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ProSPER.net Assignment # 3

SDG 11 and Tokyo

A livable city with high standards in sustainability and community involvement

Figure 1. Green Tokyo, (Traveling I Love,2016)

The Tokyo metropolitan area is the city with the largest population in the world, home to 38 million people (UN, 2016). Tokyo city (with its 23 wards) had a population of 13.5 million people in 2015[1]. It's also the city with the highest GDP[2] and purchasing power parity in the world. These conditions make Tokyo a very attractive city for Japanese citizens from all across the country to migrate to this mega city.

Target 11.1

Tokyo city planning authorities have managed to successfully rebuild a dense and well organized city after the wars and natural disasters suffered in the past century. Tokyo is a good example of an interconnected and highly developed transport oriented city, which can stand as an example for the rest of the world.

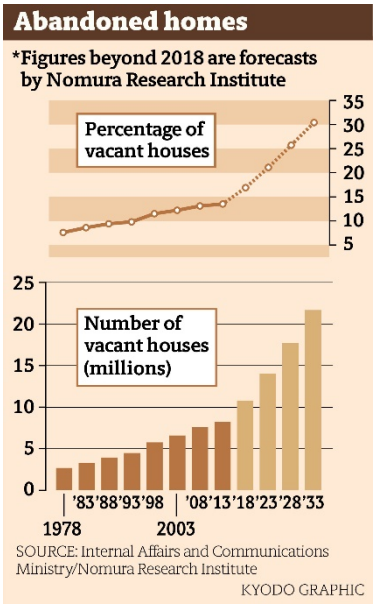
[1] Tokyo metropolitan government. Retrieved from http://www.metro.tokyo.jp/english/about/history/history03.html

[2] Tokyo Statistics Division, Bureau of General Affairs. Retrieved from :http://www.toukei.metro.tokyo.jp/tnenkan/tn-eindex.htm

Tokyo city (the 23 wards of the official city area) has an urban area of 2,191 square kilometers (only 6% of the total land of Japan), with an urban density of 6,158 per square kilometer. This means that even though Tokyo's population has been growing exponentially during the past 60 years, land use has been efficient.

One of the elements that have permitted sustainable urban planning (besides its reliable and interconnected public transit) is the mixed land use. It's possible for citizens to find almost anything within their own neighborhoods (including schools, hospitals, groceries, shops and recreation). Even though the influx of students and workers coming from nearby areas such as Chiba and Saitama account for around 20% of the population of the city, the use of sustainable transportation mitigates the impact on livelihood, traffic congestion, and reduced air quality.

Even if Tokyo seems to be the perfect mega city, it has its unique set of challenges to address in the 21st century. One of the most relevant issues is the abandoned houses problem. Tokyo has 1.94[3] persons per household, this means that there is less than two persons per house in the city, which really does not explain why almost 20% of the population come from outside of the city every day, commuting somewhere around one to two hours per day.



The matter of fact is that 820,000 houses in 2013 were abandoned. These houses were either not reclaimed as inheritance or abandoned to avoid taxation. However, the pricing for new homes have not varied even with the increased availability of used houses. This is due to a cultural aspect of the Japanese - to search for new housing due to high depreciation of used houses and a short lifespan for traditional building materials and techniques used in Japan (around 30 years before tearing down and rebuilding).

Tokyo city has a lot that could be learned from when building a resillient city. Japan is vulnerable to the seismic activity of the pacific Ring of Fire, the city has been able to adapt to strong and oppressive natural dissasters such as earthquakes and tsunamis. Strict building codes for skyscrapers and buildings in general are enforced diligently, especially since more than 70% of the people in the city live in apartments. Japan has great engeneering and architechtural development in terms of new technologies and techniques to achieve better performing infrastructure in a seismicly active region, placing Japanese cities, and especially Tokyo, as some of the most resilient cities in the world.

