Women farmers from Cagayan province affected by typhoon Mangkhut clearing weeds as part of a cash-for-work initiative by Oxfam (Photo: Denvie Balidoy/Oxfam)

POTENTIALS FOR CHINA-PHILIPPINE COOPERATION ON CLIMATE ACTION

Unabated, climate disruptions continue to manifest through extreme weather events such as super typhoons, prolonged drought conditions, and abnormal precipitation patterns, as well as sea level rise and ecosystem disturbances, directly impacting human and non-human lives, communities, and ecosystems. China and the Philippines are not spared of these ongoing changes. The vulnerabilities to climate impacts of their communities, both coastal and inland, are projected to be among the most severe.

INTRODUCTION

Unabated, climate disruptions continue to manifest through extreme weather events such as super typhoons, prolonged drought conditions, and abnormal precipitation patterns, as well as sea level rise and ecosystem disturbances, directly impacting human and non-human lives, communities, and ecosystems. China and the Philippines are not spared of these ongoing changes. In fact, the vulnerabilities to climate impacts of their many communities, both coastal and inland, are projected to be among the most severe.

China is acutely vulnerable to climate change. In China's Third National Assessment Report on Climate Change, released in 2015, significant threats were identified in terms of extreme weather events, glacier melt, and sea level rise. Already, China had increased its average temperature from 0.9 ºC to 1.5 ºC from 1909 to 2011 and predicts another 1.3 ºC to 5.0 ºC warming by 2100, way above the global average of 3.7 ºC warming. Glaciers and permafrost are also retreating by 10.1 and 18.6 percent raising potential geopolitical risks in terms of dispute escalation over transboundary water resources and smaller river flows with China's downstream South Asian neighbors. Sea levels had also risen in China's eastern coasts by 2.9 mm per year from 1980 to 2012. As sea level continues to rise further in the projected range of 40 and 60 cm higher in 2100, more than 55 million people living in the Pearl River Delta region, which are also among the world's most densely populated regions, will be affected. An increase of one centimeter alone could cause the coastline to recede by more than 10 meters, significantly increasing risks of flooding and storm damage. Significant redistribution of precipitation in China's regions are also projected: with arid and semi-arid West China seeing increased precipitation while parts of northern, northwestern and southern China experiencing decrease in rain and snowfall. With intense precipitation, river flooding impacts not only China but also the world since many in the global supply chains rely on goods shipped via the Pearl River Delta region. While climate change can bring positive effects as increased heat benefits northern China's agriculture through extended growing seasons for some crops, prolonged droughts, however, would affect soil capacity to retain water, spread dangerous pests, strain reservoirs, and create dam safety challenges.

The Philippines is ranked third among the world's most vulnerable to climate change. Over the past 65 years, that is between 1951 and 2015, the observed temperature in the Philippines is warming at an average rate of 0.1°C per decade. By 2050, average mean temperature could increase by as much as 2.3°C for a high emission scenario. By 2100, average mean temperature could increase by as much as 4.1°C for a high emission scenario. Projections further suggest a range of +/-40 percent change in rainfall. Wettest possible change exceeding 40 percent increase in rainfall can be expected over Luzon, western Visayas and some parts of Mindanao, while the driest possible rainfall change could reach beyond 40 percent reduction in many areas, particularly over Mindanao. Severe droughts associated with weather patterns, such as the El Nino phenomenon, may increase, which have implications for agricultural production such as reduction in crop yield and greater incidence of pests. South-central Mindanao is particularly vulnerable. The Philippines does not only have high exposure to natural hazards such as typhoons, landslides, floods, and droughts but also strong dependence on climate-

sensitive natural resources, including its vast coastlines where major cities and a big proportion of the population reside. Geographically, the Philippines is located in the world's most cyclone-prone region, where on average twenty cyclones pass every year, of which between seven and nine make landfall. As with China's eastern coast, Philippine coastal areas are also impacted by sea level rise, increasing the hazard posed by flood surges and threatening permanent inundation of low-lying areas. The Philippine agriculture sector is particularly vulnerable. As temperatures increase, alongside periods of heavy rainfall and extended drought, both agricultural crops and fish production are easily affected. Increased number and strength of typhoons can inflict further damage on crop stocks. Rising sea levels and flood surges could quickly contaminate freshwater ponds, lead to saltwater intrusion, inundate infrastructure, and affect aquaculture.

