

M40 CITIES

THE MANGROVES 40 CITIES NETWORK AND A MUNICIPAL MANGROVE BOND FUND



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CREATING THE MANGROVES 40 CITIES NETWORK (M40 CITIES)

The world's remaining mangrove stocks are concentrated in 750 regions around the planet's tropical and sub-tropical belt. Of these, just 40 locations account for almost 70% of the mangroves still standing, and which currently store some 3 billion tonnes CO₂e. An agile initiative that coordinates, aggregates and accelerates collective action among these locations could also provide a pathway to finance mangroves on a planetary scale.



River and mangroves behind
Recife City, Pernambuco, Brazil.
Cacio Murilo / Shutterstock

Most of these 40 locations identified contain at least one urban centre where coastal, estuarine or riverine mangrove ecosystems are present.

There are medium-sized and larger cities, including Brisbane (Queensland, Australia), Miami and Jacksonville (Florida, USA), alongside municipalities in Brazil, Indonesia, Malaysia, Papua New Guinea, Myanmar, Bangladesh and Mexico.¹ These cities differ in the size of their economies; their creditworthiness and ability to borrow from capital markets, and technical capabilities needed to tap effectively into climate finance. However, they share common challenges of making urban development more climate resilient; and for all of them mangroves can be a cost-effective asset for urban development and climate adaptation.

Cities are emerging as increasingly important political and economic building blocks for the global economy, cities' networks are an opportunity to share knowledge, accelerate political leadership and collective action, and co-ordinate climate financing opportunities.

Examples include C40 Cities, a group that has grown from 40 to 96 cities around the world, and ICLEI, a global network of more than 1,200 municipalities acting on climate change. These networks have shown the value of co-ordinating mechanisms that can mobilise and support mayors and their administrations to accelerate climate action, and organise global collective action in new ways.^{2 3}

The concept also builds on Earth Security's work in the Philippines, one of the world's most exposed countries to climate change. Funded by Germany's Federal Ministry for the Environment, Conservation and Nuclear Safety (BMUB), Earth Security has developed a programme in collaboration with the Asian Institute of Management (AIM) in Manila. Launched in 2020, the Bridging Leaders' Initiative for Climate Resilience (BLICR), hosted by AIM, brings together 10 mayors from local municipalities that are most vulnerable to climate change and 10 private sector companies, which are seeking to build greater climate resilience in their operations.



Panoramic of Estero Bay with mangrove islands in Bonita Springs, Florida.
SunflowerMomma / Shutterstock

One of the participants in our programme is Alfredo Coro, Municipal Vice Mayor of the Municipality of Del Carmen, in the Siargao Islands in the Philippines. Mr. Coro has been at the forefront of mangrove regeneration projects in their locality. He sees first-hand the value that these green infrastructures bring in terms of climate resilience and the local economy. But also recognises that to be sustainable, municipalities must find new ways to tap into climate finance and private sector green investment.

Through the programme, the group of mayors and companies are discovering each other. They are partnering to develop financing mechanisms to support municipalities to invest in nature-based climate adaptation faster and over the longer-term.

Drawing on these models, we propose the development of M40 Cities: a network of municipalities located along the planet's mangrove belt. The M40 would increase knowledge transfer, activate collective action and support the aggregation of financing opportunities. To begin with, the M40 does not need to be a new institution – it can be created as a programme of an existing structure such as C40s or ICLEI. A process must follow to engage prospective municipalities, identify common areas of interest, based on how they currently approach mangroves in their city masterplans and infrastructure blueprints; establish how these options could be financed in new ways, including through the establishment of a dedicated municipal finance fund, and establish an agile institutional format for the development of the M40 Cities.

We see this programme as an opportunity not just to connect the leadership and opportunities available for mayors, but also to help global decision-makers in climate finance funds to 'visualise' the opportunity to invest in mangrove regeneration on a planetary scale. The network would also allow the aggregation of financing opportunities, for which we propose the establishment of a 'municipal mangrove bond fund'.



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ACCELERATING MUNICIPAL FINANCE FOR CLIMATE ADAPTATION

Coastal cities are in dire need of adaptation finance.

Average flood-related losses suffered by the world's 136 largest coastal cities are expected to rise to USD 52 billion per year by 2050. If risks of sea-level rise and sinking land are taken into account, total losses could be as high as USD 1 trillion.⁴

In the US alone, USD 400 billion will be needed to protect coastal municipalities and cities by 2040.⁵ Municipal-level financing of climate adaptation and resilience projects is however in its nascence. Out of 1,143 climate-related projects in cities identified by the C40 Cities Finance Facility, fewer than 4%, are for climate change adaptation.⁶ Although the gap exists for both developed and emerging economies, the latter struggle even more to access finance for low-carbon and climate resilience projects. Globally, just 2% of green financing goes to cities in emerging markets.⁷

Overall, global financing needs for climate-resilient infrastructure are expected to reach USD 93 trillion by 2030 — 70% of which will be in rapidly developing urban areas.⁸

Mangroves provide coastal municipalities with a cost-effective climate solution.

