RESILIENT BANGKOK

PIONEERED BY THE ROCKEFELLER FOUNDATION

100 RESILIENT CITIES

LETTER FROM THE GOVERNOR

For the first time in history, more people live in cities than in rural areas. In the past, cities have been living laboratories for major political, social, economic, scientific and technological changes, which have given rise to opportunities for human progress in many areas. People have flocked to cities, attracted by the promise of opportunities and in search of a better life.

Nowhere is this more true than in Bangkok. The heart of Thailand, Bangkok plays a central role in national life and is almost 40 times larger than the next largest city in the country. Almost all of our country's very substantial industrialisation during the last three decades has taken place in our city and its surroundings. Bangkok's urban primacy has brought, and continues to bring, its residents and the country many opportunities. With such a central and prominent role in the nation's life, Bangkok must succeed. By 2020 the lives of a projected 15 million residents will depend on it.

To succeed to 2020 and beyond, Bangkok and its residents must be prepared to face the many shocks and stresses that will continue to challenge our resilience. Rapid and widespread growth has us grappling with increasing urbanization. Facilitating mobility for all our residents in our sprawling city and catering for the social and economic needs, and health and wellbeing of our diverse and rapidly growing population, including the poor and vulnerable, are all significant challenges.

By virtue of our location in the central region of Thailand, on the low lying plains of the Chao Phraya River, flooding is common in Bangkok. With climate change, population growth and increasing population density, learning to live with water in new and different ways is one of our most urgent tasks, along with conserving the natural environment on which all life in our city depends.

Given the scope and severity of these resilience challenges, we cannot implement sustainable and long lasting resilience solutions on our own. To provide our city and its residents with the opportunities, security and quality of life they long for and deserve, we need all our city organisations, and residents to work together towards shared priorities.

Only through united effort can we navigate both the shocks and stresses we currently face, and those that loom on the horizon. This Resilience Strategy outlines these priorities. It is a collection of responses to our most important issues and a call to action to our city to get involved in their implementation.

In today's world, cooperation within cities, as well as between cities, government authorities and regional and international organisations is critical. This Strategy would not have been possible without the inspiration and support of 100 Resilient Cities, Pioneered by the Rockefeller Foundation, and the shared experience and learnings of our peers in the 100 Resilient Cities Network. We believe strongly that cooperation with others is the key to finding and implementing sustainable solutions that will not only build resilience for this generation, but for generations to come.

We are proud to take our first steps on our resilience journey. As we set out on this journey, this Strategy will be our map; our peers on the 100 Resilient Cities Network and 100 Resilient Cities, our trusted travel companions and allies. Together, we will move forward each day towards a city that is safe, liveable and sustainable for all.

LETTER FROM MICHAEL BERKOWITZ

PRESIDENT | 100 RESILIENT CITIES

On behalf of the entire 100 Resilient Cities team, I want to congratulate the city of Bangkok, former **Governor Mom Rajawongse Sukhumbhand Paribatra** and **Governor Pol Gen Aswin Kwanmuang** on the release of the city's resilience strategy. A thriving modern metropolis, Bangkok is also a city that cherishes its traditions, with the two coexisting along its storied river and canals. This document honours the vibrant future of both and lays out an extraordinary vision of urban resilience for the residents and neighbourhoods of the entire Bangkok Metropolitan Area.

Since its early beginnings as the capital of Thailand over 250 years ago, Bangkok has become the beating heart of the country and a major hub for commerce and culture across Asia. As the city continues to adapt to its rapid urbanization and unparalleled growth, this strategy sets out a clear vision for the way forward, enabling the city to thrive rather than merely survive its various challenges. This document addresses not only the shocks posed by floods and other disasters; it also provides plans for strengthening the city amid its myriad stresses caused by its continuing expansion. The strategy includes plans for the city's transportation system, provision of city services, and preserving traditional agriculture. It also emphasizes plans for improving the quality of life of all citizens, including and especially its aging population, reducing risks posed by floods and other natural disasters, and building a strong and competitive economy.

While flooding continues to present a major risk, Bangkok has renewed its relationship with the Chao Phraya and the threats it poses. Rather than focusing its resilience strategy on preparing for major floods, the city has brought a forward-looking balance to its plans, one that accepts water as an integral part of the city's future, rather than merely a threat to it. In this way, and many others, the strategy is designed to turn Bangkok's challenges into opportunities for a more resilient future.

Through his energetic leadership in Bangkok, and the 100RC network, **Dr. Supachai Tantikom**, the city's Chief Resilience Officer, has guided the city to this major moment. The release of Bangkok's strategy is an important milestone for advancing the city's resilience and strengthening the capacity of the city and its partners for coordination, collaboration, and innovation. Importantly, the strategy reflects many lessons learned from the 100RC network and emphasizes further collaboration.

Though this strategy represents the end of the strategic planning process in Bangkok, it is only the beginning of the exciting work to come in the months and years ahead. And 100 Resilient Cities' partnership with the city is also just beginning. It is now that we can collectively begin implementing the actions and initiatives contained in the following pages, which will positively impact the lives of all of those who call Bangkok home, and its many visitors. From its engagement with world-class service providers through the 100 Resilient Cities platform of partners, to its active engagement with the network, Bangkok is well positioned to help us in leading the global urban resilience revolution. We at 100 Resilient Cities could not be more pleased to be a partner in these efforts.

Congratulations again on this enormous achievement, and we look forward to our continued partnership in the journey ahead.

LETTER FROM THE CHIEF RESILIENCE OFFICER

First and most foremost, I would like to thank all of the passionate, professional and dedicated individuals and organisations that have contributed their time and forward thinking to the Bangkok Resilience Strategy.
In particular, I would like to thank the esteemed members of our Steering Committee, the Bangkok Resilience Strategy Working Teams and our Strategy Partner, AECOM for helping to make this Strategy everything that it is. I would like that thank former **Governor Mom Rajawongse Sukhumbhand Paribatra** for bringing this opportunity to Bangkok and to **Governor Pol Gen Aswin Kwanmuang** for carrying this strategy, and the program of activity it outlines, forward.

We are grateful to 100 Resilient Cities for providing us with this opportunity to expand our horizons and for their constant and steadfast support in our resilience journey so far. Participation in the 100 Resilient Cities Network has been invaluable to the development of this Strategy. Our peers on the network have taught us much. I hope that this Strategy speaks to the many lessons we have learned.

Bangkok is a city of contrasts. For the most part, Bangkok is a vivid, fast-paced metropolis, bursting with modern life. It draws people in from all over the country and the region, in search of education, economic opportunity and a higher quality of life. But look again and you will see a city steeped in tradition. Historic buildings and temples allude to deep rooted customs.

Unprecedented changes have taken place within Bangkok in the last decade and this pace of change shows no sign of slowing down. While rapid growth and industrial success has lifted millions in our city from poverty, such development has not been universal. Massive migration to Bangkok by people seeking better livelihood options has resulted in areas of inevitable poverty. Amongst the glittering new condominiums there remain areas of unplanned informal settlements where people live and work, which are unsafe and put people at risk.

Increasing urbanization has created a busy and stressful lifestyle, congested streets and poor water and air quality. Our natural environment and the health of our residents have suffered with ever-expanding development. Such challenges will only be compounded by climate change, which will bring increasing uncertainty and unplanned interruption to our city.

With more people than ever before living in, and engaging with our city, it is a critical time for us to break the cycle of reacting to problems and set out on a more deliberate course to ensure that our city is resilient. Only by preparing Bangkokians, our communities, institutions, businesses and systems to survive, adapt and grow no matter what kind of chronic stresses and acute shocks we experience, can we bring our city closer to our vision of a city that is safe, liveable and sustainable for all. We must work to improve social services and mobility for all residents. We must ensure no one is left behind, for to be successful, we must lift everyone up.

To do this, we have identified three Strategic Action Areas. Each is underpinned by a number of important goals, which are supported by a suite of initiatives and projects. These Strategic Action Areas focus on increasing quality of life, reducing risk and increasing adaptation and driving a strong and competitive economy. A significant challenge for us is to reimagine fundamental problems in our city, such as traffic congestion and flooding, in new and creative ways. In doing so, we will adapt, learn and grow with our environment whilst ensuring that we won't make the mistakes of the past.

No longer is it enough for us to only protect Bangkok from flooding, with a changing climate and increasing urban development managing floods will only become more complex. Instead, we must harness water in the city for life and liveability. Our new approach to water management will use green and blue infrastructure – parks and canals, as much as it uses the traditional protection of grey infrastructure – pipes and pumps. This will provide multiple benefits for Bangkok, including contributing towards our goal of growing green space and encouraging environmentally friendly urbanization.

I am honoured to be able to present Bangkok's first Resilience Strategy, what I hope will be the first of many. This Strategy belongs to all Bangkokians. I hope that it can catalyse new ideas and inspire all of us to work together to build resilience now and into the future.

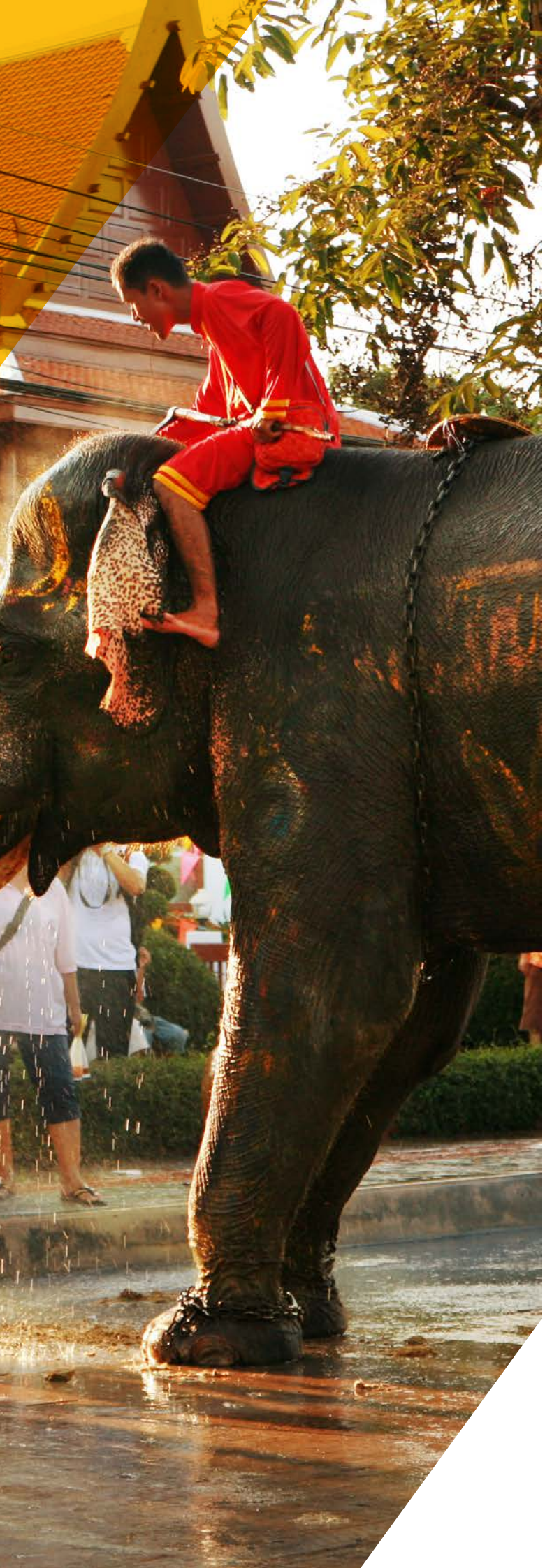
RESILIENT BANGKOK

CONTENTS

EXECUTIVE SUMMARY

Unprecedented changes over the last decade have rendered Bangkok, at first glance, almost unrecognizable. Rapid growth and industrial success has made the city a magnet for migration from across the country and beyond. Millions of people flock to 'the city of angels' in search of opportunity amidst the concentration of economic growth and prosperity; Bangkok's population has increased more in the last decade than the preceding three decades combined. Alongside newfound opportunity, this growth has brought myriad social, economic and environmental challenges.

With more people than ever before living in and engaging with the city, it is a critical time to look ahead and make a plan for a better, more resilient Bangkok. One that is safe, liveable and sustainable for all. How can we make Bangkok a vibrant city of opportunity for everyone, rather than a select few? How can we create space for collaboration and communities, rather than of division and exclusion? How can we work together to embrace water and its opportunities and values, rather than battle to keep it out? These and many more questions were asked in the development of this Resilient Bangkok Strategy. While the pages that follow do not provide a single and absolute solution, they do outline a series of steps that will bring us closer to our goal.



Together with 100 Resilient Cities – Pioneered by the Rockefeller Foundation, the Bangkok Metropolitan Administration is proud to present this Resilient Bangkok Strategy. The pages that follow outline what we have found to be the most urgent threats to Bangkok's resilience and the integrated and participatory actions that we will take to address them. Our actions will focus on three, interconnected Strategic Action Areas. These are:

INCREASING QUALITY OF LIFE

REDUCING RISK AND INCREASING ADAPTATION

DRIVING A STRONG AND COMPETITIVE ECONOMY

Each Strategic Action Area comprises a number of goals and each goal has a range of initiatives with specific, implementable projects. A summary of all Strategic Action Areas is provided on page 37 and all goals, initiatives and projects are summarized on page 14-116.

INCREASING QUALITY OF LIFE

Bangkok supports over 8 million people in the city, and over 14 million in its metropolitan area, who travel to and from work, access healthcare, and partake in entertainment and recreation. To ensure that our residents can experience an increased quality of life, we will work to improve social services and mobility for all residents.

This Strategic Action Area has three goals:

- Health and wellbeing for all city residents, now and into the future
- Safe, accessible and convenient transportation network; and
- Environmentally friendly urbanization.

Ensuring our healthcare and facilities meet the evolving needs of an ageing population will be central to achieving our goals. We will work to promote and facilitate the benefits of a healthy lifestyle, through infrastructure change and engagement with the community. We will improve mobility and connectivity through actions that will contribute to a safe, accessible and convenient transportation network and promote green space in urban areas to make the city a more pleasant and accessible place to live and work.

REDUCING RISK AND INCREASING ADAPTATION

Climate change, urbanization and globalization will bring increasing uncertainty and unplanned interruption to Bangkok. By supporting and strengthening community-led disaster risk reduction actions and increasing institutional adaptive capacity, we will support all of Bangkok's residents to better adapt to natural and human hazards and the increasing risks posed by climate change.

This Strategic Action Area has three goals:

- Improving resilience to floods
- Increasing public and community-driven action on awareness, preparedness and adaptation; and
- Stronger institutional capacity and regulation.

While identifying and planning for foreseeable risks is an important part of disaster risk reduction, we will also build resilience in our communities so that they can withstand a range of shocks and stresses, even those that are unforeseen.

DRIVING A STRONG AND COMPETITIVE ECONOMY

Bangkok's economy is inextricably connected to the global economy, bringing opportunities for economic diversity and growth through trade, tourism, and investment. Increasing interconnections and interdependencies also introduce significant volatility and vulnerability into our economy. While the city cannot shield itself entirely from this volatility, there is much that can be done to ensure our economy is strong, efficient, accessible, and competitive. We will drive a strong and competitive economy through economic diversification, both in terms of industries and in employment opportunities for our residents.

This Strategic Action Area has two goals:

- Facilitating city and community-based economy; and
- Expanding tourism, service industry and hospitality.

To achieve these goals we will work to cultivate our world-renowned tourism and service industries by developing a roadmap for our tourism sector and by supporting tourism providers with business development training. We will explore opportunities for technological advancement, which can facilitate higher skilled and higher paying jobs and support a diverse range of community-based livelihoods.

Bangkok has come a long way since it became the capital of Thailand in 1782. The past 250 years has seen the city change from a small fortress town on the eastern bank of the Chao Phraya River into one of South East Asia's most prosperous and modern cities. But while history has been kind to the city, it has also been cruel. Bangkok has faced, and will continue to struggle with severe financial crises, floods, political unrest and other significant disruptions amidst the slow burning stress caused by increasing inequality and rampant urbanization. Such challenges have often left the city struggling to catch up. This strategy marks an important step forward for Bangkok. We are well and truly into the 21st century now. Perhaps lessons from the 21st century tell us that change and growth will be unparalleled, but we will not be scrambling to catch up, instead we will be well ahead.

BRIEF HISTORY

Bangkok, or Krung Thep Mahanakorn in Thai, means the City of Angels. Its full name is Krung Thep Mahanakhon Amon Rattanakosin Mahinthara Ayuthaya Mahadilok Phop Noppharat Ratchathani Burirom Udomratchaniwet Mahasathan Amon Piman Awatan Sathit Sakkathattiya Witsanukam Prasit. It is Thailand's capital and the national centre of administration, education, transportation, finance and commence and development.

Once known as the "Venice of the East", Bangkok became the capital of Thailand in 1782 after re-establishment on the eastern bank of the Rattanakosin Island. Originally located on around 4 square kilometres of the eastern bank of the mighty Chao Phraya River in central Thailand, Bangkok's natural settings have always been a central feature of its form and mobility. Central Thailand is known for its flat and fertile plains which are reliant on natural and man-made waterways to irrigate and drain farmland during dry and green seasons. This centuries-old relationship with water, as the source of life and livelihoods, means the city is no stranger to floods and the disruption caused by severe weather, which is now intensified with climate change.

EARLY CITY STRUCTURE AND PLANNING

Canals were used as a planning tool and were a central part of urban land use planning policy during the period of King Rama I. The city was divided into three parts by the canals: inner Bangkok, outer Bangkok, and the area outside the city wall. People settled along both sides of the river and developed an extensive network of canals as their main mode of transport. To this day, thousands of people get around the city using an extensive network of large and small river and canal boats. Freight is transported up the Chao Phraya to Northern provinces, and down to the Gulf of Thailand on barges. The importance of roads in attracting national and global investment emerged in 1851, led by King Rama IV, with rail and tram transport connecting Bangkok to neighbouring areas.

Over the next century Bangkok's development accelerated, attracting people from across Asia to live and work together, building over fields and canals in the process, to create one of the world's largest and most dynamic city hubs. The city's rapid growth and industrial success has made it a magnet for migration from across the country and beyond, marking the beginning of a trend of rapid urbanization, which to this day, shows no signs of slowing down.

INFLUENCE OF TRADE

Western trade has had a big influence on the growth of Bangkok. Thailand has a long history of agricultural production, trading with the West and China to become a world centre for rice and rubber. In the 20th Century, the Chao Phraya and its delta developed quickly to support port facilities, warehouses, shipyards, and rice mills; all built by thousands of labourers. Over the decades and with the influence of globalization, Thailand has grown its export industries beyond agricultural products to include vehicles, electronics, heavy and light machinery, plastics and refined petroleum to become one of the major exporting countries in the region and the 22nd largest exporter in the world.

Now Bangkok is a thriving commercial hub supported by world-class government infrastructure including two international airports, stadia, numerous beautifully designed bridges, and mass transport systems. Bangkok is studded with stunning temples and palaces, traditional markets and houses, and still supports ancient crafts and a food culture that is unparalleled. Its unique blend of ancient and modern ways of life creates a bustling and fascinating city.

1782

Bangkok, known as the 'Venice of the East,' became the capital of Thailand.

1809–1824

Canals were a central part of urban land use planning policy, they divided the city into three parts and were used as a passage for transport.

1851

Land-based transport became increasingly important for attracting national and global development.

1851 – 1951

People from all over Asia came to Bangkok and the city grew rapidly.

1950s

Western trade had a big influence on growth in Bangkok, it became a world centre for rice and rubber.

2000s

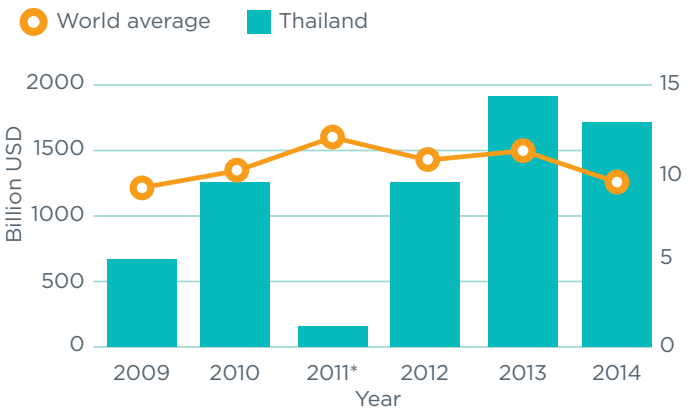
With the influence of globalization Thailand has grown its export industries to include vehicles, electronics, plastics and petroleum.

CITY IMPORTANCE AND NATIONAL AND REGIONAL CONTEXT

Despite its short history in comparison to other globally important cities, the Bangkok Metropolitan Area has quickly burgeoned to a vast sprawling megacity over 1568 square kilometres, hosting over 14 million people. Bangkok's role and importance as a primate city in comparison to Thailand's other cities is unparalleled in Asia. Over a fifth of Thailand's population and the vast majority of the nation's financial, commercial and government responsibility is concentrated there.

Thailand has demonstrated remarkable economic progress experiencing 21 per cent growth in Foreign Direct Investment inflows over the past 6 years, compared to the global percentage of 0.7%. Occupying the 4th rank in Asia's top prospective host economies, Thailand has gained a solid reputation as a second home for various global multinational enterprises (MNEs).

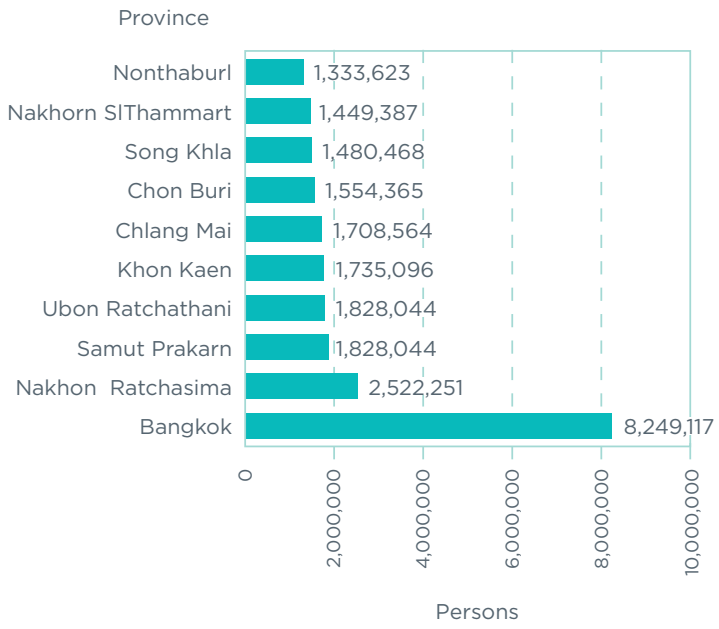
Figure 1: Foreign Direct Investment in Thailand



Bangkok's strategic role as capital and driver of Thailand's national economy, along with an industrial centre on the Eastern Seaboard, gives it regional as well as national importance. Its location and facilities provide attractive opportunities for companies to invest and workers to settle. This migration from across the world, neighbouring countries and Thai provinces gives Bangkok its unique, multicultural diversity and dynamism.

The rapid growth of the city, and its changing role within Thailand, Asia and the world, has not been without its challenges. Some areas of the city have experienced intense, unplanned urban growth and an unsustainable increase in population density. Due to this, authorities struggle to provide sufficient public services and ensure compliance to safety and land use regulation. Programs for upgrading public infrastructure, regenerating housing, reforming land tenure and documenting migrants have helped to rectify many areas of risk in urban areas. However, Bangkok's constant change and growth remains a challenge, driving vulnerabilities to hazards, safety, health, poverty and people's well being..

Figure 2: Ten provinces with largest population in the year 2010



In the fiscal year 2015, Thailand's international airports catered for more than 106 million passengers and transported more than a million tons of air freight (more than 500 airlines were serviced). Moreover, Suvarnabhumi, the largest airport in Thailand, was ranked 5th in the list of the world's best airports. Don Mueang International Airport has recently completed the second phase of development. With the reopening of a newly renovated Terminal 2, the airport is able to serve up to 30 million passengers annually.

CITY DYNAMICS

URBANIZATION

Over the last 250 years Bangkok has blossomed from a small fortress town to a 21st century megalopolis. Today, the built up area of Bangkok is almost 16 times greater than in 1958. The registered population in Bangkok increased from 1.6 million in 1958 to 5.4 million in 1986 and is projected to grow to 15.32 million in 2020 [1]. A great number of unregistered people also live and commute into Bangkok, swelling its official numbers. These bustling and exciting mixes of international and Thai people compete for, and also provide, its unique services. Bangkok is world renowned for its incredible street food, shopping and architecture and as a base for important tourism and business sectors.

The way traditional and modern practices come together is a critical part of its attractiveness to visitors and those who live here. It also reflects, and caters for a significant income divide, which is experienced in most large cities. The authorities, as well as Bangkok's citizens, are working to build their economic opportunities, and it is critical that legislative, social and governance structures support fair livelihood opportunities for all Bangkokians individually to contribute to the country's economy.

Figure 3: Number of Tourists in Thailand

Figure 4: Population of Thailand

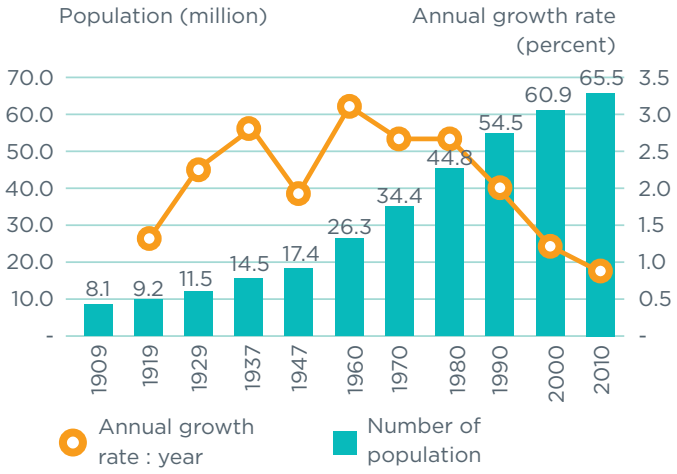
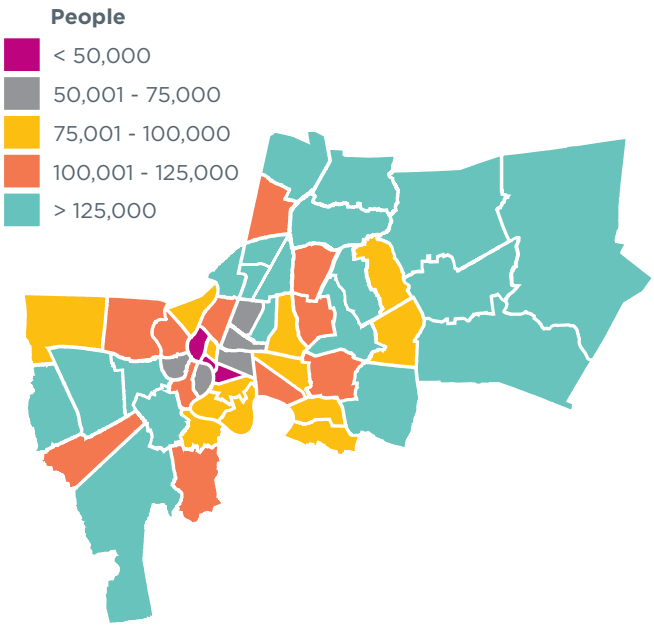


Figure 5: Population Density Map of BMA Area



To be able to ensure sufficient public services such as drainage, suitable road layouts and electricity and create urban areas that promote safe and healthy buildings and lifestyles, growth must be well planned and regulated. This is a great challenge in a city experiencing rapid growth.

