

# ARNEC CONNECTIONS

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Working Together for Early Childhood



THEME

Ensuring the well-being of young children amidst environmental risks in the Asia-Pacific region



**ARNEC**  
Asia-Pacific Regional Network  
for Early Childhood





**ARNEC**

Asia-Pacific Regional Network  
for Early Childhood

# Ensuring the well-being of young children amidst environmental risks in the Asia-Pacific region

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### ARNEC's Strategic Goals

**Strategic Goal 1:** Improve advocacy for holistic and inclusive ECD

**Strategic Goal 2:** Increase the knowledge base on ECD

**Strategic Goal 3:** Increase strategic partnerships and memberships

**Strategic Goal 4:** Strengthen ARNEC's reach and impact at the country level

ARNEC covers a large geographical area, totaling more than 40 countries in the Asia-Pacific Region. This publication is one of the many ways that our network has sought to share interesting and new knowledge for cross-country learning. Within the pages of ARNEC Connections, you will find unique initiatives from the region, field experiences, and research summaries. This is a publication for ECD professionals by ECD professionals. All articles are contributed by individuals who are ARNEC members and/or are working within the field of early childhood.

#### Write to us

We look forward to your feedback. Kindly send in your comments and suggestions to: ARNEC Secretariat 1 Commonwealth Lane, #03-27, Singapore 149544 Email: [secretariat@arnecc.net](mailto:secretariat@arnecc.net)

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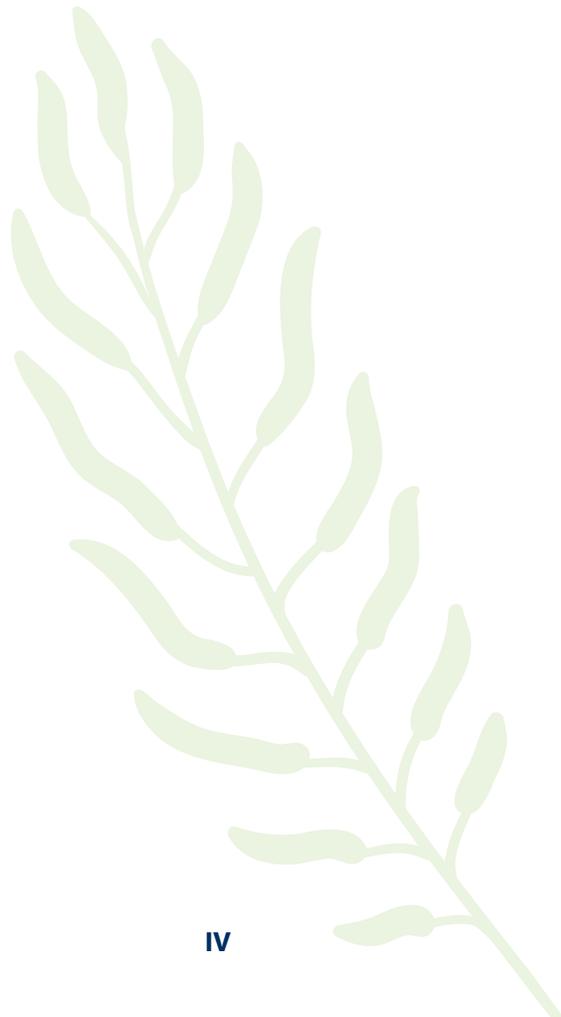
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# Acronyms