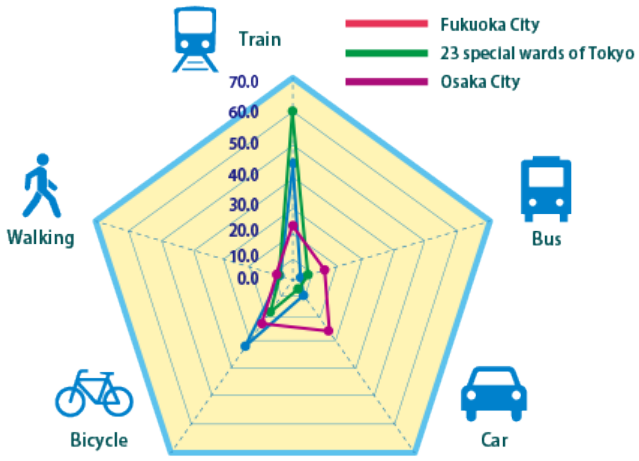
Its important to highlight that this new modern tools and technologies are equally as important to learn from as from traditional sustainable techniques that date back to the origin of Japanes home construction. These include the use of *tatami* floors to insulate homes, the *yakisugi* technique to improove durability and natural fire resistancy of houses, and *tsugite* artistic techniques that permits recycling or reusing materials every time (30 to 50 years) the houses are demolished.

[3] Retrieved from http://www.stat.go.jp/english/

Target 11.2

Tokyo, as the biggest mega city in the world, has a great challenge when planning and directing people's mobility needs. The city has grown towards the Tokyo greater metropolitan area with a Transport Oriented Development approach thanks to the staggering prices of land, increasing population and fast urbanization after the Second World War.

The rail system operators have had an important impact over the cities development, as they have permitted citizens to travel in an efficient and fast way without depending on a private vehicle and keeping travel time relatively short. Tokyo has the world's most extensive rail network made up of sub urban trains, monorails, trams and subways – a very diverse rail system. 27 of the top 50 busiest railway stations in the world are found in Tokyo; this clearly corresponds to having more than half of the moving population using public transport.



Source : National Census 2010
(Ministry of Internal Affairs and Communications)

This complex system is accessible and reliable for most of the population, and also has grown strong with in the culture as stations are popular places to shop, eat, recreate and meet (besides the iconic role that the Shinkansen train play in popular culture by servicing as the most convenient mode of transport in between major cities in Japan). The 13 lines of subway in Tokyo city (among the 23 wards) receive around 9 million people every day, and some lines work doubling their intended capacity, this is why overcrowded trains during peak hour seem are part of the routine for workers and students.

All cities around the globe have a lot to learn about the railway system in Tokyo, regarding its reliability, financial stability, technology, interconnectedness, and accessibility. However, there are other challenges that indirectly relate to the railway system that Tokyo hasn't been able to address successfully, such as cycling.

If only around 16% of daily trips are made by bicycle (frequently with in the same neighborhoods and for few block a day), cycling is not mainstreamed as a formal reliable mode of transport in a city. Bicycles are most used as a First Mile Last Mile (FMLM) solution, making Tokyoites transportation multimodal most of the time. The biggest challenge that the city faces regarding cycling and non-motorized transportation (NMT) is to move towards formalizing bicycle usage without negatively affecting ridership and convenience on public transportation. Several laws and regulations have tried to transform cycling culture and usage in the city, but since so many people reply on other types of vehicle, policy enforcement has been put aside in most cases and some policies have even been revoked.

Non-motorized transportation has a great potential to be unleashed and contribute to achieve Japan's Nationally Determined Contributions (NDCs) to the Paris Climate Agreement, which is why bicycles are an important element for the future of the sustainability of Tokyo and other cities in Japan.

Target 11.6

Tokyo's water, air, light and noise pollution are not currently a serious concern for the city's inhabitants since their average levels seem to be low to moderate[i].

One of the most important topics for the Japanese government is to prepare a strategy to implement the nation's NDC of cutting 80% the emissions by 2050. This ambition looks promising, but is not sufficient enough compared with other developed countries in Europe which aim to be carbon neutral by 2050.

Since 2010, the 22% electricity production share of nuclear power has decreased, being replaced by coal power plants and renewable sources. Japan's plans for coal plants are the main focus for the Japanese government, representing a major concern, since coal-fired power need to be eliminated by 2050 according to IPCC Special Report on 1.5c.

Japan may be on track to achieve a 22% to 24% renewable energy production target, but is important to highlight that the targets are not enough in comparison with other developed countries.