Bangkok is situated on low-lying flat land, below sea-level in some areas. Originally this land was well suited to serving as rice paddy fields, and as the flood plain for the Chao Phraya River and its many tributaries that drain the massive monsoon rains into the Gulf of Thailand. This land has now largely been developed and houses many residents, business and transport corridors. There are a great many people and their livelihoods, as well as productive industries, including important foreign direct investment relying on this flood-prone land remaining safe, despite the difficult location.

Effective control of land use in Bangkok influences a great number of other development areas including industrial and agricultural output, transportation, water and food security, environmental protection, climate change, drainage and solid waste management, subsidence control, migration and illegal immigration, disaster mitigation and social welfare.

WHY DO WE NEED TO WORRY?

RESILIENCE CHALLENGES

TRANSPORT AND AIR QUALITY

One of the most obvious urban problems for Bangkok is its traffic congestion. According to a study by TOMTOM in 2016, Bangkok experiences the second worst traffic congestion in the world after Mexico City [2]. Insufficient public transportation facilities and increasing private car ownership have caused an acute problem across major thoroughfares in the city for over a decade.

The road system has not been able to keep up with the city's intensifying road use. The daytime commuting population is so high in number that congestion problems have remained despite the construction of several high-speed elevated expressways. The use of private vehicles by city dwellers and those commuting from surrounding areas has reached 53 per cent and is projected to rise to 59 per cent by 2037 [3]. In 2014, there were 8,651,172 registered vehicles in Bangkok. Of these 317,870 were newly registered private cars, equivalent to 870 new cars per day. In this year, 405,649 new motorcycles were registered, equivalent to 1,111 new motorcycles per day.

Recent electric-powered underground and overhead ('BTS Skytrain') transport links have provided many commuters with traffic-free, but relatively expensive options; however old buses and an ever-growing number of cars, vans and trucks continue to be a critical way to transport goods and people around the city. Blocked roads and harmful carbon monoxide emissions cause difficulties as well as serious health issues. The city needs a complex and widespread system of rail, boat, skytrain and underground mass transit systems to answer all the requirements for a cheap, resilient and extensive public transport system which reaches to the suburbs where most residents need it

The government has prioritized public awareness initiatives and activities relating to traffic control and driving quality across Thailand. Bangkok has seen greater enforcement of traffic and safety violations and safety rules which contribute to risk as well as overall traffic congestion. But challenges remain for road-building, including a shortage of funds to extend the road network and difficulties in expropriating private land for road construction.

The extensive use of motorcycles and tuk-tuks gives Bangkok a unique quality. These vehicles do contribute to road safety issues although the city has been successful in introducing regulations to increase the quality and safety of motorcycle taxis. The roads and sidewalks remain notoriously dangerous for cyclists and pedestrians, as well as unpleasant because of noxious fumes.

IN 2014

PRIVATE CARS
3,809,929

MOTOR BIKES
3,168,496

BUS AND TRUCKS
174,582

PRIVATE TRUCKS
1,200,273

Besides the immediate costs of congestion, including long commute times and blocking the access for first responder vehicles such as police and ambulances, vehicle emissions are the greatest source of air pollutants in Bangkok. This is becoming one of the city's most pressing health risks. Air quality monitoring performed by the Pollution Control Department (PCD) indicates that in Bangkok 24-hour average values of particle pollution exceeded air quality standards. Areas found to exceed particulate pollution on a daily basis are: Din Daeng District, Rat Burana District, Phra Khanong District, Chatuchak District, Ministry of Science and Technology, Ratchathewi District, Ratchathewi District Office and Pathum Wan District [4].

To compound this air pollution, Bangkok has one of the lowest percentages of green areas of any major capital in Asia. According to the Economist Intelligence Unit's Asian Green City Index 2011, commissioned by Siemens, on average, urban citizens in Asia enjoy 39 sq.m. of green space each, while Bangkok has a mere 3sq.m. each [5] Economist Intelligence Unit. (2011) Asian Green City index. Green areas act as a CO2 sink and filter many pollutants from the air, thereby improving air quality and lowering the health risk. Resilient development that balances environmental conservation, and the health and well being of the population remains a challenge for Bangkok [6].

WASTE AND WATER

Although the municipal authority has been active in solid waste management since 1915, solid waste is a major concern for Bangkok. The daily municipal waste generated by city dwellers and from light industry is growing rapidly, from 7,000 tonnes per day in 1993 to around 8,800 tonnes per day in 2014, and expected to reach 11,500 tonnes per day by 2025.

Bangkok faces challenges related to the separation of solid waste once collected. Much of this waste could be dealt with more sustainably. Around 14 per cent is recyclable, and up to 48 per cent is organic waste and could be mulched, incinerated or otherwise disposed of. In response to this challenge, the city is focusing on improving the efficiency of organic waste management and supporting solid waste reuse and recycling.

1993 | 7000 TONNES PER DAY

2014 | 8800 TONNES PER DAY

2025 | PROJECTED TO BE 11,500 TONNES PER DAY

The Chao Phraya and Mae Klong Rivers are the main source of potable water supply to the city. However, domestic, industrial and agricultural waste provide water purification challenges, and cause physical blockages. Water from ground sources is known to be limited and at risk, and its use by industry has caused concerning subsidence of the entire delta area.

The city is located on layers of soft clay, which provide numerous problems for heavy infrastructure. The over-pumping of ground water out of aquifers under this clay causes ground settlement which is experienced as land subsidence across the city. The subsidence reached its most critical state in the early 1980s when it occurred at a rate as high as 120 mm/year. Active management of ground water use has allowed the subsidence rate to decrease but the threat remains. Bangkok is also situated between 1 metre below and 2 metres above mean sea level. Those areas below sea level are particularly vulnerable to any changes in water level. This threat will become more important as relative sea-levels rise, both from subsidence and as a result of a changing climate. Relative sea-level rise increases the risk of salt-water incursion into the Chao Phraya River as well as increasing flood risk in the delta as water drains slower in times of flood and high river water.

INEQUALITY LEAVING PEOPLE WITHOUT BASIC NEEDS

Massive migration to Bangkok by people seeking good livelihood options and security has resulted in areas of inevitable poverty or illegal status which are currently uncatered for. There remain areas of unplanned informal building where people live and work in places which are unsafe, unsanitary and lack basic service provision, putting people at risk. It is estimated by some social work NGOs that up to 20% of Bangkok's residents live on squatter settlements [7]. The precarious social and legal positions of residents mean they do not receive the full set of public services which can reduce risk, such as waste collection, pest control and storm-drain clearance, which makes them more vulnerable to flood, health problems and other hazards [7].

One example of a squatter settlement is in Klong Toei, to the South East of Bangkok's city center which has been home to a diverse community of an estimated 80,000 people, including migrants to Bangkok, for more than half a century. Residents of this community live in uncertain financial, legal, and social conditions and work together to try to survive in an environment which can put them at massive risk [8]. Flood risk from the adjoining Chao Phraya puts residents at risk of damage to their belongings, health, education, safety and source of income, causing greater poverty and dependence. Flood risk, and its impacts on health, livelihoods and safety, would be mitigated if the community was provided with certain public services, but their unregistered and illegal status makes it difficult for government agencies to justify this work.

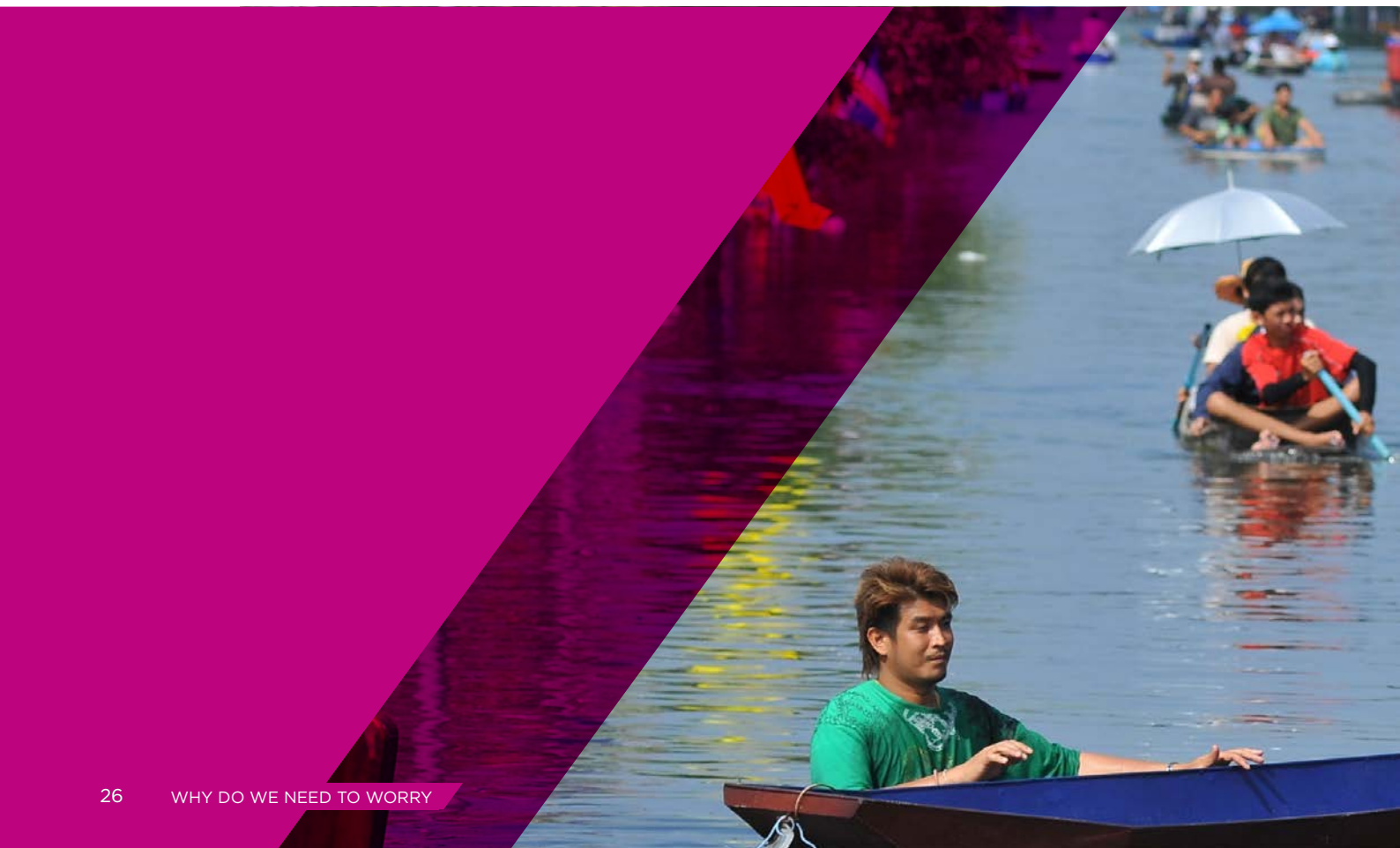
Undocumented workers are vulnerable to exploitation and often suffer poor working conditions and low wages. The International Organization for Migration (IOM) in Bangkok stated after the 2011 floods that migrants are particularly at risk of being arrested, deported and fined after disasters. Any work permits and registration documents owned often get destroyed, and people are limited to the province where they were first registered despite losing livelihoods and outstanding pay.

Klong Toei - FIRE - On 2 March 1991, chemical containers in Bangkok Port (Klong Toei) exploded and caused a terrible fire. It took about three days to control this fire and residents of both the Klong Toei community and nearby areas were evacuated to temporary housing in Lumpini Park. A total of 5,417 people were displaced as a result of the incident.

FLOOD RISK

Flood is a natural phenomenon in the Chao Phraya River Basin. Bangkok's situation, on the lower basin, on flat land reaching towards a low-lying delta, means up to 4 km on either side of the river is the natural flood plain. Bangkok has always received floodwater during the 5-month long annual monsoon. In the past, fields, canals, irrigation channels and both natural and man-made flood retention areas (known in Thai as 'Gamling' or Monkey Cheeks as they hold water) acted to reduce flood impacts. The flood water was even utilized for farming rice tolerant to high water events.

With the trend of urbanization, water bodies were slowly replaced by settlements and roads, and Bangkok started to experience floods as one of the first recognized urban hazards. Urban ground cover affects not only the direction of the water flow but flood depth, velocity and duration. The building of flood barriers in some places has protected those areas, sometimes putting other areas at greater risk, or allowing people to build behind barriers which cannot fully protect them from all floods, and can fail [9]. Now, complex urban systems, including electricity, transport, communications, drinking water supply, livelihoods and many other elements are more likely to be disturbed as they are concentrated in a locations exposed to flood. Wider systems, including the management of water flow elsewhere in the Chao Phraya River Basin, also impact on what is experienced in Bangkok. Rainfall throughout the region is subject to unpredictability as a result of climatic changes making it more difficult to regulate dams and river flows to meet the needs of farmers and industry upriver, and protect households in both rural and urban areas [10].



In 1917 and 1942, Bangkok experienced devastating floods. The city also experienced floods during 1975, 1977, 1978, 1980, 1983 and 1995. 2011 saw Thailand experience a historically devastating flood with a significant impact to Bangkok and its surrounding areas. Among the complex causes of the flood were the natural effects of extreme monsoon rainfall and the low capacity of upstream rivers, but also changes to land use and water management including urbanization on the flood zones, diversion of water through certain channels, dam height and lack of proper maintenance of water structures [9].

CHALLENGES TO BUILDING RESILIENCE TO SHOCKS AND STRESSES

COMMUNITY RESILIENCE IN URBAN SETTINGS

Risks posed by shocks and stresses can be reduced by communities working together to prepare and protect each other from vulnerabilities and to recover quickly. It is recognized that building a strong, unified and fair community within a diverse and dynamic urban setting is a huge challenge. Bangkok is a huge, sprawling city, bolstered each day by millions of commuters and tourists. Different agendas, languages and levels of wealth, to name a few criteria, illustrate some of the barriers to encouraging people to work together for a stronger and safer Bangkok, and support each other. The responsibility of providing a safe and productive city for all inhabitants remains with the authorities, but community resilience-building could be a tool used by BMA, NGOs and others to help bring people together to be aware of and mitigate risks created in the city.

Getting community participation for resilience could be based upon the unique way in which urban communities have been formed in the Bangkok vicinity. A number of communities have the potential to take community-driven initiatives for resilience that would complement risk-reduction initiatives by the authorities. Some communities exist within temples, mosques, churches, in common business activity areas, and around local markets who may be able to self-organize towards a common goal of resilience, while promoting generosity and equality. Newcomers sharing living space such as residents of condominiums and housing estates could also form communities to support resilience building [11].

ECONOMIC DYNAMICS

Bangkok is inextricably linked to the global economy. This brings trade, tourism, investment and great opportunities for diversity and growth. It also exposes the economy to world market fluctuations and competition. This was borne out in the East Asia financial crash of the late 1990s where weaknesses in Asian financial systems plunged Thailand and its neighbours' economy into a deep recession. Being export-dependent, Thailand's economies is vulnerable to shocks and stresses, including those brought by climatic phenomena and political unrest. Drought affects agricultural production and trade frequently.

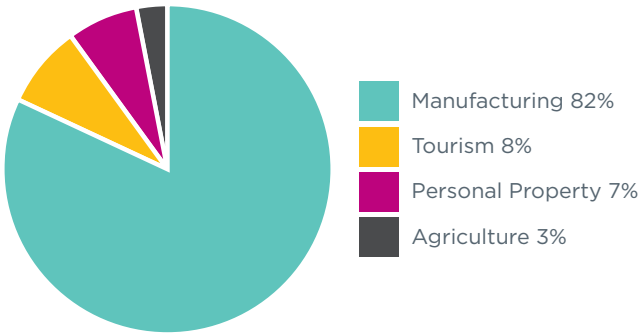
The 2011 Thailand floods caused approximately 1.4 trillion THB (USD 47 billion) of economic damage. Many publicly owned companies faced a huge challenge to return to normal production levels and the country had to actively bolster foreign investor confidence in Thailand's resilience [12]. In the aftermath of the 2011 floods, the Thai government initiated a National Disaster Fund of 50.0 billion THB (USD 1.4 billion) to support the provision of natural disaster risk coverage to households, small firms and industries.

Thailand's recent period of political unrest also poses a risk to the city's fragile economic recovery following the 2011 flood event. The Asia Development Bank lowered predictions for Thailand's growth from 3.6 percent to 3.2 per cent, citing contracted merchandise exports and deterioration of Thailand's consumer confidence index. Despite this, tourism numbers have been steadily rising since their slump in 2013 and 2014, following a period of unrest. Bangkok was recently recognized as the world's most visited city, and the country relies heavily on tourism, which accounts for roughly 15 per cent of Gross Domestic Product (GDP).

Grass-roots businesses, known as micro, small and medium enterprises (MSMEs) such as small shops, street food sellers and self-employed domestic workers are at great risk from physical, social, legislative and economic shocks; and are less able to adapt themselves quickly to prepare or build back better after an event. Supporting MSME's to build resilient businesses will help Bangkok's economy to be stronger in the face of shocks and stresses.

Figure 6: Businesses affected by the 2011 floods

1% businesses that experienced financial loss from 2011 floods



INEQUALITY

Over the last four decades, Thailand's economy has grown remarkably, moving from a low-income country to an upper-middle income country in less than a generation. As such, Thailand is a widely cited development story, with sustained strong growth and impressive poverty reduction, particularly in the 1980s. However, access to these economic opportunities is unequal, and many Bangkok residents still live in informal settlements, and in poverty.

It has been recognized that there is an unequal distribution of risk. Livelihoods and accommodation that are more exposed to the elements, poor quality buildings and air quality are often taken by poorer people, putting them at greater exposure to hazards without giving the capacity to manage the risks.

The income divide between average wages in Bangkok compared to Thailand's other provinces, as well as between social strata within Bangkok, puts some at much greater risk than others. It is critical that authorities create an enabling environment for everyone who is impacted by the management of Bangkok to be able to participate in developing and challenging that policy to create a resilient, wonderful city that has opportunities and safeguards for all.

There have been numerous coup d'état's in Thailand in recent decades. Political instability at a national level has ramifications for the city. Riots and protests have physically taken place in Bangkok, adversely impacting tourism and disrupting services. Since May 2014, Thailand has been governed at a national level by a military government, called the National Council for Peace and Order (NCPO), which has brought some stability to the country, and the capital. The NCPO has since drafted a new constitution which paves the way for a general election to take place in 2017 and with it greater political stability for the country.

STRATEGY DEVELOPMENT

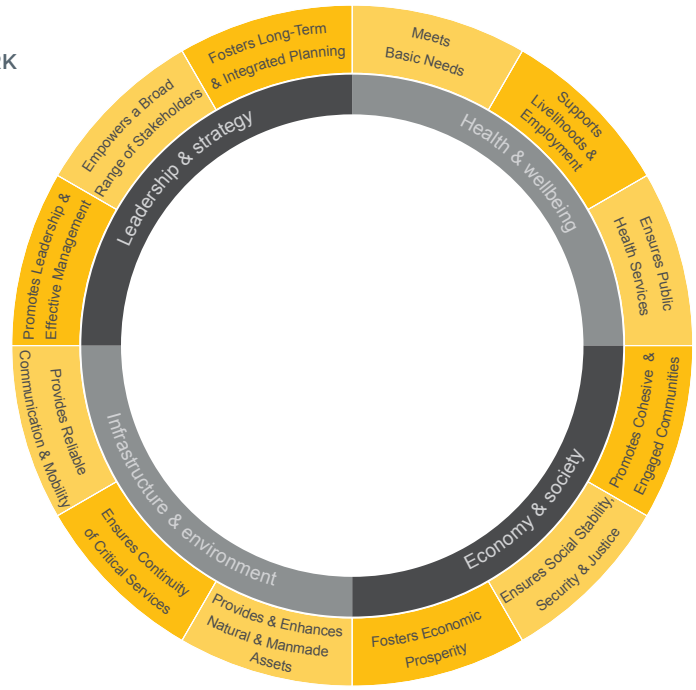
STRATEGY DEVELOPMENT PROCESS

The development of this strategy began with an Agenda Setting Workshop in September 2014. Following the workshop, research and consultation was undertaken to better understand the challenges facing the city. While Bangkok has become a world renowned mega-city visited by more people each year than any other in the world, it has suffered and will continue to experience a variety of shocks and stresses, putting its physical and social infrastructure under further strain.

A series of large-scale workshops with the public and private sector, civil society, academia and Bangkok residents revealed a variety of perceptions of the city's resilience challenges both during everyday conditions and under times of increased stress, such as directly following the 2011 floods. Over 500 individuals participated in this consultation.

Participants were asked to consider a variety of questions related to 12 drivers of resilience that comprise the City Resilience Framework (CRF). The CRF allowed participants to comprehensively identify what they considered to be the city's strengths and weaknesses. This would be the foundation for developing actions to address these weaknesses, and to build on our strengths. A Preliminary Resilience Assessment was produced, which summarised findings from this process and proposed key areas for further investigation.

CITY RESILIENCE FRAMEWORK



Five working teams comprized of staff from across a variety of departments within the Bangkok Metropolitan Administration and in collaboration with universities and other specialists in the city were assembled to explore each area and consider solutions to the core issues that were found. The solutions, outlined in this strategy, are comprized of new initiatives designed to respond specifically to the issues identified, and existing programs that have been enhanced or scaled-up to further increase their benefits across the city. A full list of participants and collaborators can be found at the end of this document.

Some solutions will make an immediate difference to the lives of Bangkokians, while others will build longer term resilience through a gradual process of shifting behaviours and perspectives. More than disaster response or risk reduction, all initiatives in this strategy work together to provide the resilience dividend, that is, they work together to reduce the impact from a number of shocks and stresses while providing multiple benefits to city residents; rich, poor, young and old alike.

Academia

Government

NGOs

Businesses

PHASE 1

JANUARY 2015

STRATEGY KICK-OFF → STAKEHOLDER CONSULTATION → DISCOVERY AREA IDENTIFIED → PRELIMINARY RESILIENCE ASSESSMENT

APRIL 2016

PHASE 2

DISCOVERY AREAS DIAGNOSTIC → OPPORTUNITY ASSESSMENT → RESILIENCE PRIORITIES AND INITIATIVES → RESILIENCE STRATEGY

MAY 2016

DEVELOPMENT OF INITIATIVES

JANUARY 2017

Expert Panel

Challenge Team

100RC Network

100 RESILIENT CITIES

100 Resilient Cities - Pioneered by The Rockefeller Foundation (100RC) helps cities around the world become more resilient to the physical, social, and economic challenges that are a growing part of the 21st century. Bangkok's application was selected from almost 1100 that were submitted by cities from around the world.

As a part of the network, Bangkok receives funding for a Chief Resilience Officer to coordinate resilience efforts across the city, including the development of this strategy. It also has access to the experience and expertise of other cities in the network and the 100RC platform; a group of leading service providers who offer in-kind support to member cities. In this way, Bangkok joins a global community of urban resilience practitioners implementing integrated, city-wide resilience actions around the world.

DRIVING CHANGE IN BANGKOK

The Bangkok Metropolitan Administration (BMA), organized in accordance with the Bangkok Metropolitan Administration Act 1985, is responsible for the management of the city of Bangkok. It is the sole organization at the local authority level responsible for the well being of Bangkok residents with some financial support from the central government.