AAP	Ambient air pollution	GNH	Gross National Happiness
ADHD	Attention Deficit Hyperactivity Disorder	HAP	Household air pollution
ALRI	Acute lower respiratory infections	IAQ	Indoor air quality
ASD	Autistic Spectrum Disorder	IHD	Ischemic heart disease
ARNEC	Asia-Pacific Regional Network for Early Childhood	ILO	International Labor Organization
BOET	Bureau of Education and Training	ISSA	International Step by Step Association
BvLF	Bernard van Leer Foundation	MECSS	Ministry of Education, Culture, Science, and Sports
CIFF	Children's Investment Fund Foundation	NCDs	Non-communicable diseases
CITIES	Communities of practice Inspiring Teaching Innovations in the Early Education System	OA	Oceans causing its acidification
COPD	Chronic obstructive pulmonary disease	SDGs	Sustainable Development Goals
DOET	Department of Education and Training	UNEP	United Nations Environment Programme
ECD	Early Childhood Development	UNICEF	United Nations International Children's Fund
ECCD	Early Childhood Care and Development	VVOB	Flemish Association for Development Cooperation and Technical Assistance
FAO	Food and Agriculture Organization	WASH	Water, Sanitation and Health
		WHO	World Health Organization

# From the ARNEC Secretariat

Young children are the most vulnerable to the impacts of poor environmental health. The World Health Organization (WHO) [2020] estimates that "...about one quarter of deaths of children under 5 could be prevented through healthier environments that reduce key risks including...air pollution, unsafe drinking water, sanitation, and inadequate hygiene as well as exposures to certain toxic chemicals, such as lead and mercury." About 93 percent of all children globally and 630 million children under 5 years are exposed to air pollution levels above WHO quality standards and 570,000 children die due to air pollution covering indoor, outdoor, and second-hand smoke (Park, 2019).

The impact of climate change on young children is also a cause for alarm. UNICEF (2015) stressed that while climate change affects everybody, children are the most vulnerable given that "...hundreds of millions of today's children live in areas that are most exposed to climate change." Climate change leads to more droughts, massive flooding, heatwaves, and other severe weather conditions (UNICEF, 2015). These, in turn, contribute to increased cases of malnutrition, malaria and diarrhea, all of which pose significant risks to young children's early development. The impact of changing climates poses greater risks for the Asia-Pacific region with the following conditions raised by UNICEF (2015):

- Majority of the children in extremely high flood occurrence zones live in Asia.
- More than 115 million children live in zones at high or extremely high risk for tropical cyclones – known as typhoons, hurricanes or cyclones depending on their location – with Asia by far the most vulnerable continent.
- Over 50 per cent of the people living in areas of high or extremely high drought severity are in Africa and nearly 40 percent in Asia.

Moreover, the impact of climate change on food production patterns, can further aggravate the malnutrition burden among children aged under 5 years which is already significant in the region, especially in South Asia.<sup>1</sup> This is on top of other crises such as the COVID-19 which is also undermining the health and nutrition of young children.

Clearly, the poor health of the environment exacts a heavy toll on young children and if not addressed, will undermine collective efforts to achieve national and global targets in the Sustainable Development Goals. Today is a borrowed future from our young children. The least we can do is to be responsible stewards to ensure that the environment is healthy and sound for all, especially the youngest citizens. Risks in the physical environment need to be assessed, anticipated

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<sup>1</sup> The Global Nutrition Report (2020) indicates a 31.7% prevalence of stunting and 14.3% prevalence of wasting amongst children aged under 5 years, both of which are above global average. <https://globalnutritionreport.org/resources/nutrition-profiles/asia/southern-asia/>

and addressed, from the viewpoint of young children to uphold their well-being at all times.

Young children need clean, safe and secure environments to develop their full potential. Their future depends on nurturing and sustainable environments they are in at the household and community levels. For ARNEC, this is more than an advocacy. It is a commitment and a responsibility to ensure healthy and secure futures for young children.

The 2020 ARNEC Connections reinforces this advocacy and commitment with a theme *Ensuring the well-being of young children amidst environmental risks in the Asia-Pacific region*, reinforcing agreements at the ARNEC Regional ECD Conference in Ha Noi, Viet Nam in December 2019 and the 2019 Ha Noi Call to Action that emerged from it.