COMMITMENT TO CLIMATE ACTION

China and the Philippines are both signatory to the United Nations Framework Convention on Climate Change and are committed to climate action. Targets for reducing emissions and strategies for adaptation and resiliency in both countries are already present—and are made known in international agreements, in their Nationally Determined Contributions (NDC) to the *Paris Agreement* on climate change. Both countries are also committed to *Agenda 2030* or the *Sustainable Development Goals* for people, planet, and prosperity for all. Some of the institutions and legal arrangements to achieve these ambitions are also set out. They are far from perfect but these frameworks have provided strong impetus for both domestic and international climate action commitments.

China's NDC goals include: peaking carbon dioxide emissions by 2030 at the latest; increasing the share of non-fossil energy sources in the total primary energy supply to around 20 percent by 2030; lowering the carbon intensity of gross domestic product by 60 to 65 percent below 2005 levels by 2030; and increasing the forest stock volume by around 4.5 billion cubic meters, compared to 2005 levels. China continues to implement significant multi-sectoral climate action policies, especially in the energy sector. These climate actions include an emissions trading system, which is expected to start in 2019, mandatory renewable energy certificate schemes that sets renewable energy targets for each province, and restrictions in coal consumption. Energy transition has been rapidly progressing in China, in accordance with state plans. In its *13th Five Year Plan 2016-2020*, China had set targets for non-fossil capacity installed by 2020, which include 340 gigawatt hydropower capacity; 200 gigawatt wind power; 15 gigawatt from biomass; 120 gigawatt of solar power; and 58 gigawatt of nuclear capacity.

China leads the world in manufacturing, innovation, and deployment of renewable energy technologies. China has seven of the world's top 10 solar panel companies in 2018, and three of the top 10 wind turbine companies in 2018. It has plans to more than double its wind energy capacity, nearly treble its solar capacity, and increase electric vehicle production by a factor of 10. China's State Grid also aims to establish a Global Energy Interconnection that seeks to serve as a platform for

extensive development, deployment and utilization of renewable energy globally via interconnected smart grids using ultra high voltage technology.

In the Philippines, climate action is set out in its 2009 *Climate Change Act,* which mandates the State to cooperate with the international community to act on climate change issues, including disaster risk reduction. The law also created the *Climate Change Commission*, an agency attached to the Office of the President, to coordinate, monitor and evaluate programs and action plans on climate change with support from an *Advisory Board* and a *National Panel of Technical Experts*. Complementary environmental and energy laws were also enacted, including the *Clean Air Act*, the *Electric Power Industry Reform Act (EPIRA)*, and *Renewable Energy Act*. However, many provisions of these laws have yet to be implemented. In the Philippines' NDC, the country "intends to undertake greenhouse gas emissions reduction of about 70 percent by 2030 relative to its business-as-usual scenario of 2000-2030. Reduction of carbon dioxide-equivalent emissions will come from energy, transport, waste, forestry and industry sectors. The mitigation contribution is conditioned on the extent of financial resources, including technology development and transfer, and capacity building, that will be made available to the Philippines.

While the Philippine NDC is generally silent with regards to the country' renewable energy targets, other public documents show plans on tripling renewable energy capacity in the Philippines by up to 15 gigawatts by 2030 and increasing the share of electricity production from renewables up to 40 percent. The country has also set energy efficiency targets through an *Energy Efficiency and Conservation Roadmap*, which mandate energy savings equivalent to ten per cent across energy demand sectors by 2040. The Philippines is also expanding its energy efficiency program, following the release of the *Energy Efficiency and Conservation Action Plan 2016-2020* aimed at reducing energy intensity by 40 percent by 2030 from its 2005 level. A key component of this plan is energy labelling and efficiency standards for air conditioners and refrigerators. The next NDC submission must reflect these quantified targets for readers to better appreciate policy and program support the Philippine government is doing on climate action. Beyond mitigation, the Philippines has also instituted its climate adaptation plans through legislation. The 2012 *People's Survival Fund* supports local governments with climate adaptation.

Cooperation for climate action between China and the Philippines comes at a time when South-South Cooperation has become more and more compelling to maximize opportunities for bilateral and multilateral climate action. In November 2017, United Nations principals adopted the *South-South Cooperation Action Plan* as a substantive pillar to support the implementation of the *UN Secretary-General's Climate Change Engagement Strategy*. China has emerged as one of the leaders in South-South cooperation and partnerships in advancing climate action. China does this through its key institutions such as the *National Development and Reform Commission* and the *National Center for Climate Change Strategy and International Cooperation*. A new agency to be tasked solely with international cooperation has also been announced in 2018 and will most likely take the lead in the Chinese international cooperation programs in the years to come. China's support is made through clear resource commitments, global engagements, know-how, and a strategic vision.

