and health consultation so that each citizen can positively improve their lifestyle habits and maintain and promote their health. The city is carrying out such promotion in close coordination with citizens and businesses.

Promotion of Mental Health Awareness: In order to promote mental health, related organizations such as health, medical care, welfare, labor and education, collaborate to tackle mental health measures in communities, workplaces and schools.

Improving childcare and making working mothers lives easier: Toyama has numerous strategies including:

- Development and improvement of nurseries;
- Providing diverse childcare services;
- Enhancement of child rearing support;
- Improvement of child health development;
- Maintenance of children's playgrounds;
- Support for single parent families;
- Improvement of child abuse prevention system;
- Environment that supports severity of pregnancy, childbirth, and child rearing; and
- Support for balancing child rearing and work.

2014 OECD chooses Toyama as the host city for OECD's International Roundtable of Mayors and Experts on "Resilient Cities in Aging Societies"
2015 OECD Policy Briefing – Ageing in Cities including Toyama as one of nine global case studies.
2016 Toyama City selected for the World Bank City Partnership Program (CPP) with ageing and accessibility identified as areas of comparative advantage.



Toyama Urban Development Timeline – Inclusive Community Planning

CASE STUDIES AND LESSONS LEARNT

CASE STUDY (1) – ESTABLISHING A DOWNTOWN COMMUNITY CARE CENTER (SOGAWA LEGATO SQUARE)

- ✓ *Strong partnerships with private sector*
- ✓ *Multiple benefits from one policy*
- ✓ *Innovate Mindset*
- ✓ *Developing community bonds*

Background: In the context of the ageing population in Toyama and under the framework of a comprehensive set of policies in providing welfare, inclusive community and compact city planning, a number of elementary schools that have become surplus have now been repurposed. One of the highlights of this chapter is the **Sogawa Legato Square** development, recently completed in 2017, which provides a strong example of establishing an inclusive health and care center in the downtown area through public-private partnership (PPP) collaboration. Using the site of one of the aforementioned closed elementary schools, Toyama has now delivered this model urban community care center for its citizens.

Approach: With the aim to create a fully inclusive health and welfare area for citizens in the downtown, Toyama City repurposed the former site of Sougawa Elementary School and established a regional comprehensive care institution – **Machinaka General Care Center** as well as a number of other private sector facilities as part of the development. The Sogawa Legato Square development is delivering a synergetic effect between public and private facilities to provide comprehensive community care for local senior citizens as well as the wider generations:

(1) Machinaka General Care Center: The focal point of the Legato Square development, providing 8 different functions offering seamless care and support for all generations and helping to foster a healthy, more active and happier lifestyle. The center is unique in that it has delivered two new facilities that are a first in Japan for a public entity:

1F	▪ Machinaka (neighborhood community) salon ▪ Regional collaboration room ▪ Child Development Support Office ▪ Patio (square)
2F	▪ *Childcare room for sick children ▪ Machinaka clinic ▪ Medical care collaboration room ▪ Conference room
3F	▪ *Postpartum care support room

Note: *First attempt in Japan by a municipality

(2) Private Sector: The PPP development includes four active private sector facilities that won the tendering of Toyama's concept for welfare and health neighborhood renewal plan:

- ***School corporation "Aoike Gakuen":*** A vocational school that cultivates welfare and cookery students. The number of students has now grown to over 500.
- ***"Gunze Sports Club":*** A sports club that promotes intergenerational exchanges through sport, creating a sense of living for the elderly, and improving health awareness.
- ***"Natural Cafe Kokando":*** Kokando is the city's leading pharmaceutical company. The cafe helps foster habits of healthy eating and drinking and has created a space for relaxation and an "oasis" for different generations to gather together.
- ***Convenience Store and Pharmacy:*** This convenience store and dispensing pharmacy have been installed as infrastructure to support the healthy lives of local residents.

(3) Other facilities: The development maximizes the benefits of the Toyama City Medical Association Nursing School that was already planned at the site. It is also extremely well aligned with the overall concept and goals.

Legato Square Development, Toyama City

Lessons Learnt: From project inception, strong partnerships between the public and private sector were developed with a shared goal for welfare and healthy lifestyles for local citizens to deliver a comprehensive facility. Whilst the project is in its early stages, multiple benefits and synergies are emerging across welfare, health, mobility, and community and intergenerational bonds. The bringing together of facilities with similar goals has enabled mutually beneficial collaborations. For example, the sports club is helping the Machinaka General Care Center to provide sports education. Moreover the vocational school, the pharmaceutical company, and the nursing school are active in human resource exchange with each other. Finally, the project works towards silo-breaking as it spans not only the health and welfare sectors but contributes to compact city planning, in that it is the infill development.

CASE STUDY (2) – KADOKAWA PREVENTIVE CARE CENTER

- ✓ *Innovative mindset*
- ✓ *Strong partnerships with stakeholders*
- ✓ *Multiple benefits from one policy*
- ✓ *Developing community bonds*

Background: Also aligned with Toyama City's comprehensive framework of policies in providing welfare, preventive care and compact city planning, the Kadokawa Preventive Care Centre was opened in July 2011 and became one of Japan's first preventative care facilities and the first using hot spring water.

Kadokawa Preventative Care Center - Aquakinetic Therapy

Located in the core urban area, it offers accessible health and community-oriented activities, many of which are focused on preventative care, including activities to stabilize or improve the mobility of people in their later years. The overarching goal is to reduce the number of older people needing nursing care and to encourage physical mobility.

Approach: The Kadokawa Preventative Care Center was constructed on the former site of Hoshii-cho Elementary School in 2011. Leading up to this, donations for the center were received from citizens who were seeking to support senior welfare in the city. This helped build momentum for a PPP project whereby the center was built through a combination of private donations and Department of Welfare, Toyama city funds at a cost of USD 17.6 million (1943 million yen), with the centre then being operated and managed by the private sector - Association for Preventive Medicine of Hokuriku / Wellness Development Consortium ltd.

The center is an innovative preventive care facility, which employs spring water for hydrotherapy, employs resident doctors and exercise experts, and develops unique exercise programs for the elderly.

A variety of programs are offered including aquakinetic therapy and spa therapy using hot spring water, physical therapy and other fitness activities, as well as regular medical check-ups by specialized healthcare practitioners.

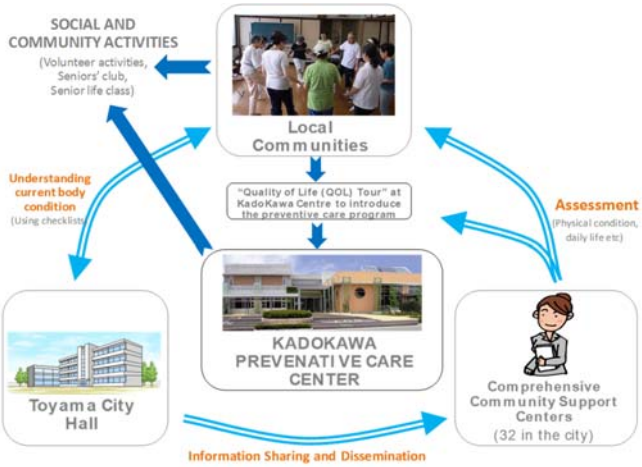
Before citizens join the centre a "Quality of Life (QOL) Tour" of the centre is offered to introduce the care prevention program by combining various activities after measuring their physical condition.

The center records the users' athletic performances continuously to monitor care prevention effects. The programs seek to the increase the mobility of the ageing population and make them more active.

In addition, the centre provides lifestyle support services and community activities to give their clients increased confidence and a better quality of life and to harness community bonds.

Lessons Learnt: The project demonstrates the city's innovative mindset and multiple benefits from one policy through the repurposing of a school that was no longer required due to the context of the ageing population and providing a unique health and community facility in Japan for the citizens with private sector involvement and located centrally in the city as part of the compact city policy.

More strategically, and as set out in Toyama's Environmental Future City Plan (2017), the center is not a standalone measure, as it forms part of a strategy to deliver preventative care through wider local networks. The strategy as introduced in the figure below includes important dialogue, information sharing and synergies with the municipal government, citizens and Comprehensive Community Support Centers – of which there are now 32 in the city (average for regional cities is 13).



Preventative Care Through Local Networks

CASE STUDY (3) – CITY PLANNING TO FOSTER INTERGENERATIONAL BONDS

- ✓ *Developing community bonds*
- ✓ *Innovative mindset*
- ✓ *Strong partnerships with stakeholders*

Background: In the context of an ageing population, a final and smaller scale case study to be highlighted concerns the City's efforts to help facilitate and foster intergenerational exchange and nurture family bonds, through innovative community activities and initiatives.

Approach: Toyama has championed local community initiatives and projects to inspire all generations including senior citizens, by providing places for their activities and fostering social bonds through participation in community activities. Some example initiatives include the following:

(1) Community Garden Project: This project focuses on revitalizing local communities and developing community garden plots in parks and squares in the city center area. Led by neighborhood councils and other community groups, it encourages local communities to get together and in particular to provide senior citizens with more opportunities to be mobile and to socialize with the rest of the community.

Toyama Community Garden Project

(2) Project to Support Outings with Grandchildren: A second example, involves a project to encourage and facilitate opportunities for social outings for senior citizens and their grandchildren or great-grandchildren. The scheme provides free admission into a range of facilities across the city for senior citizens when visiting with their grandchildren or great-grandchildren.

This scheme has multiple benefits including nurturing family bonds, encouraging inter-generational communication, offering increased opportunities for senior citizens to be mobile and contributing to revitalizing the city centre.

It has been implemented for 16 facilities in Toyama City such as the Toyama Science Museum and Toyama Glass Art Museum, as well as wider implementation for 24 other facilities across Takaoka City, Tonami City, Oyabe City, Nanto City, and Imizu City.

The project has proved popular and Toyama City statistics for the 12 facilities in the scheme show that the number of visitors increased by 7.8% from 617,000 in 2011 (before the scheme), to 718,000 in 2015, which included 56,000 grandparents and grandchildren.

(3) "Walkable Zone Community Workshops": The city's strategy for locating key community care facilities in the city center such as the aforementioned Machinaka Care Center and Kadokawa Preventive Care Centre, enable them to also act as hubs for walking and mobility and enhancing opportunities for outings and social interaction.

The "walkable zone community workshops" are city centre walking tours for senior citizens attended by students mainly from the University of Toyama. Again it provides increased mobility and intergenerational social activity. The scheme also offers "walking carts" to assist the less mobile and therefore maximize safe and comfortable participation for more senior citizens.

Lessons Learnt: These small scale local community initiatives form part of wider measures by the city in its objectives to address issues with an ageing population and its objectives towards a compact and inclusive city. They reflect the innovative mindset of the city and demonstrate good examples of practical measures to help facilitate the development of community bonds, partnerships with local communities and intergenerational communication and increased mobility.

4. Disaster Risk Management

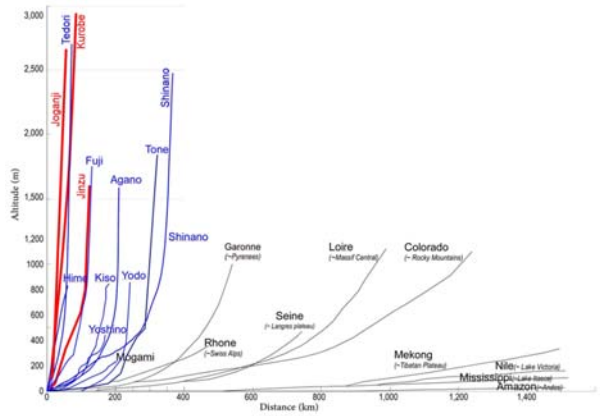
BACKGROUND AND CHALLENGES

(1) Topography and Geography: Flood control and flood risk management are critical challenges for Toyama. Historically, flooding has been the most common disaster in Toyama, principally due to the city's topography and geography.