ARNEC does not only emphasise the interconnections between environmental health and early childhood, but also calls for multi-sectoral approaches and partnerships to promote the safety and well-being of young children and their families against environmental risks. We strongly advocate for:

- a **policy environment** that addresses the damaging effects of harmful environments on young children and provides institutional arrangements that are pro-environment and pro-children;
- a **sustainable physical environment** for young children where air and water are safe and accessible; soil is healthy; noise is mitigated; and changing climates do not aggravate risks to life, health, and livelihoods;
- a **community environment** that is protected from risks that expose young children to disaster, displacement, poverty, exclusion, and deprivation; and

- a **home environment** that is safe and healthy and where parents and caregivers are supported so there is an increased awareness on the importance of protecting their children from environmental risks, especially from household air pollution exposure.

ARNEC is pleased to share the insights and experiences of ECD experts and practitioners in the region on the state of environmental health and the impacts on young children and ECD through the articles and thought pieces included in the 2020 ARNEC Connections. Although the usual disclaimer applies—that each article contains the views of authors drawn from their professional work in the fields of ECD and the environment and does not reflect those of ARNEC—the reality is that the authors are bold in demanding collective action to address the vulnerability of young children to environmental risks in the region.

Their message is clear: environmental degradation erodes the potential for ECD and sustainable development. Policies and programs need to respond to the inter-linkages of environmental health, climate change, and ECD.

The collective voice of the ECD experts and practitioners in this edition calls for integrated and multi-sectoral action to promote healthy, sustainable environments for young children and inclusive processes to inform children-friendly solutions.

We all have the obligation to protect the environment for the world's young children. To nurture them in a safe and healthy environment and to give a fair chance to enjoy life's opportunities is our utmost commitment and responsibility.

**Evelyn D. Santiago**  
EXECUTIVE DIRECTOR

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ARNEC would like to thank the Bernard van Leer Foundation and the Open Society Foundations for supporting the 2020 ARNEC Connections.

At the Bernard van Leer Foundation, we believe that giving all children a good start in life is both the right thing to do and the best way to

build healthy, prosperous and creative societies. We are a private foundation focused on sharing insights, innovations and best practices from around the world on what works in early childhood development. This work is underpinned by our programmes in a diverse set of core countries. Currently, these include Brazil, Cote d'Ivoire, India, Israel, the Netherlands, Peru and Turkey. We are also launching a regional initiative to support Syrian families forcibly displaced across the Middle East and Europe.

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- **Parents+**. Combining coaching for parents in early childhood development with services that meet families' basic needs.
- **Urban95**. Incorporating a focus on early childhood development into the planning and management of cities.
- **Building Blocks**. Promoting the science of nurturing care and sharing best practices in transitioning successful early childhood programmes to scale.

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# Introduction

Margaret Sims, *Lead Editor*

The physical environment in which communities are located can be a major impediment to the achievement of the Sustainable Development Goals (SDGs). The World Health Organization [WHO] (2017, p. 1) claims that “26% of childhood deaths and 25% of the total disease burden in children under five could be prevented through the reduction of environmental risks such as air pollution, unsafe water, sanitation, and inadequate hygiene or chemicals.”

A key factor impacting on the physical environment is that of climate change. It can be argued that climate change is the biggest threat of our times, impacting not only on us today, but on the lives of future generations. The groups most vulnerable to the impacts of climate change are pregnant mothers and their fetuses, along with young children. The negative impacts experienced by these groups are increased when additional risk factors apply. Factors such as poverty and racial or religious minority status increase the allostatic load borne by those who are most vulnerable. This increased allostatic load ultimately overwhelms individual and socio-ecological resilience resulting in worsening physical and mental health outcomes. Epigenetic effects result in poorer outcomes for children yet to come and long term impaired developmental trajectories for children today (Olson & Metz, 2020).