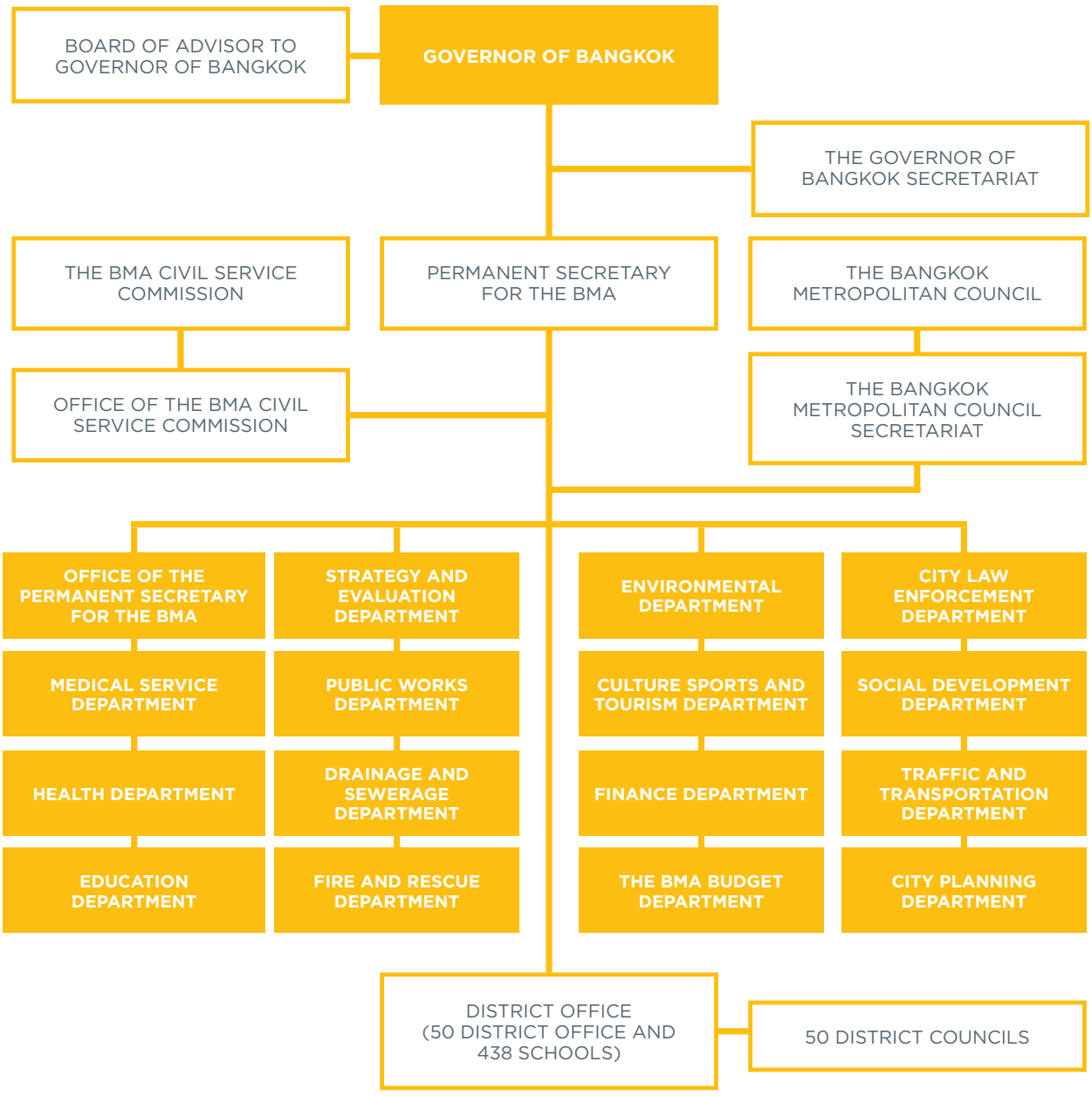
Bangkok has made a step forward in setting a long-term futuristic vision as a blueprint for the city to grow. The Bangkok Vision 2032 "Bangkok: Vibrant of Asia", an outcome of initiatives jointly conducted by BMA and Chulalongkorn University, reflects people-centred perspectives on what Bangkok should look like and how to reach that desirable future. It highlights six strategic dimensions: Safe City, Green City, City for All, Compact City, Democratic City, and Economic and Capitalise Knowledge-based City. It also has performance measures to achieve concrete outcomes.

The three Strategic Action Areas outlined in this resilience strategy will compliment Bangkok's vision for the future. It will work alongside the city's investments to upgrade and transform city systems to ensure that Bangkok is a safe, liveable and sustainable city for all by increasing quality of life, reducing risk and increasing adaptation and driving a strong and competitive economy.

This will not only allow the city to fulfil its functions as envisaged for the future, but also reduce the impacts of shocks and stresses, ensuring that all city residents will be able to share and enjoy the development gains accumulating over time without serious interruption.

This task will not be easy. Implementation will be an ongoing challenge to ensure alignment and coordination between siloed city departments in a city that is rapidly changing. From an ever-growing population, to urban expansion and a thriving young manufacturing industry, Bangkok is hurtling forward and challenging its administrators to catch-up. In recognition of this, this strategy represents a serious commitment from BMA to resilience building efforts to ensure that the city not only grows but that it brings all residents along on that journey.

ORGANIZATION CHART OF THE BANGKOK METROPOLITAN ADMINISTRATION



BANGKOK FOR TOMORROW

This section outlines a program of interrelated actions that will work together to build resilience across Bangkok. It is made up of three Strategic Action Areas designed to bring Bangkok closer to its vision of a safe, liveable and sustainable city for all. These action areas are:

INCREASING QUALITY OF LIFE THROUGH:

GOAL 1: Health and wellbeing for all city residents, now and into the future
GOAL 2: Safe, accessible and convenient transportation network
GOAL 3: Environmentally friendly urbanization

REDUCING RISK AND INCREASING ADAPTATION THROUGH:

GOAL 4: Improving resilience to floods
GOAL 5: Increasing public and community-driven action on awareness, preparedness and adaptation
GOAL 6: institutional capacity and regulation

DRIVING A STRONG AND COMPETITIVE ECONOMY THROUGH:

GOAL 7: Facilitating city and community-based economy
GOAL 8: Expanding tourism, service industry and hospitality

Each action area comprises a series of goals for the city. To achieve each of these goals, Bangkok will implement a broad program of activities with specific, implementable sub-actions. Some will be implemented directly by BMA, others will be delivered in partnership with a range of private and public sector organizations. Most are new initiatives designed to fill recognized gaps in the city's current capabilities, while some are existing projects that will be expanded or improved to fully realise their resilience benefits. Implementing projects, like the benefits they will generate, will unfold over the short, medium and long term.

These actions are the first set of actions that look at city-wide initiatives in a different way, to consider how one action can address multiple problems and provide multiple benefits, as well as how stakeholders can better work together to achieve resilience outcomes for the city. They will not be the last. To become a truly resilient city will require many hands, much work and constant evolution.

BANGKOK IS A SAFE, LIVEABLE AND SUSTAINABLE CITY FOR ALL

STRATEGIC ACTION AREA 1 — Increasing Quality of Life

GOAL 1: HEALTH AND WELLBEING FOR ALL CITY RESIDENTS, NOW AND INTO THE FUTURE

GOAL 2: SAFE, ACCESSIBLE AND CONVENIENT TRANSPORTATION NETWORK

GOAL 3: ENVIRONMENTALLY FRIENDLY URBANIZATION

STRATEGIC ACTION AREA 2 — Reducing Risk and Increasing Adaptation

GOAL 4: IMPROVING RESILIENCE TO FLOODS

GOAL 5: INCREASING PUBLIC AND COMMUNITY-DRIVEN ACTION ON AWARENESS, PREPAREDNESS AND ADAPTATION

GOAL 6: INSTITUTIONAL CAPACITY AND REGULATION

STRATEGIC ACTION AREA 3 — Driving a strong and competitive economy

GOAL 7: FACILITATING CITY AND COMMUNITY-BASED ECONOMY

GOAL 8: EXPANDING TOURISM, SERVICE INDUSTRY AND HOSPITALITY

STRATEGIC ACTION AREA 1: INCREASING QUALITY OF LIFE

Increasing quality of life through improved social services is important for the resilience of Bangkok – particularly for our most vulnerable residents. Access to healthcare is well-regarded, with universal healthcare available to all Thai nationals and to a certain extent registered migrants. However, significant challenges remain, including rising costs, inequalities, an ageing population and unhealthy habits among residents.

While a major challenge for Bangkok is ensuring healthcare and facilities meet the evolving needs of an ageing population, promoting a healthy lifestyle and habits that prevent illness and injury are important to quality of life across all age brackets. Improving these aspects of residents' lives can also significantly reduce strain on the healthcare system and reduce economic costs associated with illness and ageing.

Increasing mobility and connectivity through safe, accessible and convenient transportation networks, and promoting green spaces in urban areas, will make the city a more pleasant and accessible place to live and help to facilitate healthy behaviours and recreation. This key action area has three goals:

GOAL 1: HEALTH AND WELLBEING FOR ALL CITY RESIDENTS, NOW AND INTO THE FUTURE

GOAL 2: SAFE, ACCESSIBLE AND CONVENIENT TRANSPORTATION NETWORK

GOAL 3: ENVIRONMENTALLY FRIENDLY URBANIZATION (GREEN SPACE, POLLUTION, TRAFFIC)

GOAL 1: HEALTH AND WELLBEING FOR ALL CITY RESIDENTS, NOW AND INTO THE FUTURE

To address health-related issues and the physical wellbeing of different population segments in the city, this goal will focus on improving systems to deliver comprehensive health care services. Specific groups who are vulnerable to health conditions, including the elderly, migrant workers, and those living in squalid environments will benefit from the following interventions:

- Promoting healthy living and lifestyles
- Epidemic prevention in urban communities
- Preparing for quality ageing.

1.1 PROMOTING HEALTHY LIVING AND LIFESTYLES

LIVING IN A BUSY CITY CAN RESULT IN LESS HEALTHY LIFESTYLES, WHICH CAN INCREASE THE RISK OF NON-COMMUNICABLE DISEASES, INCLUDING DIABETES. IN SUPPORT OF HEALTHIER LIFESTYLES, BMA WILL IMPLEMENT THE FOLLOWING PROJECT AS PART OF THIS RESILIENCE STRATEGY.

1.1.1 SCREENING FOR DIABETES AND HIGH BLOOD PRESSURE IN PEOPLE OVER THE AGE OF 21

IMPLEMENTING AGENCIES AND PARTNERS:

Health Promotion Division, Health Department, BMA

RESILIENCE VALUE & OUTCOMES:

Early detection of diseases in new patients will ensure early treatment, reducing strain on the healthcare system, and reducing the severity of illnesses and mortality rates. It will also encourage early intervention in unhealthy lifestyles and help promote healthier habits among city residents. A healthier population will be better positioned to engage in city life and contribute to the community.

BENEFICIARIES:

Bangkok residents aged 21 and above.

Eating habits are a leading risk factor for health problems for the residents of Bangkok. Junk food and lack of proper exercise leads to problems such as obesity, high blood pressure and diabetes. Younger generations in particular increasingly face health issues such as heart disease and depression. This initiative will raise awareness of the importance of a healthy lifestyle and provide opportunities for healthcare providers to engage with residents about their daily habits, facilitating the early detection and prevention of non-communicable diseases.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

This project will work with healthcare providers to establish screening programs for high blood pressure in people aged over 21. This screening program will also raise awareness among the target group about the benefits of a healthy lifestyle.

TIMELINE:

Ongoing, starting in 2017

OUTPUT	Public participation program	
RESILIENCE QUALITIES	Robust, resourceful	
RELEVANT SHOCKS/AND OR STRESSES	Stress – Reduce chronic diseases leading to better health for the public and reduced disease complications.	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	■

1.2 EPIDEMIC PREVENTION IN URBAN COMMUNITIES

FOR BANGKOK TO ACHIEVE HEALTH AND WELLBEING FOR ALL, VIGOROUS ACTIONS ON EPIDEMIC PREVENTION ARE CRITICAL, PARTICULARLY FOR PEOPLE HIGHLY SUSCEPTIBLE TO HEALTH PROBLEMS AND INFECTIOUS DISEASES. CONSISTING OF THE TWO SUB-PROJECTS DESCRIBED BELOW, THIS INITIATIVE WILL FOCUS ON EPIDEMIC PREVENTION AND CONTROL IN THE MIGRANT WORKER HOUSING AT CONSTRUCTION SITES ACROSS BANGKOK. IT WILL ENHANCE DISEASE SURVEILLANCE AND CONTROL SYSTEMS, AND IMPROVE LIVING CONDITIONS FOR LABOURERS AND MIGRANT WORKERS.

1.2.1 EVENT BASED SURVEILLANCE FOR PANDEMICS

IMPLEMENTING AGENCIES AND PARTNERS:

Health Department of BMA, Institute of Urban Disease Control of Ministry of Public Health, and Private Health units

RESILIENCE VALUE & OUTCOMES:

By developing an integrated, community-based network of disease surveillance and health standards for migrant worker housing, healthcare can be extended to the city's large population of unregistered migrants and illegal workers. This will increase the quality of life of migrant workers in over 300 camps across Bangkok.

BENEFICIARIES:

Residents of Bangkok, labourers and workers.

Every year a significant number of workers, particularly migrant workers, suffer from communicable diseases due to complicated risk factors associated with working conditions, migrant worker housing environments, and health practices.

As the city continues to grow, with a reliance on migrant workers and labor forces as the backbone of construction activities, it is essential that disease prevention and control systems are inclusive of health-related issues and epidemic control for this vulnerable group.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

The project will focus on developing comprehensive systems for epidemic control and prevention among labour forces and migrant workers. This includes activities ranging from medical screening, integrated network surveillance, vaccination, and improving sanitation, to developing regulations that mandate disease surveillance in campsites and the use of media for health risk communication.

BMA – together with Ministry of Public Health, public and private health care units including hospitals, clinics, and community health centers – will play crucial roles in implementing these activities with support from surveillance networks including occupational health and safety officers and volunteers.

TIMELINE:

2 Years

OUTPUT	Program design and public participation	
RESILIENCE QUALITIES	Robust, flexible, resourceful, inclusive	
RELEVANT SHOCKS/AND OR STRESSES	Shock – Infectious disease (in case of outbreak) Stress – Access to healthcare and minimum standards of living, informal migration	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

1.2.2 IMPROVING WORK PLACES AND LIVING CONDITIONS FOR MIGRANT WORKERS IN BANGKOK

IMPLEMENTING AGENCIES AND PARTNERS:

Environmental Sanitation and Health Department of BMA; Department of Health, Ministry of Public Health; Institute for Urban Disease Control, Ministry of Public Health; Public Health Law Centre.

RESILIENCE VALUE & OUTCOMES:

These measures will help to ensure minimum standards in workplaces and housing which caters to migrant workers. This will contribute to increasing the quality of life for these residents and improving health outcomes for migrant workers.

BENEFICIARIES:

Migrant workers in Bangkok.

It is critical that health and safety regulations and standards are complied with at all employment places to ensure the well being of workers. It has been identified that some workplaces, in particular those which employ a high proportion of migrant workers and low-income workers (such as the industrial sector) do not comply, thereby putting this section of society at risk. Moreover, many of these workers live in substandard housing at different locations of the city. This initiative will study the current situation of high risk workplaces, and the living environments of their work, especially of concentrations of migrant workers to ensure a higher health and safety standard.

ACTIVITIES IN BRIEF AND IMPLEMENTATION

This initiative will be implemented through an in-depth study of workplaces and housing known to have migrant laborers.
Focus group discussion, interviews and workshops will be conducted to understand the key issues and improve the quality of working conditions and housing sites.

TIMELINE:

1 year

OUTPUT	Workplace and housing standards for migrant workers	
RESILIENCE QUALITIES	Inclusive, resourceful, robust	
RELEVANT SHOCKS/AND OR STRESSES	Shock – Infectious disease pandemic Stress – Access to healthcare and minimum standards of living, informal migration	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	■
	New	

1.3 PREPARING FOR QUALITY AGEING

AS THE POPULATION OF BANGKOK REMAINS HEALTHIER INTO OLD AGE, IT IS IMPORTANT FOR THE CITY TO BE ABLE TO CATER FOR THEIR SPECIFIC NEEDS. CONSISTING OF THE THREE SUB-PROJECTS DESCRIBED BELOW, THIS INITIATIVE WILL ADDRESS THE IMPLICATIONS OF AGEING FROM VARIOUS PERSPECTIVES – SOCIAL, ECONOMIC, ENVIRONMENTAL, MENTAL, AND BEHAVIOURAL. IT WILL ALSO HELP DEVELOP POSITIVE ATTITUDES TOWARDS AGEING MEMBERS OF SOCIETY, AND PROMOTE INDEPENDENCE AND QUALITY OF LIFE FOR THE ELDERLY.

1.3.1 SUPPORT FOR ELDERLY RESIDENTS

IMPLEMENTING AGENCIES AND PARTNERS:

Graduate School of Environmental Development Administration, National Institute of Development Administration and BMA

RESILIENCE VALUE & OUTCOMES:

Savings schemes and a cooperative approach will increase independence and ensure quality of life for elderly residents.

BENEFICIARIES:

Elderly residents.

The average life expectancy in Thailand has increased notably over the last decade, resulting in an increase in the number of elderly people. Accompanying this are changes in family structure with a trend towards smaller families, leaving an increasing number of elderly people vulnerable to improper attention and care. The situation is more acute in Bangkok, where the family unit is not as strong compared to smaller cities and rural areas in Thailand. This particular initiative aims to understand and put in place a well-designed savings scheme aimed at enabling older savers to become financially independent.

Risks to the elderly will be researched, including the drivers of stress, crime and safety. Support schemes will be investigated and implemented to build social support and social services for people growing older to remain independent, safe and well.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

This initiative aims to design and implement a savings scheme to support elderly residents to be financially secure and independent. This will require a thorough understanding of the current financial needs of the elderly and how these may be better supported.
Risks to the elderly will be researched, including the drivers of stress, crime and safety. The savings scheme will be accompanied by appropriate social services and programs for the elderly to more fully support this growing group in our community to remain independent, safe and well.

TIMELINE:

3-5 Years

OUTPUT	Public participation program	
RESILIENCE QUALITIES	Robust, flexible, resourceful, inclusive	
RELEVANT SHOCKS/AND OR STRESSES	Stress – Ageing population	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

1.3.2 PREPARING THE POPULATION AGED 18 – 59 FOR OLD AGE

IMPLEMENTING AGENCIES AND PARTNERS:

Health Promotion Division, Health Department, BMA

RESILIENCE VALUE & OUTCOMES:

By supporting residents to prepare for old age earlier in life, the city is taking a proactive approach to facilitating quality ageing in all residents. This include more opportunities for elderly residents to participate in city life, to interact and form networks with each other and to develop healthy habits and financial security into old age.

BENEFICIARIES:

Citizens of Bangkok aged 18-59.

A key element of community resilience is social cohesion which is a recognized challenge in urban places. In particular, older people can be supported well by families, neighbours and others by working together to look after their social and physical needs. The social structure of Bangkok is becoming more modernized and isolated and less family-oriented. It is important to raise the awareness of 18-59 year old Bangkokians about social responsibility to encourage them to help each other to meet the current and future needs of older people in the city.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

This initiative has two objectives: to build awareness in the population of what they will require as they age and what they can do now to prepare for old age (savings, social networks, etc.), and; to build stronger social networks by connecting the younger population to older residents through various activities including education, religion, culture and sport.

TIMELINE:

1 year (starting 2017-2018 with continuation in the future)

OUTPUT	Community education and program design/research	
RESILIENCE QUALITIES	Robust, flexible, resourceful, inclusive	
RELEVANT SHOCKS/AND OR STRESSES	Stress – Ageing population	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

1.3.3 ACCESSIBILITY AND SAFETY OF TRANSPORT OPTIONS FOR SENIOR CITIZENS

IMPLEMENTING AGENCIES AND PARTNERS:

Graduate School of Environmental Development Administration; National Institute of Development Administration; Traffic and Transportation Department, BMA Office of Transport and Traffic Policy and Planning, Ministry of Transport

RESILIENCE VALUE & OUTCOMES:

Current gaps in transportation system facilities for elderly people will be better understood allowing for interventions that will empower elderly residents to move about the city and reduce isolation.

BENEFICIARIES:

Senior Citizens of Bangkok.

By 2021, around 20 per cent of the population of Bangkok will be considered elderly. The current transportation system does not cater the needs of elderly people, limiting their ability to travel on their own and increasing isolation. This initiative will focus on understanding the current system's shortcomings and future needs for accessible and safe transport options.

ACTIVITIES IN BRIEF AND IMPLEMENTATION

This study will undertake primary research to better understand the existing shortcomings of Bangkok's transportation system. It will include physical investigations of existing infrastructure, as well as interviews with older residents to understand their needs and the ways in which existing systems are failing to meet these needs. Attention will be given to identifying required facilities for elderly people.

TIMELINE:

3-5 years

OUTPUT	Study and program design	
RESILIENCE QUALITIES	Robust, inclusive	
RELEVANT SHOCKS/AND OR STRESSES	Stress – Ageing population	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

GOAL 2: SAFE, ACCESSIBLE AND CONVENIENT TRANSPORTATION NETWORK

The mobility of Bangkok residents is currently limited by significant traffic and inadequate and over-capacity public transport systems. These are complicated and interrelated issues – new thinking will be needed if we are to provide safe, accessible and convenient solutions that meet the diverse needs of different segments of the population. This means being resourceful and building redundancy into transport systems, trialling multiple options to reduce traffic congestion and providing alternative networks and connection points. Interventions include:

- An integrated mass transport system
- Improving traffic flow in the city
- Reducing road related deaths through influencing driver behaviour and new technologies.

COLLABORATING WITH MEXICO CITY

More than 50 per cent of cities in the 100RC network have identified transportation and sustainability as key issues in their resilience strategies. Bangkok and Mexico City share a number of common challenges. In both highly populated, urbanised mega cities, getting around is not easy – globally, Bangkok and Mexico City have been found to have the worst traffic congestion.

In response to this, like Bangkok, Mexico is focused on improving mobility through an integrated, safe and sustainable system that will transform the city's current transportation system and how residents interact with it. Similarly, Bangkok is embarking on a master plan for an integrated mass transport system. As these initiatives unfold, Bangkok and Mexico will work closely together through the 100RC network to share progress, lessons, knowledge and insights throughout implementation.

2.1 INTEGRATED MASS TRANSPORT SYSTEM

MASS TRANSIT SYSTEMS ARE WIDELY RECOGNIZED AS AN EFFECTIVE PART OF THE SOLUTION TO TRAFFIC CONGESTION IN MEGA-CITIES. TO MAKE THE PUBLIC TRANSPORT SYSTEM IN BANGKOK MORE EFFECTIVE, LINKING ITS MASS TRANSIT SYSTEM TO THE CITY'S OTHER PUBLIC TRANSPORTATION NETWORKS WILL MAXIMISE ITS USE AS A FAST, SAFE AND CONVENIENT WAY TO TRAVEL CURRENTLY, BANGKOK HAS A SKYTRAIN, AIRPORT LINK AND MASS RAPID TRANSPORT. UNDER THE CURRENT PLAN, DUE TO BE DELIVERED BY 2029, THIS WILL BE EXPANDED TO 548 KM. BETTER CONNECTING THESE SYSTEMS IS THE CORE OF THIS GOAL. BMA WILL IMPLEMENT THREE KEY INITIATIVES FOR THE INTEGRATED MANAGEMENT AND OPERATION OF PUBLIC TRANSPORTATION, TO INCREASE CONNECTIVITY AND EXPAND THE LINKAGES BETWEEN DIFFERENT TRANSPORTATION MODES ACROSS BANGKOK, AS DESCRIBED BELOW.

2.1.1 INTEGRATED MASS TRANSPORT SYSTEM MASTER PLAN

IMPLEMENTING AGENCIES AND PARTNERS:

Traffic and Transportation Department, BMA

RESILIENCE VALUE & OUTCOMES:

Mobility is integral to the quality of life of Bangkok residents. Investing in a robust, integrated transport system will facilitate safer, more equitable and efficient movement of people in the city and reduce the use of private vehicles and their associated environmental impacts, while stimulating economic growth.

BENEFICIARIES:

Residents of Bangkok and visitors.

Thailand began developing its mass transit system in 1994 to cover a total distance of 373 kilometers. This comprises a connected system of underground railway lines (subway), BTS (sky train lines), and an Airport Rail Link. To increase mobility in Bangkok and populated suburban areas, secondary public transportation systems such as a monorail and light rail have been planned, aiming to expand coverage of the mass transit system and provide convenient access to different points across Bangkok.

ACTIVITIES IN BRIEF AND IMPLEMENTATION

The project will develop a master plan for an integrated transport system, including the Mass Transit Master Plan, feeder system and other modes of public transportation such as bus and water transport to ensure connectivity across the city.

To maximize the use of an integrated and robust public transportation system in Bangkok, the Master Plan and budget for system operation will be prepared based on detailed studies, review and analysis of relevant research on secondary public transportation systems, physical volumes of traffic data and mobility information, forecasting public transit use and passengers, and assessing the efficiency of secondary public transportation in reducing road congestion.

TIMELINE:

1 Year

OUTPUT	Master plan and strategy development	
RESILIENCE QUALITIES	Robust, integrated	
RELEVANT SHOCKS/AND OR STRESSES	Stress – Traffic congestion	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

2.1.2 EXPANSION OF MONORAIL FEEDER AND LIGHT RAIL SYSTEM

IMPLEMENTING AGENCIES AND PARTNERS:

Traffic and Transportation Department, BMA

RESILIENCE VALUE & OUTCOMES:

Multiple and well-connected mass transportation facilities and networks will be made available for Bangkok residents for safe, fast and convenient daily commuting. This will offer an alternative mode of transportation in Bangkok, and reduce private vehicle use, contributing to a sustainable solution to traffic congestion and vehicle fuel consumption in Bangkok.

BENEFICIARIES:

Residents of Bangkok.

Monorail feeders and light rail systems are to form an integral part of Bangkok's mass transit system. Both systems are expected to increase the redundancy of the transport system – providing more residents with multiple mobility options – and provide greater connectivity and access to multiple linkage points, complementing the main Mass Transit Systems. Construction of monorail feeders and a light rail system will start on the completion of a comprehensive program and budget for system operation.

ACTIVITIES IN BRIEF AND IMPLEMENTATION

This project will construct a monorail feeder and light rail system as a part of Bangkok's interconnected mass transit system. This includes construction of the following:

- Monorail - Gray Line: Phase 1) Watcharaphon to Thonglor, 16.25 km, 15 stations. Phase 2) Phra Khanong to Rama 3, 12.17 km, 14 stations. Phase 3) Rama 3 to Tha Phra, 11.14 km, 9 stations.
- Monorail – BMA 2 (Din Daeng Area) to Yothee, 6 km, 6 sky- stations and 1 subway station interconnector
- Rail Transit System, 4 km, along the road from Bang Wa to Taling Chan.
- Light rail - Bang Na to Suvarnabhumi Airport

The Traffic and Transportation Department in BMA will be in charge of infrastructure development, transit system and control and monitoring of the system, drawing on input from specialist consultants.

TIMELINE:

8 years for completion of light rail construction, 3 years for completion of Phase 1 monorail

OUTPUT	Infrastructure improvement	
RESILIENCE QUALITIES	Robust	
RELEVANT SHOCKS/AND OR STRESSES	Stress – Traffic congestion	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

2.1.3 EXPANSION OF THE WATER TRANSPORT NETWORK

IMPLEMENTING AGENCIES AND PARTNERS:

Traffic and Transportation Department, BMA

RESILIENCE VALUE & OUTCOMES:

This will be a faster and cheaper option for daily commuters along the Phasi Charoen Canal route.

BENEFICIARIES:

Residents of Bangkok.

Bangkok currently has water based transport to various city locations. However, the water transport network is not well linked with land transport networks. Integration of water based transport with the road and rail network will encourage city dwellers to use waterways more frequently.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

This project will pilot two new ferry services over the course of a year. The new service will include a 11.5 km route in Phasi Charoen Canal, between Phasi Charoen, Watergate Pier and Phetkasem 69. Phetkasem 69 pier will connect to the Bangkok Mass Transit System (BTS). A route will also go from klong Padung Krung Kasem to Hua Lum Pong (Central Station). This initiative will test the benefits of encouraging more people to use waterways, which are currently underutilized, cheaper, and less time consuming than some other modes of transport. Ferries will operate on these routes daily from 06:00 to 09:00am and 04:00 to 07.30pm.