Toyama is located between the Sea of Japan and the crest of the Northern Japan Alps on an alluvial plain formed by the Jinzu and Joganji rivers. With steep gradients over loose volcanic soils, both rivers often caused flooding. A number of branch rivers from the hilly areas above the plain have been controlled by over a hundred years of continuous river engineering, but they still exist as channels.

Toyama's Jinzu and Joganji Rivers

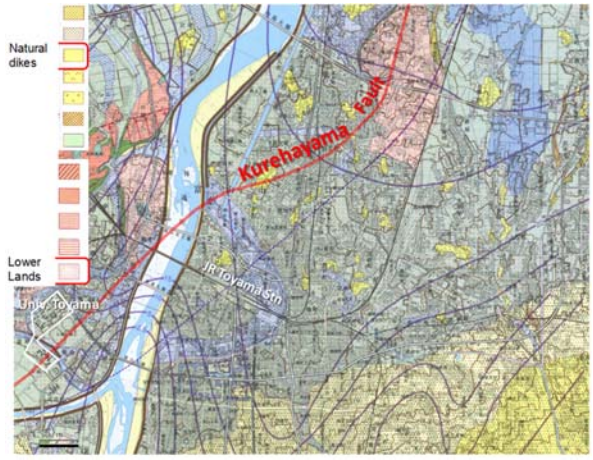
In fact, as shown in the following figure, Toyama, has some of the world's steepest rivers on the both sides of the Tateyama mountains, namely the aforementioned Joganji River as well as the Kurobe River.



Source: Toyama University

Steepest Rivers in the World

Toyama City includes several active faults such as the Kurehayama fault, with additional faults in the surrounding area. It is estimated that these faults have the potential to cause earthquakes of up to 7 degrees magnitude, causing severe damage to people and assets. For the last few decades, Toyama has not experienced large scale earthquakes and is therefore categorized as one of the safest cities in Japan. This perception could hinder communities from taking effective action to prepare for earthquakes, and therefore Toyama has identified this as an important consideration in resilience planning and community engagement.



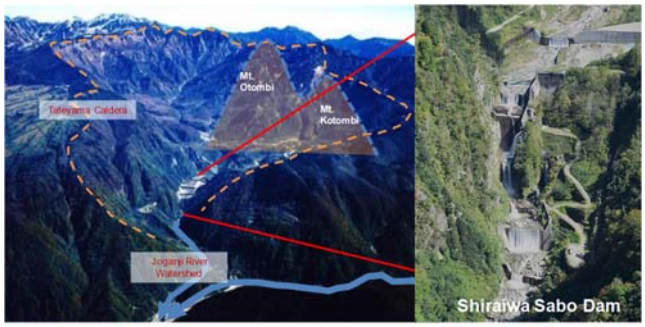
Source: Toyama University.

Kurehayama Fault Line and Land Conditions

(2) Joganji River and the Sabo Dam: The headwaters of the Joganji River begin at 2,661 meters in the Northern Japan Alps and from there it flows through an alluvial fan, the Toyama Plain, into Toyama Bay. The river's length is 56 km and the basin area is 368 km2 with a bed gradient of 1/30 in the mountain area and 1/100 in the plains. It is one of the leading torrential rivers in Japan, having caused frequent flooding in the past.

In 1858, the Ansei Earthquake with a magnitutde of 7.3 struck the mountains above Toyama and caused Mt. Otombi and Mt. Kotombi to collapse, damming the Joganji River in the Tateyama Caldera with 410 million cubic meters of debris. When the earthquake dam broke, a devastating flood occurred, destroying most villages and Toyama castle town on the Plain.

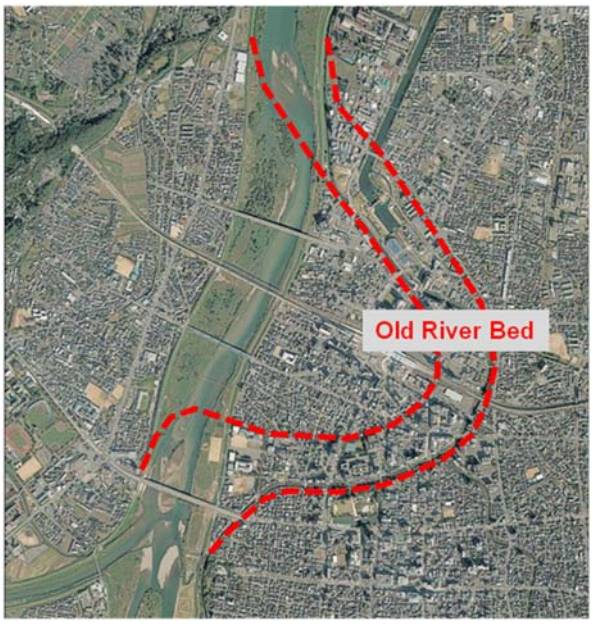
Whilst Toyama City and the neighboring villages suffered devastating damage in the event, it subsequently harnessed a longstanding legacy of resilience in the citizens. As a direct response, the Shiraiwa Sabo Dam was constructed in 1939 to prevent further debris laden flooding. Approximately 200 million cubic meters of sediment still remain in the Joganji River watershed. Therefore, Sabo Dam construction continues.



Shiraiwa Sabo Dam

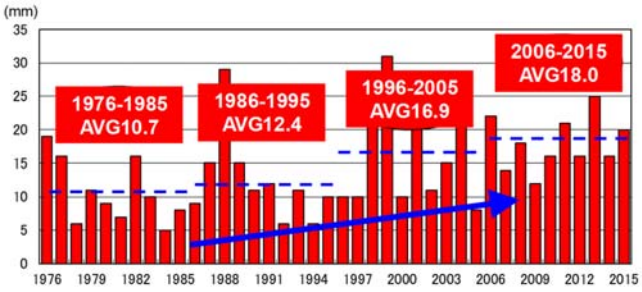
Knowledge transfer of Sabo technology and best practice has since disseminated from Japan across the world, with more than 1,000 Japanese sabo engineers having been engaged in international technical cooperation projects since 1967.

(3) Jinzu River: The Jinzu River flows directly through downtown Toyama and into Toyama Bay. The basin area is approximately 2700 km2 in size with the length of the main stream being 120km. With its headwaters at 1626 meters, the Jinzu has a bed gradient of about 1/20 in the mountains. Torrential waters from the mountain come to a more gentle gradient of about 1/250 on the plain, but the course of the river is winding, causing frequent flooding. A major bend in the river which had caused frequent downtown flooding was straightened between 1901 and 1920.



Straightening the Jinzu River in the Downtown

(4) Increased Frequency of Torrential Rain: In recent years the frequency of torrential rains has increased nationwide. The amount of rainfall per hour can reach 100mm. Climate change has contributed to these increased torrential rains which cause flooding of both medium and small rivers and overwhelm city centre urban drainage.



Number of Rainfall Events Exceeding 80mm per hour in Japan

(5) Combination of Shocks: However, combinations of shocks make the prefecture-wide response, operation and coordination complex, i.e. between information gathering and circulation, evacuation and relief work. Furthermore, in addition to the physical shocks, social risks such as declining population, declining birthrate and aging population, and aging of social capital (lagging of earthquake resistance) can be further compounded when combined in the disaster risk discussion. For this reason, it is necessary to strengthen the city from both aspects of hard and soft infrastructure across all sectors.

STRATEGIES ADOPTED

Introduction: Following aforementioned historic physical measures for flood control such as the Sabo Dam and realignment of the Jinzu River, formulation of Toyama City Regional Disaster Prevention Plan in 2006, as well as severe flooding in 2008, helped pave the way for comprehensive hard and soft strategies.

As will be demonstrated in the following case studies, Toyama has adopted a range of approaches that include; infrastructure investment, such as the Matsukawa rainwater storage facility; maximizing its assets, such as flood control using storage in paddy fields; piloting innovative systems, including rainwater management and flood forecasting technology; as well as a strong focus on community level partnerships and engagement, such as the initiatives of the **Toyama prefectural Association of Disaster Prevention Officers (ADPO).**

INTERNATIONAL RECOGNITION

2014 Toyama first Japanese city chosen for Rockefeller 100 Resilient Cities (100RC) Program (see Chapter 6**)**

2016 Toyama City selected for the World Bank City Partnership Program (CPP) with flood control identified as one of its areas of comparative advantage.

Toyama City National Resilience Regional Plan Background: In 2013, the Japanese government set out the "*Basic Law for National Resilience to Contribute to Disaster Prevention and Reduction and realization of a Strongly Flexible Life of the People.*" It was a comprehensive and systematic set of measures for "toughening" the country and promoting disaster resilience. In 2014, Cabinet set out the basic plan of toughening of the land which guides the plan of the relevant regions ("Land Resilience Regional Plan"). In order to strengthen the country's land, it is indispensable that both national and local governments should promote comprehensive measures.

Toyama City Land Resilience Regional Plan (LRRP): In 2017, the Toyama City Land Resilience Regional Plan (LRRP) was formulated under Article 13 of the Basic Law for Strengthening the National Land, and coordination and harmony with Toyama City's comprehensive plan concerning tougher tenure in the city, while planning to promote various measures comprehensively and systematically as a guideline for each sectoral plan.

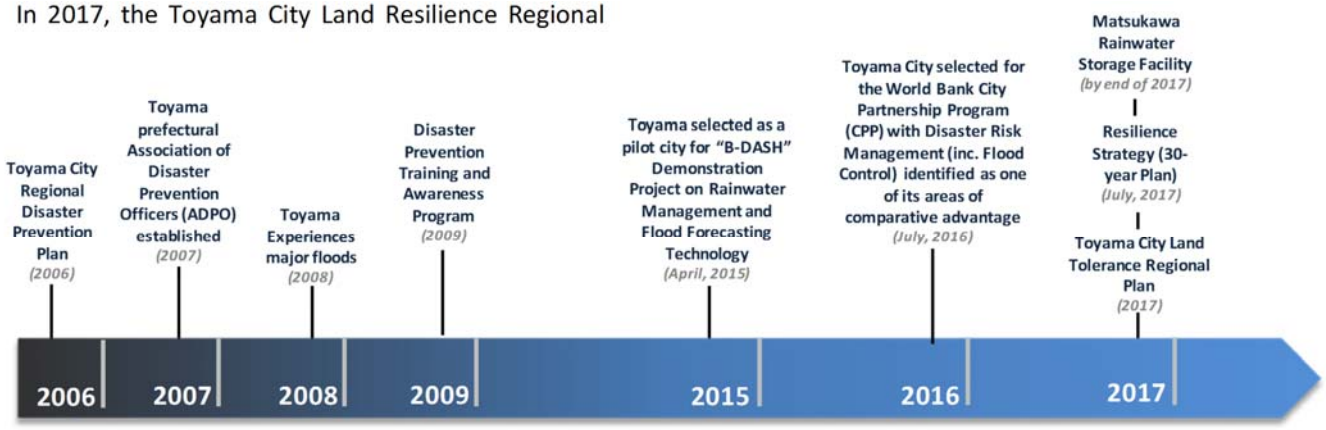
The *Toyama City Regional Disaster Prevention Plan* defines disaster prevention measures of the city and was formulated based on the Basic Law of Disaster Countermeasures, and sets out to implement preventive measures, emergency measures, and recovery measures for each disaster risk such as wind, flood, earthquake, or tsunami.

Unlike the Regional Disaster Prevention Plan, the LTRP does not set individual measures for each disaster risk, but targets holistic preventive measures, looking at all risks. It is a comprehensive guideline on "toughening" the city as a whole, such as administrative functions, local society, regional economy, etc. Therefore, the plan works well for cities like Toyama where there are not only high disaster risks but also high social risks.

Toyama City LRRP Vision and Objectives: The city will aim for a tough, resilient, safe, and secure city. In addition, the city will promote sustainable town development through comprehensive policy development focusing on its compact city policy, enhancement of the necessary urban functions, maintenance and revitalization of local communities, and aiming to toughen the entire city.

Regardless of the scale and type of natural disaster, Toyama will promote "toughening" the city with the following objectives.