In China, urban development proposals for Jiangdong New District, Haikou, on the island of Hainan, include plans to restore and protect China's largest mangrove forest, integrating it into city protection and flood management planning.⁹

In the Philippines, the municipality of Del Carmen, Surigao del Norte raised USD 1.3 million from public funds, private sector corporations and ODA to conserve and rehabilitate 5,000 hectares of mangrove forest, reduce illegal and destructive activities in 44,000 hectares of municipal waters, diversify local livelihoods, and improve access to market for local fishers.¹⁰ Interventions in Siargao have reduced mangrove felling by 100% and its restoration efforts have an 80% survival rate. Fish stocks have increased by 200% and, pre-COVID pandemic, poverty fell by 20% through the development of new livelihoods including ecotourism and fishing.¹¹

Municipalities need more capacity to overcome barriers to climate finance.

Despite evidence for the cost-effectiveness of mangrove conservation and restoration in protecting coastal assets, in many municipalities where mangroves are concentrated, budgets cannot cover any additional expenditure, and tax revenues are often insufficient even to meet the costs of providing basic services.

In Abidjan, Cote d'Ivoire — a coastal city highly vulnerable to flooding and sea-level rise — the per capita municipal budget is just USD 0.02, compared to USD 813 in Cape Town, South Africa.¹² The inability to raise external finance is a further constraint. C40 Cities found that half of its member cities in low and middle-income countries, including coastal cities such as Dar es Salaam, Ho Chi Minh City, Jakarta and Mumbai, either find it difficult to borrow or cannot do so without sovereign oversight or approval.¹³ Even where cities in the developing world are permitted to access finance, 96% are unable to do so in international markets because of their low creditworthiness (due to high debt ratios, low capital reserves, limited revenue sources, and restricted revenue-raising powers) or a lack of credit rating, severely constraining their ability to raise the funds for climate-related projects.¹⁴ This is due to poor financial record-keeping and low transparency, high levels of debt and poor revenue collection, and an inadequate credit history.¹⁵

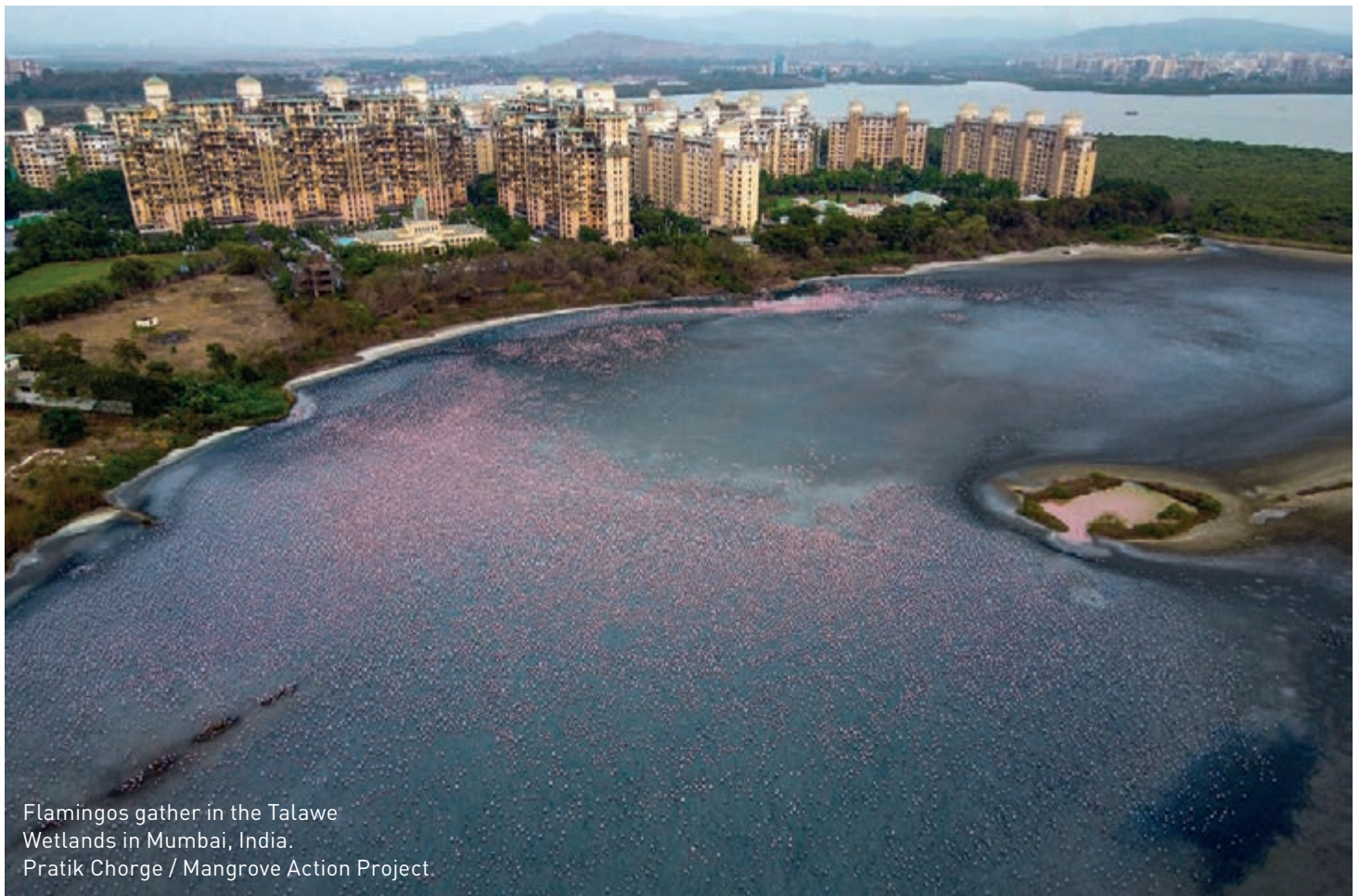
“New pathways to unlock climate finance for municipalities are vital for us to achieve a resilient blue economy locally.”