China's *13th Five Year Plan 2016-2020* is geared towards its aspirational goals to curb climate change impacts as it provides a clear statement of intent to dominate clean technology markets both domestically and abroad. The Plan accelerates China's move into the low carbon economy and continues the previous Plan, which aims to create a strong foundation for China's green, robust and resilient economy over the next two decades. *The 13th Five Year Plan* also aims to lift 70 million people out of poverty, double China's GDP growth compared to 2010 to RMB 90 trillion (with annual average growth rate of between 6.5 and 7 percent), and increase China's urbanization rate to 60 percent. The *13th Five Year Plan* prioritizes structural reform of the Chinese economy and expands the role of the market. Clean technology and high-tech manufacturing and services will complement traditional manufacturing as the new economic driver. More importantly, the *13th Five Year Plan* states that the principle of "ecological civilization," which emphasizes sustainable development, will guide China's growth and the implementation of development plans going forward. The *13th Five Year Plan* also seeks to accelerate the government's strategy of using China's vast internal market to create domestic demand and champions, as well as reduce the cost of green technologies and services.

Prospects for a bilateral cooperation between China and the Philippines can be developed to shape future global multilateral negotiations on climate action, especially in terms of ramping up NDCs and climate finance. If both countries can demonstrate that they stand ready to cooperate on several climate action cooperation programs—including China assisting the Philippines in improving its NDC targets—perhaps developed countries can see it as signal for more directed, measurable and verifiable climate action that they are willing to finance. Under the Paris Agreement, countries will be submitting their revised NDCs in 2020, with a view to introducing greater ambition. The Philippines would benefit from updating their NDCs with sufficient granularity to provide clear signals to investors to enable a comprehensive assessment of investment needs. Both countries are, of course, in need of different technologies and capacity development support since both have varied potentials and current approaches.

China carries out its *13th Five Year Plan* hand in hand with its aggressive "going out" strategy for its companies to capture the potentially large overseas market, especially in developing countries, through programs such as the *Belt and Road Initiative* (BRI). Launched in 2013, the BRI, which promotes connectivity, has received endorsement from a stream of countries in the global South. The BRI, which now includes over 100 countries, makes enticing promises of finance to bridge long standing infrastructure gaps in host countries. China finances these development projects mostly through the *China Development Bank* and the *Export Import Bank of China*, which are still trying to establish their track record and credibility on transparency and sustainable energy projects. China also plays and influential role into two (2) multilateral banks, which are also tasked with supplying finance for overseas infrastructure: the *Asian Infrastructure Investment Bank* and the *New Development Bank* or the Brazil-Russia-India-China-South Africa (BRICS) Bank, albeit on a much smaller scale. In 2018, as part of the BRI, China made a number of significant commitments, including an additional USD 60 billion to Africa and over USD 20 billion to west Asia, in addition to several bilateral commitments.

The Philippines has already formalized its intention to participate in the BRI through an agreement entitled "Memorandum of Understanding Between the Government of the Republic of the Philippines and the Government of the People's Republic of China on Cooperation on the Belt and Road Initiative" signed in November 2018. Through this agreement, both countries agree to hold dialogues on key macroeconomic policies and development strategies, working side by side on infrastructure, transport, telecommunications, energy, and other areas of mutual interest. Clearly, the Philippines can make use of the BRI to advance its climate action agenda, since it covers the energy sector—which is vital in ensuring the reduction of its emissions. However, whether the Philippines stands ready to cooperate with China to ensure that its participation in the BRI will lead to some climate action dividends, not just infrastructure, is still an evolving question.

Cooperation for climate action between China and the Philippines could be envisaged in both technological/hardware and non-technological/software partnerships. For climate action to be effective, deployments of technologies—including infrastructure, on one hand, are necessary for transitioning energy systems to renewables, closing energy access gaps, greening infrastructure, adapting natural-based solutions, initiating ecosystems-based approaches for adaptation in agriculture, land-use, forestry and fisheries sectors, increasing resiliency, and maximizing opportunities for sustainable urbanization and sustainable mobility. Shifts in institutional arrangements, policy and human behavior—alongside capacity development, on the other hand, is also equally important. These aspects include reengineering institutions, including energy markets and policy, encouraging stronger public engagement, preparing and mobilizing a new generation of skilled workers and experts, and mainstreaming gender approaches. Various opportunities can be envisaged in co-designing, co-developing, and co-implementing a more robust and reciprocal China-Philippines relationship in the areas of low-carbon cooperation in the design and development of climate action technologies, access to infrastructure that are climate-responsive, green investment and services, and capacity development that regards gender equity as central.