1) Maximize protection of citizen's lives
2) Maintain important functions such as infrastructure supporting urban activities without catastrophic obstacles
3) Minimize damage on public facilities supporting the citizens' property and civic life
4) Prompt restoration and reconstruction



Toyama Urban Development Timeline – Disaster Risk Management including Flood Control

CASE STUDIES AND LESSONS LEARNT

CASE STUDY (1) - MATSUKAWA RAINWATER STORAGE FACILITY

- ✓ *Multiple benefits from one policy*
- ✓ *Strong partnerships with stakeholders*

Background: The confluent sewer area of Toyama City starts from the areas of Toyama Castle and the Toyama City Science Museum from the south side of Toyama Station. It is approximately 277 hectares in size up to the South Park. The combined sewer system in Toyama has merit in that it can deploy simultaneous countermeasures for wastewater and rainwater. On the other hand, the design criteria at the time of construction had a constraint that the sewage pipe's failing level is lower than the current standard, and it is not possible to respond to heavy rains such as local concentrated torrential rains, which have been increasing in recent years.

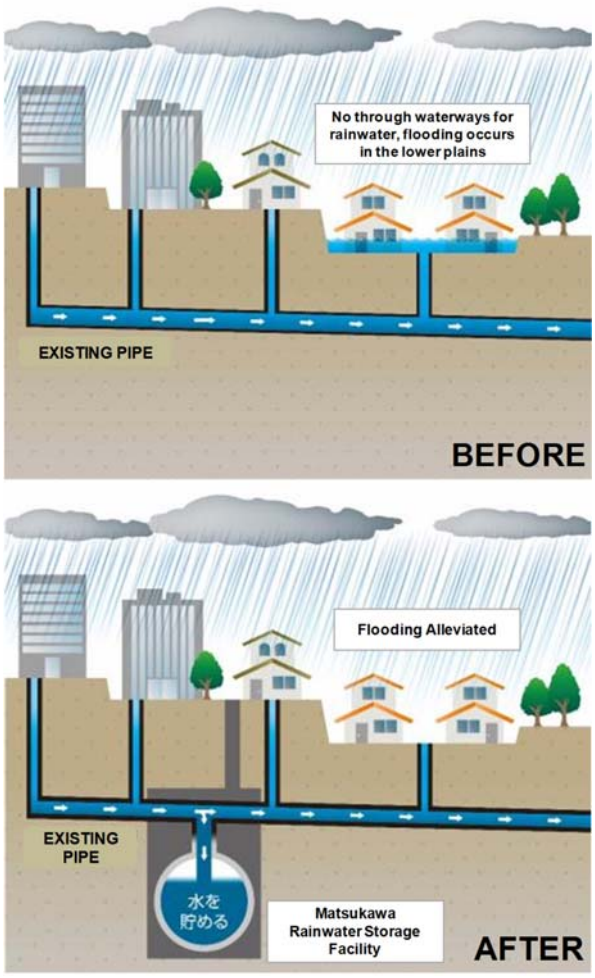
In addition, due to the progress of urbanization and concentrated torrential rain caused by abnormal weather in recent years, flooding damage has occurred more frequently. In particular, the city experienced large flooding in 2008 which was a precursor for the development of the Matsukawa Rainwater Storage Facility project. Previously in the urban area, if heavy rain fell and the underground sewage pipe was full, there was no way for water to escape, so flooding occurred in the lower land areas.

Approach: Therefore, based on the above, in 2012 the Matsukawa Rainwater Storage Facility project was initiated for the dual purpose of conserving water quality in Matsukawa and alleviating future flood damage. The project consists of a 1,069 meter rainwater storage tunnel (Matsukawa storage tube) with a diameter of about 5 meters and is due to be completed by fiscal year end 2017. After construction, the huge tunnel will be able to store excessive water (up to 20,200 tons), and reduce flooding damage in the low land area of the city centre.

Matsukawa Rainwater Storage Facility (Construction)

According to the Toyama City Waterworks & Sewerage Bureau, the city carefully considered the option of a separated system for wastewater and rainwater in the area. However, after a detailed cost benefit analysis, the city decided to continue with the existing combined system, as it was less expensive but safe and effective. This also allowed for a more effective allocation of its internal resources.

Furthermore, Toyama City was very keen on engaging and gaining consensus from its citizens on this project. Numerous public hearings were held in approximately 50 communities, and people became interested in the project from the beginning. A field visit that was implemented in 2014 to the construction site created great interest with 1,300 applicants received for 80 positions.



Matsukawa Rainwater Storage Facility

Lesson learnt: The Matsukawa Rainwater Storage Facility will deliver multiple benefits including both conserving water quality in Matsukawa and alleviating flood damage. The efforts to combat flooding were carefully examined in the context of the city's internal resource allocation to achieve the best possible project. In addition, the partnership and consensus between the city and its citizens was prioritized and has been very effective.

CASE STUDY (2) – FLOOD CONTROL USING STORAGE IN PADDY FIELDS AND AGRICULTURAL CANALS

✓ *Strong partnerships with stakeholders*
✓ *Innovative mindset*

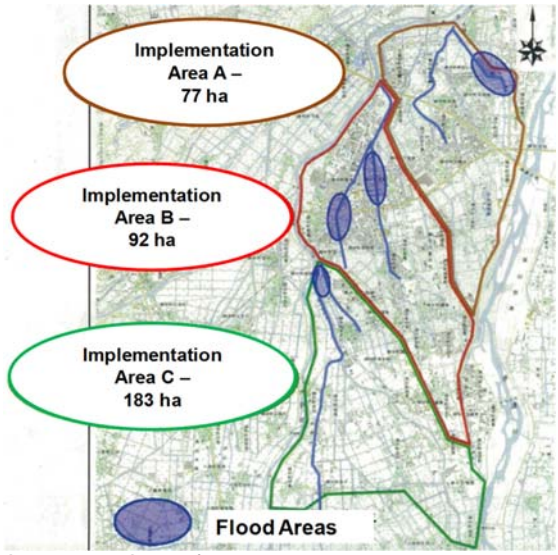
Background: Urban development and flood control in Toyama City come together in this case study on water storage in paddy fields and agricultural canals. As noted, Toyama City has suffered from frequent flooding caused by the Jinzu and Joganji Rivers. Therefore urban development planning in the city has had to fully consider flood control and erosion control, particularly in the current context of increased overflow of small-scale rivers and drainage canals in downtown area due climate change. Urban flooding caused by concentrated torrential rain has been occurring more and more frequently. Whilst drastic measures to combat flooding can include major river improvement schemes, due to the extensive time and expense necessary, the city has implemented other simpler, immediate and more cost-efficient measures.

Approach: This case study introduces a successful measure used in Toyama against flooding using paddy field storage as a unique system for flooding management. It seeks to temporarily store excessive rainwater in paddy fields in order to suppress the inflow into rivers and waterways and reduce flooding in urban areas. In the Fuchu area of Toyama City, which is located directly between the Jinzu and Ida Rivers, citizen participation paddy field storage is carried out in cooperation with the community. By temporarily storing water in the rice paddy fields, the outflow of rainwater is 4.4 times gentler than before. By lowering the water level of rivers and waterways, flooding damage in the downstream area of the city has been reduced.

Source: Toyama Construction Department

Paddy Field (Rice Planting)

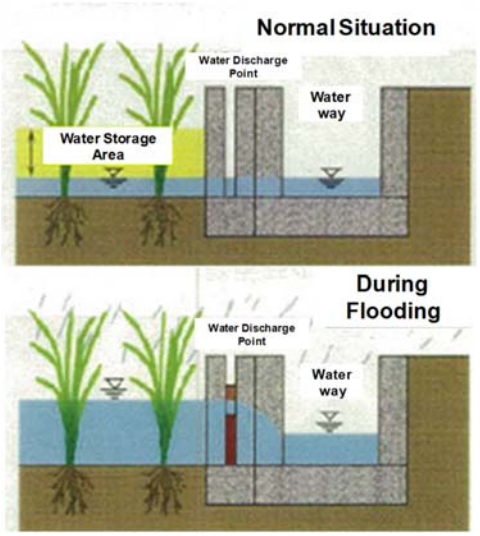
The effectiveness of the system can be demonstrated by comparing the case of heavy rains in July 2004 along Tsubono River, where 60 households suffered river flood damage, yet after this scheme was implemented, no households suffered damaged in the heavy rains of 2007.



Source: Toyama Construction Department

Areas of Paddy Field Storage for Flood Control

With the close cooperation of the farming communities, weir boards with small holes are built into the drainage ports of the paddy fields. Efforts to temporarily store the rainwater that fall in the paddy field and gradually flowing over time, reduce flooding damage. In Toyama City, workers' wages are subsidized to the cultivators who cooperate with the paddy field storage program. In 2016, the subsidized areas of the scheme in Toyama totaled 352 hectares.



Source: Toyama Construction Department

Storage in Paddy Fields and Agricultural Canals

Lessons Learnt: The system is simple, but it fully maximizes the traits of the abundant areas of rice fields. This system is also seen in other areas of Japan. However, the subsidy scheme for those farmers who participate is more unique. The cooperation of both rice field farmers and communities are indispensable to the scheme and a further example of strong partnerships in Toyama.

CASE STUDY (3) - RAINWATER MANAGEMENT AND FLOOD FORECASTING TECHNOLOGY

- ✓ *Innovative mindset*
- ✓ *Strong partnerships with stakeholders (private sector and academia)*

Background: The Ministry of Land, Infrastructure and Transport (MLIT) facilitated the *Breakthrough by Dynamic Approaches in Sewage High technology (B-DASH)* initiative to implement a series of demonstration projects in innovative technology for strengthening regional disaster prevention capacity in cooperation with residents as part of comprehensive structural and nonstructural flood control efforts.

Approach: One of the key B-DASH initiatives was the *"Demonstration Project on Rainwater Management and Flood Forecasting Technology for Localized Concentrated Heavy Rainfall in Urban Areas".* Toyama City (200 ha Kureha drainage area) and Fukui City were designated as the two pilot cities for demonstration of the project in the field in April 2015.

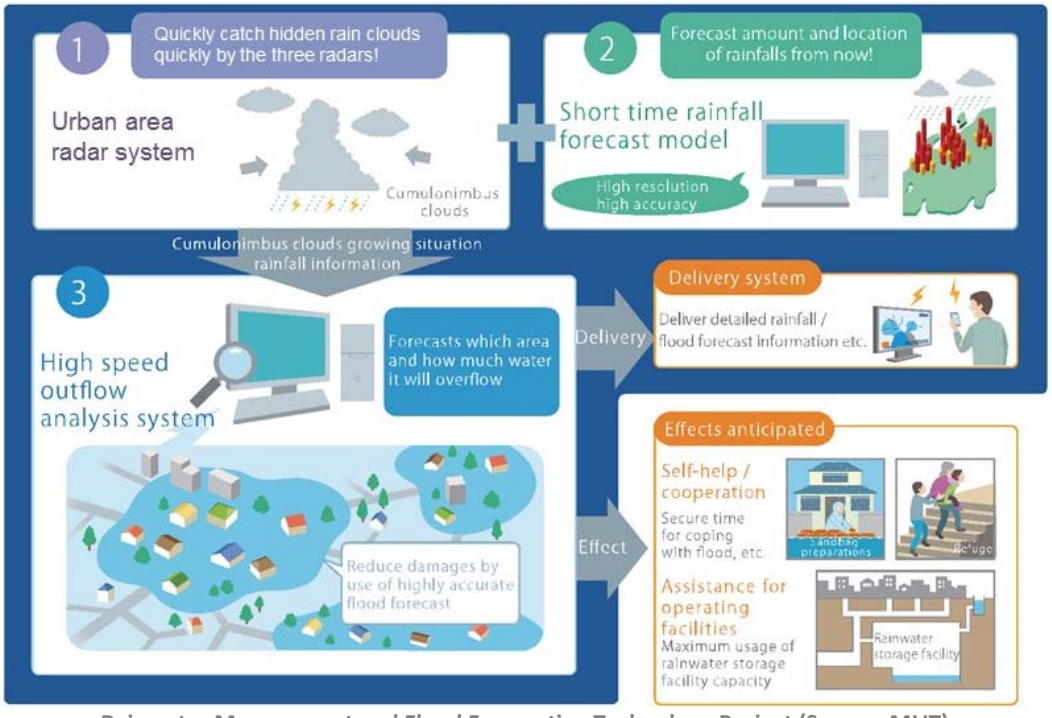
The rainwater management and flood forecasting technology project incorporated three key systems:

1. **Urban Area Radar System:** Early detection of cumulonimbus cloud through the installation of multiple small and inexpensive high-resolution radar systems.
2. **Rainwater Estimation System:** Prediction of rainfall amount and rainfall intensity through a short-term rainfall prediction model.
3. **High Speed Outflow Analysis System:** A real-time, high-speed rainwater outflow prediction analysis system that utilizes information from (1) and (2) above. It allows forecasting of where the rainfall will be, how far it will overflow and its effect on rainwater / wastewater storage facilities.