**Alfredo Coro, Municipal Vice Mayor,
Municipality of Del Carmen, the
Siargao Islands in the Philippines**

“Municipal green bonds” have significant potential to finance climate adaptation.

The municipal bond (muni-bond) market is one of the best recognised segments of global fixed-income markets. The US muni-bond market, valued at USD 3.8 trillion, is the world’s largest and most vibrant market, including both state and municipal issuances. 54% of the country’s largest cities have issued bonds to fund resilience projects, such as seawall construction and restoration and improving stormwater drainage.¹⁶

In less developed markets, the muni-bond climate resilience market is also starting to grow. In India, eight local governments have raised USD 463 million through municipal bond issuance for infrastructure projects and the Ministry of Housing and Urban Development is helping municipalities to improve their credit ratings to help them attract investment.¹⁷ Muni-bonds are seen as a good tool to invest in climate resilient infrastructure, particularly in cities with high credit ratings. Some of these, including Mumbai and Kolkata, are located in or near coastal areas, where mangrove conservation and restoration are key components for climate resilience.¹⁸



Flamingos gather in the Talawe
Wetlands in Mumbai, India.
Pratik Chorge / Mangrove Action Project

Figure 1
The M40 Cities
Municipalities accounting for the
majority of mangroves reserves

Country	Regions	Largest city with mangroves ^A	Blue carbon stock ^A Million tonnes CO ₂ e	Global total ^A %	Primary governmental responsibility for mangroves	Subnational entities allowed to borrow externally ^B
Indonesia	Papua	Jayapura	329	7.77	Central	No
	Irian Jaya Barat	Sorong	237	5.61		
	Kalimantan Timur	Balikpapan	96	2.26		
	Maluku	Kota Ambon	93	2.19		
	Sumatera Selatan	—	82	1.93		
	Riau	Dumai	74	1.75		
	Kalimantan Utara	Tarakan	63	1.50		
	Kalimantan Barat	Singkawang	63	1.49		
	Bangka-Belitung	Pangkal Pinang	32	0.75		
	Sulawesi Tenggara	Kendari	29	0.68		
	Kalimantan Selatan	—	28	0.65		
	Kepulauan Riau	Batam	25	0.60		
Brazil	Maranhão	Sao Luis	155	3.66	Central	Yes
	Pará	Belem	107	2.52		
	Amapá	—	76	1.80		
Malaysia	Sabah	Sandakan	137	3.25	Central	Yes
	Sarawak	Kuching	74	1.74		
Papua New Guinea	Gulf	Kerema	122	2.89	Central	—
	Central	Port Moresby	27	0.65		
	Western	Daru	26	0.60		
Myanmar	Tanintharyi	Myeik	88	2.07	Central	Yes
Australia	Queensland	Brisbane	81	1.91	Subnational	Yes
	Northern Territory	Darwin	54	1.27		