It is increasingly important that communities facing the greatest physical threats address the consequent developmental, health, and well-being consequences of those threats,

particularly with the most vulnerable groups in their societies. This edition of ARNEC Connections explores the work undertaken across a number of countries in the Asia-Pacific region to address the accumulating stressors impacting the lives of young children and their families.

Kidong Park begins the discussion with an article addressing air pollution and the risks it poses to children. He reminds us that around 300 thousand children under 5 died as a result of outdoor air pollution in 2016 and a further 400 thousand died as a result of indoor air pollution. WHO has published recommendations to protect children from bad air and it is up to us to all act to follow these.

Peck Gee Chua reminds us that by 2050 it has been estimated that seven out of every 10 children worldwide will be living in cities, mainly in Asia and Africa, so the need to address urban pollution is pressing. She reports many people in the region already identify the declining quality of air as a major concern, and believe that relocating factories and industries, and integrating air quality monitoring and reporting in early childhood centres and preschools are important steps needing to be taken as soon as possible.

Karma Gayleg, writing from Bhutan, argues the role of legislation in the establishment and maintenance of policies and practices around climate change is essential. In Bhutan conservation of the environment is a key pillar in the philosophy of Gross National Happiness (GNH). Economic development initiatives cannot be made at the expense of



**9 out of 10**  
children worldwide do not breathe safe air.

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environmental conservation. The aim is to achieve zero net greenhouse gas emission as well as zero waste status and become 100 percent organic. Renewable energy generation is encouraged and Bhutan is currently self-sufficient in clean electricity.

From Mongolia, Ulziisaikhan Sereeter writes of the risks posed by an extremely cold climate coupled with the traditional coal-burning stoves needed to generate sufficient heat to maintain human life. The resultant air pollution has created an unprecedented maternal and child health crisis. UNICEF Mongolia and the Mongolian government have collaborated to install and maintain sustainable energy solutions (such as window filters and forms of building insulation) into kindergartens and have also introduced the hygiene programme.

Chau Nguyen Thi, Lieve MRD Leroy, and Nguyen Dinh Khuong Duy share how rapid urban growth in Da Nang, Viet Nam, has created significant urban stress and exhausted the capacity of schools and early childhood services to manage demand. As a consequence, a rapid increase in home-based services has occurred, increasing the risk that children are supported by teachers with lower qualification levels. Training has been developed to build capacity in these teachers, school leaders, and education officers to identify and address the urban barriers and risks experienced by young children and their families.'

Maria Raquel da Costa and Silvana Birchenough look at the impact of climate change on families dependent on the sea for their livelihood. Changes in sea-based food sources reduce food security for families and the

nutritional intake of young children. Changes in ocean chemistry due to increasing amounts of carbon dioxide impact on food availability. Families may need to search larger areas to find sufficient food, and this increases the risk that children will be required to help with food gathering, rather than attend school. Parents may need to migrate to earn a living, and children are often left behind.

Caroline Essame reminds us of the importance of children's engagement with the natural world. She argues exposure to green space is found to impact brain development, enhancing cognitive and social functioning along with empathy and altruism, emotional regulation, and physical development. Playing in nature is likely to result in children being more willing to protect the natural world around them as they grow up. Ideally, we need to ensure that all children have opportunities to play in, and engage with, the natural world.

Following on from this idea, Julien Vincelot and Esther Goh argue that we work towards achieving this by focusing on the provision of green and blue infrastructure. By this, they mean actively providing natural and semi-natural landscapes which include trees, grass, pools, and ponds. This approach was trialled

in Rotterdam in the Netherlands through the Green-Blue Schoolyards programme. Planning these spaces needs to include children and their families (including infants and toddlers) so the resulting spaces make cities more enjoyable, safer, and healthier places to live.

As adults, we have the ability to re-shape the environments around us to make them healthier places for children to live and flourish. There is an urgent need to take action at all levels: through the creation of legislation, policies, and funding initiatives, the development of appropriate support programmes, and the education needed to promote sustainable and healthy human behaviour.