1. COOPERATION ON ENERGY TRANSITION

Chinese leadership on energy transition is remarkable. It is home to top solar and wind companies in the world. With strong state investment, coupled by robust public support, China has been transitioning its energy systems faster than any other countries. Yet, its rapid urbanization and industrialization, which require meeting an increasing energy demand, had also resulted into choices that locked in the country in coal assets—a fair warning to the Philippines, if it continues to support coal-based development and ignore market signals favoring the transition. Although geography did not assist China well in its transition because renewable energy rich regions in the west are far from demand centers in the east, extensive state support to bring that renewable energy assets eastward through high voltage transmission systems will see to it that China will be largely powered by renewables in a not-so-distant future.

The Philippine potential to transition its energy systems is also high—and makes the case for China-Philippine cooperation on energy transition. While renewable energy generation already constitutes the majority of power sector capacity additions globally since 2012, the Philippine renewable energy sector needs to catch up in its energy transition if it is to contribute meaningfully to climate action. Fossil fuels supplied about 71 percent of total final energy consumption in the country in 2014—only 29 percent was derived from renewable energy. In electric generation, renewable energy represented 26 percent of all power generation that year, representing a decrease from 45 percent in 1990. Hydroelectric power plants provide 12 percent of this overall generation. In 2015, wind energy has only provided 216 megawatts of installed power capacity; solar energy contributed 122 megawatts; and geothermal energy provided 1,870 megawatts. Compared to the Philippine potential, these additions remain minimal. In particular, biomass for power, hydropower, geothermal, solar PV, and onshore wind technologies can all now provide electricity that is competitively priced compared to fossil fuel-fired electricity generation.

By and large, the archipelagic geography of the country has, thus far, posed a key transmission challenge; but this natural condition can also be the country's most important asset in ensuring that it meets its climate action commitments. With renewables being distributed—meaning it can be generated almost everywhere—the prospect for turning every island in the Philippines into micro-grid systems is very appealing. The fast-declining cost of technologies needed to achieve this, particularly solar and wind, as well as storage systems, supports that aspiration.

The business case for renewable energy transition in the Philippines has been driven largely by falling renewable energy technology costs globally. Mature renewable energy technologies, including hydropower and geothermal, which are both of high potential in the Philippines, have already been cost-competitive for years where they operate. Solar and wind have also gained a competitive edge as a result of technological advances and increased investment. Solar and wind have even beaten conventional generation technologies on cost in many of the world's top markets, even without subsidies. Beginning in 2017, solar and wind have already become competitive with coal-based generation worldwide.

For China-Philippine cooperation on energy transition to be effective, an understanding of the Philippine energy sector and its political economy is imperative. Unlike China's, the Philippine electricity generation and distribution systems are privatized. With a private sector-led, decentralized, market-oriented power system, the country's capacity and generation mix results from procurement decisions of distribution utilities, which, in turn, are based on private financial costs and profit targets. The Department of Energy's plans, therefore, are akin to declarations of intention, not state mandates. Nonetheless, the Philippine Government still possess some levers for nudging investments in major energy projects since these still need their approval.

Harvesting the vast potential for improving energy efficiency across sectors and industries remain unaddressed in the Philippines, one of the few countries in southeast Asia with no law on energy conservation. While opportunities to conserve energy have been pursued in lighting (replacing

incandescent bulbs with light-emitting diodes) and the appliance sector (through energy efficiency ratings), industrial and transport energy efficiency remains unaddressed. This presents new opportunity for cooperation. Most of the technologies required to achieve higher energy efficiency and demand-side reduction potential are already available. Their deployment at scale will likely drive cost reductions, for instance in recycling industries; however, major changes in product design, industry practices and regulations will be essential to seize the opportunity. Improved materials circularity cannot occur without better and coherent coordination across actors along the manufacturing, automotive and buildings value chains. High-quality recycling would also require new approaches to product design as well as to end-of-life dismantling and materials separation, which will not occur unless required by regulation, in particular, through extended producer responsibility. Improved logistics efficiency will also rely on greater coordination, with big data computing most likely facilitating it.