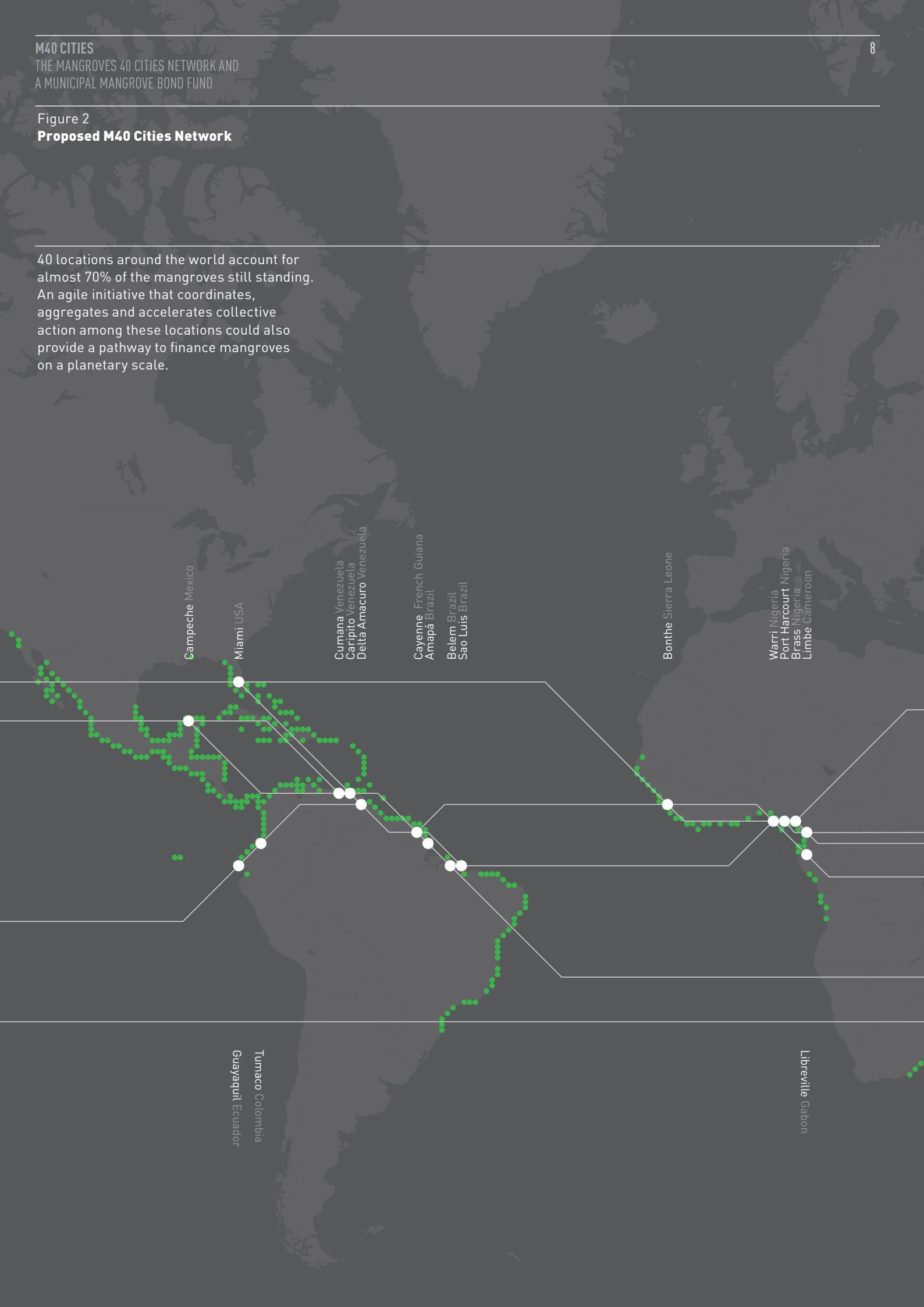
^A 'Global carbon stocks and potential emissions due to mangrove deforestation from 2000 to 2012', Stuart Hamilton and Daniel Friess, Nature Climate Change (8), 2018.

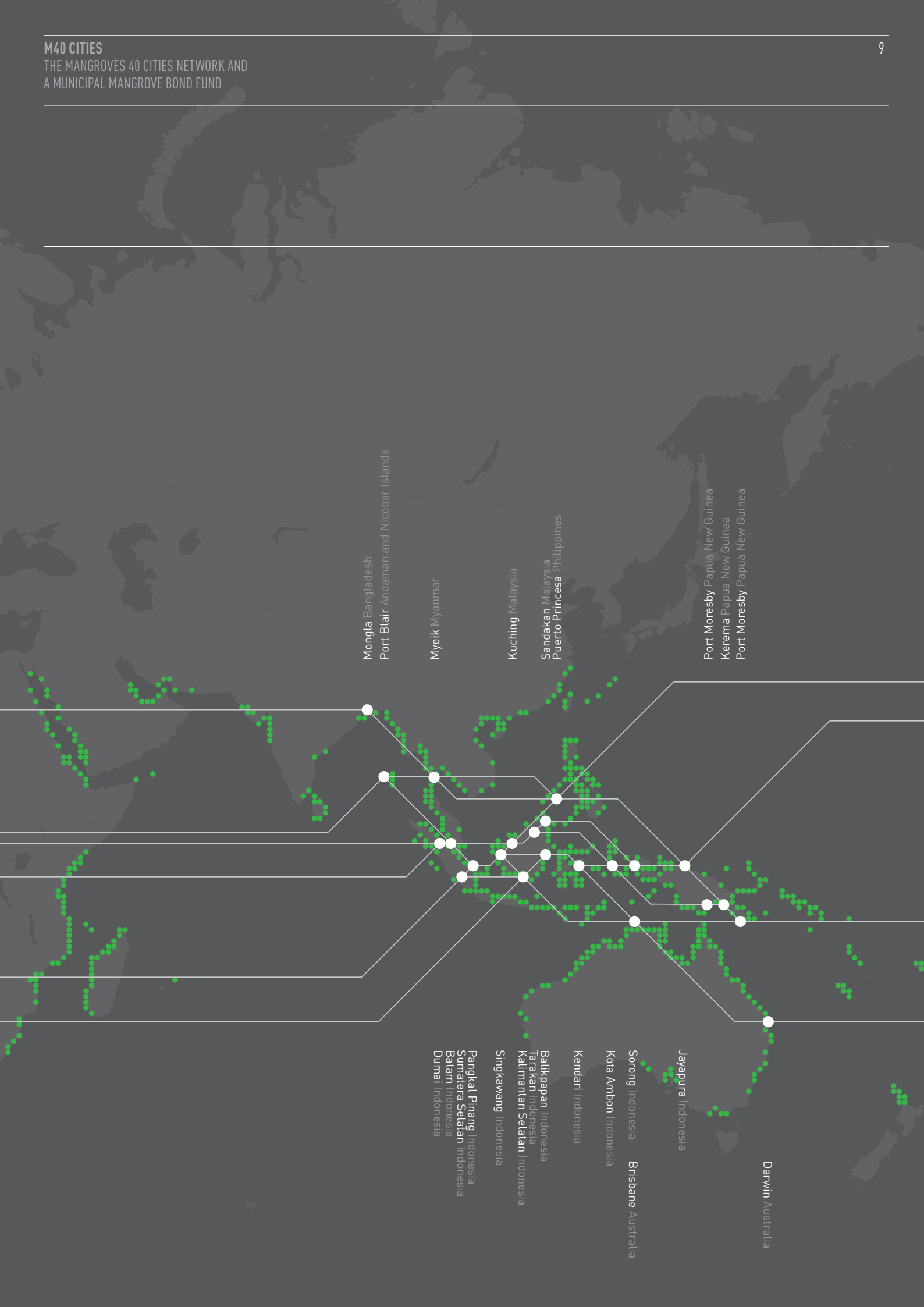
^B '2019 Report Key Findings', World Observatory on Subnational Government Finance and Investment (SNG-WOFI), Organization for Economic Cooperation and Development (OECD), 2019.