Use of the service will be monitored carefully, including numbers of passengers and levels of satisfaction with the service. Near the end of the trial period the success of this new service will be evaluated and recommendations made on its future, including approaches for increasing the potential for more Bangkok residents to benefit from increased use of water-based transport

TIMELINE:

1 year

OUTPUT	Infrastructure improvement	
RESILIENCE QUALITIES	Robust, redundant, resourceful	
RELEVANT SHOCKS/AND OR STRESSES	Stress – Traffic congestion	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

2.2 IMPROVING TRAFFIC FLOW IN THE CITY

GIVEN THAT BANGKOKIANS STILL PREDOMINATELY TRAVEL BY ROAD, TRAFFIC CONGESTION, ROAD CONDITIONS AND DRIVER BEHAVIOUR IS A MAJOR CHALLENGE IN MANY PEOPLE'S DAILY LIVES. THIS INITIATIVE SEEKS TO IMPROVE TRAFFIC FLOW THROUGH A RANGE OF INTERVENTIONS.

2.2.1 INTEGRATED INFORMATION SYSTEM FOR TRAFFIC MANAGEMENT AND PLANNING

IMPLEMENTING AGENCIES AND PARTNERS:

Traffic and Transportation Department, BMA

RESILIENCE VALUE & OUTCOMES:

This initiative will optimize traffic management and help to reduce congestion in the city. Reduction in transit times will encourage a more active lifestyle, providing residents with greater opportunities for recreation and economic growth.

BENEFICIARIES:

Bangkok residents and businesses.

Traffic management is a significant challenge for Bangkok – one for which cities around the world are increasingly turning to innovative technological solutions. The city requires a comprehensive traffic management system that can optimise traffic movement and reduce congestion. This project will establish an integrated information system for interactive traffic management in Bangkok.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

This initiative will drive establishment of an interactive information system to facilitate traffic flow monitoring, traffic volume control, signal management and the design of a traffic movement plan.

TIMELINE:

1 year

OUTPUT	Integrated information system	
RESILIENCE QUALITIES	Robust, resourceful	
RELEVANT SHOCKS/AND OR STRESSES	Stress – Traffic congestion	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	■
	New	

2.2.2 REDUCING TRAFFIC CONGESTION AROUND SCHOOLS – PILOT STUDY OF SAMSEN ROAD

IMPLEMENTING AGENCIES AND PARTNERS:

Traffic and Transportation Department, BMA

RESILIENCE VALUE & OUTCOMES:

Multiple and well-connected mass transportation networks will improve residents' mobility by providing safe, fast and convenient daily commuting. Shorter commute times will increase productivity and economic efficiency and contribute to broader economic growth. Reducing traffic congestion in school areas will also increase the health and wellbeing of children by reducing exposure to emissions, and reducing risk of traffic accidents.

BENEFICIARIES:

Residents of Bangkok.

Samsen Road is a secondary road that links the important areas of Phra Nakhon, Dusit, and Bang Sue Districts. It also accepts traffic from the main road that connects travel between the east and west sides of Bangkok, and therefore is a critical thoroughfare for many residents and businesses. Currently, traffic conditions are particularly bad, with an average of up to 18,000 vehicles per hour during peak hours. This is exacerbated by the parking of private cars waiting to pick up students from schools . This causes congestion of nearby roads on which schools are located, massive traffic delays and concentrates pollution in these school areas. This initiative will study the impacts of traffic congestion in and around Samsen Road and determine approaches to reduce traffic congestion, including through improving the public transportation system especially for students.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

This initiative will be implemented based on a detailed study of traffic volumes during peak and off peak hours, land use compatibility and road capacity. A development plan will be prepared for reducing traffic congestion and improving road safety.

TIMELINE:

6 months

OUTPUT	Traffic volume study and implementation plan for reduction of congestion	
RESILIENCE QUALITIES	Robust	
RELEVANT SHOCKS/AND OR STRESSES	Stress – Traffic congestion	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

2.2.3 STUDY OF INTEGRATED MANAGEMENT OF ROAD NETWORK AND DEVELOPMENT OF A MASTER PLAN

IMPLEMENTING AGENCIES AND PARTNERS:

Public Works Department, BMA

RESILIENCE VALUE & OUTCOMES:

Improving traffic flow in the city through a diverse range of policies and technologies will increase economic productivity and better ensure the safety and ease of movement of residents. Reduction in transit times will encourage a more active lifestyle, providing residents with greater opportunities for recreation.

BENEFICIARIES:

Residents who commute through "Super Block Areas" and communities in these areas.

A number of enclosed areas or a so-called 'Super Block Areas' in central Bangkok face severe traffic congestion. The Super Blocks are enclosed space associated with commercial areas, business centres, residential areas or education institutes, which connect to few or far-away main roads and have insufficient 'distributing roads' inside to allow traffic flow. Some of the available distributing roads are narrow lanes, discontinuous, with no linkages to other routes. Due to the number of occupants of super blocks, traffic problems in these area are of serious concern, and cause cascading traffic jams in adjacent main roads. This initiative aims to solve traffic problems in Super Block Areas through better understanding the integrated road network, and improving traffic regulations.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

This initiative will explore feasible options to improve road networks in Super Block Areas in Bangkok. Studies will be conducted on different aspects regarding Super Block Areas and traffic congestion, causes and solutions, possible expansions and improving existing road conditions, traffic regulations and other safety measures to enhance road connectivity, mobility and safety. Land use options such as land development to downsize Super Block areas and strategic decisions on traffic movements in the selected areas, such as linkages to main roads, creating emergency routes for prompt access and road lighting will also be considered. The result will be used for formulation of Transportation Master Plan in Super Block Areas.

TIMELINE:

1 Year

OUTPUT	Feasibility study and development of a Master Plan	
RESILIENCE QUALITIES	Robust	
RELEVANT SHOCKS/AND OR STRESSES	Stress – Traffic congestion	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

2.2.4 FEASIBILITY STUDY FOR DRIVING CREDIT MEASURES AND TAXES

IMPLEMENTING AGENCIES AND PARTNERS:

Traffic and Transportation Department, BMA, National Institute of Development Administration (NIDA)

RESILIENCE VALUE & OUTCOMES:

The outcome of the study will guide a potential new tax policy as a measure to reduce the use of private cars and increase the proportion of passengers using public transport. Reduction in the use of private vehicles will have a number of benefits including improving air quality in the city, reducing carbon emissions and a healthier lifestyle for Bangkokians.

BENEFICIARIES:

Bangkok residents and businesses.

Around the world, various Transportation Demand Management (TDM) strategies have proven to be effective in reducing demand for road travel, particularly in single-occupant vehicles. Some of these measures entail taxes for private car users to fund public costs such as traffic management, investment in road or public transporation system construction, and traffic pollution control. Some involve financial deterrents to limit or restrict the use of private cars in certain areas or routes, reducing traffic congestion in particular places at peak times. BMA will explore various TDM options for better mobility management, encouraging communities to use public transport rather than private vehicles.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

A feasibility study will be conducted on TDM focusing on Driving Credit Measures to limit the use of personal vehicles and Vehicle Miles Travelled (VMT) – a tax-based measure which would impose an additional financial burden on owners of personal cars registered in Bangkok.

The study will also review road rules, laws, guidelines and case studies on the application of the TDM measures in other major cities. It will also develop a better understanding of the Bangkok-specific context in relation to TDM, including behaviours of private car users, mode of mobility, traffic volumes, mobility time and cost, and car user opinions. The outcomes of the study will support decisions on whether these TDM measures are appropriate, practical and viable for Bangkok.

TIMELINE:

1 year

OUTPUT	Feasibility study	
RESILIENCE QUALITIES	Redundant, flexible	
RELEVANT SHOCKS/AND OR STRESSES	Stress – Traffic congestion	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

2.3 REDUCING ROAD RELATED DEATHS THROUGH INFLUENCING DRIVER BEHAVIOUR AND NEW TECHNOLOGIES

AS ROAD TRANSPORT REMAINS THE DOMINANT MODE OF TRANSIT FOR RESIDENTS, INCREASING ROAD SAFETY THROUGH INFLUENCING DRIVER BEHAVIOUR AND COMMUNICATION IS AN IMPORTANT AREA OF FOCUS. THIS INITIATIVE HAS THREE SUB-PROJECTS APPROACHING THIS ISSUE FROM THE PERSPECTIVES OF DRIVER BEHAVIOUR CHANGE, TESTING DRIVERLESS VEHICLES, AND ROAD SAFETY AUDITING.

2.3.1 ROAD SAFETY AUDIT

IMPLEMENTING AGENCIES AND PARTNERS:

Public Works Department and Local District Offices, BMA

RESILIENCE VALUE & OUTCOMES:

Improving the physical condition of roads will reduce the risk of accidents and contribute to a safer driving environment. Fewer accidents will help alleviate traffic congestion.

BENEFICIARIES:

BMA staff, and road users in Bangkok.

BMA is responsible for constructing and monitoring public infrastructure such as roads and bridges in Bangkok. It is important to maintain road safety standards during infrastructure development and monitoring. This initiative intends to disseminate information about safety standards relating to the physical condition of roads. This will be supplemented through the training of staff in auditing procedures. This will minimize road accidents inside the city and in adjoining areas that arise from poor road conditions.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

This initiative will be implemented through a training workshop with staff at the Public Works Department of BMA. On the job training and case studies will be provided to educate staff on risks arising from the physical condition of roads and how these risks may be mitigated.

TIMELINE:

1 year

OUTPUT	Systems improvement	
RESILIENCE QUALITIES	Robust, reflective	
RELEVANT SHOCKS/AND OR STRESSES	Shock – Traffic accidents	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	■
	New	

2.3.2 DRIVER BEHAVIOUR CHANGE CAMPAIGN TO REDUCE ROAD ACCIDENTS

IMPLEMENTING AGENCIES AND PARTNERS:

Traffic and Transportation Department, BMA

RESILIENCE VALUE & OUTCOMES:

Road users will be educated on traffic regulations and safe driving to reduce number of accident and casualties. Creating more awareness of road safety will encourage residents to take greater responsibility for their own safety and that of their community.

BENEFICIARIES:

Residents of Bangkok.

The use of private vehicles in the city is increasing, with more than half of the city's residents using a personal vehicle as their primary or sole mode of transport. At the same time, Thailand is ranked second in the world with regard to the number of traffic fatalities, with 44 deaths per 100,000 people (5.1 per cent of Thailand's overall deaths) [13]. This project aims to raise awareness, particularly among youth, about traffic regulations and road safety, to reduce road accidents. One component of enforcing driving safety standards is to ensure drivers in the highest risk category, youth, are aware of applicable regulations and road safety measures.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

This initiative will be implemented in support of the National Government's Policy (2011-2020) "Decade of Road Safety". BMA will first investigate global best practices in addressing road deaths, and use this to develop messaging and delivery modes which will be most likely to change behaviour. Campaigns for building awareness and vigilance on road safety will be developed and rolled out across the city. These will use both electronic and print media.

TIMELINE:

300 days (2017)

OUTPUT	Public education/behaviour change	
RESILIENCE QUALITIES	Reflective, flexible	
RELEVANT SHOCKS/AND OR STRESSES	Stress – Traffic congestion	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

2.3.3 MEMORANDUM OF UNDERSTANDING (MOU) FOR THE DEVELOPMENT OF DRIVERLESS VEHICLES

IMPLEMENTING AGENCIES AND PARTNERS:

BMA, Research Institutes and Automobile Companies

RESILIENCE VALUE & OUTCOMES:

Benefits range from environmental outcomes such as better air quality and reduced carbon emissions, to safer roads, less traffic congestion and improved mobility for vulnerable groups such as the disabled or elderly.

BENEFICIARIES:

Bangkok residents and the car manufacturing industry.

Driverless vehicles have significant potential to reduce traffic congestion and accidents in the city. Additionally, a driverless car can act as private and public transport, in that it can make multiple, consecutive trips, potentially reducing the number of cars on the road and reducing requirements for parking in urban areas. As a major car manufacturing hub, Bangkok is in a unique position to participate in the development and testing of these vehicles, giving our city an opportunity to benefit economically, as well as in terms of improved liveability.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

The initiative will be implemented through a Public Private Partnership (PPP), involving private automobile companies, research institutes from home and abroad and BMA. The PPP approach will be designed with strong technology transfer and capacity building provisions.

TIMELINE:

6 months

OUTPUT	'MoU' for PPP for the development of driverless vehicles	
RESILIENCE QUALITIES	Inclusive, integrated, resourceful	
RELEVANT SHOCKS/AND OR STRESSES	Shock – Traffic accidents Stress – Traffic congestion , air quality and ageing population	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

GOAL 3: ENVIRONMENTALLY FRIENDLY URBANIZATION

Environmental sustainability is an increasingly important priority for Bangkok. As a major hub of industry, population and economic growth, Bangkok seeks to be a world leader among other Asian cities that have experienced rapid and unplanned growth, bringing with it the associated transport, waste management and land use challenges that impact on the health and wellbeing of its citizens. BMA's program to lower the city's carbon footprint and lessen the effects of carbon emissions consists of the following four initiatives:

- Green growth: supporting environmentally friendly growth and sustainable waste management
- Encouraging low-carbon transport
- Growing green space
- Improving air quality management and communication.

LEARNING FROM MELBOURNE

In increasingly urbanised cities, land is scarce and often comes at a high premium. Lack of available land is one of Bangkok's biggest challenges to growing the city's green space. Melbourne is focused on greening of the city through one of its Strategy's three flagship actions – implementing a Metropolitan Urban Forest Strategy. This action unites existing greening efforts by numerous stakeholders, helping them to understand how they can deliver urban greening projects that best contribute to improving ecosystem health and the services they naturally provide, such as air purification and temperature regulation. By sharing and exchanging knowledge through the 100RC network, Bangkok can learn from this approach to unite future greening activities to maximise a network of greening across the city.

3.1 GREEN GROWTH: SUPPORTING ENVIRONMENTALLY FRIENDLY GROWTH AND SUSTAINABLE WASTE MANAGEMENT

THESE TWO PROJECTS WILL SUPPORT BETTER RECYCLING AND DISPOSAL OF RUBBISH AND WASTEWATER. BY PROMOTING COMMUNITY RECYCLING AND WASTE COLLECTION, AND THROUGH TURNING SOLID WASTE INTO USABLE ENERGY, LESS FOSSIL FUEL WILL BE CONSUMED AND THE ECOLOGICAL IMPACTS OF WASTE WILL BE REDUCED.

3.1.1 SUSTAINABLE WASTE MANAGEMENT

IMPLEMENTING AGENCIES AND PARTNERS:

Environment Department, and Drainage and Sewerage Department, BMA

RESILIENCE VALUE & OUTCOMES:

The project will reduce solid waste disposal and treatment costs, reduce Gree House Gas emissions, devise suitable means and approaches for charging for waste and wastewater treatment, and improve quality of life for Bangkok residents.

BENEFICIARIES:

Bangkok residents at the community level, through income generation from waste recycling and at the city level through sustainable growth and effective waste management.

Bangkok produces 22 per cent of the whole nation's wastewater and yet can treat only 46 per cent of its wastewater daily. While part of the solution to this will be increasing capacity to process and treat Bangkok's waste, the greatest and most cost-efficient gains can be made through reducing waste generation. This project has been developed to support sustainable waste and wastewater management to correlate with green growth development and the 20 year direction of the city development plan.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

The project will encourage waste reduction in communities and businesses according to the reduce, reuse and recycle hierarchy, and study suitable means of charging for waste management and wastewater treatment. It will also run an awards program to reward communities and businesses for strong performance in waste and wastewater management.

TIMELINE:

3 years

OUTPUT	Study and public participation program	
RESILIENCE QUALITIES	Reflective, flexible	
RELEVANT SHOCKS/AND OR STRESSES	Stress – Environmental problems from waste and waste water	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

3.1.2 DEVELOPMENT OF WASTE-TO-ENERGY

IMPLEMENTING AGENCIES AND PARTNERS:

Environment Department, BMA

RESILIENCE VALUE & OUTCOMES:

Waste-to-energy plants can reduce waste volume to be disposed to landfill, while also reducing demands on fossil fuels, as well as Green House Gas emissions to the environment associated with landfills. These plants will also provide another source of employment for people of varying skill levels.

BENEFICIARIES:

BMA, Bangkok residents, the natural environment.

Producing 9,900 tons of solid waste per day, or 22 per cent of total waste in the country, Bangkok is struggling to find suitable landfill areas for waste treatment. Waste-to-Energy technologies can generate electricity by either incineration which is direct combustion or without direction combustion through thermal technology or non-thermal technology. This contributes to reducing waste volumes to landfill and provides a fossil fuel free source of electricity.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

The project will construct a waste-to-energy plant which can treat 600 tons of solid waste per day of waste, and community plants with a total capacity of 600 tons per day.

The development ot this project will include an engagement process that includes meaningful community input into selecting sites for the plant that maximises the potential for environmental, social and economic benefits.

TIMELINE:

Long-term (20 years)

OUTPUT	Design and construction of waste to energy plant	
RESILIENCE QUALITIES	Redundant, Resourceful	
RELEVANT SHOCKS/AND OR STRESSES	Stress – Environmental problem from solid waste	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

3.2 ENCOURAGING LOW CARBON TRANSPORT

ACCESS TO, AND USE OF, LOW CARBON TRANSPORT OPTIONS IN BANGKOK WILL BE INCREASED BY THESE TWO PROJECTS. BY PROMOTING EXISTING EMISSION-FREE TRANSPORT AND LOOKING INTO BUILDING NEW BICYCLE PATHWAYS ACROSS THE CITY, CAR USE WOULD BE REDUCED AND COMMUTERS WILL ENJOY SAFER JOURNEYS WITH LESS TRAFFIC.

3.2.1 ENCOURAGEMENT OF ENVIRONMENTALLY FRIENDLY TRANSPORTATION

IMPLEMENTING AGENCIES AND PARTNERS:

Environment Department, and Traffic and Transportation Department of BMA, Office of Transport and Traffic Policy and Planning, and Department of Land transport of Ministry of Transport

RESILIENCE VALUE & OUTCOMES:

The use of private vehicles, traffic congestion, and air pollution will be decreased which could improve the health and quality of lives of Bangkok citizens.

BENEFICIARIES:

People who live, work and study in Bangkok.

Air pollution in Bangkok has been increasing – today it exceeds air quality standards on most days, primarily due to the large quantity of vehicles using fossil fuels. This project aims to promote alternative ways of travel to reduce air pollution and traffic congestion in Bangkok.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

BMA will work with contracted consulting firms to improve the public's awareness of the use of public transport and other means of environmentally friendly travel modes such as electric vehicles, bicycles and walking. Monitoring and evaluation, particularly of air quality will be done periodically to assess the impacts of the project.

TIMELINE:

Short-term 5 years (2018-2022);

OUTPUT	Public awareness and participation program	
RESILIENCE QUALITIES	Inclusive, flexible, resourceful	
RELEVANT SHOCKS/AND OR STRESSES	Stress – Air pollution which is the main cause of respiratory diseases	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

3.2.2 STUDY ON ENHANCING CYCLING PATHWAYS AND FACILITIES

IMPLEMENTING AGENCIES AND PARTNERS:

Graduate School of Environmental Development Administration, National Institute of Development Administration, BMA, and relevant partners

RESILIENCE VALUE & OUTCOMES:

This project will result in enhanced accessibility to facilities and infrastructure for many vulnerable residents, promotion of local tourism, and pollution reduction along cycle paths. It will also enhance the city's cultural landscape.
Effective cycling infrastructure will also provide alternative mobility options when disruption strikes road and/or public transport networks.

BENEFICIARIES:

Bangkok residents and tourists, especially vulnerable residents who cannot afford a private vehicle.

Encouraging residents to take up cycling can have multiple benefits for the city. Cycling is a healthy, low impact form of exercise that can be enjoyed by all ages. In addition to health benefits, it can contribute to improved mobility for Bangkok residents, facilitating quicker, short commutes, connecting transportation options. Increased uptake of cycling can also reduce traffic congestion and improve air quality through reducing emissions from vehicles. Whilst Bangkok currently has some cycling pathways, these are desperate and not well connected. In some places they may also be unsafe, reducing their widespread appeal and use.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

The study will analyse and make recommendations in relation to three areas:

- Location of cycling pathways and physical facilities suitable for elderly persons, tourists, and communities in Bangkok.
- Providing an enabling environment for cycling focusing on air quality, connection of cycling paths, public transport and potential communities/ tourism sites, layout and maps of accommodating facilities and landmarks.
- Enhancing local business facilities and capacities along cycling pathways.

TIMELINE:

3-5 years

OUTPUT	Study	
RESILIENCE QUALITIES	Resourceful, flexible, inclusive	
RELEVANT SHOCKS/AND OR STRESSES	Stress – economic downturn, air quality/pollution, lack of concern for public spaces, and health issues of the elderly	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

3.2.3 IMPROVING AIR QUALITY MANAGEMENT AND COMMUNICATION

IMPLEMENTING AGENCIES AND PARTNERS:

Environment Department, 50 Bangkok district offices of BMA, and Pollution Control Department, Ministry of Natural Resources and Environment

RESILIENCE VALUE & OUTCOMES:

A Bangkok air pollution inventory and database will assist in solving air pollution problems. This can be expected to result in a decline in respiratory diseases and increased health and quality of life for Bangkok residents.

BENEFICIARIES:

The residents of Bangkok who live, work or study in the city.

The Air Quality Index (AQI) is the international standard to assess air quality on a daily basis. In Thailand, the AQI parameters and standards have been identified by the Pollution Control Department and have been applied throughout the country. However due to unique characteristics of air quality in a mega-city like Bangkok, which is different from other parts of the country, AQI parameters and standards for Bangkok should be developed specifically for the city to ensure more effective air quality management.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

The project will develop an air emission inventory for Bangkok. The inventory will be used to determine and predict air pollution sources in Bangkok, as well as developing an accurate and reliable database (GIS-based) to support effective solutions to air pollution problems. The results from the Bangkok index will be used to raise awareness, and contribute to solving air pollution, health and sanitation problems in the city.

TIMELINE:

1 year (2017-2018)

OUTPUT	Air emissions inventory	
RESILIENCE QUALITIES	Stress – air pollution that leads to respiratory diseases	
RELEVANT SHOCKS/AND OR STRESSES	Stress – economic downturn, air quality/pollution, lack of concern for public spaces, and health issues of the elderly	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

3.3 GROWING GREEN SPACE

BANGKOK'S RAPID GROWTH FROM RURAL LAND TO A BUSTLING MEGA-CITY HAS MEANT REDUCING GREEN SPACES AND TREES, TO THE DETRIMENT OF ITS CITIZENS AND THE ENVIRONMENT. THESE THREE PROJECTS AIM TO PROMOTE THE GROWTH OF PARKS, RECREATION GROUNDS AND OTHER URBAN GREEN AREAS, IN PRIVATELY AND PUBLICLY OWNED SPACES.

3.3.1 DEVELOPING NEW RECREATIONAL PARKS

IMPLEMENTING AGENCIES AND PARTNERS:

Office of Public Park, Environment Department, BMA

RESILIENCE VALUE & OUTCOMES:

The initiative provides green recreation areas for Bangkok residents for improved quality of life and better environmental outcomes. The database will be used by decision makers to plan for more green spaces in the future.

BENEFICIARIES:

Bangkok residents.

Green space has a tremendous number of positive effects for a city. These range from ecosystem services like natural temperature regulation and reduction of surface water runoff, to psychological benefits and providing spaces for Bangkok residents to be active or relax.

BMA's commitment to increase green space by 500,000 acres over the next 5 years is one of its most important policies. This project aims to construct parks fully equipped with standard facilities and develop a database of green areas in Bangkok for future planning.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

The project will see the construction of four new recreational parks to increase urban green space in Bangkok including:

- Golden Jubilee Park to celebrate the 7th Auspicious Ceremony in Bang Bon (250 hectares)
- Community park on the land at Phetkasem Soi 69, Bang Kae (70 acres)
- Community park under the responsibility of Land Development Department (37 acres)
- Community park at Soi Phrachaluamjai 7, Bueng Lum Pai, Minburi (78 acres).

Planning and development of these parks will embody the quality of inclusiveness by providing Bangkok residents with an opportunity to share their hopes and expectations for these new public spaces. The spaces will also be designed to maximise co-benefits, such as floodwater retention during extreme rainfall events, and to act as a safe gathering place in the event of a major shock such as a seismic disturbance.

The project will also survey and generate a database of green spaces in Bangkok

TIMELINE:

2012-2017 (on-going)

OUTPUT	Green infrastructure improvement	
RESILIENCE QUALITIES	Redundant, inclusive, resourceful	
RELEVANT SHOCKS/AND OR STRESSES	Stress – Urbanization and lifestyle hindering health and wellbeing outcomes	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

3.3.2 PROMOTE PUBLIC ENGAGEMENT AND MEASURES TO SUSTAINABLY INCREASE GREEN SPACE

IMPLEMENTING AGENCIES AND PARTNERS:

Environment Department, BMA

RESILIENCE VALUE & OUTCOMES:

Increasing the amount of green space on private land will result in better environmental conditions in Bangkok. The initiative will also increase public awareness of sustainable green space, and guide possible measures for the government to support green space policy.

BENEFICIARIES:

Bangkok residents.

Planting trees is a simple and sustainable solution to reduce carbon emissions, adapt Bangkok to the effects of climate change, and reduce air pollution and its health effects on residents. Public engagement to increase green spaces on privately owned land is a low cost and sustainable way of improving the city's environment.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

This project includes awareness-raising and training for government officials, community leaders and members of the community to promote the importance of green spaces, and will select a pilot community to develop a community-based green area. The project also includes research on practical measures to support sustainable green space development, considering examples from across Thailand and globally, drawing on knowledge within the 100RC network.

TIMELINE:

3 years (2017 – 2020)

OUTPUT	Community participation	
RESILIENCE QUALITIES	Inclusive, redundant, flexible, resourceful	
RELEVANT SHOCKS/AND OR STRESSES	Stress – Lack of green space, climate change and air pollution	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

3.3.3 DEVELOPMENT OF GREEN SPACE AND RIVERSIDE PROMENADE ALONG THE BANKS FOR THE CHAO PHRAYA RIVER

IMPLEMENTING AGENCIES AND PARTNERS:

Department of Public Works BMA, National Government

RESILIENCE VALUE & OUTCOMES:

The promenade will restore the public's access to the river bank while also providing open green space and transport connectivity between major business districts. The promenade will be wheelchair accessible and provide recreational opportunities for the young, elderly and disabled. The promenade will also provide a new attraction for the city which will help boost trade and incomes for local residents.