Lessons Learnt: The combined rainwater management technology allows the Toyama City to fully maximize the capacity of rainwater storage facilities in real time in order to reduce flood damage. Furthermore, the forecast distribution information makes it possible to secure enough time to respond and put coping mechanisms in place such as the use of sandbags and evacuation.

Importantly, the demonstration project showcased strong partnerships with stakeholders and collaboration in both the academic and private sectors. The pilot project implementers and their roles included the following:

Meta Water Co., Ltd.	Overall coordination using synthetic engineering
Shinnihon Consultant Co., Ltd. Nissui Kon Corporation	Construction of the simulation model
Furuno Electric Co., Ltd.	Construction of the radar system
Emori Corporation Co., Ltd.	Construction of outflow analysis software
Kobe University	Rainfall prediction technology
Toyama City / Fukui City	Offer of fields



Rainwater Management and Flood Forecasting Technology Project (Source: MLIT)

CASE STUDY (4) – COMMUNITY AWARENESS AND TRAINING

- ✓ *Strong partnerships with stakeholders*
- ✓ *Developing community bonds*

Background: The final case study under disaster risk management relates to community awareness and training measures, which is consistently a priority across all sectors for Toyama City.

In 2007 the Toyama prefectural *Association of Disaster Prevention Officers (ADPO)* was established. It now comprises 158 volunteers, most of whom are in other full time employment.

Approach: The ADPO provides assistance to the City's internal Disaster Emergency Team and in 2008 implemented an innovative ***"Disaster Prevention Training and Awareness Program"*** which had four key components:

(1) Training for disaster prevention leaders in the region: Provision of training for volunteer disaster prevention organization leaders, especially leaders of local groups. Lectures are given on the importance of disaster prevention organization and preparation with case study examples, interactive Q&A's and opinion exchange. The volunteer leaders are then the catalyst for dissemination of increased disaster preparedness in the community.

(2) Disaster Prevention Awareness Leaflet: A disaster prevention awareness leaflet is regularly issued electronically by the Disaster Prevention Agency and distributed to each representative of voluntary disaster prevention organization. It includes characteristics of natural disasters, examples of awareness activities, and knowledge dissemination and advice on what to do during a disaster.

(3) Voluntary Disaster Prevention Organization Activity Advisor: Advisory services from the city to voluntary disaster prevention organization seeking advice on activities and evacuation drills. By giving advice through city officers, the city can advise on plan formulation and training contents for voluntary disaster prevention organizations. It also ensures on-the-ground support and guidance and consultation between city and voluntary disaster prevention organizations.

(4) Shelter Management Training: This part of the program is targeted at evacuation (shelter) center management training for Toyama City staff, particularly district center personnel. Held in district centres such as at elementary schools and gymnasium etc, each shelter management training session is for 40 Toyama City staff members and is undertaken 3 times a year, enabling 120 city staff to participate each year.

Disaster Volunteer Training, Toyama City

Lessons Learnt: Moving forward, Toyama City and the ADPO recognize progress has been made, but that challenges to be addressed include increasing awareness, providing more easily understandable hazard maps for dissemination to citizens, and addressing gaps between voluntary disaster prevention teams.

The Disaster Prevention Training and Awareness Program is a key public partnership and demonstrates the culture of volunteerism and community engagement, which is a key aspect to disaster awareness and preparedness and also helps to further strengthen community bonds.

5. Waste Management

BACKGROUND AND CHALLENGES

Overview: Toyama City's citizens have had a longstanding, strong connection and respect for its unique and extensive natural environment. To protect the environment, it is essential that effective waste management and recycling promoted and that environmental education is actively supported to further improve citizen's awareness towards the environmental issues.

Building a recycling based society: Toyama City formulated the *Toyama City Basic Environmental Plan*, as well as the *Toyama City Basic Plan for General Waste Disposal (2012-2016)*. These plans helped set out a comprehensive approach for greater application of 3R principles (Reduce, Reuse and Recycle) and the proper disposal of waste, as well as tackling global warming and disaster related waste. They also seek to foster a recycling based society and address the challenges of gaining support from citizens who live near waste processing facilities.

NATIONAL RECOGNITION

2008 National Government designates Toyama an "Environmental Model City"

STRATEGIES ADOPTED

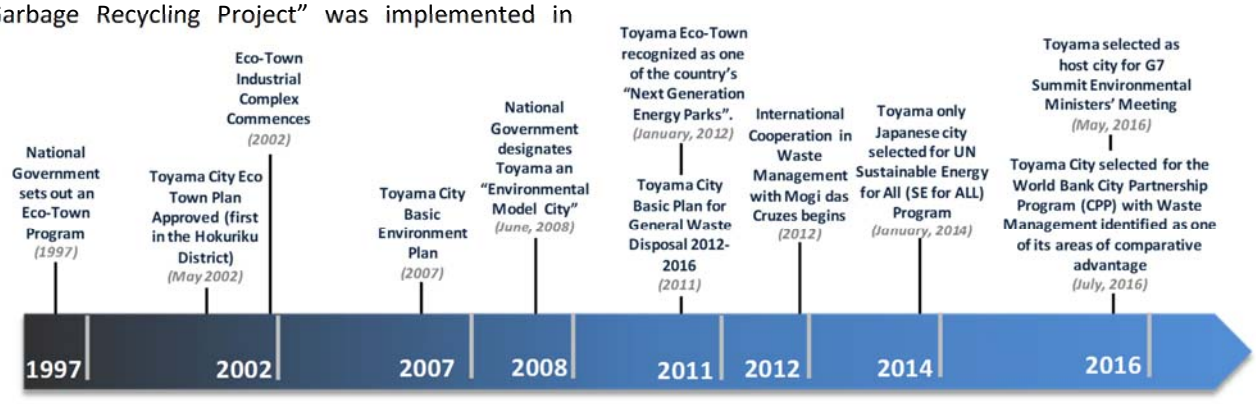
Innovative Waste Management and Recycling Approach: With the goal of developing an environment-friendly recycling city the "Raw Garbage Recycling Project" was implemented in 2006 where biogas is produced from raw garbage at the Eco-Town Industrial Park and electrical power is then generated. In June 2008 the National Government selected Toyama as one of the first seven "Environmental Model Cities" including for its systematic efforts to reduce greenhouse gas emissions, including developing an extensive Eco-town, a city supported industrial park that includes seven waste-to-useable-product companies. Toyama is also home to one of Japan's most advanced forerunners of industrial waste management and waste-to-energy (WtE) business – Toyama Kankyo Seibi.

Education, Cooperation and Promotion: A key component of building a recycling based society in Toyama is its extensive education, cooperation and promotion approach. The waste recycling education center at Toyama Eco-Town increases citizen awareness of the methods and importance of waste recycling and fosters collaboration among citizens, businesses and the government. In recent years Toyama has continued its international cooperation and promotion through waste management partnerships and collaborations with international cities and international bodies and institutions.

INTERNATIONAL RECOGNITION

2014 Toyama only Japanese city selected for the UN Sustainable Energy for All (SE for ALL) program

2016 Toyama selected as host city for G7 Environment Ministers' Meeting (inc. 3Rs discussion)



Toyama Urban Development Timeline - Waste Management

CASE STUDIES AND LESSONS LEARNT

CASE STUDY (1) – TOYAMA CITY ECO-TOWN

- ✓ *Innovative mindset*
- ✓ *Strong partnerships with stakeholders*
- ✓ *Multiple benefits from one policy*

Background: In 1997 the Ministry of Economy Trade and Industry and the Ministry of the Environment set out an Eco Town Program to tackle waste generation and to provide basis for establishing environmentally harmonious towns whilst developing the local communities.

In response, Toyama City formulated the *Toyama City Eco Town Plan* in April 2002 which was subsequently adopted as the 16th plan in Japan and the first in the Hokuriku District. Based on the Plan, Toyama City then began the implementation of unique advanced community planning through the reduction and recycling of waste while taking distinctive characteristics of the region into consideration.

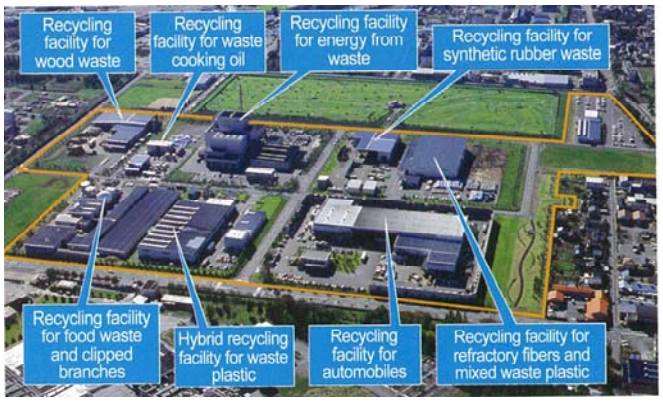
Approach: The key principles of the Toyama City Eco Town Plan include the following:

1. Prioritizing regional recycling
2. Realization of "human-friendly and environment-friendly town Toyama" by taking advantages of civil activities
3. Promotion of phased material recycle and effective utilization of refuse derived fuel (RDF)
4. Consideration of profitability
5. Cooperation between enterprising bodies and consumers
6. Disclosure of information

The Eco-Town Industrial Complex began in 2002, and the 18 hectares Toyama City Eco-town site promotes the establishment of a recycling oriented society through energy saving and waste recycling efforts.

As noted, the Ecotown program is a national government initiative (METI and MoE) to help create a more recycling society across the country, and to also act as a showcase of new technologies of recycling economies. To this end, there is some subsidy for disposal sites and public promotions. The eco town participating industries can receive the benefits of agglomeration economies of recycling industries.

The Eco-Town industrial complex is managed by seven private business operators who turn "waste" into usable products including a recycling facility to turn food waste and clipped branches into methane. It also process refractory fibers and mixed plastic recycle.



Toyama Eco-Town Industrial Park

Lessons Learnt: The Toyama City Eco-town policy has yielded multiple benefits across increased recycling, reduction in carbon dioxide emissions, wider environmental improvements, facilitation of strong private sector partnerships and enhanced community awareness and engagement.

Stakeholder consensus was obtained by finalizing the *Environment Preservation Agreement*, which declares the project as an environmentally friendly enterprise, between Toyama City and enterprises, and between Toyama City and its citizens.

It is recognized that the approach whereby the city administration has mediated between business operators and citizens has helped to provide strong support to business operators in the project.

In addition, the Eco-Town industrial complex was complemented by the inclusion of an extensive waste recycling education center which focuses on bringing citizens, business operators, and government together, through learning activities and promotion of the Eco-Town Plan.

Education of the next generation in the awareness of the methods and importance of waste recycling is a priority for Toyama City. The goal is for all elementary school pupils to make at least one visit to the Eco-Town.

NATIONAL RECOGNITION

In January 2012, the Toyama City Eco-Town received national recognition as one of the country's "Next Generation Energy Parks", and the first in the Hokuriku Region.