There is a big challenge for Japan to reduce costs for Photovoltaic (PV) energy, by making is more accessible and by creating the right incentives to shift from coal to sun. A disconnected electricity grid and infrastructure creates a great opportunity for renewables since diverse sustainable sources can be used to cover the demand depending on the city, region, and local resources.

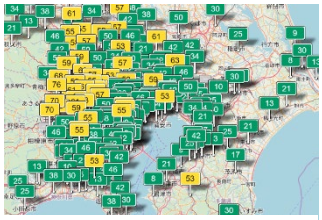


Figure 2 December 6 2018, aqicn.org

The transportation sector also accounts for an important part of air and noise quality in Tokyo. The emissions from combustion vehicles used to represent a significant negative externality, but since 2003 the Metropolitan government has regulated vehicle emissions, and since then the concentration of black smoke has decreased significantly. The demand for new cleaner technologies in the car industry has influenced air quality in the city.

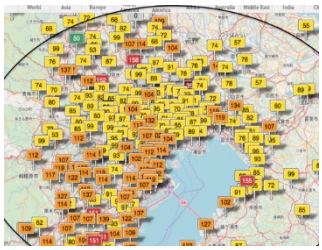


Figure 3 August 13 2018, aqicn.org

During the growth of the economic peak period after World War II, Tokyo's water and air quality deteriorated remarkably, due to lack of proper treatments and unsustainable production. This situation started to change around the 1970s when the city started to make improvements to regulate and control sources of pollution such as factories, as well as investing in sewage systems and infrastructure.

Tokyo bay is one the places that has suffered most from waste water pollution. Many factories generated high amounts of pollutants and poured them directly on the rivers that led to the bay. The Edogawa River received most of the pollution that the bay received during several decades of the 20th century, but as the pollution grew, many started to see the effects and demand regulation. The fisherman, who saw the effects on fish and quality of water first and who were affected directly, were actually the ones that paved the way through protests to what is now the legal framework that protects the quality of water and regulates industries waste management in Japan.

Many positive governmental changes have been done to help recover the water quality in the bay, with the aim for it to be suitable for humans again. Such an example of these targets is to be able to use the bay as the venue for the triathlon event in the Summer Olympics in 2020. However, many challenges still face the city regarding the bay's water quality, since the lack of oxygenation and excess of organic pollutants among other issues are a concern for human health and life below the water. The bay beaches were closed to recreation and bathing in the 1960's due to the unsafe levels of pollution. But this challenge is being addressed by private initiatives to clean the rivers and the bay, projects which have been funded by the government and brought awareness of what once was a clean source for fisherman and recreation of all Tokyoites.

Tokyo, as the world's biggest megacity, is actually able to properly treat household water and also curb industries waste water; this is an example of big efforts in city planning, excellent quality engineering, accessibility, and sustainable investment. Despite all of this progress, there is still a long way to go for recovery of the Edogawa and Tama rivers, as well as the bay waters, to what they were before the economic growth period.

11.7

For many visitors Tokyo may seem a gray city, full of concrete and skyscrapers, but besides having 7.5%[ii] of its urban land dedicated to public green spaces (parks, gardens, pedestrian paths and canal recreation trails), Tokyo has a long tradition of private front yards, flowering trees on streets and urban community vegetable gardens.

Many famous parks such as Shinjuku *Gyoen* National Garden, *Yoyogi* Park, Imperial Palace East Garden and Ueno Park, are very important urban green spaces, both for recreational purposes as well as fauna and flora proliferation purposes. This parks and gardens are for the enjoyment of Tokyoites and for the pleasure of visitors. Normally used as places where the community interacts in open air events, these parks have a long tradition that can be traced back to the 17th century.

It's important to highlight the care that parks and especially gardens are given. Authorities as well as citizens play a determinant role in protecting the conditions of the green spaces as well as in enjoying the different seasonal events, such as *Hanami* season (*Sakura* blossom), and having a reduced impact on the green spaces.