BENEFICIARIES:

Bangkok residents and visitors.

The Chao Phraya River runs through the centre of Bangkok for over 70 kilometres. Public access to the riverbank is limited to transportation, public buildings, hotels and a limited number of parks. This project aims to restore Bangkok's riverside area for public use and is strongly backed by residents and land owners.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

A five metre wide promenade will be developed along 1.2 km of the Chao Phraya River bank and will feature a walkway, cycling path and open green space for public recreational use. The cycling path will stretch from Rama 7 Bridge to Phra Pen Klao Bridge, on both sides of the river. The promenade will be strategically situated to connect central business districts and serve as a major hub for land and water transport. While some of the area to be converted is government owned, some will be acquired from local land owners. These land owners will be compensated for the contribution of their land.

TIMELINE:

3 years

OUTPUT	Riverside promenade with cycling path and green space	
RESILIENCE QUALITIES	Inclusive, integrated	
RELEVANT SHOCKS/AND OR STRESSES	Stress – Traffic congestion, air quality, lack of green space, climate change, urbanisation and lifestyle hindering health and wellbeing outcomes.	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

STRATEGIC ACTION AREA 2: REDUCING RISK AND INCREASING ADAPTATION

By supporting community-led disaster risk reduction action and strengthening institutional adaptive capacity, we will support all Bangkok residents to better adapt to natural hazards and the increasing risks posed by the changing climate. While identifying and planning for foreseeable risks is an important part of disaster risk reduction, resilience also means acknowledging the inherent uncertainty of our future and taking sensible actions that will increase Bangkok's capacity to withstand a range of shocks and stresses.

GOAL 4: IMPROVING RESILIENCE TO FLOODS

GOAL 5: INCREASING PUBLIC AND COMMUNITY-DRIVEN ACTION ON AWARENESS, PREPAREDNESS AND ADAPTATION

GOAL 6: STRONGER INSTITUTIONAL CAPACITY AND REGULATION

WORKING TOGETHER WITH ROTTERDAM, MEXICO CITY AND NEW ORLEANS

Water is a significant issue in Bangkok, as it is for a number of its peers in the 100RC network. In October 2015, the Chief Resilience Officers (CROs) of Bangkok, Berkeley, Mexico City, New Orleans, Norfolk, Rome, Rotterdam, Surat and Vejle convened in Rotterdam to share innovative approaches to water management and identify opportunities for collaboration.

In developing this strategy, Bangkok continued this collaboration with the CROs of Rotterdam, New Orleans and Mexico City to shape a progressive, holistic approach to achieving its goal to improve the city's flood resilience. This approach supplements the city's need to maintain essential 'grey' infrastructure with new, 'green' and 'blue' infrastructure such as more parks and water retention and detention areas. This 'green' and 'blue' infrastructure provides multiple benefits for the city, including amenity, recreational space and cooling while also contributing strongly to reducing risks from flooding. It is the first step on a journey that will see Bangkok move closer towards living with water in new and innovative ways, rather than simply draining it. Over the next few years, Bangkok will also work to develop its vision for managing water in the city now and into the future.

GOAL 4: IMPROVING RESILIENCE TO FLOODS

As a flood-prone city facing a changing climate, we must look at different approaches for 'living with water'. These approaches represent a more integrated and holistic way to manage different city water systems, rather than solely depending on flood protection via hard infrastructure.

Initiatives to deliver this goal will focus on conservation and development of the city's blue and green infrastructure, primarily by improved catchment management, open space, and green areas to maximize natural infrastructure for water management. These actions will be underpinned by community participation for integrated socio-economic, environmental and flood protection benefits. This will be combined with specific flood defence actions such as upgrading drainage and trialling the use of a flood resilience index in an urban area.

This goal is supported by the following three initiatives:

- Catchment management strategy and vision for the Chao Phraya Basin
- Community water resource management programs
- Urban flood defences.

4.1 CATCHMENT MANAGEMENT STRATEGY AND VISION FOR THE CHAO PHRAYA BASIN

WITH A CHANGING CLIMATE AND INCREASING URBAN DEVELOPMENT, CATCHMENT MANAGEMENT IN THE CHAO PHRAYA BASIN WILL ONLY BECOME MORE COMPLEX AND IMPORTANT. GIVEN THIS, IT IS A CRITICAL TIME FOR THE CITY TO CONSIDER ITS VISION FOR LIVING WITH WATER IN THE FUTURE. COMPRISED OF THREE SUB-PROJECTS, THIS INITIATIVE WILL HELP TO PROVIDE A CLEAR NARRATIVE ON HOW BANGKOK, AND CITIES UP-STREAM, WILL APPROACH HOLISTIC CATCHMENT MANAGEMENT AND SET A FUTURE DIRECTION AND OBJECTIVES FOR INNOVATIVE WATER MANAGEMENT IN THE CITY. THESE OBJECTIVES WILL BE SET OUT IN CLEAR TERMS AND WILL REQUIRE COOPERATION ACROSS THE CITY ON A NEW APPROACH, NOT ONLY TO PROTECT THE CITY FROM FLOODING, BUT TO HARNESS WATER IN THE CITY FOR LIFE AND LIVEABILITY

4.1.1 STUDY OF LOWER CHAO PHRAYA BASIN AND SETTING VISION FOR WATER MANAGEMENT IN BANGKOK

IMPLEMENTING AGENCIES AND PARTNERS:
BMA, Royal Irrigation Department, Ministry of Agriculture and Cooperatives, The National Water Resources Board,
Deltares and other up-stream city offices.

RESILIENCE VALUE & OUTCOMES:
This study will help to understand the current gaps and effective water management initiatives required in the future. This initiative will bring together diverse stakeholders to take a holistic approach to water management in the city, moving Bangkok beyond flood protection to look at how it will live with water now and into the future.

BENEFICIARIES:
This study will help to understand the current gaps and effective water management initiatives required in the future. This initiative will bring together diverse stakeholders to take a holistic approach to water management in the city, moving Bangkok and the upstream cities beyond flood protection to look at how these will live with water now and into the future.

For comprehensive flood management, it is necessary to understand the prevailing conditions in the lower Chao Phraya Basin. The Basin receives a large amount of water from the northern part of the country, which must pass through Bangkok before draining into the Gulf of Thailand.

This action will help to establish a clear understanding of this process and explore how to utilize water passing through the Basin, both during the rainy season and the dry period. The areas to be covered under this initiative include the adjoining areas of Tah Cheen, Bang Phra Kong and Chao Phraya River.

Following this study, the city will determine objectives for water management in the near future. This will be set out as a clear vision, for agreement by stakeholders across the city. This vision will not only consider flood protection, but will embody a holistic approach to water in the city.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

The activity will involve intensive situational analysis based on infrastructure, land use and land elevation and the climatic and socio-economic conditions of the selected areas. It will bring together stakeholders to set objectives for water management in the city and clearly set out these objectives for broad agreement across agencies responsible for water management, including those for flood protection and drainage, in Bangkok.

TIMELINE:

2 years

Deltares

OUTPUT	Study, vision and strategy	
RESILIENCE QUALITIES	Reflective	
RELEVANT SHOCKS/AND OR STRESSES	Shock – Flood Stress - Unemployment, Economic downturn, etc.	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

4.1.2 DEVELOPMENT OF A FLOOD HAZARD MAP FOR MANAGEMENT AND TO COMMUNICATE WITH THE PUBLIC ON PREPARATION FOR FLOOD EVENTS

IMPLEMENTING AGENCIES AND PARTNERS:

Drainage and Sewerage, Department of BMA, Swisse Re

RESILIENCE VALUE & OUTCOMES:

Will contribute to more effective flood management with particular attention to drainage system improvement, land use decisions, public awareness campaign and decision support for flood management.

BENEFICIARIES:

Public and private organizations, business, and Bangkok residents.

Bangkok has physically grown in different directions over the decades and many of its settlements are in low lying areas. Being located on the basin of River Chao Phraya, floods are a common phenomenon for the city; however, vulnerable residents remain inadequately prepared for flood events. This project will develop a flood hazard and risk assessment for the city to help residents better understand flood risk and assist in flood preparedness. At the same time, it will also be useful for city authorities in identifying flood preparedness initiatives and decisions.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

This project will conduct a comprehensive flood risk assessment which will consider historical flood events, exposure, vulnerability and socio-economic aspects. Based on the outcomes of this study an emergency response plan and spatial contingency plan will be prepared both at city and community levels.

TIMELINE:

1-3 years

AIR WORLDWIDE

OUTPUT	Study and information provision	
RESILIENCE QUALITIES	Reflective	
RELEVANT SHOCKS/AND OR STRESSES	Shock – Flood	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

4.1.3 ENHANCE EFFECTIVENESS OF WEATHER AND RAINFALL FORECASTS

IMPLEMENTING AGENCIES AND PARTNERS:

Drainage and Sewerage Department of BMA

RESILIENCE VALUE & OUTCOMES:

Will improve the accuracy of predictions about the time, location and volume of rainfall or water in the city for more effective management of flooding in the city. This will minimise disruption to the city and contribute to reduced loss of life, less damage to property and economic stability.

BENEFICIARIES:

Bangkok residents and businesses.

Bangkok experiences seasonal flooding due to rainfall events both upstream and within the City. Many areas are often flooded from sudden rain, causing disruption to residents' lives and amplifying existing stresses, such as traffic congestion. Impermeable surfaces in the built environment. Uncertain climate change impacts further add to the unpredictability of flood events in the city. An improved weather forecasting system would assist with more effective flood preparedness in the short and long term.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

This project will implement weather forecasting staff capacity building and training, along with investment in updates to forecasting technology. In the medium-term, the aim is to provide city residents with access to more accurate and easy-to-understand weather information that can be used to inform day-to-day decision making.

TIMELINE:

1-2 years

OUTPUT	Training and information provision	
RESILIENCE QUALITIES	Reflective	
RELEVANT SHOCKS/AND OR STRESSES	Shock – Flood Stress – Traffic Congestion	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	■
	New	

4.2 COMMUNITY WATER RESOURCE MANAGEMENT PROGRAM

ICONIC AND CHARMING WATERWAYS AND CANALS ('KLONGS') AROUND THE CITY – ONCE CORNERSTONES OF LIFE FOR THE PEOPLE OF BANGKOK – ARE NOW SERIOUSLY DETERIORATED DUE TO OVERUSE AND POLLUTION. WHILE THESE RIVERS AND KLONGS CAN PLAY IMPORTANT AND DIVERSE ROLES IN MODERN BANGKOK, ACCUMULATED STRESSES, INCLUDING POOR WASTE MANAGEMENT AND LACK OF PRIORITIZATION OF WATER RESOURCE CONSERVATION, HAS SEEN THESE WATERCOURSES DECLINE IN QUALITY AND AMENITY. THIS INITIATIVE HIGHLIGHTS THE CRITICAL CONTRIBUTION THAT THE COMMUNITY HAS IN WATER RESOURCE MANAGEMENT AND WATERWAYS RESTORATION. THROUGH TWO SUB-PROJECTS, IT WILL ENGAGE COMMUNITIES AS A KEY AGENT FOR WATER RESOURCE MANAGEMENT WHILE ALSO PROMOTING COMMUNITY ADAPTATION TO A CHANGING CLIMATE AND URBANIZATION, REDUCE WASTE AND IMPROVE WATER QUALITY AND FLOOD PROTECTION.

4.2.1 COMMUNITY WATER RESOURCE MANAGEMENT

IMPLEMENTING AGENCIES AND PARTNERS:

Hydro and Agro Informatics Institute, BMA, Community

RESILIENCE VALUE & OUTCOMES:

The initiative will ensure an increase in the amount of fresh water supply for agriculture, improved water quality in the community and ensure continuation of tourist attractions.

BENEFICIARIES:

The community along Klong Lat Ma Yom, Klong Lum Phra Dong, and Klong Bang Prom,Taling Chan District, Bangkok

Taling Chan is considered to be the only agricultural-based tourism area in Bangkok. It is the home of local herb, flower and vegetable gardens, as well as floating markets (Klong Lat Ma Yom) that host more than 3,000 tourists each day.

The community have restored the canal and promoted it as a tourism destination with the help of Phothisanpittayakorn school, Taling Chan district Office and Utokapat Foundation under the Royal Patronage of H.M. the King. However, inadequate water in the canal (Lum Phra Dong) and the branches are placing this area under stress. The community then has a plan to expand the restoration of Klong Lam Phra Dong and Klong Bang Prom, as well as improving waste management in Klong Lat Ma Yom to further improve water quality.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

The activity will involve intensive situational analysis based on infrastructure, land use and land elevation and the climatic and socio-economic conditions of the selected areas. It will bring together stakeholders to set objectives for water management in the city and clearly set out these objectives for broad agreement across agencies responsible for water management, including flood protection and drainage, in Bangkok.

TIMELINE:

2 years

OUTPUT	Study, vision and strategy	
RESILIENCE QUALITIES	Reflective	
RELEVANT SHOCKS/AND OR STRESSES	Shock – Flood Stress - Unemployment, Economic downturn, etc.	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

4.2.2 WATER-SENSITIVE MARKETPLACE

IMPLEMENTING AGENCIES AND PARTNERS:

Environment Department, Drainage and Sewerage Department and Local District Offices of BMA

RESILIENCE VALUE & OUTCOMES:

Will help to reduce the waste and food scraps from Marketplaces to improve drainage and enhance water quality.

BENEFICIARIES:

City dwellers particularly the Canal Side Traders and consumers.

Marketplaces generate high volumes of general and food waste daily, much of which flows into nearby watercourses, interrupting drainage and significantly decreasing water quality. In many markets, wastewater from residential and commercial areas is connected to the canal system, further degrading water quality and polluting the surrounding environment. This project will focus on waste and wastewater management from marketplaces to improve water quality and drainage.

ACTIVITIES IN BRIEF AND IMPLEMENTATION

This project will be implemented through a community-based approach, engaging directly with marketplaces and their vendors to better understand barriers to sustainable waste management. At the outset, a range of different solutions will be considered, ranging from awareness campaigns centred on waste and wastewater disposal, to introducing new wastewater collection and treatment systems, along with accompanying training in how to use these systems effectively. The project will also draw on expertise from the 100RC network on innovative models for funding new initiatives where increased cost may be a major barrier to uptake.

TIMELINE:

1 year

OUTPUT	Community-based project	
RESILIENCE QUALITIES	Reflective	
RELEVANT SHOCKS/AND OR STRESSES	Shock - Flood Stress - Environmental issues including water quality	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

4.2.3 MANAGEMENT OF WASTE COLLECTION FOR CANAL COMMUNITIES

IMPLEMENTING AGENCIES AND PARTNERS:

Environment Department, Local District Offices, and Drainage and Sewerage Department of BMA.

RESILIENCE VALUE & OUTCOMES:

The volume of garbage in the canals from the communities will be reduced to facilitate effective navigation and drainage, and improve water quality and amenity for the community. It will also increase the attractiveness of the area for tourism.

BENEFICIARIES:

The residents of Bangkok, in particular canal side residents.

Once known as the Venice of the East, the city of Bangkok still has a number of canals that are used for transportation and drainage. However, the canals often have reduced functionality due to excessive garbage dumping particularly by the communities residing by the canals. This project intends to review the management of waste collection in community areas along the canals, reducing the amount of garbage in the canals and ensuring the proper navigation and drainage capacity of the canals is restored.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

A community-based approach will be adopted to develop and encourage the use of a waste management system across the communities living alongside selected canals. A number of actions including awareness building on waste dumping, and improvement of waste facilities will be implemented as part of this project.

TIMELINE:

2 years

OUTPUT	Community-based waste management approach	
RESILIENCE QUALITIES	Inclusive, resourceful	
RELEVANT SHOCKS/AND OR STRESSES	Shock - flooding Stress – poor environmental conditions and water quality	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

4.3 URBAN FLOOD DEFENCES

BANGKOK'S HIGH VULNERABILITY TO FLOODING REQUIRES MULTIPLE MEASURES TO SIGNIFICANTLY IMPROVE THE CITY'S FLOOD RESILIENCE. IN ADDITION TO CATCHMENT MANAGEMENT AND ENGAGING COMMUNITY ACTIONS FOR WATER RESOURCE MANAGEMENT, INNOVATIVE, VIABLE AND COST-EFFECTIVE OPTIONS FOR FLOOD DEFENCES MUST BE EXPLORED. CONSISTING OF SEVEN SUB-PROJECTS, THIS INITIATIVE WILL BE IMPLEMENTED BY BMA TO DEVELOP AN INTEGRATED AND ROBUST URBAN FLOOD DEFENCE SYSTEM, INCLUDING GREY, GREEN AND BLUE INFRASTRUCTURE RANGING FROM STRUCTURAL MODIFICATIONS TO UPGRADING EXISTING DRAINAGE SYSTEMS, DEVELOPING NEW WATER STORAGE CAPACITY, AND EXPLORING THE CITY'S FLOOD RESILIENCE MONITORING.

4.3.1 REVISION OF DESIGN CRITERIA FOR DRAINAGE

IMPLEMENTING AGENCIES AND PARTNERS:

Drainage and Sewerage Department, BMA

RESILIENCE VALUE & OUTCOMES:

Existing design and functions of drainage system will be better understood for effective design and implementation to meet current drainage demand and future community needs.

BENEFICIARIES:

The residents and businesses of Bangkok.

Providing drainage to support safe and healthy conditions in the face of rapid growth will mean significant investment in Bangkok's drainage systems. This new infrastructure will need to stand the test of time, meeting current needs as well as those of a larger population in a future affected by climate change. With this in mind, there is a pressing need to review and revise design standards for future drainage systems.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

This initiative will be implemented through detailed investigations into the existing drainage system, coupled with other activities such as scenario planning to ensure that future demographic and technological developments are able to be considered. Additionally, flooding implications of different climate change scenarios will be better understood, and global leaders in urban drainage will be engaged with. This will inform future revisions in design standards.

TIMELINE:

6 months

OUTPUT	Study	
RESILIENCE QUALITIES	Redundant, integrated	
RELEVANT SHOCKS/AND OR STRESSES	Shock - Flood Stress - Water logging and traffic congestion	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

4.3.2 PILOT STUDY ON DEVELOPING URBAN WATER RETENTION

IMPLEMENTING AGENCIES AND PARTNERS:

Drainage and Sewerage, City Planning, Public works and Education Department of BMA

RESILIENCE VALUE & OUTCOMES:

This initiative will increase green areas in the city, reduce flood intensity, and help to reduce urban heat island effects in built up areas.

BENEFICIARIES:

Residents of the City of Bangkok.

As a result of Bangkok's rapid expansion, the city has failed to retain adequate open spaces for retaining rain water and now faces frequent flood and water logging problems. This project aims to understand the current water retention areas and to identify possible locations for water retention in the city area. This project will look at innovative ways to use green infrastructure to reduce flood intensity, while also generating other co-benefits such as areas for recreation.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

In the built up areas within the city, potential areas like parks or play grounds will be identified for use as water retention areas. Identified areas will be properly designed with the provision of green areas. In the city periphery, agricultural lands suitable for water retention will be identified, with local landholders and residents consulted in this process.

TIMELINE:

1-2 years

OUTPUT	Study and design	
RESILIENCE QUALITIES	Reflective	
RELEVANT SHOCKS/AND OR STRESSES	Shock – Flood	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

4.3.3 IMPROVEMENT OF DRAINAGE SYSTEMS ALONG MAIN ROADS

IMPLEMENTING AGENCIES AND PARTNERS:

Drainage and Sewerage Department, BMA

RESILIENCE VALUE & OUTCOMES:

This study will help to understand the current gaps and effective water management initiatives required in the future. This initiative will bring together diverse stakeholders to take a holistic approach to water management in the city, moving Bangkok beyond flood protection to look at how it will live with water now and into the future.

BENEFICIARIES:

Residents along the Chao Phraya Basin especially those living in the lower basin will benefit specifically from the study. All Bangkok residents will benefit from an integrated approach to water management in the city.

Proper drainage is important for a city like Bangkok where flooding is a common phenomenon. Many drainage pipes are too small for the volume of water they now receive and are irregularly maintained, creating water logging problems in many city areas. This project aims to improve drainage facilities in selected areas through infrastructure intervention.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

Drainage and sewage system improvement through the construction of new drains and replacement of old pipes as required. This will be founded on a detailed program of technical investigations to determine where investment will be most effective. The project will also seek opportunities to maximise the benefits of ground-disturbing works, such as co-location underground of electrical wires where possible.

TIMELINE:

1-3 years

OUTPUT	Infrastructure improvement	
RESILIENCE QUALITIES	Robust	
RELEVANT SHOCKS/AND OR STRESSES	Shock – Floods Stress – Traffic Congestion	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

4.3.4 DEVELOPMENT OF DRAINAGE TUNNELS

IMPLEMENTING AGENCIES AND PARTNERS:

Drainage and Sewerage Department, BMA

RESILIENCE VALUE & OUTCOMES:

This initiative will ensure there are redundant facilities to increase drainage capacity and reduce flood in city area and on road surface.

BENEFICIARIES:

Residents of the City of Bangkok.

Underground tunnels are currently being used to mitigate floods and waterlogging in Bangkok. These tunnels provide a shortcut to direct excessive water in the city area to the Chao Praya River for quick discharge. This helps reduce the time it takes for water to drain through connected drainage pipe systems and canal systems, significantly increasing efficiency of water drainage and reducing the risk of flooding. With the capacity to discharge high volumes of water, underground tunnels could also be used for canal water cleaning, by flushing water to wash away wastes and dilute pollution in canals.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

This project forms one part of a multifaceted approach to building redundancy into Bangkok's water management system. Apart from the existing seven underground tunnels currently operating, and two under construction, another four underground tunnels will be constructed – two in Bangkok's east, as well as two in the west. As with the drainage systems project, this project will apply systems thinking to maximise the benefits that can be generated by this major infrastructure investment.

TIMELINE:

4 years

OUTPUT	Infrastructure improvement	
RESILIENCE QUALITIES	Redundant, integrated	
RELEVANT SHOCKS/AND OR STRESSES	Shock – Flood Stress – Water logging and traffic congestion	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

4.3.5 IMPROVEMENT OF MAJOR CANALS

IMPLEMENTING AGENCIES AND PARTNERS:

Drainage and Sewerage Department, BMA and Ministry of Social Development and Human Security

RESILIENCE VALUE & OUTCOMES:

This initiative will help reduce settlement along water ways and canals, resulting in increased drainage capacity and water flow during heavy rainfall or flood periods.

BENEFICIARIES:

Residents of the City of Bangkok and settlements on the canals.

Encroachment of canals or 'klongs' has been one of the major causes for water logging in Bangkok. Squatter settlements along the waterways have severely obstructed water flow, making a number of canals unable to function at optimal drainage capacity. The built up and densely populated environment of formal and informal settlements along canals has contributed to water pollution through household waste water discharge further deteriorating water quality in city. This problem is in part due to limited availability of affordable housing in urban areas that drives those with low incomes to informal settlements along the canals.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

This project will take an integrated and holistic approach to the challenges facing our city's canals, particularly in the areas of water regulation and waste management.

This will include challenging processes and decisions, such as the possible relocation of informal settlements to new areas; this will be managed in an inclusive way, providing these vulnerable communities a voice in the decision-making process. Other activities may include expanding canals and clearing to increase water drainage and storage capacity, and building reinforced concrete dams to regulate water flow of nine major canals in Bangkok Metropolitan Region - Klong Lad Prao, Klong Prem Prachakorn, Klong Bangkhen, Klong Bang Sue, Klong Pravet Burirom, Kong Phra Kanong, Klong Sam Wa, Kong Lad Buakhao and Kong Praya Rachmontri.

Linking closely with the strategy goals around waste management, the project will also review the management of waste collection in remaining community areas along the canals, with a view to better understanding areas of need and how the needs of these communities can be more effectively met, thereby generating flow-on benefits for other Bangkok residents.

TIMELINE:

8 years

OUTPUT	Infrastructure improvement, community engagement	
RESILIENCE QUALITIES	Resourceful, redundant, integrated	
RELEVANT SHOCKS/AND OR STRESSES	Shock – Flood Stress – Water pollution, encroachment of canals	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	■
	New	

4.3.6 STUDY OF THE FEASIBILITY OF DEVELOPING COMBINED UTILITY TUNNELS

IMPLEMENTING AGENCIES AND PARTNERS:

Public Works Department, Drainage and Sewage Department, BMA

RESILIENCE VALUE & OUTCOMES:

The result of the study will be helpful to understand appropriate and cost-effectives structures, functions, and management of utility tunnels hosting multiple services' infrastructure supporting the integrated and robust underground space development of Bangkok.

BENEFICIARIES:

The residents and businesses of Bangkok.

Multiple service infrastructures located underground has made it difficult and costly to implement infrastructure upgrades, maintenance and replacement. Drainage pipes, water, electricity, and communication lines, as well as subway tunnels, cross each other in a disordered manner and sometimes obstruct each other, which can result in dangerous and structural malfunction. Additionally, the streets and pavements of Bangkok are constantly undergoing excavation, causing impacts on traffic, and producing noise, dust and air pollution. As there is an urgent need to upgrade Bangkok's aging sewerage system and drainage pipelines, it is crucial that Bangkok put in place an underground development plan for combined tunnels as a sustainable development solution.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

This initiative will be implemented based on in-depth research into the feasibility, application, cost effectiveness, and comparative advantage of combined utility tunnels. The study will consider economic, financial and environmental aspects related to the tunnels, and also look into possible locations and prioritized areas for developing combined utility tunnel infrastructures, service life, different designs and sizes. The study will produce: guidelines on how to enhance the capacity of underground utility systems, the costs and benefits of using a combined utilities tunnel, and a prototype for the utility tunnels.

TIMELINE:

1 year

OUTPUT	Study	
RESILIENCE QUALITIES	Reflective, integrated, robust	
RELEVANT SHOCKS/AND OR STRESSES	Shock – Flood	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

RETURNING PUBLIC SPACE TO THE PUBLIC - LINKING PEOPLE AND SPACES AND INCREASING ACCESS TO WATERWAYS

Klong Ong Ang is one of the oldest remaining canals in Bangkok, dating back more than 200 years, constructed by King Rama I. In fact, elderly resident Wisuth Lertsuphanimitre points to a big tree by the canal he claimed was planted during King Rama V's reign, signifying that the community may be more than a century old [15].