China's leadership in energy efficiency improvement beyond lighting and appliances towards urban infrastructure offer opportunities for the Philippines to learn from. China's rapid urbanization and increasing living standards require new building construction, which also means increase in energy consumption and greenhouse gas emissions.

2. COOPERATION ON UNIVERSAL ENERGY ACCESS

The Philippine transition agenda is not only serving climate action; it, too, assists in rapidly closing energy poverty gaps, which have implications to a number of sustainable development goals and one that, for a long time, the Philippines has been struggling to close. Without making necessary interconnections through an expensive grid system, stand-alone renewable energy systems, such as solar home systems, micro-hydro, hybrid systems, and micro-grids, in islands and rural areas are poised to close these long-standing access gaps. The Philippines can look at China for some inspiration. Using small-scale renewable energy systems, including small hydro power plants, China has delivered the quickest and the largest universal energy access programs in history.

In 2014, China reported that it has provided electricity access to all its citizens. Over a period of 50 years, China made rapid progress in closing rural electrification gaps using a series of rural energy policy on integrated energy strategy and rural energy management including pursuits of four rural energy technologies: small hydropower, biogas units, improved biomass stoves, and firewood forest plantations. China have also embarked on an ambitious plan to electrify its remote areas in a phased manner through the *Brightness Program* and the *Township Program*.

Prospects for cooperation to close energy access gaps in the Philippines are vast, with benefits to better access to education, health care facilities, information and communication technologies. Cooperation to address energy poverty, however, should move beyond meeting consumption goals towards extending and increasing the productive use of energy, since it is clear that the lower tier levels of energy access may not fully contribute to poverty alleviation, if at all. Considering productive use of energy in cooperation programs entails not only renewable energy provision but also ensuring that

the desired energy services are run adequately and reliably—i.e. the absence of service interruptions such as blackouts—in terms of quantity, duration, quality, and affordability.

3. COOPERATION ON GREEN INFRASTRUCTURE

As many developing countries look at China as a new source of development finance, ensuring that new partnerships, especially for infrastructure, are aligned with the objectives of climate action is necessary. This means that the "grow now, clean later" approach does not make sense; instead, gray and green infrastructure need to be brought front-and-center in present and future infrastructure investment decisions. As the Philippines move forward in its *Build Build Build* project and as China goes out to the world through its BRI, climate change considerations have to be embedded in design and decision-making, not just as an afterthought.

The physical networks that operate at multiple scales rely on governance systems to establish infrastructure policies and priorities, mobilize finance, and procure, operate and regulate infrastructure networks. Infrastructure programs, in all its complexity, should account for its nexus with climate change, meaning that a "grow now, clean up later" approach does not make sense since it runs counter to the holistic approach to climate action. Unleashing the potential of purposefully designed infrastructure policies and assets would be essential to spur multilevel climate action. Important sectors for the infrastructure-climate action nexus include emissions reduction in energy, transport, and waste, among others. The energy sector would require investment to expand renewable energy systems, alongside optimizing and integrating existing power grids, as opposed to the construction of additional coal-fired power plants.

Cooperation potential to ensure climate-resilient infrastructure is to combine green with gray infrastructure. Green infrastructure, also called natural infrastructure or engineering with nature, intentionally and strategically preserves, enhances or restores the elements of a natural system, such as forests, agricultural land, floodplains, riparian areas and coastal forests. Gray infrastructures are built structures and mechanical equipment, such as reservoirs, embankments, pipes, pumps, water treatment plants and canals. The opportunities for integrating natural and built infrastructure in both China and the Philippines can deliver optimal outcomes, including for biodiversity. Built infrastructure such as hydropower, water impoundment and irrigation dams (which, depending on size, can serve in climate mitigation and adaptation), for example, can benefit greatly from natural infrastructure such as forests in stabilizing soils and combatting upstream erosion.