CASE STUDY (2) – TOYAMA KANKYO SEIBI: INNOVATIVE INDUSTRIAL WASTE MANAGEMENT

- ✓ *Innovative mindset*
- ✓ *Strong partnerships with stakeholders*
- ✓ *Multiple benefits from one policy*

Background: In 1972, Toyama Kankyo Seibi (former Toyama Road Service) was founded as a waste management company dealing with cleaning roads and discarded waste. At that time, this waste was not well administered by regulations and there were a lot of issues with road safety. A few years later, the company was granted a license for industrial waste and began to expand into Fuchu-machi, on the south west side of the present City.

When the founder established the company, the Toyama Kankyo Seibi facility was generally considered by city residents as a NIMBY (not in my backyard) facility. However, with its advanced system of waste management and innovation, and after long efforts of community awareness and contribution to community activities, the communities began to welcome the company as one of the most dependable and important enterprises or leaders in the area.

This, the first of two case studies on Toyama Kankyo Seibi, highlights its innovative industrial waste management operations.

Approach: Toyama Kankyo Seibi is one of Japan's most advanced forerunners of industrial waste management and associated businesses. It has around 350 employees and collects 300,000 tons of waste per year. Its business is varied, including:

- Collection and transporting of industrial waste
- Collection and transport of general waste (Toyama City, Imizu City, Tonami City, Nanto City)
- Reclamation disposal of industrial waste
- Intermediate treatment of industrial waste
- Treatment of harmful waste including PCB
- General waste intermediate treatment
- Reclamation disposal of general waste
- Plastic recycling
- Production of plastic products
- Production of wood products
- Road maintenance and repair work
- General civil engineering works
- Cleaning in various tanks

The company possesses several important licenses including being Container and Packaging Recycling Law Certified.

A Recycled Product Factory
B Intermediate Treatment
C Resource Development
D Chemical Area
E Final Disposal
F Management Building
G Parking Area
H Wastewater Treatment
I WtE Plant & Incineration Facility
J, K Next Generation Horticulture / Greenhouses

Source: Kankyo Seibi

Toyama Kankyo Seibi Facility

In addition to these multiple roles as the leading waste management institution in the region, the company has adopted many innovative systems, including:

(i) Regeneration of high quality plastic resources: The law pertaining to the recycling of plastic containers was established in Japan in 1995. Toyama Kankyo Seibi, as the accredited operator of container packaging recycling, recycles containers and packaging materials as the law requires. However, Toyama Kankyo Seibi takes this a step further as it is a recycling business operator that transfers and regenerates compliant waste separation standards and converts them into new "resources". Namely, it manufactures recycled plastic products as part of its "re-commodity products business" on the same premises.

(ii) Unique one-stop system of industrial waste: The company carries out all processes of: a) crush and sorting; b) incineration; and c) reclamation disposal on the same premises. In this way, it realizes safety, security, adequacy, high efficiency and energy savings and it is only facility that uses this integrated system in Japan.

(iii) Combustion incineration facility (reverse power): Toyama Kankyo Seibi adopts a rotary kiln system for incineration. This system generates electricity using waste heat after complete combustion in primary combustion / secondary combustion. On the other hand, operation of the facility keeps the load on the incinerator within an appropriate range and ensures that stable combustion can be continued.

In addition, advanced exhaust gas treatment

equipment such as a bag filter is employed. During the operation, exhaust gas temperature and concentration of hazardous substances are continuously measured and combustion state is checked.

In this incinerator, not only construction-related combustibles (such as wood chips, paper scraps, fiber scraps, waste plastics, etc.) generated from construction sites, but also waste generated from business activities, sewage sludge, waste oil, and the animal and plant residues from food processing companies are also mixed and incinerated.

Utilizing the generated heat obtained through the incineration of waste, the facility can then generate electrical power of up to about 1,500 kwh.

(iv) Disposal and collection of various waste types: With their possession of various types of vehicles and equipment, the company also cleans the waste of river dredging, cuts down the grass of national roads, river beds and private lands, and it cleans town roadways including national highways and the road surface of sidewalks.

(v) Community Safety Programs: Whilst the aforementioned generating electricity is used by Toyama Kankyo Seibi for its own functions including at the factories / facilities, it is also used as a power source for crime prevention facilities such as nighttime lighting in the wider area.

(vi) Community Awareness Programs: Toyama Kankyo Seibi is a company that is enthusiastic and dedicated to community awareness programs for citizens of the surrounding neighborhoods. It receives site visits to its recycling facilities from Community Based Organizations (CBOs) and women's societies and it explains the system of container recycling law and basics of industrial waste management, raising awareness.

Lessons learnt: Since its establishment 40 years ago, Toyama Kankyo Seibi has responded, innovated and developed into a leading waste management, recycling and environmental corporation and is now recognized as one of the most advanced industrial waste management companies in Japan.

In addition to its technical innovation and successes, the company is continuously dedicating time to developing citizen awareness of waste management and is also ensuring that it contributes to the safety and well-being of the surrounding neighborhoods and communities.

CASE STUDY (3) – TOYAMA KANKYO SEIBI: NEXT GENERATION WTE GREENHOUSE HORTICULTURE & DISASTER WASTE TREATMENT SYSTEMS

- ✓ *Innovative mindset*
- ✓ *Strong partnerships with stakeholders*
- ✓ *Multiple benefits from one policy*

Background: This second case study for Toyama Kankyo Seibi, highlights more recent innovative components of its operations. Presently, Toyama Kankyo Seibi is undertaking next generation waste to energy (WtE) greenhouse horticulture for the purpose of effective use of the final disposal site. It sets up a vinyl house at the final disposal site where landfill is completed, and cultivates fruit tomatoes and flowers throughout the year. It also works as a collaborator the for national disaster waste management alliance.

Approach:

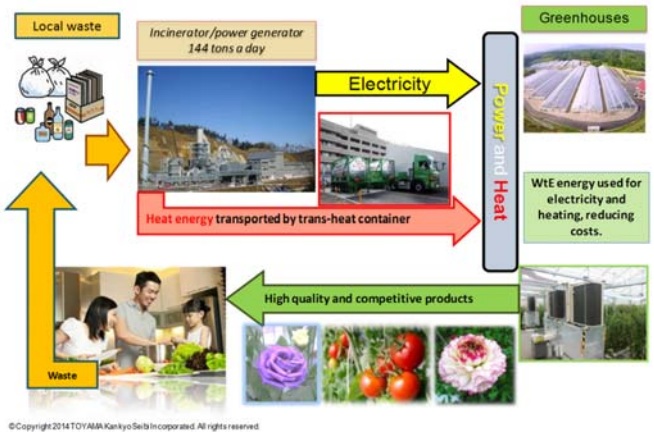
(1) Next Generation Greenhouse Horticulture: Toyama Kankyo Seibi has been committed to reuse and create value from the surplus energy created by the combustion system. In fact, in 2014 it received a subsidy from the national government to reuse the generated electricity and heat from waste combustion / built sophisticated greenhouses under a program called "*Project to Accelerate Adoption of Next Generation Greenhouse Horticulture*" from the Ministry of Agriculture, Fishers and Forests (MAFF).

MAFF set up this agriculture subsidy program to help cost reduction for farming businesses, create jobs and to promote initiatives including smart agriculture using ICT and next-generation greenhouse horticulture. The subsidy (for operating costs) was awarded to companies or organizations that had contributed to using renewable energy in horticulture. Toyama Kankyo Seibi along with a variety of collaborators, was selected as one of 10 awardees across Japan.

For Toyama Kankyo Seibi's Next Generation Greenhouse Horticulture project they constructed 28 greenhouses (with a total area of 4 hectares) in 2015. The electricity generated from incinerating waste is used for all the electric devices in the greenhouses and premises.

The targeted annual yields from the project are 500 tons of fruit tomatoes and 1.4 million Ornamental plants (including Eustoma, Ranunculus, Campanula). In fact, Toyama Kankyo Seibi's tomatoes and flowers are highly favored due to their high quality and are sold in luxury markets and stores across the

country and the tomatoes are also exported to Thailand and Singapore.



Toyama Kankyo Seibi Next Generation Greenhouse Horticulture Flow Chart

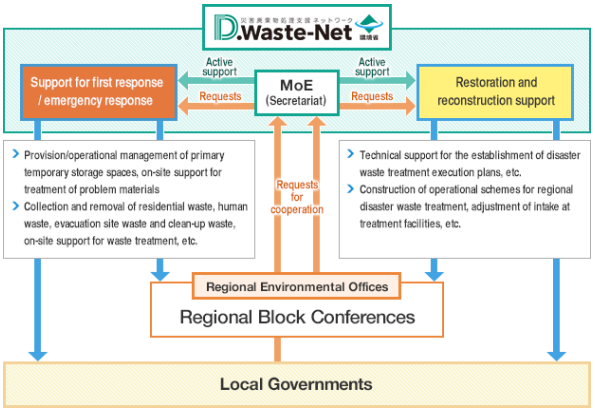
The company was awarded with the JGAP (Japan Good Agriculture Practice) agriculture certification in 2015, which is awarded to the top agricultural companies. They are now seeking the GLOBAL GAP, Global Good Agricultural Practice profile in Ecolabel Index, the independent global directory of ecolabels and environmental certification schemes.

KEY FACTS: NEXT GENERATION WTE GREENHOUSE HORTICULTURE PROJECT	
TOYAMA SMART-AGRI NEXT GENERATION GREENHOUSE HORTICULTURE BASE DEVELOPMENT COUNCIL:	
Members	Toyama Prefecture, Toyama Agriculture Forestry Promotion Center, Toyama City, Toyama Kankyo Seibi, JA Aoba, Wagoen, Smart Forest, NTT Data Institute of Management Consulting, ATGREEN
CROPS, AREA AND TARGETED YIELDS (UNIT CROP):	
Fruit tomatoes	Area: 2.8584 ha Targeted Yield: 505t (17.67t/10a)
Ornamental plants (Eustoma, Ranunculus, Campanula)	Area: 1.2 ha Targeted Yield: 1.43 million units
PROJECT IMPLEMENTATION SUMMARY:	
Development of the base	**(1)** Greenhouses and air-conditioning facilities: 28 buildings (4 ha), **(2)** 2 Seeds & seedlings supply facilities, **(3)** 1 shipping/preparation facility (Collection facility), **(4)** Cogeneration system from generator-equipped boilers (about 1,500 kw) utilizing fuel made from waste
Technical demonstration	**(1)** Demonstration of the introduction of the advanced environmental control system using ICT, etc., **(2)** Demonstration of utilization of wearable terminals for sharing knowledge from the data created.
Other measures	**(1)** Effort to cooperate with different industries (medical care, etc.), **(2)** Employment of the handicapped and contribution to welfare, **(3)** Grasping the needs of users and consumers (in the field of ornamental plants, etc.)

It is of note, that all 8 other example of the MAFF subsidy in Japan are using wooden pellets as fuel. This method has limitations, therefore Toyama is regarded as one of the most successful cases. Furthermore, Toyama Kankyo Seibi recognizes that there are applications of these technological experiences that could be utilized in times of disaster to support communities.

(2) Disaster waste treatment systems: The company has also been a member of the national initiative - "Japan Disaster Treatment Systems" since 2016, along with the country's biggest industrial waste management companies. This organization was made in response to the amendment of a part of the *Waste Disposal and Public Cleansing and Basic Disaster Countermeasures Law* in 2015 after the unprecedented catastrophes in Japan. Under the revised law, it is necessary to flexibly utilize existing waste disposal facilities after ensuring proper disposal, including strengthening of mutual cooperation and collaboration among the national and local government and private enterprises.

In this context the national "**D waste-Net"** initiative was formed and **Japan Disaster Treatment Systems** plays an important role in designated waste treatment organizations**.** It is indispensable for waste disposal companies to act collectively, and the social demands for waste disposal business operators in disaster time are critical. Toyama Kankyo Seibi, along with other prominent industrial waste management companies, plays an important role in this national initiative.