Over the years, the area had become overrun with illegal stalls and garbage, leading to deteriorating water quality. With the support of the local community, the waterway was recently restored by the Bangkok Metropolitan Administration. The restoration involved removing 500 illegal stalls (that once crowded the area and restricted pedestrian movement), landscape improvements, garbage removal and water treatment.

The area now has a two kilometre pedestrian walkway along the canal bank. The Bangkok Post reported that "according to the vendors, sales should be much better than before as the new walkway will be more spacious, orderly and will attract lots of people to come." [15]. It also noted that "residents living near and along the canal were completely behind the move to reclaiming public areas and improve the city's scenery." [15] Residents noted that the "stalls at the old market were a serious fire risk," and that the restoration will "bring back a sense of life and enjoyment to the area."[15]

4.3.7 FEASIBILITY ASSESSMENT OF FLOOD RESILIENCE INDEX (FRI) –SUKHUMVIT CASE STUDY

IMPLEMENTING AGENCIES AND PARTNERS:

Hydro and Agro Informatics Institute (Public Organization), Wattana District Office and Klong Teoy District Office, BMA, Drainage and Sewerage, BMA

RESILIENCE VALUE & OUTCOMES:

An understanding of flood resilience can help decision makers design appropriate interventions to reduce flood risk, increase economic productivity and better ensure the safety and movement of residents with less disruption.

BENEFICIARIES:

Wattana District Office and Klong Teoy District Office, Drainage and Sewerage Department of BMA.

The Flood Resilience Index (FRI) helps cities to understand their vulnerability to flooding and other resilience characteristics in a specified area, informing decisions around how best to intervene and enhance resilience. This project will apply the FRI to assess and determine the resilience of Bangkok to flood, focusing on highly urbanized areas, with Sukumvit as pilot location. Applying the FRI will also allow for the comparison of Sukumvit's level of flood resilience to other cities in Europe and Asia, and inform BMA on sensitive areas and effective ways to take action.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

Covering over 24 square kilometers and comprising approximately 1,000 buildings, Sukumvit will be used as a case study for the application of FRI. This will include assessment at different spatial scales including macro (city or district), block, and micro (building), plus consideration of the five key elements of urban systems: physical, natural, economic, social and institutional. The assessment will produce a GIS database and map, which will help in identifying the weak points of the study area and how these may be addressed.

TIMELINE:

2 years

OUTPUT	Study	
RESILIENCE QUALITIES	Redundant, integrated	
RELEVANT SHOCKS/AND OR STRESSES	Determine the area's FRI to handle the 'Shock' of city flood	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

GOAL 5: INCREASE PUBLIC AND COMMUNITY DRIVEN ACTION ON AWARENESS, PREPAREDNESS AND ADAPTATION

Apart from flood, Bangkok is exposed to a number of different shocks and stresses which affect city residents. Many of these are likely to be exacerbated by climate change. It is important that our communities have the knowledge and skills to enable them to cope with these shocks and stresses. Additionally, community participation will complement all other BMA initiatives on urban resilience. Effective communication systems through multiple channels and networks will improve promptness in emergency monitoring, alertness and responsiveness. BMA along with the communities at risk will implement the following initiatives:

- Community-based adaptation and disaster preparedness and communication;
- Making better use of technology for public communication and disaster preparedness.

KNOWLEDGE SHARING WITH BERKELEY

Like Bangkok, Berkeley is working towards building a connected and prepared community. It is launching a Community Resilience Centre Program, which will provide disaster planning assistance and disaster supply 'caches' to local community-based organizations that are connecting with a range of communities, including some of the city's most vulnerable.

Berkeley is also fostering neighbour-to-neighbour connections to advance disaster readiness. They are achieving this by partnering with local community leaders and an NGO to identify local organizers at the neighbourhood level (Neighbourhood Disaster Preparedness Liaisons).

To achieve the goal of increased public and community driven action on awareness, preparedness and adaptation, Bangkok is also looking to work with communities by empowering local community members as facilitators to help build disaster preparedness capacity in their community. Bangkok will also explore a number of means for communicating disaster risks, including a mobile phone application. The 100RC network offers significant potential for Bangkok and Berkeley cities to learn from each other as they move forward with implementation of their strategies.

5.1 COMMUNITY-BASED ADAPTATION AND DISASTER PREPAREDNESS AND COMMUNICATION

ACTIVE ENGAGEMENT AND THE COLLECTIVE EFFORT OF ALL RESIDENTS WILL BE CRUCIAL FOR BANGKOK TO COPE WITH POTENTIAL THREATS AND ADAPT TO CHANGES. THROUGH THREE SUB-PROJECTS, THIS INITIATIVE PROMOTES INTEGRATED DISASTER PREPAREDNESS IN COMMUNITIES BY FACILITATING COMMUNITY-BASED AND SCHOOL-BASED ADAPTATION AND RISK MANAGEMENT, STARTING WITH RAISING PUBLIC AWARENESS ON PREPAREDNESS AND PREVENTION AGAINST FLOODING AND OTHER HAZARDS.

5.1.1 COMMUNITY-BASED DISASTER RISK MANAGEMENT PILOT

IMPLEMENTING AGENCIES AND PARTNERS:

Fire and Rescue Department of BMA, Asian Disaster Preparedness Center (ADPC) and National Institute of Development Administration (NIDA)

RESILIENCE VALUE & OUTCOMES:

Pilot communities have knowledge and skills to cope with disaster and the ability to adapt to uncertainties brought about by climate change and other hazards.

BENEFICIARIES:

Pilot communities, relevant agencies in Bangkok and Department of Disaster Prevention and Mitigation to have new model and maintian disaster relief budget.

The changing climate will increase disaster risks globally, this is especially the case for a mega city like Bangkok with high population density in an extremely urbanized area. The Community Based Disaster Risk Management (CBDRM) project aims to raise awareness and build capacities of communities to be resilient from disasters and the changing climate, and promote economic and equitable adaptation.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

The initiative will identify and establish a network of CBDRM leaders/facilitators. These people will build capacity on disaster and climate risk management directly with their communities, acting as a trusted advisor who can help develop community action plans and formalize community networks to build resilience. Additionally, CBDRM facilitators will help identify and mobilize shared resources (e.g. those with valuable skills that can be drawn upon by other community members in response to a shock event). Establishing facilitators for different communities will help ensure the solutions are right for each community, as well as being developed with the meaningful input of local people.

The project will also conduct feasibility studies on community-based solar roof energy sources to provide communities with redundancy during a disaster event

TIMELINE:

3 years

OUTPUT	Community development, disaster risk reduction	
RESILIENCE QUALITIES	Inclusive, resourceful, flexible	
RELEVANT SHOCKS/AND OR STRESSES	Shocks – Flood, earthquake, fire, building collapse Stresses – Unemployment, slum, economic problem, environmental degradation	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	■
	New	

5.1.2 COMMUNITY FLOOD PREPAREDNESS COMMUNICATION

IMPLEMENTING AGENCIES AND PARTNERS:

Drainage and Sewerage Department, Fire and Rescue Department, and Local District Offices of BMA, and Media and Press

RESILIENCE VALUE & OUTCOMES:

The public can access accurate information to create better understanding to cope with floods, minimize damages and losses, and reduce conflicts and confusion in times of disaster.

BENEFICIARIES:

The residents of Bangkok and relevant organizations.

Although Bangkok has continuously invested in flood prevention infrastructure, flood risk still remains high. Effective communication on flood preparedness to the public is thus deemed as important to minimize the impacts of flooding. This project aims to study flood impacts and measures, develop flood preparedness guidelines, create an effective public communication system, and build the capacity of government staff to communicate risks effectively.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

The project will study possible impacts from floods to inform a set of flood preparedness guidelines for the public. This will be complemented by training for government officials to build effective communication skills, and the development of a communication system which is accurate, reliable and easy to access by the public.

TIMELINE:

1 year

OUTPUT	Public education and community development	
RESILIENCE QUALITIES	Inclusive, reflective, resourceful	
RELEVANT SHOCKS/AND OR STRESSES	Shock - Flood	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

5.1.3 YOUTH EDUCATION PROGRAM FOR DISASTER SAFETY

IMPLEMENTING AGENCIES AND PARTNERS:

Fire and Rescue Department, BMA

RESILIENCE VALUE & OUTCOMES:

The activities will raise awareness and create a culture of safety for younger generations – our future leaders. They will have the ability to survive and assist others in times of disaster and can also transfer safety knowledge to their families and wider communities. Schools in Bangkok will include safety aspects into school activities and curriculum.

BENEFICIARIES:

Children and youth from primary to university education, educational institutions and communities in Bangkok.

The majority of young people in Bangkok lack an understanding on how to prepare and respond safely in times of emergency. The disaster safety youth education project will help raise awareness among youth to prevent, mitigate and reduce disaster risks while engaging parents through community participation. The action activity also aims to integrate disaster risk reduction into school activities and curriculum.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

The project will conduct training on disaster safety for children and youth in selected schools and communities in Bangkok, including in some of the most vulnerable areas. The disaster education activity will focus on school and community evacuation and disaster survival through activities and games. After the initial year, the program will be evaluated and, if successful, opportunities for a broader roll-out investigated.

TIMELINE:

1 year

OUTPUT	Community education	
RESILIENCE QUALITIES	Inclusive, resourceful	
RELEVANT SHOCKS/AND OR STRESSES	Shocks – Fire, flood, earthquake	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	■
	New	

5.1.4 DISASTER LEARNING CENTRE FOR EARTHQUAKE AND FIRE HAZARDS

IMPLEMENTING AGENCIES AND PARTNERS:

Fire and Rescue Department, BMA

RESILIENCE VALUE & OUTCOMES:

The learning centre for earthquake and other hazards will be a knowledge-based resource that enhances the culture of safety among the general public.

BENEFICIARIES:

Residents, students, and general public.

Fire is a common hazard in the city, resulting in loss of property and lives. However, Bangkok has also been known to suffer the impacts of seismic force from neighbouring epicentres. Given that the city is situated on water-saturated, unconsolidated soil, collapsed structures triggered by earthquakes occurring in other regions are anticipated, though our ability to predict when and where these impacts will occur is limited. Risk awareness, precautionary measures and structural mitigation for earthquake-resistant construction are crucial to reducing catastrophic impacts and saving lives.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

Bangkok's first Disaster Learning Centre will be designed and constructed at the Fire and Rescue Department of BMA to provide learning opportunities on earthquake and fire hazards. The aim of this centre will be to engage with the public on the dangers and possible harmful impacts of disasters, how to react and survive in unexpected circumstances and tips for safety. The centre will also demonstrate BMA's disaster management capacity to build confidence and sense of security for residents and foreigners.

TIMELINE:

2 Years

OUTPUT	Public education	
RESILIENCE QUALITIES	Integrated, Reflective, Inclusive	
RELEVANT SHOCKS/AND OR STRESSES	Shock – Earthquake and fire hazard	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

5.2 MAKING BETTER USE OF TECHNOLOGY FOR PUBLIC COMMUNICATION AND DISASTER PREPAREDNESS

EFFECTIVE COMMUNICATION OF EARLY WARNING INFORMATION HELPS PEOPLE PREPARE AND TAKE NECESSARY ACTIONS FOR SELF-PROTECTION AND SAFETY. RAPID TECHNOLOGICAL DEVELOPMENTS PRESENT EXCITING NEW OPPORTUNITIES TO IMPROVE HOW WE DO THIS.

5.2.1 DISASTER PREPAREDNESS AND FLOOD INFORMATION COMMUNICATION

IMPLEMENTING AGENCIES AND PARTNERS:

Fire and Rescue Department, Drainage and Sewerage Department, and Local District Offices of BMA

RESILIENCE VALUE & OUTCOMES:

The public can access flood/disaster information via mobile devices and are ready to prepare themselves when disaster strikes. Running a design competition also encourages innovation among Bangkok's technology sector.

BENEFICIARIES:

Residents, the technology sector.

Smart phones are increasingly a part of everyday life. Today, they are most people's main outlet for connecting in a range of ways, including social media, traditional media and with one another via phone calls and messaging apps.

The opportunity exists to use smartphones to connect more effectively with the public on disaster risks in real time.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

This project will trial multiple applications for mobile devices on flood/disaster preparedness. It will include a competition for app developers to crowdsource the best ideas and innovative approaches from Bangkok residents.

The resultant apps will add redundancy in communication channels, improve access to information, and increase understanding for how to deal with flood/disaster. The applications will also provide a channel for the public to request assistance. By sourcing innovative ideas from the public, there is also the potential for unexpected innovations and benefits.

TIMELINE:

1 year

OUTPUT	Technology	
RESILIENCE QUALITIES	Flexible, resourceful, inclusive, integrated	
RELEVANT SHOCKS/AND OR STRESSES	Shocks – Flood, fire, earthquake, etc	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

GOAL 6: STRONGER INSTITUTIONAL CAPACITY AND REGULATION

Striving to make Bangkok safer to live for all, BMA, as the primary agency for city administration, must be fully versed in disaster mitigation, preparedness, response and recovery. Complex urbanization and multi-layer facilities and systems to run city functions make urban disaster management a unique discipline that requires a mix of expertise and practical skills to address.

Considering the shocks Bangkok is likely to encounter, advancing disaster management systems and practices are essential for city authorities to be able to address multiple shocks and related emergency situations in a more effective, comprehensive and harmonized manner, better protecting people and their assets as well as social stability and the wider economy.

The capacity and capabilities of BMA to be able to reduce risks in Bangkok need to be assured, especially their ability to carry out emergency operations which require practical knowledge and skills. Certain areas that the city should target for capacity development include search and rescue, emergency drills in a given scenario, coordination mechanisms, and communications. Bangkok will also seek to promote collaboration and experience sharing with different partners within the country and in the region. The in-house capacity of BMA, equipped with modern equipment and necessary resources to effectively respond to emergency situations will be strengthened through:

- Capacity building for disaster risk reduction in BMA
- Resources and infrastructure for better preparedness and response.

KNOWLEDGE SHARING WITH DA NANG

Da Nang is focusing on building the capacity of the city's municipal workforce to enhance its ability to respond to disasters. Over the next few years, it will enhance city officer capacity in natural disaster forecasting and early warning, and improve action plans for typhoon preparedness, response and recovery.

Similarly, Bangkok is committed to building capacity for disaster risk reduction in BMA. In an increasingly urbanised city, an area of weakness Bangkok has identified in BMA's capacity is in urban search, rescue and fire training. Bangkok is also committed to sharing knowledge and learning from its neighbouring cities about disaster prevention and mitigation, including through the ASEAN city network and the 100RC network with Da Nang. Further collaboration between Bangkok and Da Nang will be investigated during implementation of this strategy.

WORKING WITH JAKARTA

Bangkok and Jakarta share a number of resilience challenges. As rapidly developing, south-east Asian mega-cities, both are threatened by frequent flooding and face significant issues with mobility and rapidly growing inequality. There are significant opportunities for Bangkok and Jakarta to work closely together through the 100RC network to share lessons learned, particularly as Bangkok approaches implementation just as Jakarta is kicking off its resilience strategy process. The first steps have been taken to establish this relationship, with Dr Supachai Tantikom featuring as a panellist at the Jakarta Agenda Setting Workshop. This relationship will be further developed as each city moves further along its resilience journey.

6.1 CAPACITY BUILDING FOR DISASTER RISK REDUCTION IN BMA

AS A PIVOTAL AGENCY FOR BANGKOK DISASTER RISK MANAGEMENT, BMA STAFF ARE A CRITICAL HUMAN RESOURCE IN CHARGE OF REDUCING RISKS AND DELIVERING EMERGENCY RESPONSE DURING CRITICAL TIMES. THROUGH FOUR SUB-PROJECTS, THIS INITIATIVE AIMS TO SUBSTANTIALLY ENHANCE BMA STAFF'S EXPERTISE AND SKILLS ACROSS A WIDE RANGE OF PLANNING AND MANAGEMENT FUNCTIONS. THESE INITIATIVES WILL IMPROVE EFFICIENCY AND TIMELINESS, PROMOTE INCLUSIVENESS AND EMBED RESILIENCE THINKING AND PRACTICE IN BMA STAFF. BANGKOK'S APPROACH TO THE STRATEGY DEVELOPMENT PROCESS RECOGNISES THE PIVOTAL ROLE BMA PLAYS IN INSTITUTIONALIZING RESILIENCE IN THE CITY AND HAS THEREFORE HAD A STRONG FOCUS ON CAPACITY BUILDING. THROUGH THE PROCESS OF RESEARCH AND INVESTIGATION AND THE COLLABORATIVE DEVELOPMENT OF SOLUTIONS WITH A RANGE OF EXTERNAL ORGANIZATIONS, BMA EMBRACED THE OPPORTUNITY TO BECOME RESILIENCE PRACTITIONERS AND TO APPROACH CHALLENGES WITH A RESILIENCE LENS.

6.1.1 DISASTER PREVENTION AND MITIGATION DRILLS

IMPLEMENTING AGENCIES AND PARTNERS:

Fire and Rescue Department, BMA

RESILIENCE VALUE & OUTCOMES:

The action empowers and leverage coherent efforts of different groups of stakeholders on preparedness, prevention, mitigation and emergency response in a more effective and integrated manner.

BENEFICIARIES:

BMA disaster management and emergency response officials, communities, schools, businesses in Bangkok.

While Bangkok has put in place Disaster Prevention and Mitigation Plans and other emergency operation plans, how and to what extent the plans could be run in an actual disaster situation remains uncertain. To translate these plans into action, it is necessary to ensure that all concerned are able to apply procedures, measures and steps in timely and effective manners, with role clarity, operating systems up and running, mechanisms in place for coordination and communication, and necessary resources pre-identified and readily available.

Government officials, NGOs, volunteer groups, and others with roles in disaster management will work together in joint exercises that will better equip them to understand and effectively apply their respective functions. These exercises will build trust and confidence, as well as helping to identify gaps and overlaps in accountabilities in a safe-to-fail environment. These exercises will be informed by extensive engagement with Bangkok citizens, residents, schools and business to understand how each organization's role responds to community needs.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

A series of training sessions, emergency exercises, and drills will be conducted by BMA to test functions and roles of assigned staff, volunteers and concerned agencies according to operational procedures and action plans, based on a comprehensive review of staff skills and capacities. Emergency operation systems and mechanisms for timely and effective delivery of disaster prevention, mitigation and emergency operations will be developed. Evacuation plans and drills will be conducted with the participation of communities, schools and businesses, enabling reflective and collective response to disaster events.

TIMELINE:

Continuous

OUTPUT	Capacity Building/Internal Training	
RESILIENCE QUALITIES	Integrated, Robust	
RELEVANT SHOCKS/AND OR STRESSES	Shock – Flood, other hazards and emergency situations	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	■
	New	

6.1.2 ASEAN CITY NETWORK AND COOPERATION ON DISASTER PREVENTION AND MITIGATION

IMPLEMENTING AGENCIES AND PARTNERS:

Fire and Rescue Department, BMA

RESILIENCE VALUE & OUTCOMES:

The action will strengthen capacity of BMA to address natural and other hazards in a more integrated way, reflective of collective knowledge and skills in the region.

BENEFICIARIES:

BMA becoming part of the Association of Southeast Asian Nations (ASEAN) disaster prevention and mitigation network, Bangkok residents.

Advancing disaster management systems and practices is crucial if Bangkok is to protect people, their livelihoods and the services they require from the uncertain array of shocks they will face in future.

Thankfully Bangkok is not alone in this challenge. We can learn a great deal by collaborating on urban disaster management with the ASEAN community of nations, many of whom have cities facing similar challenges. When coupled with what we can learn from membership in the 100RC network, active participation and city-to-city knowledge sharing in the ASEAN network can help all members develop more effective emergency management and resilience-building practices, founded on global best practices.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

To enhance the collective efforts of ASEAN cities on disaster management, an ASEAN regional disaster meeting will be organized with BMA as co-host. The meeting will be a platform for ASEAN cities to explore areas of potential collaboration and develop standard operation procedures for urban emergency management. It will also build the capacity of concerned officials on disaster prevention and mitigation through training, joint-exercises, and knowledge exchange programs among the ASEAN network.

TIMELINE:

1 year

OUTPUT	City-to-city collaboration	
RESILIENCE QUALITIES	Inclusive, Reflective, Integrated	
RELEVANT SHOCKS/AND OR STRESSES	Shock – Flood, other hazards and emergency situations	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	■
	New	

6.1.3 SEARCH AND RESCUE TRAINING PROGRAM

IMPLEMENTING AGENCIES AND PARTNERS:

Fire and Rescue Department, BMA

RESILIENCE VALUE & OUTCOMES:

Improvement in overall effectiveness in search and rescue operations will benefit Bangkok residents in times of shock, and will also build greater capacity that can be shared with other regions in times of need.

BENEFICIARIES:

Search and rescue teams and relevant concerned officials of BMA, search & rescue volunteers.

Search and rescue of victims in earthquake, structural collapse, fire and flood is a crucial, life-saving function. Bangkok's city centre is filled with high-rise condominiums, office buildings and multi-function buildings. Collapsed structures or other shock events in the urban area could have a catastrophic toll on residents, building users and nearby areas. Bangkok will aim to improve institutional capacity to perform search and rescue operations to a globally recognized standard.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

BMA will strengthen its capacity in search and rescue for earthquakes and collapsed structures through skill development of search and rescue responsible units and volunteer teams to the international standard. Knowledge and skill building on advanced practices, use of search and rescue equipment and technology will be shared by high-calibre and experienced experts, facilitators, and trainers. BMA will leverage connections established through the 100RC network to access the most suitable experts. BMA will take continuous efforts in this area, initially establishing local leaders in this space who can coordinate large teams. These leaders will also have a knowledge-sharing role, helping to build the skills of a broader cohort of experts, who in turn will have the capacity to train future generations of search and rescue professionals.

TIMELINE:

2 years

OUTPUT	Internal Training	
RESILIENCE QUALITIES	Robust, Reflective	
RELEVANT SHOCKS/AND OR STRESSES	Shock – Earthquake	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

6.1.4 RESILIENCE TRAINING FOR BMA SOCIAL PLANNERS AND ANALYSTS

IMPLEMENTING AGENCIES AND PARTNERS:

Strategy and Evaluation Department - BMA, AECOM and Resilient Melbourne Office

RESILIENCE VALUE & OUTCOMES:

By giving its officers the skills and knowledge to put resilience into action, Bangkok can ensure that resilience is mainstreamed across how it plans for, makes decisions about, and budgets for the future. The project will also help form strong ties with leading thinkers in Melbourne, enabling officials to engage in ongoing learning into the future.

BENEFICIARIES:

BMA social planners and analysts, as well as Bangkok residents through a higher capacity public service committed to resilience thinking and action.

BMA is responsible for setting the policy direction in a number of areas that fundamentally influence the lives of all Bangkokians. This includes social policy, planning and education. Recognising this, it is important that these social planners and analysts develop their capacity over time to set and achieve resilience goals for the city, informed by leading knowledge and systems thinking.
Melbourne, awarded the world's most liveable city for six consecutive years, is considered to have a number of best practice examples for social policy and planning. This project will bring 30 BMA social planners and analysts to learn from the living laboratory that is Melbourne.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

A two week training program will bring BMA social planners and analysts to Melbourne to share knowledge with and learn from specialists and peers in resilience, strategic planning and education. The program will also showcase a number of local examples of resilience in action, highlighting a range of multidisciplinary, cross sectoral projects and best practice.

TIMELINE:

2 weeks

OUTPUT	Internal Training	
RESILIENCE QUALITIES	Robust, Reflective, Integrated	
RELEVANT SHOCKS/AND OR STRESSES	Stresses – General	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

6.2 RESOURCES AND INFRASTRUCTURE FOR BETTER PREPAREDNESS AND RESPONSE

IN ADDITION TO HUMAN RESOURCE DEVELOPMENT, BANGKOK WILL ALSO INVEST IN THE FACILITIES AND EQUIPMENT NECESSARY FOR ROBUST DISASTER PREPAREDNESS AND RESPONSE. THROUGH FOUR SUB-PROJECTS, THIS INITIATIVE WILL PROVIDE A STRUCTURE FOR BANGKOK TO COLLECT AND USE INFORMATION ON DISASTERS, ENABLING IT TO LEARN FROM PAST EVENTS, AND A COMMAND CENTRE TO RESPOND MORE EFFECTIVELY TO FUTURE CHALLENGES.

6.2.1 INSPECTION OF BMA BUILDINGS FOR EARTHQUAKE RESILIENCE

IMPLEMENTING AGENCIES AND PARTNERS:

Public Works Department, BMA

RESILIENCE VALUE & OUTCOMES:

Improving seismic strength of critical buildings now will enable key city functions to continue when disaster strikes.

BENEFICIARIES:

BMA and Bangkok residents.

Recent studies have found that buildings in Bangkok are vulnerable to earthquake risk. While building codes for earthquake resistance have been implemented since 2007, there is a need to inspect the earthquake resistance capacity of many buildings, particularly those constructed before the act was implemented.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

The project will develop a database of BMA buildings vulnerable to earthquake risk, conduct assessments of earthquake resistance of these buildings, and provide solutions or recommendations for enhancing the earthquake resistance performance.
The aim is to scale up this initial project in future to assess and improve the seismic strength of buildings throughout Bangkok.

TIMELINE:

2 years initially

OUTPUT	Building inspection	
RESILIENCE QUALITIES	Robust	
RELEVANT SHOCKS/AND OR STRESSES	Shocks – Building collapse from earthquake	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	■
	New	

6.2.2 EQUIPMENT AND DEVICES FOR EMERGENCY RESPONSE TO BUILDING COLLAPSE

IMPLEMENTING AGENCIES AND PARTNERS:

Public Works Department, BMA

RESILIENCE VALUE & OUTCOMES:

BMA will have a database and list of required equipment for earthquake and building collapse response.

BENEFICIARIES:

BMA and decision makers at national level.

According to the Disaster Prevention and Mitigation Action Plan for Earthquakes and Building Collapse in Bangkok, there is a lack of tools and heavy equipment to assist those trapped under collapsed buildings. Thus, there should be an assessment of the need for additional tools and equipment to enable effective disaster response, according to the risks, locations, and population density of affected areas.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

The project will conduct a survey and develop a database of existing tools and equipment for more effective response to earthquake and collapsed buildings, and recommend any additional devices required.