Since climate change is expected to bring about tremendous stresses on water resources, cooperation on infrastructure can also be found in water-related infrastructures to ensure that water resources and systems are climate-resilient. Cooperation programs can be designed towards improving the state of understanding long-term water security issues in both countries and options for addressing them; embedding integrated water resources management programs into water supply, irrigation, flood

control and wastewater treatment services, policy, planning and investment plans of local government units; and raising public awareness and support towards sustainable consumption of water resources. Emergent examples of cooperation efforts for climate-resilient water infrastructure include partnership projects on urban floodwater management, river flood management, and coastal flooding and erosion protection. Significant opportunities for cooperation are also available in areas of water supply and hydropower, and in water supply and agriculture in drought conditions. Water system-related practices in China offer examples, including the soil erosion and water retention program on the Loess Plateau and the Sponge Cities program.

4. COOPERATION ON ADAPTATION

As climate change brings about tremendous stresses on land, agriculture, fisheries, water resources and water infrastructure, cooperation between China and the Philippines should be advanced in terms of increasing adaptive capacities and ensuring climate-resilient food-and-water systems. Opportunities for partnerships—especially in terms of knowledge sharing and transfers—are found in the many best practices to adapt both countries' agriculture, forest, fish and coastal resources to the impacts of climate change.

Ecosystem-based adaptation approaches, which draw on biodiversity and ecosystem services to assist people adapt to climate change, offer a strategic opportunity for China-Philippine cooperation on adaptation. Using action learning to enhance community capacities and improve local governance frameworks and institutions, ecosystem-based adaptation includes programs to restore, maintain or enhance ecosystems' capacity to continue producing services for communities, and allow these ecosystems to withstand climate impacts.

Cooperation on climate adaptation can also be envisaged in improving land-use, agriculture and forest management. Partnerships can be developed to help actors in these sectors in both China and the Philippines improve the design and implementation of their land-use, agriculture and forestry programs with climate benefits. These partnerships can be based on the respective countries best practices such as China's slope protection and reforestation programs and the Philippines' parametric risk insurance system for drought and typhoons. New cooperation efforts can also be designed around projects that strengthen risk assessment and early warning services.

A great majority of people living in China and the Philippines depend on fisheries and aquaculture as a source of protein and income. Since fish provides half or more of animal protein and dietary minerals, both countries can benefit in cooperation for adaptation in Chinese and Philippine fisheries and aquatic ecosystems. The Philippine experiences on coastal resource management, which are designed to address current and long-term coastal zone management issues, including increasing poverty, loss of coastal habitats and resources, degradation of water quality, and adaptation to the impacts of climate change, while involving key stakeholders in identifying and anticipating future

opportunities at the community level, offers a lens by which China can learn to improve its own coastal adaptation programs.

5. COOPERATION ON SUSTAINABLE URBANIZATION AND MOBILITY

As China and the Philippines both face the challenge of rapid urbanization as more people congregate in cities—and, along with it, pollution and traffic congestion—cooperation can also be envisaged in moving towards sustainable urbanization and mobility. The many stories of best practices emerging in Chinese cities offer local governments in the Philippines some mirror to design future cities that are resilient to the vagaries of climate change to natural and physical assets and infrastructure. Implementing nature-based solutions for climate action in cities, for instance, represent a key area for cooperation. In this effort, cities can integrate nature into their gray infrastructure in many ways including the establishment of urban tree corridors Trees are climate action power tools in cities since they clean and cool the air, increasing biodiversity, regulate temperatures, offset urban "heat island" effect, support water quality and manage flow, and deliver mental and physical health benefits to city dwellers. Cities have also the means to shape and re-shape a new energy landscape—one that is largely powered by renewable energy. With many cities in developing countries already taking decisive action to transform their energy systems, there is an opportunity to develop city-based energy transition cooperation programs between Chinese and Philippine cities. The same opportunity for cooperation exists in the energy demand management or energy efficiency.

Chinese and Philippine cities race to manage their rapid urbanization respectively, they, too, must contend with sprawl, traffic congestion, air pollution and growing greenhouse gas emissions from a growing number of passenger cars and public transport systems. Air pollution and traffic congestion costs money. With advances in sustainable mobility, particularly electric vehicles, another prospect for cooperation can be found in terms of joint project that looks at producing sustainable urban transport systems.

Since some of Chinese and Philippine urban centers and populations live near the coasts, partnerships can be designed around ensuring that water supply and systems are resilient. These include designing resilient floodwater systems and addressing coastal flooding. More potential for cooperation can further be envisaged in ensuring sustainable water resources as hydropower assets and the agriculture sector in both countries are subjected to climate impacts.