Country	Regions	Largest city with mangroves ^A	Blue carbon stock ^A Million tonnes CO ₂ e	Global total ^A %	Primary governmental responsibility for mangroves	Subnational entities allowed to borrow externally ^B
United States	Florida	Miami	74	1.75	Subnational	Yes
Bangladesh	Khulna	Mongla	66	1.56	Central	Yes
Mexico	Campeche	Campeche	56	1.31	Mixed	No
Nigeria	Bayelsa	Brass	52	1.23	Subnational	Yes
	Delta	Warri	41	0.96		
	Rivers	Port Harcourt	26	0.61		
Venezuela	Delta Amacuro	—	50	1.18	Central	No
	Monagas	Caripito	30	0.72		
	Sucre	Cumana	24	0.57		
Gabon	Estuaire	Libreville	44	1.05	Central	Yes
Ecuador	Guayas	Guayaquil	40	0.95	Central	—
Colombia	Nariño	Tumaco	37	0.88	Subnational	Yes
Cameroon	Sud-Ouest	Limbe	33	0.77	Central	No
French Guiana	Cayenne	Cayenne	32	0.76	Subnational	Yes
India	Andaman & Nicobar	Port Blair	26	0.61	Subnational	Yes
Philippines	Palawan	Puerto Princesa	24	0.57	Central	Yes
Sierra Leone	Southern	Bonthe	24	0.56	Central	Yes

Figure 2
Proposed M40 Cities Network

40 locations around the world account for almost 70% of the mangroves still standing. An agile initiative that coordinates, aggregates and accelerates collective action among these locations could also provide a pathway to finance mangroves on a planetary scale.





3

THE BUSINESS CASE FOR A MUNICIPAL MANGROVE BOND FUND

Based on the above, we propose the development of a municipal mangrove bond fund. This would provide a mechanism for municipalities to access finance for climate adaptation projects that use mangrove regeneration to provide green infrastructure and blue carbon offsets. A fund that aggregates financing of many municipal locations would allow investors to spread investment risk across developed and emerging markets, while reaching the global scale needed for a product to be viable in global fixed income markets. The business case for such a fund is as follows:

Municipal bonds have already been used to finance mangrove restoration.

The US muni-bond market finances two-thirds of all infrastructure improvements in the country.¹⁹ Some coastal municipalities are experimenting with issuing bonds to fund climate resilience. In 2017, residents of the city of Miami approved the city’s plan to issue the USD 400 million Miami Forever Bond. USD 192 million will be used to fund projects to combat sea-level rise and flooding, including mangrove protection and restoration.²⁰

The city’s Downtown Development Authority (DDA) proposes planting mangroves as part of a plan to restore the city’s seawall that will be funded through the bond.²¹ The state of Louisiana is reported to be considering issuing an environmental impact bond to fund its Coastal Master Plan, that comprises USD 50 billion in wetland and coastal restoration and protection projects over the next 50 years.²²

Municipal bond issuances need the support of local residents, particularly if taxes or rates will be increased to help finance the bond. In Miami voters were asked for their support to either repurpose an existing bond that was about to expire or to introduce a new 3% property tax to pay for the bond.²³

Widespread citizen and stakeholder support also helped to attract additional finance from other public and private sources, and to ensure continued multi-stakeholder involvement in activities funded by the bond.²⁴ For blue carbon projects, local buy-in with individual or communal owners of blue carbon ecosystems is critical.