Some green urban spaces can be found as river-side areas along the Tama and Edogawa River, normally used as sports venues for soccer, baseball, and running. Many of these locations near rivers play an important role when preventing floods and mitigating the impact of river overflows. The river embankments in Tokyo were once reinforced with concrete and therefore isolated from the green spaces, and this affected negatively water quality in the rivers since organic matter in the rivers was not able to be cleaned up by microorganisms nor plants at the watersheds. The connection between the river and the green spaces was a mistake for some ecologists but an assertion for engineers. Now a days some initiatives to clean the rivers

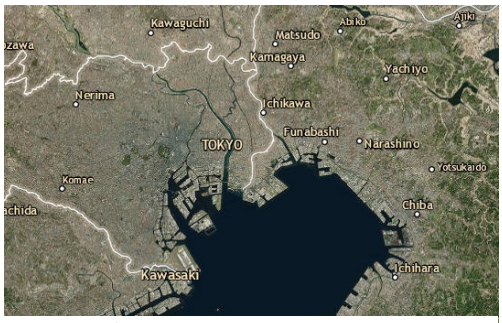


Figure 4 Tokyo green spaces, ARCGIS 2018

water has been to introduce special plants and animals to naturally clean the rivers again from its elevated levels of organic matter.

There is a very important element to highlight when discussing Tokyo's urban green spaces, and that's the Private Owned Public Spaces (POPS). POPS are key for citizens to enjoy nature and find calm between the grey cement of the city. With around 652 POPS, these private areas are very important to interconnect the public and private spaces, contribute to quality of life, and add value to nearby properties. For Tokyoites this means that both the community and private development companies play a central role in the transformation of the city's livability. Some challenges and recommendations still appear to be on hold, such as demanding interconnected cycling networks and proliferation of cycling facilities in buildings nearby in order to obtain a life sized city where non-motorized modes of transportation thrive and people enjoy traveling or just strolling through the city.

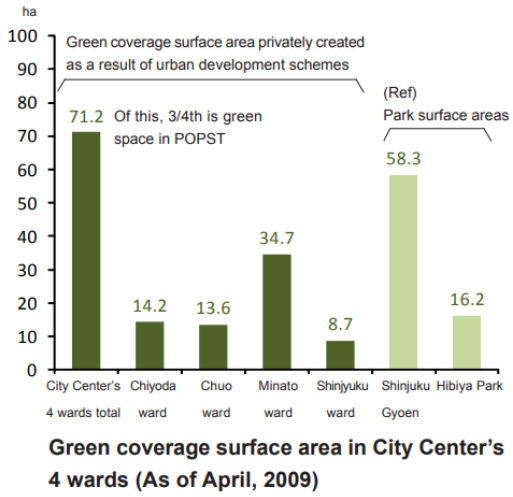


Figure 6 The Mori memorial Foundation, 2011

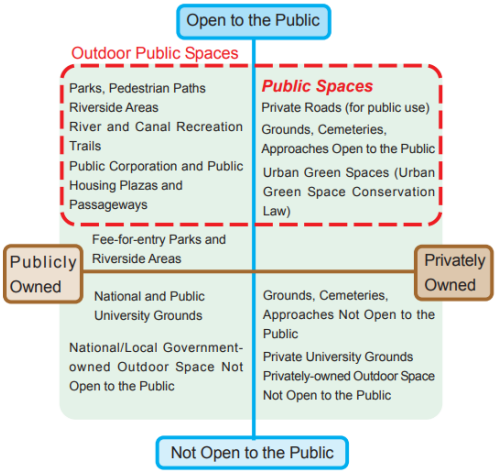


Figure 5 The Mori memorial Foundation, 2011

Overall, Tokyo is a city that has proven to be resilient to both natural and manmade disasters in past centuries. This city is home for more than 10 million people and generates mode GDP than any other city in the world. These great achievements are part of a series of historic learned lessons which forged the cultural strength of the city as well as the correct line of investments in city infrastructure and the built environment.

Tokyo has evolving new challenges such as an aging population and a continuous flow of people into the city. But the society, its political leaders, and public employees seem to be working to keep the city's sustainability and livability ever present. In the present Tokyo is aiming to be exposed as the best version of itself, by demonstrating it can host the Tokyo 2020 Olympics in such a way that will make every foreigner want to stay and live here.

[i] https://www.numbeo.com/pollution/in/Tokyo
[ii] http://www.worldcitiesscultureforum.com/data/of-public-green-space-parks-and-gardens

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