TIMELINE:

6 months

OUTPUT	Systems improvement	
RESILIENCE QUALITIES	Robust	
RELEVANT SHOCKS/AND OR STRESSES	Shock – Collapsed buildings from tremors of earthquakes	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

6.2.3 BANGKOK DISASTER DATABANK

IMPLEMENTING AGENCIES AND PARTNERS:

Fire and Rescue Department, Traffic and Transportation Department, BMA

RESILIENCE VALUE & OUTCOMES:

Databases on hazard-related information are systematically developed for quick data synchronization, processing and sharing among the BMA department and other agencies. This data can also be used to inform more effective community development activities and build resilience to chronic stresses, such as providing services for an ageing population.

BENEFICIARIES:

Fire and Rescue Department, BMA, as the main agency responsible for Bangkok emergency management; other departments of BMA with related functions; Bangkok residents.

Bangkok holds a significant amount of data to inform natural disaster planning; however, this information is not always easy to locate, understand or manipulate. To support more effective emergency management, the existing GIS database of Bangkok city, developed by the Fire and Rescue Department, will need to further expand in terms of the variety of relevant data, volume, accuracy, reliability and networks with other data sources from different departments, sectors, and other provinces.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

A Bangkok Disaster Database/Databank will be developed as a comprehensive one-stop online hub on different types of disaster and hazard information. It will also act as a repository of labour, skills, machinery and vehicles for resource mobilization in emergency operations, and scenario-based impact analysis through networks of data sharing and transfer. The database will also generate 3D maps based on geo-spatial and baseline data to support BMA emergency teams in delivering their services more effectively.

TIMELINE:

2 years

OUTPUT	System improvement	
RESILIENCE QUALITIES	Robust	
RELEVANT SHOCKS/AND OR STRESSES	Shocks – All	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

6.2.4 DISASTER TRAINING CENTRE

IMPLEMENTING AGENCIES AND PARTNERS:

Fire and Rescue Department, BMA

RESILIENCE VALUE & OUTCOMES:

BMA has its own Disaster Training Centre as an all-in-one fully-equipped centre for capacity building and skills development activities that advance capacity to cope with and manage emergency situation and impacts of shocks.

BENEFICIARIES:

Personnel and staffs of BMA as well as others in and outside the country.

Bangkok's Fire and Rescue Department recognises the need for long term efforts in strengthening institutional capacity to respond better in emergency and crisis situations. Robust emergency management systems will require skilful staff with integrated and multidisciplinary technical knowledge, who are able to leverage off collective accumulated experience and lessons learnt. Additionally, the Department must have technical equipment that offers cutting edge efficiency and reliability during emergency operations. Bangkok disaster management also needs to adopt state-of-the-art learning and practices, utilize modern technology, and build platforms for cooperation and collaboration with local and international agencies.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

Committed to delivering high quality emergency services, BMA will enhance all aspects of its disaster management services. A flagship activity will be to establish a Bangkok Disaster Training Centre, dedicated to capacity building and serving as a learning centre for urban disaster management that benefits Bangkok and the broader region. Essential roles of the centre will be to create pools of competent BMA officials and staff with specialized knowledge and skills in disaster management service delivery such as firefighting in high-rise buildings and Collapsed Structure Search and Rescue (CSSR).
In addition to this focus on skills development, the Centre will form a centre of excellence for knowledge in urban disaster management, and will be fully equipped with modern equipment and support systems. The centre will offer hands-on practical training, learning and knowledge exchange on disaster management for interested persons, and local and international agencies.

TIMELINE:

4 years

OUTPUT	Internal Training	
RESILIENCE QUALITIES	Robust, Reflective, Integrated	
RELEVANT SHOCKS/AND OR STRESSES	Shocks - All	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

6.2.4 ESTABLISHMENT OF A BANGKOK COMMAND CENTRE

IMPLEMENTING AGENCIES AND PARTNERS:

Fire and Rescue Department, BMA in collaboration with various BMA Departments.

RESILIENCE VALUE & OUTCOMES:

The establishment of a command centre would assist agencies to respond to disasters and incidents in a more integrated and cross-disciplinary manner, ensuring a more effective response to residents.

BENEFICIARIES:

Bangkok residents.

Effective response to disaster events requires coordination across a wide range of Departments and Agencies responsible for a number of city actions. A command centre would enable BMA to have a single point of command for all emergency incidents and would bring Departments and Agencies together to share information and cross silos. It would provide integrated monitoring of the environment, and facilitate effective facilitation across BMA.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

This initiative will established an integrated command centre, where Departments and Agencies directly or indirectly involved in emergency response will join together to coordinate response to large emergency events.

TIMELINE:

2 years.

OUTPUT	Establishment of a command centre for emergency management	
RESILIENCE QUALITIES	Inclusive, resourceful	
RELEVANT SHOCKS/AND OR STRESSES	Shocks – Natural disasters, terrorism and other emergencies	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

STRATEGIC ACTION AREA 3 - DRIVING A STRONG AND COMPETITIVE ECONOMY

Today, the global economy is increasingly volatile. As a megacity that relies heavily on exports and tourism, Bangkok cannot shield itself entirely from this volatility, but there is much that can be done to ensure our economy is strong, efficient and competitive.
This strategic area is about increasing competitiveness and reducing economic vulnerability through diversification, both in terms of industries and employment opportunities for our citizens. This approach must build upon our existing strengths and the uniqueness of Bangkok's economic, social, infrastructural and environmental assets, including a world-renowned tourism and service industry, as well as being a gateway city to Asia and the rest of the world. Coupled with this must be a focus on technological advancement, which can facilitate higher skilled and higher paying jobs, as well as supporting a diverse range of community-based livelihoods.

GOAL 7: FACILITATING CITY AND COMMUNITY-BASED ECONOMY

GOAL 8: EXPANDING TOURISM, SERVICE INDUSTRY AND HOSPITALITY

GOAL 7: FACILITATING CITY AND COMMUNITY-BASED ECONOMY

Bangkok is currently experiencing slow economic growth due to several domestic and external factors including political instability, low investor confidence and private investment lagging behind public investment. However, Bangkok has a number of avenues for growing its economy to the benefit of all Bangkokians. BMA will proactively increase economic competitiveness and widen opportunity through:

- Supporting economic resilience through:
- Establishing Bangkok as a centre for trade and finance
- Developing and preserving agriculture in the city

LEARNING FROM SEMARANG AND GLASGOW

A number of Bangkok's peers on the 100RC network are grappling with the economic empowerment of their residents and businesses in the wake of shocks such as recession or natural disasters, and stresses such as poverty, economic downturn and disparities between rich and poor.

Through the promotion of urban farming and eco-tourism Semarang is taking action to develop environmentally friendly and socially orientated businesses. Much like Bangkok, it is looking at how it can the city's existing spaces and services can be used or improved in different and innovative ways.

In the wake of recession and transitioning from an industrial economy, Glasgow is taking numerous actions around skills development and small businesses. Among these actions are programs to increase the skill levels of Glasgow's working age population with a view to transitioning from manufacturing roles, and supporting new and existing business to grow.

As Bangkok, Semarang and Glasgow work to implement these actions, there is great opportunity to share experiences and lessons learnt through the 100RC network.

7.1 SUPPORTING ECONOMIC RESILIENCE IN COMMUNITIES AND ENCOURAGING THE PRESERVATION OF AGRICULTURE IN THE CITY

SOME COMMUNITIES IN BANGKOK FACE PARTICULAR CHALLENGES THAT CREATE OR INTENSIFY THEIR PRE-EXISTING VULNERABILITY. THIS INCLUDES INFORMAL SETTLEMENTS, AGRICULTURAL COMMUNITIES, WHOSE LAND IS BEING ENCROACHED UPON BY WIDESPREAD URBAN DEVELOPMENT AND THOSE EXPERIENCING FINANCIAL DISADVANTAGE. PATHWAYS TOWARDS A MORE RESILIENT BANGKOK WILL ENSURE INCLUSIVE DEVELOPMENT THAT WORKS WITH SOCIALLY AND ECONOMICALLY DISADVANTAGED COMMUNITIES TO UNDERSTAND HOW CURRENT APPROACHES ARE LEAVING THEM FURTHER AND FURTHER BEHIND. BMA WILL WORK WITH TARGETED COMMUNITIES TO PROMOTE WAYS TO BECOMING MORE SELF-RELIANT BY CREATING INCOME EARNING ACTIVITIES AND CAREER CHOICES, IMPROVING ACCESS TO PUBLIC SERVICES AND UTILITIES AND PROMOTING THE RETENTION OF ARABLE LAND TO SECURE AGRICULTURAL LIVELIHOODS IN THE CITY. THESE WILL ALSO PROVIDE VALUABLE FLOOD MITIGATION AND RETENTION AREAS.

7.1.1 ENHANCING RESILIENCE OF VULNERABLE COMMUNITIES IN BANGKOK THROUGH INTEGRATED FINANCIAL AND SOCIAL SUPPORT

IMPLEMENTING AGENCIES AND PARTNERS:

Fire and Rescue Department, Drainage and Sewerage Department, Local District Offices of BMA

RESILIENCE VALUE & OUTCOMES:

Social and economic disparity of vulnerable communities are addressed in an integrated and holistic way, which exhibits co-efficiency with other actions.

BENEFICIARIES:

Local communities and urban population, especially the socially and economically disadvantaged.

Within Bangkok, there is a significant gap between the disadvantaged and advantaged. Among the disadvantaged are domestic migrants, labourers (local and foreign), city nomads and squatters. Other vulnerable groups include the elderly, disabled and children whose living condition is deteriorating due to factors like unemployment, poverty, poor health outcomes and inadequate housing, all of which reduces their capacity to find and maintain a living.

Disregarding these people will only reduce the liveability of Bangkok and increase our resilience challenges, as vulnerable residents are less likely able to support themselves when disaster strikes. This action will seek to address a wide range of social and livelihood needs in vulnerable segments of the city's population, making the city more equitable and inclusive.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

BMA will engage with identified disadvantaged communities in Bangkok to understand their needs and get their input into the design of support services in a wide range of areas. These include accessible and affordable public utilities, education and technologies to meet basic needs that underpin resilience. Financial support and knowledge transfer will also be provided based on community-driven needs to start community-based economies and micro-businesses that can help strengthen networks, economic security, and social cohesion in the long run.

TIMELINE:

4 years (2018-2022)

OUTPUT	Program design	
RESILIENCE QUALITIES	Inclusive	
RELEVANT SHOCKS/AND OR STRESSES	Stress - Accumulated vulnerable conditions of population groups	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

7.1.2 PROMOTING DEVELOPMENT OF AGRICULTURE SECTOR FOR SUSTAINABILITY

IMPLEMENTING AGENCIES AND PARTNERS:

Social Development Department, District Offices, Department of City Planning, BMA

RESILIENCE VALUE & OUTCOMES:

Agricultural areas in Bangkok will be further developed for co-effective outcomes that increase economic value and earning of urban farming communities, land preservation for ecological service and temporary water storage, and environmental heritage of the city.

BENEFICIARIES:

Agricultural communities in Bangkok.

The expansion of Bangkok's built environment has encroached on fertile land which was once used for farming activities. These areas supported a common agrarian way of life, but only 13,774 farming households across 26 of 50 districts remaian. Recognising the importance of agriculture as an important livelihood for some Bangkok residents, both in terms of food production and tourism, is important to Bangkok's history, as well as its ability to provide green infrastructure for flood protection This project will help the city retain its remaining agricultural areas.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

Bangkok will take an integrated and participatory approach to promoting urban agriculture and sustainable farming practices on preserved farm land in the city. The action will look at maximising the multiple land-use and co-benefits of farming through residential areas, communities' interaction and flood protection.
This project will use integrated planning to enhance adaptive capacity and provide planned incentives that allow alternate use of urban farm lands for multiple purposes including cropping, water retention, urban-agro tourism, and preserving biological diversity and ecological services. An agricultural sector development plan for Bangkok will be developed through a community consultation process. It will consider a range of options to support farming livelihoods, ensure sufficient earning of households relying on framing practices, and optimise land resources through flexible and integrated use of farm land.

TIMELINE:

3 years (2019-2022)

OUTPUT	Agriculture sector development plan for Bangkok	
RESILIENCE QUALITIES	Redundant, Resourceful, Integrated	
RELEVANT SHOCKS/AND OR STRESSES	Stress - Agriculture areas decreasing constantly Shock - Areas to absorb and prevent flood	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

7.2 ESTABLISHING BANGKOK AS A CENTRE FOR TRADE AND FINANCE

THE INTERCONNECTED NATURE OF THE DOMESTIC, REGIONAL AND GLOBAL ECONOMY CREATES VULNERABILITY FOR BANGKOK, BUT ALSO OPPORTUNITY. BANGKOK MUST BE ABLE TO KEEP PACE WITH EVER-CHANGING ECONOMIC FORCES AND TRENDS, AND TURN RISK FACTORS INTO POSITIVE DRIVERS FOR ITS ECONOMIC DEVELOPMENT. A KEY FACTOR FOR BANGKOK'S ECONOMIC GROWTH AND STABILITY WILL BE ITS CAPACITY TO ACCURATELY FORECAST AN ECONOMIC OUTLOOK, THROUGH THE IDENTIFICATION AND ANALYSIS OF LOCAL AND GLOBAL TRENDS.

7.2.1 ESTABLISHMENT OF BANGKOK ECONOMIC DEVELOPMENT CENTRE FOR TRADE, FINANCE

IMPLEMENTING AGENCIES AND PARTNERS:

Finance Department, Strategy and Evaluation Department, Bangkok Metropolitan Administration, BMA

RESILIENCE VALUE & OUTCOMES:

The initiative will empower BMA towards fostering economic prosperity by enabling BMA to address economic impacts from shocks and stresses, realizing city economic growth and expanding further opportunity for economic competitiveness.

BENEFICIARIES:

Local community, domestic and international entrepreneurs, business partners/owners and investors.

As a major centre for investment, trade, travel and logistics, both nationally and globally, Bangkok has great potential to enjoy ongoing economic competitiveness and be a truly global city.
This requires a specialized and dedicated body to coordinate economic development in Bangkok – one that will set strategic directions and coordinate the many different players to collectively explore, collaborate and make decisions about economic opportunities.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

The Economic Development Centre for Trade, Finance and Investment will be established as an affiliated body of BMA and tasked with all economic-oriented aspects of city development and support in realising Bangkok city's aspiration, as articulated in its 20 year plan, to become a 'City of Economy and Knowledge-Base for Asia in 2030.'

The centre will be established to drive Bangkok's economic prosperity by better addressing economic issues and challenges, expanding trade and investment opportunities, promoting government-to-government and public-private partnerships based on shared benefit, economic equity and justice, and imbedding sufficiency economy theory for sustainable growth. Comprising a joint-committee for management from different departments, units and district offices of BMA, economic analysts, and financial experts, the centre will perform interim functions in tackling immediate economic issues and challenges. BMA will also develop a framework for long-term and permanent status of the centre, with defined mandates and functions, scope of services, staff resourcing, and necessary budget to enable success.

TIMELINE:

2 years to establish, then ongoing

EY Building a better working world

OUTPUT	Center	
RESILIENCE QUALITIES	Redundant, Resourceful, Integrated	
RELEVANT SHOCKS/AND OR STRESSES	Stress - Economic downturn, low productivity	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

7.2.2 DEVELOP ECONOMY, TRADE, FINANCE AND INVESTMENT ANALYSTS FOR BMA

IMPLEMENTING AGENCIES AND PARTNERS:

Finance Department, Social Development Department, BMA

RESILIENCE VALUE & OUTCOMES:

BMA could be able to guide business plan and strategies for local entrepreneurs and business, based on economic analysis.

BENEFICIARIES:

BMA officials and officials of 50 districts, local entrepreneurs, and SMEs.

While Bangkok has enjoyed economic vibrancy and investment in various sectors including commercial property, tourism hospitality services, many other sectors have the potential to boot the city economy but have not been actively supported to realise their potential.

With a great diversity of economic activities in Bangkok, it is important that BMA and its district offices play a strong leading role in initiating and implementing proactive policy options and measures to facilitate and support trade, finance, and investment of different scales based on core-business compentencies, available production factors, and resources and skills in respective localities. This project will strongly contribute to ongoing attempts to achieve the economic aspiration outlined in Bangkok's 20-Year Development Plan (2013-2032).

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

BMA and the city's 50 District Offices will take a leading role in guiding and facilitating Bangkok's economic development. To fulfil this role, 300 BMA officials will undertake training and skills development on a range of relevant topics related to expanding finance and economic opportunities in the city.

The objective of this program is to develop an understanding of the economy, trade, finance and investment at the community and city scale and to equip BMA to build broader economic partnerships with its fellow ASEAN countries. These officers will serve as part of the Economic Development Centre for Trade, Finance and Investment outlined as part of this initiative.

TIMELINE:

2 years (2019-2021)

OUTPUT	Capacity building/internal training	
RESILIENCE QUALITIES	Redundant, Resourceful, Integrated	
RELEVANT SHOCKS/AND OR STRESSES	Stress - Lack of professionals for economic development of BMA Shock - Areas to absorb and prevent flood	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

7.2.3 REDUCING RISK OF ECONOMIC SHOCKS

IMPLEMENTING AGENCIES AND PARTNERS:

Finance Department, Social Development Department, BMA

RESILIENCE VALUE & OUTCOMES:

Bangkok and its residents have better options through readiness and remediation to reduce potential economic impacts.

BENEFICIARIES:

Bangkok and its resident.

Bangkok's economy is influenced by a variety of factors including global and regional economic crises and changes in demand and other economic trends. Similarly, negative consequences of large scale hazards such as floods, disease pandemics, and major fire accidents in the city area do not only cause severe interruption of business activities or damage of economic infrastructure, but also undermine confidence among both domestic and foreign investors.
Technological advancement has the potential to improve efficiency in the workplace, however, it may also have unintended consequences. For example, automation may lead to a decreased demand for manual labour and hence cause unemployment. As a result potential mechanisms for efficiency should be thoroughly investigated.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

The Finance Department of BMA will take proactive actions to build a resilient economy by putting in place a Bangkok Economic Plan to address projected economic challenges in a timely and sustainable way.

Comprehensive studies will be carried out to develop a critical understanding of a range of risk factors, including the impact of emerging economic trends, such as increased automation and technological advancement at regional and global scale on Bangkok's current economic activities and structures.
While the future will be inherently unpredictable, this work remains important for BMA's capacity to forecast and plan for expected future conditions, and make informed decisions on preparedness and mitigation options to turn challenges into opportunities.

TIMELINE:

1 year (2019-2020)

OUTPUT	Study and Strategic Development	
RESILIENCE QUALITIES	Redundant, Resourceful, Flexible, Integrated	
RELEVANT SHOCKS/AND OR STRESSES	Shock – to reduce economic loss of the public and the city from disaster	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

GOAL 8: EXPANDING TOURISM, SERVICE INDUSTRY AND HOSPITALITY

As a world-famous tourist destination, Bangkok's tourism industry has significant opportunities for further growth to provide visitors with a fun, easy, vibrant, safe and culturally relevant visitor experience. BMA will support potential actors in developing business models and ways to upgrade tourism related services to an acceptable standard as well as improve tourist safety in order to expand its tourism markets. This is important for the economic and social resilience of the city, and the country, as the tourism industry of Thailand is responsible for 19 per cent of the country's GDP [14]. Bangkok will further expand its tourism, service industry and hospitality offer through:

- Providing skills development for tourism operators
- Enhancing tourist safety

DEVELOPMENT OF THE CULTURAL MARKET IN THE CITY, INCLUDING TOURISM OPERATORS AND PRODUCTS

Developing expertise for local tourism businesses and hospitality services is central to optimizing the value of tourism in Bangkok. Communities with rich cultural heritage and craft skills will be equipped with entrepreneurship and business management skills to assist them in growing their businesses and Bangkok's cultural attractions. BMA will take action to promote cultural tourism, together with local communities, by implementing community-inclusive business models through these three projects.

8.1 PROVIDING SKILLS DEVELOPMENT FOR TOURISM OPERATORS.

TO ENHANCE THE QUALITY AND COMPETITIVENESS OF BANGKOK'S MANY TOURISM OPERATORS, A PROGRAM OF TRAINING AND SKILLS DEVELOPMENT WILL BE DESIGNED AND OFFERED TO OPERATORS TO BUILD THEIR BUSINESS AND ENSURE THEIR OPERATIONS MEET THE STANDARDS AND EXPECTATIONS OF VISITORS TO THE CITY.

8.1.1 TRAINING PROGRAM FOR TOURISM VENDORS AND SERVICE PROVIDERS

IMPLEMENTING AGENCIES AND PARTNERS:

Culture, Sport and Tourism Development, BMA

RESILIENCE VALUE & OUTCOMES:

Greater opportunities for Bangkok's tourism industry to offer a range of options and types of services for tourists and visitors with diverse tastes, interest and preference. This will contribute to further growth of the tourism sector.

BENEFICIARIES:

Tourism service providers, vendors, local communities and residents.

While Bangkok has wide array of tourism products and services to offer, a range of potential stakeholders owning cultural assets have limited understanding and know-how to build upon the existing rich heritage. Small-scale business owners, local street vendors and communities around Bangkok with unique catering, lodging, cultural experiences should be supported to develop their businesses and to be aware of, and meet standards and expectations of tourists in the city.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

BMA will provide capacity development programs for business owners, service providers, vendors and communities to assure quality tourism products and service delivery, and entrepreneurial opportunities for these businesses. Special focus will be on training of small and medium sized tourism-related enterprises and local communities, with guidelines, practical tools and processes for promoting and preserving cultural heritage for tourism purposes, business planning for cultural products and related businesses management.

TIMELINE:

1 year (2017-2018)

OUTPUT	Capacity building/internal training	
RESILIENCE QUALITIES	Resourceful, Integrated	
RELEVANT SHOCKS/AND OR STRESSES	Shock – Economic crisis	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

8.1.2 TOURISM SECTOR ANALYSIS AND ROADMAP FOR TOURISM PROMOTION

IMPLEMENTING AGENCIES AND PARTNERS:

Cultures, Sport and Tourism Department, BMA

RESILIENCE VALUE & OUTCOMES:

Clearer strategic direction for Bangkok's tourism industry, an integrated and comprehensive plan for achieving growth in the sector and increasing competitiveness.

BENEFICIARIES:

Tourism industry and related services and business in Bangkok.

In accordance with the BMA 20- Year Development Plan, to become a world-class tourist destination, BMA has to play an increasingly vigorous role in all aspects of tourism promotion, upgrading industry services and ensuring quality and regulatory standards. This requires strategic analysis, insight, and inclusive and forward-thinking planning.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

This project will develop a roadmap based on analysis of the challenges and opportunities for tourism in Bangkok. BMA will facilitate the development of the tourism sector through a series of interrelated, prioritized interventions with role clarity of lead and supporting agencies and stakeholder mapping, while focusing on the role of culture for tourism development as one of key areas for tourism promotion.

TIMELINE:

1 year (2017-2018)

OUTPUT	Study and strategy development	
RESILIENCE QUALITIES	Resourceful, integrated	
RELEVANT SHOCKS/AND OR STRESSES	Shock – Economic crisis	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

8.1.3 MODEL OF MANAGEMENT AND DEVELOPMENT OF CULTURAL PRODUCT FOR TOURISM PROMOTION (PILOT FOR BANGKOK NOI DISTRICT)

IMPLEMENTING AGENCIES AND PARTNERS:

Cultures, Sport and Tourism Department, BMA

RESILIENCE VALUE & OUTCOMES:

This pilot project will demonstrate how tourist attractions can be developed in local communities to showcase traditional lifestyles or cultural practices and to build economic opportunities for communities. This model can then be used by other communities to develop their own attractions and business models furthering economic development supporting the expansion of the tourism sector in Bangkok.

BENEFICIARIES:

Communities owning cultural heritage and culture-related assets, cultural tourism service providers.

The tourism industry of Thailand is responsible for 19% of the country's GDP. Bangkok, as a gateway for tourism in Thailand, is a major tourist's attraction with rich history and abundant cultural heritage, combined with modernized facilities and amenities. Opportunities still exist for Bangkok to showcase its cultural diversity and heritage by offering visitors a unique, hands on experience of some of its traditional communities.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

BMA will further promote cultural tourism by developing a model for cultural tourism enterprise creation in Bangkok Noi District. This will be used to demonstrate how practical plans and activities for the development of cultural and community tourism can be developed, replicated and adapted to other potential tourism locations. This project will showcase the process of identifying potential communities or other cultural experiences, marketing strategies, and sustainable management of cultural tourism. Participation of communities, local service providers and cultural-tourism related business owners will be key for long-term mutual profit, including social development for communities, businesses and social equity.

TIMELINE:

1 year (2017-2018)

OUTPUTS	Study to develop a model for cultural tourism enterprises in Bangkok	
RESILIENCE QUALITIES	Resourceful, integrated	
RELEVANT SHOCKS/AND OR STRESSES	Shock – Economic crisis	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

8.2 RESOURCES AND INFRASTRUCTURE FOR BETTER RESPONSE AND PREPAREDNESS

BANGKOK HAS PUT A HIGH PRIORITY ON THE SAFETY AND SECURITY OF VISITORS TO THE CITY. BMA WILL CONTINUE TO STRENGTHEN EXISTING SERVICES AND CAPACITIES TO ADDRESS DIFFICULTIES, GRIEVANCES AND UNDESIRABLE SITUATIONS THAT TOURISTS MIGHT ENCOUNTER IN THE CITY TO ENSURE SAFETY AND CONFIDENCE OF VISITORS.

8.2.1 ENHANCING TOURIST SAFETY

IMPLEMENTING AGENCIES AND PARTNERS:

Cultures, Sport and Tourism Department, BMA

RESILIENCE VALUE & OUTCOMES:

To build an integrated and robust system for the safety and security of visitors to Bangkok and enhance the tourist experience.

BENEFICIARIES:

Tourists, tourism-related business, community and residents.

Bangkok has a large amount of visitors each year. Tourist safety and security is a significant consideration for the city and tourists are currently provided with access to various types of assistance such as tourist police and tourist service centres.

ACTIVITIES IN BRIEF AND IMPLEMENTATION:

BMA will further increase efforts to ensure that essential segments of the tourism industry, including transportation, accommodation, tourist attractions, and other related services, thoroughly consider safety and security of visitors as part of their business planning activities. In this endeavour, BMA will provide businesses with access to information through online, up-to-date situation alerts from reliable sources in times of emergency, and channels for lodging complaints and responding to tourist grievances.