Funds that aggregate municipal climate finance can create economies of scale

The proposal for a Municipal Mangrove Bond fund follows the example of the Nordic Investment Bank for the Baltic Blue Bond and Kommuninvest in Sweden. These bodies aggregate projects across multiple municipalities or countries into one bond issuance or fund to raise finance that is then lent to cities and regions.

These aggregated projects can scale to an issuance size and length that is attractive to the fixed income market, namely USD 200 million — USD 500 million for a 10-year bond. Developing a loan-aggregating mechanism can help to increase funding opportunities for smaller municipalities that lack credit ratings or track record.

By aggregating single green loans into one fund, Kommuninvest allows smaller municipalities to access green financing opportunities at a lower cost that would otherwise be out of reach.²⁵ The USD 220 million Nordic–Baltic Blue Bond issued by the Nordic Investment Bank directed proceeds to eight countries, Denmark, Estonia, Finland, Iceland, Latvia, Lithuania, Norway and Sweden, in order to finance projects that would reduce pollution of the Baltic Sea.²⁶

The United Nations Capital Development Fund (UNCDF) has developed the International Municipal Investment Fund (IMIF), which is due to launch in 2021. The fund aims to support resilient urban infrastructure, especially in Least Developed Countries (LDCs), mobilising finance from national and international capital markets to fund projects of up to USD 25 million.

The UNCDF fund’s manager, Meridiam, and the Rockefeller Foundation, will develop a screening mechanism to help prospective investors evaluate the climate resilience impact of investable projects.^{27 28}

Municipal-led projects must ensure rigorous transparency and accounting standards so that funds go to the projects for which they have been earmarked. Clear and well-defined eligibility criteria are important to assure investors that their projects can deliver impact and are both technically and financially viable.²⁹ In the case of mangrove restoration, which has a range of risks and challenges, we recommend that a technical working group such as the IUCN Specialist Group on Mangroves is involved to provide quality assurance on the development of a screening mechanism and eligibility criteria.

Capacity building and risk finance can support a municipal pipeline of investable projects

For less developed municipalities, UNCDF’s IMIF combines a fund with a municipal capacity building programme. Such a combined approach is vital to build a pipeline of projects for mangrove restoration in developing countries. The proceeds from the issuance of a mangrove bond would be earmarked by municipalities to finance projects aimed at mangrove restoration and regeneration, including wastewater treatment plants that reduce mangrove pollution, sustainable fishing and aquaculture projects that use mangroves as a part of a sustainable production model, and the rehabilitation and re-planting of mangroves for blue carbon sequestration and commercialising offset credits in carbon markets.

The varying levels of technical capacity to access climate finance and implement such projects, means that providing technical assistance alongside finance is essential. Technical support would help municipalities to develop bankable blue carbon projects based on scientific best-practice, identify and secure agreements with blue carbon stakeholders, and monitor project outcomes. Capacity building is needed to raise and manage external finance through financial management controls and governance.

UNCDF’s Local Climate Adaptive Living Facility (LoCAL), which provides performance-based climate resilience grants, capacity building and operational support to local governments in LDCs to finance climate adaptation projects could help to build capacity. The facility is currently working with 280 local governments in 23 countries and has helped fund nearly 1,000 climate adaptation investments, mobilising a total of USD 84.3 million since 2014. In Ghana and Bangladesh, this has included support for mangrove projects.³⁰

In addition, blended finance can help de-risk investments in less developed municipalities. This may include risk guarantees or first-loss financing tranches from a development bank to improve a bond’s credit rating and lower the costs of capital for recipients. Other forms of risk financing have been successfully implemented in the blue finance space, including political risk insurance, as provided by the US Development Finance Corporation to support the issuance of the Republic of the Seychelles’ sovereign blue bond.³¹

In East Kenya, BHP Billiton provided insurance as an intermediary ‘off-taker’ for carbon credits in a USD 152 million forest protection bond issued by the IFC for a REDD+ project that paid interest payments in the form of cash or carbon credits. Although not for blue carbon, BHP Billiton committed to buy carbon credits in the case that bondholders decided to be paid in cash, demonstrating a strategic and catalytic use of donor or philanthropic capital.³²

Multiple cash-flows can be used to repay mangrove bonds

A total of 22 cities, including coastal cities such as Melbourne and Rio de Janeiro, have made net-zero commitments as part of their membership of the Carbon Neutral Cities Alliance, committing to reduce greenhouse gas emissions by 80–100% by 2050. Some cities are experimenting with blue carbon financing as a way to diversify their revenue streams and help to meet the financial cost of their environmental commitments.