Source: Ministry of Environment

National D.Waste-Net Initiative Flow Chart

Lessons learnt: Toyama Kankyo Seibi's networks of innovative agriculture and disaster management are impressive. Strong partnerships are enormously active in each element, with different levels of governments (national government, prefectural government, and governmental agencies) and other private companies. Also, an innovative mindset is shown from the way that they continuously seek higher quality agricultural products and ways to improve efficiency and output.

CASE STUDY (4) - INTERNATIONAL COOPERATION IN WASTE MANAGEMENT: MOGI DAS CRUZES, BRAZIL

- ✓ *Innovative mindset*
- ✓ *Strong partnerships with stakeholders*
- ✓ *Multiple benefits from one policy*
- ✓ *Developing community bonds*

Background: In recent years, Toyama City has undertaken a number of domestic and international cooperation and promotion initiatives with other cities, in order to disseminate best practice and lessons learnt from its urban development story.

In the waste management sector, Toyama City has collaborated with Mogi das Cruzes in Brazil in the knowledge transfer of waste management techniques. In fact, Toyama City and Mogi Das Cruzes, Brazil have had long standing cooperation and support having been sister cities since 1979.

The city of Mogi das Cruzes had underdeveloped waste separation and recycling processes. It faced challenges around the burdens of relying on landfill, lack of advanced and efficient separation and recycling systems and waste treatment. Most recycling was undertaken by citizens or “catadores” and the city lacked appropriate environmental education and awareness initiatives.

Therefore, during 2012-2014 with the support of the Japan International Cooperation Agency (JICA), Toyama City provided waste treatment techniques and human resource knowledge exchange to help solve the issues Mogi das Cruzes faced by disseminating Toyama City’s best know-how and expertise in a collaborate way.

Toyama and Mogi das Cruzes Collaboration

Approach: The overall goal of the initiative was to reduce the amount of landfill waste and more holistic help foster a "recycling-oriented society".

There were two main strands to the assistance including both environmental education to improve the awareness of citizen's in the separation of garbage and in providing an organized system for recycling building on the “catadores” collectors.

In cooperation with JICA, Toyama City was able to provide the following:

- Dispatch of staff from Toyama City to Mogi das Cruzes to give guidance on current problems and remedial measures in waste disposal.
- Facilitation of training in Japan for staff of the Environment Bureau of Mogi das Cruzes.
- Creation of garbage separation rules and guidance for efficient sorting and collection in Mogi das Cruzes.
- Improved communication and public awareness of the household garbage separation policy.
- Creation of environment education program centering on the 3R approach.
- Environmental education for primary schools, junior high schools, environmental volunteer organizations as well as for “catadores”
- Provision of advice on the registration, organization and support for "catadores".

As a result of the collaboration and knowledge transfer, the recycling rate in Mogi das Cruzes increased by around 7-fold in two years, from 0.6% in 2012 to 4% in 2014. It is expected to reach 10% by 2017. Furthermore the environmental education program is now practiced in 60% of schools in the city. It is hoped that the environmental knowledge gained by Mogi das Cruzes will be passed on to other cities in Brazil.

Lessons Learnt: The fostering of city partnerships has helped Toyama City grow its reputation with international organizations such as the aforementioned OECD and United Nation’s SEforALL initiatives. International cooperation again reflects Toyama City’s longstanding approach in being outward looking and innovative, developing strong partnerships and also contributes to developing community bonds and pride in the city.

6. Effective Resilience Management Approach

BACKGROUND AND CHALLENGES

Introduction: Whilst the past challenges and solutions of Toyama's development are important, it is equally important to outline the next steps and proposed strategies for its future development. Building on the policies and strategies since 2007 as summarized in this report, and working with the 100RC program, Toyama City has now prepared a 30-year "Resilience Strategy" (July 2017).

This chapter sets out the effective resilience management approach adopted by the city which overarches and brings together many of the good practices from earlier chapters, and in particular showcases some strong case study examples for vision and senior leadership, strong partnerships with stakeholders, soft power silo-breakers and developing community bonds.

Challenges and Issues: Toyama has identified four shocks and five stresses as the most challenging resilience issues facing the city, many of which have already been introduced in this report:

(1) Shocks

- Flooding
- Land slides
- Earthquakes
- Potential Infrastructure Failure

(2) Stresses

- Aging & Declining Population
- Aging Infrastructure
- Lack of Economic Resilience
- Preventing Environmental Degradation
- Insufficient Education for Citizen Self Realization

In turn, the resilience strategy initiatives outlined in the next section were designed to both address these shocks, stresses, and various challenges in a comprehensive and integrated way.

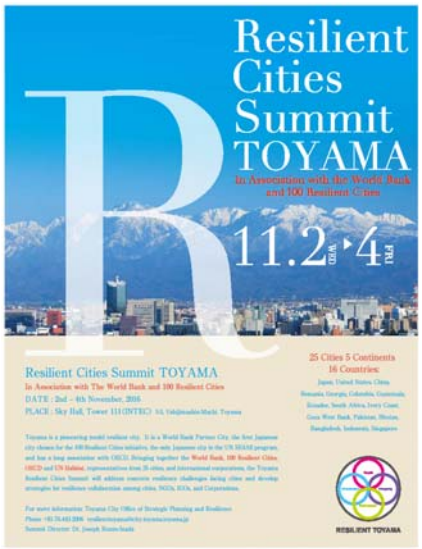
INTERNATIONAL RECOGNITION

2014 OECD chooses Toyama as the host city for OECD's International Roundtable of Mayors and Experts on "Resilient Cities in Aging Societies".

2015 Toyama first Japanese city chosen for the Rockefeller 100 Resilient Cities

Introduction to Toyama and 100 Resilience Cities (100RC): Pioneered by the Rockefeller Foundation, 100 Resilient Cities (100RC) is dedicated to helping cities around the world become more resilient to the physical, social and economic challenges that are a growing part of the 21st century. Cities in the 100RC network are provided with four main components of resources necessary to develop a roadmap to resilience, including Chief Resilience Officers (CROs), complete resilience strategies, connecting each city with platforms and partners and finally putting cities in a peer to peer network.

In 2015 Toyama was the first Japanese city chosen for 100RC and in 2016 it held the Resilient Cities Summit in association with 100RC and the World Bank that brought together key stakeholders such as OECD, UN Habitat, the private sector and 23 cities from across the world including 12 World Bank Partner and Client cities.



STRATEGIES ADOPTED

Resilience Strategy Development Process: Toyama's Resilience Strategy in the formulation of its "Resilience Strategic Plan" with 100RC draws on a rich and diverse array of stakeholders and sources. Two of the major components include:

- Formulation of a *Resilience Advisory Committee* of prominent CEOs and Presidents from the business community, Presidents of NGOs and Director Generals of key city government departments, and
- Four *Resilience Working Groups* to generate new initiatives under themes of resilient people, resilient infrastructure, resilient prosperity and resilient environment, with a cross section of members of the business community, NGOs, city government leadership, and citizens.

Outputs from the above are added to that of the Mayor's separate Task Forces (on a set of specific issues including the "Working Women Task Force"), advice from the Mayor's Policy Advisers, wide ranging discussions with citizens and city experts, and the city's various 3-year, 5-year and 10-year plans. In fact, the new 10-year plan required by the National Government was completed in March 2017.

Resilience Strategy Organizational Structure: More specifically, the development of the Toyama resilience strategy has six key components:

1) A direct relationship between the CRO and the Mayor which is supported by the Office of Strategic Planning and Resilience (SPR) which in turn is directly linked to pivotal city departments.

2) A Resilience Advisory Committee of prominent stakeholders to advise the CRO, SPR and Mayor throughout the process.

3) Working Groups of diverse stakeholders to research and develop initiatives.

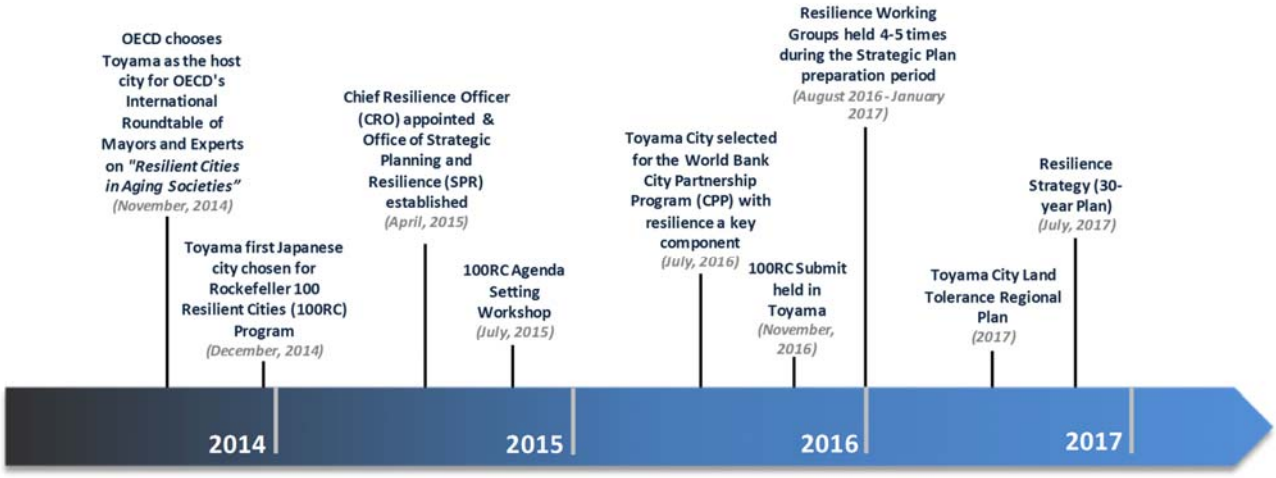
4) A consensus vetting process overseen by the CRO and SPR Director which flows from the city advisors and accumulated research then through the Resilience Advisory Committee, city Department Director Generals, city Executive Committee and Mayor.

5) Final presentation by the SPR Director of the Resilience Strategy to the City Assembly, which will be overseeing the city budget during the implementation of initiatives.

6) The understanding of all parties in this process that genuine and effective city resilience plans depends on all city policies working cross-silo and in concert toward the one goal of a long-term comprehensive resilience.

This process ensures that diverse stakeholders are already invested in the Resilience Strategy and enable silo-breaking in terms of moving outside a typical hierarchical structure and offering a more integrated planning approach.

In the next sections, a selection of case studies and lessons learnt from some of these components is explored in more detail, with the final sections introducing the policies and initiatives of the Resilience Strategy.



Toyama Urban Development Timeline - Effective Resilience Management

CASE STUDIES AND LESSONS LEARNT

CASE STUDY (1) – VISION AND SENIOR LEADERSHIP

- ✓ *Vision and Senior Leadership*
- ✓ *Strong partnerships with stakeholders*
- ✓ *Soft power silo-breakers*
- ✓ *Developing community bonds*

Background: Notwithstanding that every city has diverse and unique cultural, economic and social backgrounds, a common factor in creating successful and sustainable urban development is strong and visionary leadership. Toyama City has a highly stable political environment with strong leadership.

Since 2005, Mayor Mori has overseen the development of the newly incorporated greater city of Toyama into a leading compact city. In fact, he was first elected to the Toyama Prefectural Assembly in 1995 and was reelected in 1999. In 2002, before the current merged city of Toyama was formed, he was elected Mayor of Toyama. In 2005, six adjoining municipalities were merged with the larger city of Toyama, and Mori was elected the first Mayor of the newly consolidated Toyama City. Re-elected in 2009, 2013 and again in 2017, Mayor Mori is now serving his fourth 4-year term.

Mayor Mori Speaking at New Staff Training Session

Approach: Strong leadership has been extremely important to Toyama City in the formation and implementation of its plans and initiatives. Mayor Mori and his team have provided the can-do attitude required to form partnerships with, and to mobilize support from, citizens, the private sector and from across governmental departments.