TIMELINE:

1 year (2017-2018)

OUTPUTS	Online information portal and awareness campaign	
RESILIENCE QUALITIES	Robust	
RELEVANT SHOCKS/AND OR STRESSES	Stress – Problems of tourists being tricked. Raise confidence on safety concern for tourists	
IS THE INITIATIVE NEW, OR WILL IT BE SCALED UP FROM A CURRENT INITIATIVE?	Existing	
	Scalable	
	New	

NEXT STEPS

Our city is on a journey, one that will see it grow to be a safe, liveable and sustainable city for all its residents. This Strategy is an important milestone on this journey. It marks the beginning of a resilience building approach that will plan and resource actions that address those things that are important to our city and not just those that are the most urgent, breaking the cycle of being reactive instead of resilient. Now that we have identified what is at the heart of our city's ability to be resilient, the time has come for us to roll up our sleeves and together, plan how we will transform our dynamic vision into successful implementation.

Bangkok is committed to delivering the 18 initiatives with 57 projects, identified in this Strategy. Not all of these will be delivered in the first year, or even the second. Some will be complete within the first year, whilst others will continue on for many years to come. The details of this implementation program will be covered in an implementation plan, to be developed immediately following the release of this Strategy.

Bangkok has learnt from other cities in the 100RC network that resilience projects, by their very nature, cross silos, sectors and agencies. Their implementation therefore requires collaboration and buy-in across multiple agencies to ensure that these agencies can work together to leverage investments, engage effectively with the community and deliver coordinated and transparent benefits to Bangkok residents. Implementation agencies and partners will therefore be heavily involved in the development of an implementation plan to ensure coordination, streamline delivery and leverage investments for multiple resilience benefits.

Together with our partners, we invite you to come and share the journey.

If you are interested to help Bangkok to be resilient, please send an email to ResilientBangkok@gmail.com


UOB
EXCHANGE

QUICK REFERENCE

STRATEGIC ACTION AREA	GOALS	INITIATIVES	PROJECTS
1 - INCREASING QUALITY OF LIFE	1 - Health and wellbeing for all city residents now, and into the future	1.1 - Promoting healthy living and lifestyles	1.1.1 - Screening for diabetes and high blood pressure in people over the age of 21
		1.2 - Epidemic prevention in urban communities	1.2.1 - Event based surveillance for pandemics
			1.2.2 - Improving work places and living conditions for migrant workers in Bangkok
		1.3 - Preparing for quality ageing	1.3.1 - Support for elderly residents
			1.3.2 - Preparing the population aged 18- 59 for old age
			1.3.3 - Accessibility and safety of transport options for senior citizens
	2 - Safe, accessible and convenient transport networks	2.1 - Integrated mass transport system	2.1.1 - Integrated mass transport system master plan
			2.1.2 - Expansion of monorail feeder and light rail system
			2.1.3 - Expansion of water transport network
		2.2 - Improving traffic flow in the city	2.2.1 - Integrated information system for traffic management and planning
			2.2.2 - Reducing traffic congestion around schools – pilot study of Samsen Road
			2.2.3 - Study of integrated management of road network and development of a master plan
			2.2.4 - Feasibility study for driving credit measures and taxes
		2.3 - Reducing road related deaths through influencing driver behaviour and new technologies	2.3.1 - Road Safety Audit
			2.3.2 - Driver behaviour change campaign to reduce road accidents
			2.3.3 - Memorandum of understanding (MOU) for the development of driverless vehicles
	3 - Environmentally friendly urbanization	3.1 - Green growth: supporting environmentally friendly growth and waste management	3.1.1 - Sustainable waste management
			3.1.2 - Development of waste-to-energy
		3.2 - Encouraging low carbon transportation	3.2.1 - Encouragement of environmentally friendly transportation
			3.2.2 - Study on enhancing cycling pathways and facilities
			3.2.3 - Improving air quality management and communication
		3.3 - Growing green space	3.3.1 - Developing new recreational parks
			3.3.2 - Promote public engagement on sustainable increase of green space
			3.3.3 - Development of green space and riverside promenade along the banks for the Chao Phraya River

STRATEGIC ACTION AREA	GOALS	INITIATIVES	PROJECTS
2 - REDUCING RISK AND INCREASING ADAPTATION	4 - Improved resilience to floods	4.1 - Catchment management strategy and vision for the Chao Phraya Basin	4.1.1 - Study of Lower Chao Phraya Basin and setting vision for water management in Bangkok
			4.1.2 - Development of a flood hazard map for management and to communicate with the public on preparation for flood events
			4.1.3 - Enhance effectiveness of weather and rainfall forecasts
		4.2 - Community water resource management program	4.2.1 - Community water resource management
			4.2.2 - Water sensitive urban marketplace
			4.2.3 - Management of waste collection for canal communities
		4.3 - Urban flood defences	4.3.1 - Revision of design criteria for drainage
			4.3.2 - Pilot study on developing urban water retention
			4.3.3 - Improvement of drainage systems along main roads
			4.3.4 - Development of drainage tunnels
			4.3.5 - Improvement of major canals
			4.3.6 - Study of the feasibility of developing combined utility tunnels
			4.3.7 - Feasibility assessment of Flood Resilience Index (FRI) –Sukhumvit case study
	5 - Increase public and community driven action, awareness, preparedness and adaptation	5.1 - Community based adaptation and disaster preparedness communication	5.1.1 - Community based disaster risk management pilot
			5.1.2 - Community flood preparedness communication
			5.1.3 - Youth education program for disaster safety
			5.1.4 - Disaster Learning Centre for Earthquake and Fire Hazards
		5.2 - Making better use of technology for public communication and disaster preparedness	5.2 - Disaster preparedness and flood information communication
	6 - Stronger institutional capacity and regulation	6.1 - Capacity building for disaster risk reduction in BMA	6.1.1 - Disaster prevention and mitigation drills
			6.1.2 - ASEAN city network and cooperation on disaster prevention and mitigation
			6.1.3 - Search and rescue training program
			6.1.4 - Resilience training for BMA social planners and analysts
		6.2 - Resources and infrastructure for better response and preparedness	6.2.1 - Inspection of BMA Buildings for earthquake resilience
			6.2.2 - Equipment and devices for emergency response to building collapse
			6.2.3 - Bangkok Disaster Databank
			6.2.4 - Disaster learning centre
			6.2.5 - Establishment of a Bangkok Command Centre

STRATEGIC ACTION AREA	GOALS	INITIATIVES	PROJECTS
3 - DRIVING A STRONG AND COMPETITIVE ECONOMY	7 - Facilitating city and community based economy	7.1 - Supporting economic resilience in communities and encouraging the preservation of agriculture in the city	7.1.1 - Enhancing resilience of vulnerable communities in Bangkok by integrated financial and social support
			7.1.2 - Promoting development of agriculture sector for sustainability
		7.2 - Establishment of a Bangkok Centre for Trade and Finance	7.2.1 - Establishment of a Bangkok Centre for Economic Development, Trade and Finance
			7.2.2 - Develop Economy, Trade, Finance and Investment Analysis for BMA
			7.2.3 - Reducing risk of economic shocks
	8 - Expanding tourism, service industry and hospitality	8.1 - Providing skills development for tourism operators	8.1.1 - Training program for tourism vendors and service provider
			8.1.2 - Tourism sector analysis and roadmap for tourism promotion
			8.1.3 - Model of management and development of cultural products for tourism promotion (pilot Bangkok Noi District)
		8.2 - Resources and Infrastructure for better response and preparedness	8.2.1 - Enhancing tourist safety

REFERENCES

[1] R. Choiejit and R. Teungfung (2002). Urban growth and commuting patterns of the poor in Bangkok

[2] TOMTOM (2016). TOMTOM Traffic Index. http://www.tomtom.com/en_gb/trafficindex/ (Accessed on 3 December, 2016)

[3] Office of Transport and Traffic Policy and Planning, Ministry of Transport (2013). Transport and Traffic Statistics and Information Thailand

[4] Pollution Control Department, Ministry of Natural Resources and Environment (2011). Thailand State of Pollution Report 2011

[5] Economist Intelligence Unit (2011). Asian Green City Index

[6] The Nation (2013). In desperate need of open spaces and Fresh Air. http://www.nationmultimedia.com/opinion/In-desperate-need-of-open-spaces-and-fresh-air-30200024.html (Accessed on 25 September, 2016)

[7] P. Sapsuwan (2014). Bangkok's Klong Toey Slum. http://www.borgenmagazine.com/bangkoks-klong-toey-slum/ (Accessed on 25 September, 2016).

[8] International Organization for Migration (2011). Thailand Migration Report 2011

[9] T. Tingsanchali (2012). Urban Flood Disaster Management, Procedia Engineering, Volume 32, 2012, Pages 25-37. http://www.sciencedirect.com/science/article/pii/S1877705812012647 (Accessed on 25 October, 2016)

[10] S. Kotsuki, K. Tanaka and S. Watanabe (2014). Projected hydrological changes and their consistency under future climate in the Chao Phraya River Basin using multi-model and multi-scenario of CMIP5 dataset, Hydrological Research Letters 8 (1), 27–32 (2014). https://www.jstage.jst.go.jp/article/hrl/8/1/8_27/_article (Accessed on 25 October, 2016)

[11] International Peace Institution (2016). Building Resilience in Cities under Stress

[12] Economy and Environment Program for Southeast Asia. (2015). Economic Losses from the 2011 Thailand Floods: A study of Bangkok Metropolitan Region

[13] M. Sivak and B. Schoettles (2014). Mortality from road crashes in 193 countries: A comparison with other leading causes of death

[14] World Travel and Tourism Council (2015). Travel and Tourism Economic Impact 2015 Thailand

[15] S. Wancharoen (2015). Old canal springs back to life. Bangkok Post, 5/12/2015, http://www.bangkokpost.com/print/785449/ (Accessed on 4 December, 2016)

WITH THANKS TO THE FOLLOWING STEERING COMMITTE MEMBERS

NAME	ROLE OF ORGANIZATION
Mr.Jumpol Sumpaopol	Deputy Governor of Bangkok
Catt. Deuntemduang Na-Chiengmai	Advisor to Bangkok Governor
Mr.Supachai Tantikom	Senior Advisor on Environment to Bangkok Governor
Mr.Kittinan Koaesuti	Deputy Permanent Secretary for BMA
Prof. Dr.Pennung Warnitchai	School of Engineering & Technology
Representative from this Organization	Asian Institute of Technology (AIT)
Assoc. Prof. Dr.Seree Supratid	Climate Change & Disaster Center, Rungsit University
Asst.Prof. Dr.Wijitbusaba Ann Maronie	Faculty of Architecture and Planning
Thammasat University (Rungsit Campus)	
Asst.Prof. Dr.Sombat Yumuang	Chulalongkorn University
Asst.Prof. Dr.Tavida Kamolvej	Faculty of Political Science, Thammasat University
Representative from this Department	Director of Community Organizations Development Institute (Public Organizations) or representative
Representative from this Department	President of The Engineering Institute of Thailand under H.M. The King's Patronage or representative
Representative from this Department	Chairman of the Thai Chamber of Commerce and the Board of Trade of Thailand or representative
Representative from this Department	Director of Thailand Environment Institute or representative
Representative from this Department	Governor of Metropolitan Electricity Authority or representative
Representative from this Department	Governor of Metropolitan Waterworks Authority or representative
Representative from this Department	Director General of Department of Disaster Prevention and Mitigation, Ministry of Interior or representative
Representative from this Department	Director General of Transport and Traffic Policy and Planning Office, Ministry of Transport or representative
Representative from this Department	Director General of Department of Public works and Town & Country Planning, Ministry of Interior or representative
Representative from this Department	Commander of Traffic Division

NAME	ROLE OF ORGANIZATION
Royal Thai Police Headquarters or representative	
Representative from this Department	Director General of Fire and Rescue Department or representative, BMA
Representative from this Department	Director General of Drainage and Sewerage Department or representative, BMA
Representative from this Department	Director General of City Planning Department or representative, BMA
Representative from this Department	Director General of Strategy and Evaluation Department or representative, BMA
Representative from this Department	Director General of Traffic and Transport Department or representative, BMA
Representative from this Department	Director General of Public Works Department or representative, BMA
Representative from this Department	Director General of Medical Service Department or representative, BMA
Representative from this Department	Director General of Health Department or representative, BMA
Representative from this Department	Director General of Social Development Department or representative , BMA
Ms.Suwanna Jungrungrueng	Director General of Department of Environment, BMA
Ms Wullaya Wattanarat	
	Deputy Director General of Department of Environment, BMA
Ms.Termsiri Chongpoonphol	Director of Air quality and Noise Management Division, Environment Department, BMA
Mr.Phatanan Chuduang	
	Fire and Rescue Officer, Senior Professional Level,
Technical Service and Planning Fire and Rescue Department, BMA	
Mr.Jarupong Penggglieng	Head of Vehicle Emission Control Sub-division
Air quality and Noise Management Division, Department of Environment, BMA	

STEERING COMMITTE MEMBERS

NAME	ROLE OF ORGANIZATION
Ms. Wullaya Wattanarat	Deputy Director General, Department of Environment
Associate Professor Chamlong Poboon, Ph.D	Dean of Graduate School, Graduate School of Environmental Development Administration, National Institute of Development Administration
Sutat Weesakul, Ph.D.	Deputy Director, Hydro and Agro Informatics Institute (Public Organization)
Sarawut Jansuwan, Ph.D.	Head of Program in Logistics Management School of Applied Statistics, National Institute of Development Administration
Assistant Professor Chokchai Munsawaengsub, M.D	Faculty of Public Health, Mahidol University
Keerati Sripramai, Ph.D	Lecturer, Department of Engineering, School of Interdisciplinary, Mahidol University (Kanchanaburi Campus)
Ms. Termsiri Chongpoonphol	Director of Air Quality and Noise Management Division, Department of Environment
Mr.Jarupong Pengglieng	Head of Vehicle Emission Control Sub-division, Air Quality and Noise Management Division Department of Environment
Ms. Sermsook Noppun	Environmentalist, Professional Level Air Quality and Noise Management Division Department of Environment

WORKING TEAMS

FLOODING TEAM

FLOODING TEAM	NAME	POSITION	ORGANIZATION
Team Leader	1. Mr.Chalermpon Chotinuchit	Deputy Director General	Department of Drainage and Sewerage, BMA
Secretary	2. Mr.Surart Jaroenchaisakul	Director of Water Quality Management Office	Department of Drainage and Sewerage, BMA
Assistant Secretary	3. Mr.Visanu Charoen	Chief of Project Management Section,	Department of Drainage and Sewerage, BMA
	4. Mrs.Sermsook Noppun	Environmentalist, Professional Level	Environmental Department, BMA
Working Team Members	5. Dr.Sutat Wesakul	Deputy Director of Hydro and Agro Informatics Institute (Public Organization)	Hydro and Agro Informatics Institute
	6. Mr.Jitapon Sitthipraneet	Director of Projects Coordination 1 Bureau	Office of the Royal Development Projects Board
	7. Mr.Apisak Saravisutra	Policy and Planning Analyst, Professional Level	Office of the Royal Development Projects Board
	8. Mr. Pongsak Arulvijitskul	Director, Office of Regional Irrigation 11	Royal Irrigation Department, Ministry of Agriculture and Cooperatives
	9. Mr. Chatchom Chompardist	Director, Water Management and Maintenance Division, Office of Regional Irrigation 11	Royal Irrigation Department, Ministry of Agriculture and Cooperatives
	10. Mr.Sarawut Sakol	Professional Level Irrigation Engineer	Royal Irrigation Department, Ministry of Agriculture and Cooperatives
	11. Ms.Sotharat Insawang	Director of Hydrometeorological Division, Senior Professional Level	Thai Meteorological Department
	12. Mr.Boonlert Archevarahuprok	Expert on Research and Development for Meteorology	Thai Meteorological Department
	13. Mr.Kaittipat Sonchareon	Civil Engineer, Practitioner Level	Public Works Department, BMA
	14. Ms.Orapim Pimcharoen	City Planner, Professional Level	City Planning Department, BMA
	15. Mr.Vichai Somboon	Project Planning Expert	Department of Drainage and Sewerage, BMA
	16. Ms.Amaraporn Jitpraphai	Civil Engineer, Professional Level, Main Drainage System Development Division	Department of Drainage and Sewerage, BMA

MOBILITY TEAM

MOBILITY TEAM	NAME	POSITION	ORGANIZATION
Team Leader	Mrs.Ajara Horsombat	Deputy director – General of Traffic & Transportation Department	Traffic & Transportation Department, BMA
Secretary	Mr.Prapas Luengsirinapa	Director of Transport Division	Traffic & Transportation Department, BMA
Assistant Secretary	Mr.Prawat Wongthongdee	Policy and Planning Analyst, Professional Level Policy and Planning Division	Traffic & Transportation Department, BMA
	Mr.Chakaphong thienphithak	Civil Engineer Professionll Level Transportation Division	Traffic & Transportation Department, BMA
	Ms.Thitichaya Subyanakorn	Policy and Planning Analyst, Practitioner Level	Traffic & Transportation Department, BMA
	Ms.Yanee Kaewprasit	Policy and Planning Division Environmentalist, Professional Level	Environment Department, BMA
Working Team Members	Ph.D.Sarawut Jansuwan	Head of Program in Logistics Management School of Applied Statistics	National Institute of Development Administration
	Mr.Surapong Meanmit		Office of Transport and Traffic Policy and Planning, Ministry of Transport
	Mrs.Watinee Suwanpong	Transport officer, Senior Professional Level	Department of Land Transport, Ministry of Transport
	Pol.Capt.Boonseang Sarapat		Thai Traffic Police, Royal Thai Police
	Mr.Kittikan Chomdoung Charuworapulkul	Head of Public Works Planning Planning and Public Utility Coordination Division	Public Works Department, BMA
	Ms.Orapim Pimcharoen	City Planner, Professional Level	City Planning Department, BMA
	Mrs.Ratchanee Pongtanee	Head of Program and Evaluation Group Policy and Planning Division	Traffic & Transportation Department, BMA

ECONOMIC PROSPERITY AND EQUALITY TEAM

ECONOMIC PROSPERITY AND EQUALITY TEAM	NAME	POSITION	ORGANIZATION
Team Leader	Mrs.Silapasuai Rawisaengsun	Director of Strategy and Evaluation Department	Strategy and Evaluation Department, BMA
Secretary	Ms.Kornsupha Nitvimol	Director of Human Resource and Social Strategy Division	Strategy and Evaluation Department, BMA
Assistant Secretary	Ms.Daratip Onlamul	Policy and Planning Analyst, Professional Level	Strategy and Evaluation Department, BMA
	Ms.Supawan Intoon	Environmentalist, Practitioner Level	Environment Department, BMA
Working Team Members	Associate Professor Chamlong Poboon, PhD	Dean of Graduate School of Environmental Development Administration	National Institute of Development Administration
	Mr.Krisada Ruangchotivit	The Committee on Natural Resources and Environment	The Thai Chamber of Commerce
	Mrs.Kobkul Pitarachart	Tourism Development Officer, Senior Professional Level	Department of Tourism Ministry of Tourism and Sports
	Ms.Chiraporn Srijantr	Policy and Planning Analyst, Professional Level	Office of The National Economic and Social Development Board
	Ms.Kobkul Kuangsuan	Social Worker,Professional Level Department of Older Persons	Ministry of Social Development and Human Security
	Mr.Payot Hanpadungkit	Fiscal Technical Officer, Senior Professional Level Fiscal Policy Office	Finance Department, BMA
	Ms.Phatthanan Phokhauaoraphaibun	Director of Policy and Planning Division	Social Development Department, BMA
	Mr.Yinyon Seniwong Na Ayudhya Ph.D.	Director of Policy and Planning Division	Culture Sports and Tourism Department, BMA

HEALTH AND WELLBING TEAM

HEALTH AND WELLBING TEAM	NAME	POSITION	ORGANIZATION
Team Leader	Mr.Wongwat Liulak	Deputy Director General Health Department	Health Department, BMA
Secretary	Mr.Prapas Luengsirinapa	Director of Environmental Sanitation Office	Health Department, BMA
Assistant Secretary	Mr.Charan Potchanamaturos	Head of Occupational Health Sub-division Environmental Sanitation Division	Health Department, BMA
	Mrs.Napaporn Sripetpun	Environmentalist, Professional Level	Environment Department, BMA
Working Team Members	Assistant Professor Dr.Chokchai Munsawaengsub, M.D.	Deputy Head of Family Health Department	Faculty of Public Health, Mahidol University
	Mr.Sirikait Liengkobkit, D.D.S	Director of Health Risk Control Section	Thai Health Promotion Foundation
	Mr.Sopon Iamsiritavon, M.D.	Director of Thailand MOPH - U.S.CDC Collaboration	Ministry of Public Health
	Mrs.Sarintorn Sontisirikit	Deputy Director General Urban Disease Control Institute	Department of Disease Control, Ministry of Public Health
	Mrs.Ladaval Suan-ngam	Public Health Technical Officer, Senior Professional Level Institute for Urban Disease Control	Department of Disease Control Ministry of Public Health
	Ms Sirithorn Duangsawat	Public Health Technical Officer, Professional Level Health Centre 13	Department of Health Ministry of Public Health
	Mrs.Duangporn Pinjeesekikul	Director of Drug Abuse Prevention and Treatment Office	Health Department, BMA
	Ms Pussadee Phrommayon	Director Health Promotion Division	Health Department, BMA
	Ms Atcharawan Kamsan	Agricultural Technical Officer, Practitioner Level Office of Public Park	Environment Department, BMA

HEALTH AND WELLBING TEAM

HEALTH AND WELLBING TEAM	NAME	POSITION	ORGANIZATION
Team Leader	Mr.Wongwat Liulak	Deputy Director General Health Department	Health Department, BMA
Secretary	Mr.Prapas Luengsirinapa	Director of Environmental Sanitation Office	Health Department, BMA
Assistant Secretary	Mr.Charan Potchanamaturos	Head of Occupational Health Sub-division Environmental Sanitation Division	Health Department, BMA
	Mrs.Napaporn Sripetpun	Environmentalist, Professional Level	Environment Department, BMA
Working Team Members	Assistant Professor Dr.Chokchai Munsawaengsub, M.D.	Deputy Head of Family Health Department	Faculty of Public Health, Mahidol University
	Mr.Sirikait Liengkobkit, D.D.S	Director of Health Risk Control Section	Thai Health Promotion Foundation
	Mr.Sopon Iamsiritavon, M.D.	Director of Thailand MOPH - U.S.CDC Collaboration	Ministry of Public Health
	Mrs.Sarintorn Sontisirikit	Deputy Director General Urban Disease Control Institute	Department of Disease Control, Ministry of Public Health
	Mrs.Ladaval Suan-ngam	Public Health Technical Officer, Senior Professional Level Institute for Urban Disease Control	Department of Disease Control Ministry of Public Health
	Ms Sirithorn Duangsawat	Public Health Technical Officer, Professional Level Health Centre 13	Department of Health Ministry of Public Health
	Mrs.Duangporn Pinjeesekikul	Director of Drug Abuse Prevention and Treatment Office	Health Department, BMA
	Ms Pussadee Phrommayon	Director Health Promotion Division	Health Department, BMA
	Ms Atcharawan Kamsan	Agricultural Technical Officer, Practitioner Level Office of Public Park	Environment Department, BMA

REDUCING IMPACTS OF SHOCKS TEAM

REDUCING IMPACTS OF SHOCKS TEAM	NAME	POSITION	ORGANIZATION
Team Leader	Pol.Lt.Col. Somkiet Nontakaew	Assistant Permanent Secretary for BMA	BMA
Secretary	Pol.Lt.Col.Apichat Wilertpreechatrakool	Director of Technical and Planning Division	Fire and Rescue Department, BMA
Assistant Secretary	Mrs.Waraporn Kor. Chantraphanont	Head of Planning, Technical and Planning Division	Fire and Rescue Department, BMA
	Mr.Siwat Sripetpun	Environmentalist, Professional Level	Environment Department, BMA
Working Team Members	Assoc. Prof. Nakhorn Phuwarodom	Head, Department of Civil Engineering	Department of Civil Engineering, Faculty of Engineer Thammasat University
	Lect. Keerati Sriprami, Ph.D.	Lecturer	Department of Engineering, School of Interdisciplinary Mahidol University (Kanchanaburi Campus)
	Dr.Peeranan Towashiraporn	Director	Asian Disaster Preparedness Center (ADPC)
	Mrs. Soisiri Bunnawat		Department of Disaster Prevention and Mitigation Ministry of the Interior
	Mr.Phakdee Klomkhon	Director of Policy and Planning Division	Traffic and Transportation Department, BMA
	Mr.Kittikan Chomdoung Charuworapulkul	Head of Public Works Planning Planning and Public Utility Coordination Division	Public Works Department, BMA
	Mr.Porntep SaeHaeng, M.D.	Head of Emergency Medical Service	Medical Service Department, BMA
	Ms.Phattanan Phokuanpaiboon	Director of Policy and Planning Division	Department of Social Development, BMA
	Ms.Daratip Onlamul	Policy and Planning Analyst, Professional Level	Strategy and Evaluation Department, BMA

OTHER ORGANIZATIONS INVOLVED IN THE DEVELOPMENT OF THE STRATEGY

BMAS	ORGANIZATIONS (OUTSIDE BMA)	UNIVERSITIES
• Environmental Department • Department of Drainage and Sewerage • Fire and Rescue Department • Health Department • Traffic & Transportation Department • Public Works Department • City Planning Department • Strategy and Evaluation Department • Department of Social Development • Culture Sports and Tourism Department • Finance Department • Medical Service Department	• Transport • Thai Traffic Police, Royal Thai Police • Department of Tourism Ministry of Tourism and Sports • Office of The National Economic and Social Development Board • The Thai Chamber of Commerce • Department of Older Persons, Ministry of Social Development and Human Security • Thai Health Promotion Foundation • Institute for Urban Disease Control, Department of Disease Control, Ministry of Public Health • Health Center 13, Department of Health, Ministry of Public Health • Asian Disaster Preparedness Center (ADPC) • Department of Disaster Prevention and Mitigation Ministry of the Interior • Thailand MOPH - U.S.CDC Collaboration, Ministry of Public Health	• School of Environmental Development Administration, National Institute of Development Administration • School of Applied Statistics, National Institute of Development Administration • Faculty of Public Health, Mahidol University • Department of Civil Engineering, Faculty of Engineer, Thammasat University • Department of Engineering, School of Interdisciplinary, Mahidol University (Kanchanaburi Campus)


VANS