6 COOPERATION ON CAPACITY DEVELOPMENT AND INNOVATION

While these cooperation programs largely involve technology transfers of hardware through trade and finance, opportunities for software transfers can also be envisaged. Capacity development, institutional strengthening, co-producing innovation, and policy experience sharing are areas that both China and the Philippines can consider as opportunities for cooperation. The rapid innovation in digitalization provides both China and the Philippines a rich ground to explore new cooperation opportunities in the digitalization-decarbonization-decentralization nexus, including in fintech.

Program and policy implementation requires stronger institutional capacity, arrangement and readiness from communities to local governments (cities and provinces) to the national and international levels. Within communities, trust and social cohesion play a key role in fostering cooperation on climate action. Cooperation programs on capacity development between China and the Philippines can be envisaged in terms of building and linking social capital by creating opportunities where people and groups can interact. Collaborative management for disaster planning or emissions reduction programs through community energy can help build and link social capital.

Effective climate action also requires strong policy—not only in terms of its design, relevance, timeliness and scope but also in terms of the quality of implementation. China, which possesses vast experiences on how the processes of energy transition can be expedited using policy mechanisms, can cooperate with the Philippines as it designs additional transition policies that would meet its emissions reduction commitments.

China and the Philippines arises in terms of joint technology innovation to help drive costs further down and make technologies available widely is another opportunity for cooperation. Training and technical support for developing capacity in the energy transition sector, for instance, can be envisaged in terms of joint activities in energy planning and modelling, conducting grid impact analyses, developing tools and producing maps to assess possible energy generation sites, and analyzing energy markets to identify possible financing opportunities.

Another capacity development cooperation effort can be envisaged in climate action opportunities arising with digitalization. Digital technologies, for example, can assist in closing energy access gaps—while it opens-up new business models that people can participate. There is also an opportunity for cooperation arising from developing capacity in both countries to address the digital security risks of climate change.

CONCLUSION

In closing, China-Philippine cooperation for climate action is a welcome development in South-South and international cooperation for addressing the global climate challenge. On one hand, the Philippines, one of the most vulnerable countries in terms of climate impacts, is a powerhouse in terms of its wide array of experiences and best practices towards climate adaptation and resiliency. China, on the other hand, is undeniably a leader and is in possession of key capacities—technologies and finance—that can assist in the timely and scaled up delivery of climate action. China is a clean technology powerhouse; its BRI opens new doors for development financing streams.

China aspires to move beyond its current carbon-intensive technologies, which could have adversarial effects to climate action. An example of this is the *China Pakistan Economic Corridor,* a USD 35 billion-21 energy projects to be completed on a fast track by 2019, with a cumulative capacity of 10,400 MW. Of these, nine are coal power plants, seven wind power plants, three hydropower, and two are high voltage transmission line projects.

Nonetheless, there are some indications that China would seek to shift its own economy to a green, low-carbon growth trajectory. Chinese President Xi Jinping, in an address, for instance, had called for a development mode based on what he called *ecological civilization*, with reforms aimed at reconciling the contradiction between the economy and the environment. The Chinese Government has also promised to enforce rigorous limits on air, soil and water pollution, and has required local governments to undergo environmental management audits. The aim of Xi's *ecological civilization* reforms is not solely for environmental protection; it is also about economic advantage as China bolsters its global competitiveness in emerging green industries – particularly renewable energy, a key component of climate action. It remains to be seen whether China's own national development can indeed be 'greened' and whether domestic environmental reforms and pronouncements would influence Chinese overseas aid and investment through the BRI. In April 2019, for instance, during the BRI Forum in Beijing, China rolls out a new alliance called *The International Coalition for Green Development on the Belt and Road* to provide advice on how to transform its BRI into a powerful enabler for a green energy transition and development.

The China and Philippine cooperation on climate action and energy transition could benefit from a mutually shared goal of delivering on global commitments on carbon emissions, while improving domestic actions on adaptation for their people. It should be a relationship built on a common purpose of learning from each other and providing for the other where one has a demonstrable advantage. It should never be a relationship that has a creditor country extracting economic or political concessions to another debtor country. The narratives of 'debt trap' in Africa and South Asia need to be understood well – and factored into partnership programs – if China-Philippine cooperation for climate action is to be successful.

This is a summary of the 139-page white paper prepared by Laurence Delina. He is a research fellow at the Frederick S. Pardee Center for the Study of the Longer-Range Future at Boston University where he leads a research project on the future of energy systems in developing countries. He received a Rachel Carson Fellowship in 2017 and was twice a Visiting Fellow at Harvard Kennedy School.

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