Mayor Mori is a highly respective leader and has had a clear vision for the city, adopting a strategic and holistic mindset which has been critical in breaking silos and fostering an innovative approach. However, Toyama City's leadership extends beyond the Mayor. As will be profiled in the next section, the Mayor has strong commitment and support on strategic issues from the Chief Resilience Officer (CRO) Dr. Joseph Runzo-Inada and the Office of Strategic Planning and Resilience (SPR). Furthermore, the Mayor has identified and engaged "champions" across sectors and beyond city government.

The Mayor has demonstrated a passion to work with local businesses and citizens which is playing an increasingly important, responsive and spearheading role in delivering the city's vision and breaking down silos. For example, leaders from business, civic and social communities have been brought together for innovative themed Working Groups on resilience (profiled in detail later in this Chapter), and the Mayor has developed a number of multi-sector "Task Forces" within government focusing on key issues such as the empowerment of senior citizens and women and the promotion of health tourism.

Lessons Learnt: Toyama has been particularly successful in developing strong partnerships with stakeholders and breaking down silos through its multi-faceted efforts in communicating the urban development vision. The Mayor firmly believes in face-to-face communications, fostering the best results. When developing the compact city plan, the Mayor held 200, two hour meetings, with citizens and various groups to ensure maximized dissemination, feedback and momentum. The city focuses on clear and pragmatic messages, and ensures that action planning is at the heart of dissemination, allowing the public to see evidence of short term progress as well as the bigger picture.

To ensure communication of his vision, each year the Mayor and his team develop a simple overarching slogan or key message which is disseminated to department heads. In 2014 the slogan of "Amazing Toyama" was created and has since proved a successful tool in developing community bonds and the "heart" concept as well as providing a focus for civic pride.

CASE STUDY (2) – OFFICE OF STRATEGIC PLANNING AND RESILIENCE (SPR)

- ✓ *Vision and Senior Leadership*
- ✓ *Innovative mindset*
- ✓ *Soft power silo-breakers*

Background: In 2015, 100RC provided funding for Toyama City to appoint a Chief Resilience Officer, Dr Joseph Runzo-Inada. Dr. Joseph Runzo-Inada was the first American to serve as a senior policy adviser to a major Japanese city. The CRO is an innovative position in city government and he reports directly to the Mayor. The CRO is Toyama's point person for resilience building, helping to coordinate all of the city's resilience efforts. More widely the 100RC has defined the role of a CRO as the following:

1. Works across government departments to help a city improve internal communications, address complexities, and surface new collaboration.
2. Brings together a wide array of stakeholders to learn about the city's challenges and build support for individual resilience initiatives.
3. Leads development of the city's Resilience Strategy.
4. Ensures the city applies a resilience lens to everything it does.

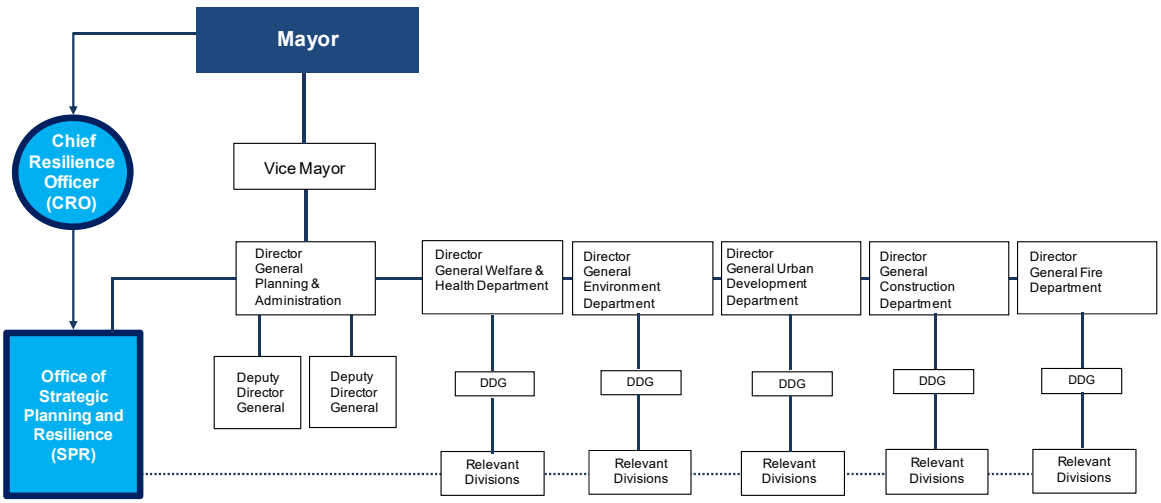
Simultaneously to the appointment of the CRO, the Office of Strategic Planning and Resilience (SPR) was established and currently has a staff of 11, seven of whom are full time in SPR. The SPR staff were selected from a wide range of key departments and have diverse backgrounds from law to economics to engineering.

Approach: The Office of Strategic Planning and Resilience (SPR) is unlike any other known unit in Japan. Rather than assembling a superpower unit to bring different silos together, Toyama has a very "soft" yet effective approach to string inter-sectoral channels together. Each member of SPR comes from a line unit in the city office – some come from construction, others from environment, or even from human resources management.

These members retain a rather strong connection with their "home" units in which allows exposure a of SPR initiatives to the staffs' respective units and sparks communication and spontaneous involvement from different units. The SPR staff works closely on resilience issues with staff in departments across City Hall, often in departments from which they were drawn. The Mayor endorses this structure and provides support for cross-unit integration. The Heads of the city Departments are actively consulted about resilience policies as part of a Resilience Advisory Committee and help carry out broad resilience directives within their respective departments.

Furthermore, to enable soft power silo-breaking, in addition to having each SPR member coming from a line unit other supporting factors utilized by Toyama City include the role of the Mayor's strong and proactive leadership, the Mayor's Task Forces, SPR members maintaining strong connections with their original units maximizing dissemination and advantages from the SPR members comprising a mix of planners and engineers.

Lessons Learnt: This approach has proven to be a very effective model for "integrated" planning that many cities aspire for both in Japan and internationally. The CRO and SPR unit provides a structure that arches across goals and sectors and has been pivotal in ensuring strategic and holistic issues are fully covered and that silo-working in Toyama is minimized. Uniquely in Toyama, the CRO holds a very senior position as a Vice Mayor level appointment, and has extensive contact with the Mayor. The CRO / SPR unit has now prepared the 30-year Strategy in association with the 100RC Program which is profiled later in this report.



Organization Chart of CRO, Resilience Office, and Departments of the Resilience Advisory Committee

CASE STUDY (3) – RESILIENCE WORKING GROUPS

- ✓ *Strong partnerships with stakeholders*
- ✓ *Innovative mindset*
- ✓ *Soft power silo-breakers*

Background: In July 2015 as part of the 100RC launch in Toyama, a roundtable "Agenda Setting Workshop" was held that brought together a diverse range of city officials, Director Generals, the Vice Mayor, businesses, non-government organizations, and representatives from diverse communities.

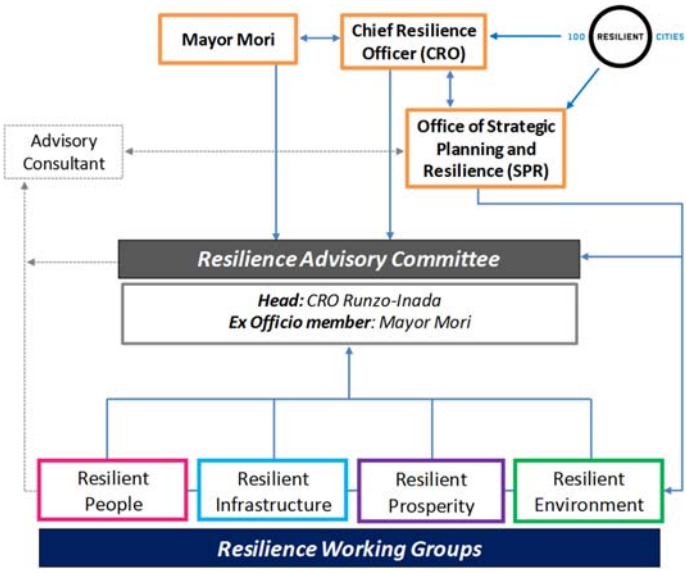
Based on the 100RC framework, the stakeholders discussed the direction of resilience in Toyama city, and four **Resilience Working Groups** were formed – *Resilient People, Resilient Infrastructure, Resilient Prosperity and Resilient Environment.*

Four Themed Resilience Working Groups

Approach: The role of the four Resilience Working Groups was to undertake analysis and diagnostic work as part of the strategy process leading up to the City Resilience Strategy, including generating new initiatives.

The Resilience Working Groups (RWGs) included a diverse cross section of influential members of the business community, NGOs, municipal government leadership, academia, individual experts and citizens. The RWGs reported their findings and conclusions to the SPR which assessed and organized the findings and reported them to the Resilience Advisory Committee (RAC).

Each Resilience Working Group was held 4-5 times during the Strategic Plan preparation period from August 2016 to January 2017. Each group researched specific questions and generated a set of proposed initiatives for the Resilience Plan. The results were compiled and integrated yielding three common concepts of focus: *"Applying cutting-edge technologies"*, *"building comprehensive networks"* and *"pursuing the uniqueness of Toyama"*. As drivers these concepts will lead to strengthening comprehensive resilience in Toyama.



Flowchart for Resilience Working Groups and Advisory Committee

The results of the discussions were added to that of the Mayor's separate Task Forces, advice from the Mayor's Policy Advisers, wide ranging discussions with citizens and city experts, and the city's various 3-year, 5-year and 10-year plans, such as the Urban Development Comprehensive/Compact City Plan to help generate the Strategy.

Lessons Learnt: The Resilience Working Groups approach is a reflection of the best practice participatory leadership approach taken by Toyama City. This hands-on involvement and strong connection of the public sector, local businesses and citizens is a key aspect to city planning and development in Toyama.

The four Resilience Working Groups working to address specific research questions with equal representation of city officials, local businesses, academia, and civic groups and meet regularly to discuss specific interventions for development strategies were important success factors.

Moreover, this also helped foster an innovative mindset and deliver integrated planning solutions during Toyama's resilience strategy development process, enabling the city to draw on a rich and diverse array of stakeholders and ideas.

Stakeholder buy-in to the working groups was harnessed through the clear process that the discussions would directly shape and generate the initiatives to be included in the Resilience Strategy.

CASE STUDY (4) – MAYOR'S TASK FORCES AND INTERDISCIPLINARY URBAN POLICY TRAINING

✓ *Soft power silo-breakers*
✓ *Innovative mindset*

Background: In addition to the four themed Resilience Working Groups introduced in the previous section, Toyama City has also been utilizing two other key complementary approaches in providing a focus for studying immediate problems the city faces, as well as future issues. This has been done through a range of activities to raise problem discovery and solution capabilities, and improve policy formation capacity.

Approach:

(1) Mayor's Task Forces: Under the auspices of the Mayor, the following four task forces have been established:

1. **Empowerment of Senior Citizens** – Investigates and proposes policies to promote the employment of citizens aged over 65 years old.
2. **Empowerment of Women** – Proposes broad policy measures for the empowerment of women in Toyama.
3. **Promotion of Health Tourism** – Proposes policies to increase health tourism in view of Toyama's strengths in the area of health and pharmaceuticals.
4. **World Bank City Partnership Program** – This task force completed the works associated with the successful application to the World Bank in April 2016 for the City Partnership Program.

The task forces comprise directors, deputy directors and section chiefs from a range of Toyama City government departments and policy divisions and seek to reinforce and help ensure the success of the aforementioned themed Resilience Working Groups.

(2) Interdisciplinary Urban Policy Training Groups: One of the most longstanding initiatives has been the Toyama City's interdisciplinary urban policy training groups which have been run in some form since 1991.

The purpose of the training groups is to provide a focus for identifying and recognizing the city's challenges, and also studying approaches on how to address them through conducting research, awareness on problem discovery and proposal identification. In particular, the training groups aim to improve staff capacity and foster creative ideas that lead to solutions.

The training groups run each year between May and November and are attended by a total of 18 nominated officials from each city government department.

For example, the ongoing 2017 Interdisciplinary Urban Policy Training Groups are focusing on the topic of procedures for implementation of urban development policy proposals in Toyama.