For example, in 2016 Yokohama City in Japan introduced the Yokohama Blue Carbon Offset scheme to secure payments from local companies and tourists for blue carbon offsets from its urban coastline.³³ The Australian state of Victoria has an emissions reduction target of net zero by 2050, and is exploring the role of blue carbon in achieving this.³⁴ For wealthier cities, property taxes can also provide a cash flow for financing protective infrastructure, such as sea walls. Where infrastructure investment leads to lower insurance premiums, municipalities can also cost the difference into municipal property taxes. The tax income received from tourism such as hotels, visiting fees to protected areas, and other tourist facilities benefiting from the value of mangroves, can also provide cash flow to finance a bond.

Blue carbon projects for the voluntary or compliance markets can run for an initial four years before income can be realised. High upfront costs for project design, baseline studies, planting and management, and certification, mean that patient money is vital to their success. The Blue Natural Capital Financing Facility (BNCFF) has proposed a way around this by creating a 'blue carbon matching grant'. Provided by philanthropists or multilateral finance from the Green Climate Fund, these grants can help municipalities to cover the first few years of coupon repayments for a mangrove bond, until carbon and other forms of income can be realised.

National governments can borrow at a sovereign level on behalf of municipalities

To use municipal bonds for climate finance, municipalities must be able to borrow directly from capital markets, without the intermediation of central governments. This is not the case for Indonesian municipalities — a key country for the M40 proposal given its concentration of mangrove stocks. However, nationally, the Republic of Indonesia has been at the forefront of the sovereign green bond movement.

First issued in March 2018, a USD 1.25 billion 'green sukuk' made Indonesia the fifth nation globally to place a green sovereign issue and the first to use the sukuk format. A sukuk is an interest-free bond that generates returns to investors without infringing the principles of Islamic law (Shariah). According to the Climate Bonds Initiative, the green sukuk could channel the USD 2 trillion Islamic finance market towards green finance. Indonesia's green bond issuance reached USD 2.7 billion as of April 2019, making it the largest borrower among ASEAN countries, accounting for 39% of total ASEAN issuance.³⁵

A municipal mangrove bond proposal should allow Indonesia to approach this as a sovereign green bond that earmarks the proceeds for mangrove restoration in key municipalities in the global M40 network.

CASE STUDY

INNOVATIVE CITY FINANCING FOR CLIMATE RESILIENCE

The Miami Forever Bond

Miami is one of the most exposed cities to climate change globally. The city of over 2 million people has already experienced almost six inches of sea-level rise and a 350% increase in flooding since the mid-90s.³⁶ The benefits of Florida mangroves during Hurricane Irma were estimated to be up to USD 47,000/ha.³⁷

The Miami Downtown Development Authority estimated that integrating a mangrove 'living shoreline' with a cement sea wall would increase net present value by USD 116 million and reduce the costs of a 10-year storm by USD 148 million, compared to a cement sea wall investment only.³⁸ The USD 400 million Miami Forever Bond is set to direct USD 192 million of proceeds to green-grey infrastructure, including sea-walls and replanting mangroves, in order to mitigate the impacts of sea-level rise and flooding, in a first for municipal bonds.³⁹

The Yokohama Blue Carbon Offsets

Yokohama, the second largest city in Japan and home to one of the largest international ports, lies on the south-eastern coast of Japan's main island, and has faced an increasing number and severity of typhoons and flooding.⁴⁰ In 2011, the city initiated the Yokohama Blue Carbon Project to estimate the carbon sequestered in its urban coastline and quantify the economic value generated by its coastal ecosystem, primarily seaweed forests.

In 2016, the city introduced the Yokohama Blue Carbon Offset scheme to secure payments from local companies and tourists for blue carbon offsets from its urban coastline.⁴¹ The project is now quantifying the risk reduction benefits of mangroves and other coastal ecosystems and is implementing projects to improve coastal management and boost local production and consumption of seaweed.⁴²



Mangroves of the Godavari River Delta in East Godavari District, Andhra Pradesh, India. Srikanth Manneperi / Mangrove Action Project

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Cover Photography

Panoramic view of Ras al Khaimah over mangrove forest in the United Arab Emirates.
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REFERENCES