Students are organized into three groups. The training method is then centered around the following steps:

- Acquiring knowledge on policy planning, etc. through training from external lecturers.
- Peer-to-peer knowledge exchange and setting of a research theme based on group discussions on key issues and responsible duties.
- Conducting research on identified topics including collection of information, field work and seeking advice from the external lecturers and with key personnel from the main department associated with the chosen research theme.
- Preparation of a report on the research outcomes.
- Presentation of research achievement to the mayor, deputy mayor and department manager, with review and evaluation given by the mayor.

In terms of utilizing the training results, the prepared reports are also distributed to the affiliated department and posted on the employee portal. Toyama City has noted that these training groups have yielded a number of policy ideas that have then become adopted by the city.

Lessons Learnt: These two examples showcase Toyama City's drive for creative and innovative thinking in urban development policy formulation.

By bringing together senior staff from multiple departments on a regular basis to tackle important cross-cutting issues in an integrated and coordinated way, Toyama City is able to help deliver soft power silo-breaking.

Both examples also provide a platform for the dissemination of policy direction and improved communications, as well as reinforcing other work streams, such as the resilience working groups.

FUTURE DIRECTION - THE RESILIENCE STRATEGY (30-YEAR PLAN)

Introduction: As noted, whilst the past challenges and solutions of Toyama's development is important, it is equally important to outline the next steps and proposed strategies for its future development. Building on the policies and strategies since 2007 as summarized in this report, working with the 100RC program, Toyama City has now prepared a 30-year "Resilience Strategic Plan" (July 2017). This section introduces a brief overview of the plan including the emerging new initiatives.

Resilience Vision 2050: The overarching vision set out by Toyama for the Resilience Strategic Plan is: **"***To be a vibrant city of innovation and a tourism gateway, a model of resilience and environment-friendly living, where strong community bonds help citizens flourish, and the high quality of an active lifestyle for all its residents achieves a harmonious balance between traditional arts and modern technology and between economic prosperity and the inspiring natural surroundings of the pristine Northern Japan Alps. "*

Resilience Themes: The Resilience Strategy is underpinned by four resilience themes which Toyama defines as the following:

(1) Resilient People: The Toyama Vision for People is a flourishing, mutually supportive community for all generations. As Toyama supports its seniors to live active lives, they can support younger people with families, while Toyama encourages youth to support their seniors. The aim is to strengthen social bonds, enhance civic pride, and increase opportunities for self-realization regardless of age, gender or disability, a Toyama vision of mutual support which will be passed on to the next generation.

(2) Resilient Infrastructure: The Toyama Vision for Infrastructure is a resilient network connecting urban, suburban and rural areas. The heart of Toyama's vision is the sustainable compact city which includes social infrastructures, and integrates disaster risk management into a labor and cost saving technology-driven infrastructure through public-private collaborations, radiating from the central city throughout the regional hubs and agricultural and rural areas.

(3) Resilient Prosperity: The Toyama Vision for Prosperity is an entrepreneurial and flexible response to demographic change and the needs of every generation of citizens. While continuing to enhance its current strengths in the IT, pharmaceutical and manufacturing industries, Toyama's innovative promotion of advanced technology industries such as aviation nanotechnology, robotics, bio technology, and its infrastructure modifications and city promotion drive to increase tourism, will attract industries, create jobs, and engage young people.

(4) Resilient Environment: The Toyama Vision for the Environment is a harmonious balance between human health, animal health and the health of Toyama's bountiful nature. Working with organizations like UNEP, NOWPAP, SE4ALL, IUCN and IGES, Toyama will continue to vigorously support eco-friendly socio-economic practices, efficient waste management systems, green industries and long range conservation plans.

Strategic Plan Goals and Guiding Principles: Toyama has set out five goals of the 30-year Plan including to: i) Create a model resilient city; ii) Develop a 30 year plan for resilience with step by step progression; iii) Focus on the four interrelated resilience themes; iv) Set out specific plans for urban, suburban and rural areas which are mutually integrated; and v) Set out specific and integrated plans for each generation of citizens

The guiding principles in developing the Plan were centered on ensuring that Plan is: comprehensive; integrated (with cross silo communication and cooperation); efficient (with multiple results from each project); flexible; underpinned by wide stakeholder engagement; and maximizes utilization of PPPs and cutting edge technologies

Major Cross-cutting initiatives and sub-initiatives: Toyama has a long history of developing innovative solutions to shocks and stresses. The Resilience Strategy initiatives identified by Toyama are designed to both address the shocks, stresses, and various challenges facing the city and to also nourish the foundational resilient spirit of Toyama's citizens in a comprehensive and integrated manner.

To break down silos and achieve a comprehensive approach to resilience, Toyama City has developed 10 major cross-cutting initiatives with specific sub-initiatives. The initiatives include a focus on Toyama's successful solutions in the aforementioned areas of comparative advantage identified with the World Bank for the City Partnership Program (CPP) (2016) including compact city planning, flood control, aging and accessibility and waste management:

1	COMPREHENSIVE SMART CITY INITIATIVE
1.A	Create a 30 Year Smart City Plan *[NEW]*
1.B	Build an integrated Lifeline Platform *[NEW]*
1.C	Create and promote the use of an open data platform *[EXTENSION]*

2	PUBLIC TRANSPORTATION
2.A	Complete north-south tram line connections under Toyama station to fully integrate system and increase light rail transit passenger numbers *[EXTENSION]*
2.B	Promote city center and other well connected zones as residential and commercial areas to increase use of public transport *[ONGOING]*
2.C	Modernize and build new train stations in congested and underserved areas. *[NEW]*

3	WATER/WASTE/ENERGY MANAGEMENT
3.A	Revise comprehensive "Toyama City Basic Environment Plan" *[EXTENSION]*
3.B	Develop the city's waste-to-energy industry [*EXTENSION]*

4	DISASTER PREPARATION AND RESPONSE
4.A	Embed resilience as a principle of infrastructure design and maintenance *[EXTENSION]*
4.B	Improve access to community infrastructure *[EXTENSION]*
4.C	Improve flood control *[ONGOING]*
4.D	Create community disaster management teams *[ONGOING]*

5	INTEGRATION OF CITY CENTER TO COAST AREA
5.A	Develop a masterplan for revitalization of the city center to seacoast corridor *[NEW]*
5.B	Attract new business activities to locate in the city center to seacoast area *[NEW]*

6	RURAL TOYAMA AND AGRICULTURAL SUSTAINABILITY
6.A	Conserve our rural landscape and forests [Ongoing]
6.B	Promote high-value agricultural products [Ongoing]
6.C	Expand agricultural skills [Extension]
6.D	Introduce electric vehicles at rural city facilities [NEW]

7	BUSINESS INVESTMENT
7.A	Develop a comprehensive 30 year Business Investment Plan [NEW]
7.B	Promote second home ownership [Ongoing]
7.C	Establish an incubator program for start-ups [Alignment]

8	TOURISM
8.A	Develop Toyama's digital services [NEW]
8.B	Promote Toyama, both internationally and domestically, as a tourist destination [NEW]
8.C	Create an international identity for Toyama [Ongoing]
8.D	Create a healthy lifestyle plan and city branding [NEW]

9	CITIZEN HEALTH, WELLBEING & PARTICIPATION
9.A	Upgrade community centers [Ongoing]
9.B	Implement intergenerational programs for community participation [Extension]
9.C	Implement intergenerational programs for local conservation [Extension]
9.D	Facilitate employment opportunities for elderly and disabled people [NEW]
9.E	Introduce initiatives to ensure working parents can continue to participate in the workplace [Extension]
9.F	Promote cultural events [Ongoing]
9.G	Encourage an active lifestyle for the older generation [Extension]

10	CONSERVATION &ENVIRONMENTAL EDUCATION
10.A	Host an international summit on the marine environment *[NEW]*
10.B	Promote "3R" project (Reduce Reuse Recycle) *[Ongoing]*
10.C	Increase environmental education at ECO Town *[Ongoing]*

Implementation and Delivery: A clear implementation plan will be required with specific actions and outcomes. In addition, Toyama City has already established a strong and effective resilience planning structure which will also be essential to successful implementation.

Working closely with the Mayor and the Director Generals of the city's departments, the CRO and SPR will provide a coordinating role to support the implementation of resilience initiatives and sub-initiatives by the relevant departmental teams. The CRO and SPR will be able to leverage resources to support the departments' work, such as the 100RC network, platform partners, the World Bank and its Partner and Client cities. The SPR will work with city departments to monitor the progress of initiatives and sub-initiatives as they are carried out, and offer additional resilience support as needed in view of each department's progress.

The CRO and SPR will also oversee Working Groups, which will be organized in specific resilience policy delivery areas in consultation with the relevant city departments and divisions. The Working Groups will offer advice to ensure that the resilience initiatives and sub initiatives bring together the best knowledge and innovation in each area.

Progress with implementing the resilience strategy will be monitored in part by making use of the key performance indicators for each sub-initiative. Progress will be reported on a yearly basis, to take stock of the successes, to review new opportunities, and to articulate the next actions.

7. Conclusion

Conclusions and Main Takeaways

The development model of Toyama can potentially serve as a useful precedent for many medium-sized cities in Japan and abroad which are combating various issues in an aging society. The Mayor has been successful in achieving a shared development vision which addresses these issues. Decreasing and aging population and severe financial stress are common issues faced by cities across Japan.

Comprehensive compact city development beyond addressing spatial issues: Toyama's compact city policy demonstrates a comprehensive approach to address such demographic and financial challenges which is highly applicable for other cities not only in Japan but other countries. Compact city development per se is not the end but the means – it is a way to address infrastructure provision in an economically efficient way in an aging society, it is also a welfare policy in some ways, and it is about inter-generational integration as well. It is also about bringing together inter-sectoral issues and not just about spatial development.

Vision and senior leadership: Strong leadership has been extremely important to Toyama City in the formation and implementation of its plans and initiatives. Mayor Mori and his team have provided the can-do attitude required to form partnerships with, and to mobilize support from, citizens, the private sector and across government departments.

Innovative mindset: Whilst Toyama may appear to have locational disadvantages being distant from either of the two major economic agglomerations in Japan – Tokyo and Osaka – in fact this has led to a longstanding culture of innovative. This report has profiled a range of innovative projects and initiatives including collaborations with national government, the private sector and academia. Toyama's international 'openness' has also helped form numerous international partnerships and collaborations, helping to nourish innovation and attract investment.

Strong stakeholder partnerships in city planning and development: Hands-on involvement of local businesses and citizens is a key aspect to urban development in Toyama. This report has showcased a range of projects and initiatives where Toyama has maximized meaningful involvement and strong partnerships with the public sector, businesses, academia and citizens. The Mayor's passion to work with local businesses and communities, and the commitment of the CRO is another key driver to connecting people in the City. Toyama focuses on clear and pragmatic messages, and ensures that action planning is at the heart of dissemination, allowing the public to see evidence of short term progress as well as the bigger picture.

Multiple benefits from one policy: At the heart of Toyama's urban development planning is seeking multiple payoffs from one policy. Each policy intervention is carefully crafted to have multiple payoffs. For instance, revitalizing public transportation can reduce GHG emissions; improve accessibility for the elderly; increase public transportation ridership; revitalize the CBD; reduce city budget costs; and encourage tourism.

Soft power silo-breakers: The report has also showcased Toyama City's unique integrated planning model centering on the SPR Unit which has helped reduce "silo" mentality between heads of the city departments. Rather than assembling a superpower unit to bring different silos together, Toyama has a very "soft" yet effective approach to string inter-sectoral channels together. The CRO and SPR unit provides a structure that arches across goals and sectors and has been pivotal in ensuring strategic and holistic issues are fully covered and that silo-working in Toyama is minimized.

Developing community bonds: Toyama's urban development model includes varied initiatives encouraging and nourishing community bonds, particularly inter-generational bonds in the context of an ageing society. A people-focused approach is also at the core of its resilience planning efforts.

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