- 1 'Global carbon stocks and potential emissions due to mangrove deforestation from 2000 to 2012', Hamilton, S.E. and Friess, D.A., Nature Climate Change, 2018.
- 2 C40 Cities'. Available at: <https://www.c40.org/> [accessed 10 November 2020].
- 3 'ICLEI Local Governments for Sustainability'. Available at: <https://www.iclei.org/> [accessed 11 November 2020].
- 4 'Which Coastal Cities are at Highest Risk of Damaging Floods? New Study Crunches the Numbers', World Bank Group, 2013.
- 5 'Who Will Pay for the Huge Costs of Holding Back Rising Seas?', Morrison, J., Yale Environment 360, 2019.
- 6 'The demand for financing climate projects in cities: An analysis of projects from the C40 Cities Finance Facility's application phase and from CDP disclosure', C40 Cities Finance Facility, 2018.
- 7 'Global Review of Finance For Sustainable Urban Infrastructure', New Climate Economy Coalition for Urban Transitions, 2018.
- 8 'The State of City Climate Finance 2015', Cities Climate Finance Leadership Alliance, 2015.
- 9 'Haikou East & Dongzhai Port Mangrove Reserve', Hassell Studio. Available at: <https://hassellstudio.com/project/dongzhai-port-mangrove-reserve#0> [accessed 10 November 2020].
- 10 'Quality Public Service through Collaborative Governance in the Philippines: Focus on Selected 2018 Galing Pook Awardees', Villamejor-Mendoza, M.F., 2019.
- 11 Documents provided by the Municipality of Del Carmen, Surigao del Norte, Philippines.
- 12 'Developing Prosperous and Inclusive Cities in Africa - National Urban Policies to the Rescue?', New Climate Economy Coalition for Urban Transitions, 2018.
- 13 'Financing the sustainable urban future: Scoping a green cities development bank', Overseas Development Institute (ODI), 2019.
- 14 'Global Review of Finance For Sustainable Urban Infrastructure', New Climate Economy Coalition for Urban Transitions, 2018.
- 15 'Planning and Financing Low-Carbon, Livable Cities', World Bank Group, 2013.
- 16 'More than half of the U.S.'s largest cities are issuing bonds to protect against climate change', Oh, S., MarketWatch, 2019.
- 17 'Here's govt plans to push up municipal bonds', Das, S., The Economic Times, 2019.
- 18 'Green Municipal Bonds in India: Potential, Barriers and Advantages', GIZ, 2017.
- 19 'The storm still comes: Invest now, while we still can', Baughman McLeod, K., New Atlanticist, 2020.
- 20 'Miami Forever Bond', City of Miami. Available at: <https://www.miamigov.com/Government/Departments-Organizations/Office-of-Capital-Improvements/Miami-Forever-Bond> [accessed 10 November 2020].
- 21 'Playbook 1.0: How Cities are Paying for Climate Resilience', Plastrik, P., Coffee, J. and Cleveland, J., Innovation Network for Communities, 2019.
- 22 'Louisiana considers an environmental impact bond to fund coastal restoration', Ramakrishnan, K., Urban Institute, 2018.
- 23 'Miami Forever Bond - City of Miami, Florida', Adaptation Clearinghouse, 2017.
- 24 'Land Use Planning to Reduce Wildfire Risk: Lessons from Five Western Cities', Headwaters Economics, 2016.
- 25 'Kommuninvest Green Bonds Impact Report, December 2018', Kommuninvest, 2019.
- 26 'Blue Bonds: Financing Resilience of Coastal Ecosystems', Roth, N., Thiele, T. and von Unger, M., 2019.
- 27 'International Municipal Investment Fund - Technical Assistance Facility', United Nations Capital Development Fund (UNCDF), 2020.
- 28 'Meridiam, Rockefeller Foundation to launch resilience fund - exclusive', Gournis, K., Infrastructure Investor, 2019.
- 29 'Kommuninvest Green Bonds Impact Report, December 2018', Kommuninvest, 2019.
- 30 'LoCAL annual report 2019: Accelerating local climate action', Local Climate Adaptive Living Facility, 2020.
- 31 'Seychelles: Introducing the World's First Sovereign Blue Bond - Mobilizing Private Sector Investment to Support the Ocean Economy', World Bank Group, 2019.
- 32 'IFC Forests Bond Annual Report to Bond Investors: Kasigau Corridor REDD Project, Kenya', International Finance Corporation (IFC), 2019.
- 33 'Blue carbon and Coastal Ecosystem-based Disaster-Environmental Risk Management', Jun, I., Yachiyo Engineering Co, 2015.
- 34 'Victoria's Climate Change Framework', State of Victoria, 2016.
- 35 'Unlocking green bonds in Indonesia: a guide for issuers, regulators and investors', Climate Bonds Initiative, 2019.
- 36 'Sea level rise is combining with other factors to regularly flood Miami', Cappucci, M., The Washington Post, 2019.
- 37 'Reducing Caribbean Risk: Opportunities for Cost-Effective Mangrove Restoration and Insurance', The Nature Conservancy, 2020.
- 38 'Valuing Sea-Wall Designs in Miami, FL', Autocase.
- 39 'Miami Forever Bond', City of Miami. Available at: <https://www.miamigov.com/Government/Departments-Organizations/Office-of-Capital-Improvements/Miami-Forever-Bond> [accessed 10 November 2020].
- 40 'Case studies: Yokohama', Carbon Disclosure Project (CDP). Available at: <https://www.cdp.net/en/articles/cities/yokohama> [accessed 10 November 2020].
- 41 'Blue carbon and Coastal Ecosystem-based Disaster-Environmental Risk Management', Jun, I., Yachiyo Engineering Co, 2015.
- 42 'Towards carbon neutral city using blue carbon: A case study of Yokohama city', Matsuda, H., Moki, H., Yonekura, Y., Inoue, T., Mochida, Y., Furukawa, K., Furuta, N., Mizui, R. and Kuwae, T., 2018.