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# Clean air for children's health

Kidong Park

## Air pollution is a global health issue

From smog hanging over cities (ambient air pollution) to smoke inside the home (household air pollution), air pollution poses a major threat to health and climate. WHO data shows that nine out of 10 people breathe air that exceeds WHO guideline limits containing high levels of pollutants, with low- and middle-income countries suffering from the highest exposures. The combined effects of ambient air pollution (AAP) and household air pollution (HAP) cause about seven million premature deaths every year (WHO, 2018a).

Air pollution is the second leading cause of deaths from non-communicable diseases (NCDs) after tobacco smoking. The main NCDs associated with air pollution include ischemic heart disease (IHD), stroke, chronic obstructive disease (COPD), and lung cancer; and evidence on additional NCDs is emerging. In 2016, WHO estimated that worldwide, 29 percent of deaths were from lung cancer; 24 percent from stroke; 25 percent from IHD; and 43 percent from COPD—all attributable to air pollution. Globally, air pollution causes seven million premature deaths each year, including more than five million due to NCD (WHO, 2017).

## Children are at a greater risk of air pollution

Though air pollution affects everybody, children are at a greater risk than adults for many reasons. Regarding physiological factors, the lungs, organs, and brains of

children are still maturing; therefore, children are vulnerable to inflammation and other damages caused by pollutants. Children breathe faster than adults; thus, they take in more air and more pollutants than adults. In addition, children have a longer life expectancy than adults; latent disease mechanisms have more time to emerge. In terms of behavioural and environmental factors, children live closer to the ground where some pollutants reach peak concentration. Children also may spend much time outside; therefore, they play and engage in potentially polluted air. New-born children and infants spend most of their time indoors; thus, they are more susceptible to HAP. In addition, children spend much time near their mothers, while their mothers, cook with polluting fuels and devices (WHO, 2018b).

Air pollution is a global children's health issue. Globally 93 percent of all children and 630 million children under 5 years are exposed to air pollution levels above the WHO air quality guidelines. The burden of air pollution is heavier in low- and middle-income countries than in high-income countries. About 98 percent of children in low- and middle-income countries are exposed to polluted air, while these figures in high-income countries are only 52 percent (WHO, 2018c).

Each year, air pollution causes 570 thousand deaths in children under 5. When we expand the scope for all children, nearly a million children die of pneumonia each year. Half of these are linked to air pollution. Outdoor air pollution was responsible for 4.2 million



premature deaths in 2016; of these, almost 300 thousand were children under 5 years old. Household air pollution was responsible for 3.8 million premature deaths in 2016, including over 400 thousand deaths of children under 5 years of age (WHO, 2018b).

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### **Evidence on the impact of air pollution on child's health is growing**

Air pollution has a negative impact on the health of the fetus. There is strong evidence that maternal exposure to ambient particle matter (PM) is associated with low birth weight.



Growing evidence also shows that maternal exposure to fine PM increases the risk of premature birth. In addition, there is compelling evidence of an association between air pollution, particularly from exposure to PM and toxic gases, and infant mortality.

In children, air pollution can cause disease in the brain and lungs, as well as cancer. There is also robust evidence that exposure to air pollution damages children's lung function and impedes their lung function growth, even at lower levels of exposure. Substantial evidence is collected to show that exposure to AAP increases the risk of children developing asthma and that breathing pollutants also exacerbate childhood asthma. Numerous studies offer compelling evidence that exposure to AAP and HAP increases the risk of acute lower respiratory infections (ALRI) in children. In addition, there is clear, consistent evidence of an association between AAP exposure and the occurrence of otitis media in children. Strong evidence is found to show that exposure to AAP can negatively affect children's mental and motor development. A growing body of research suggests that both prenatal and postnatal exposure to air pollution can influence the development of behavioural disorders such as autism spectrum disorders (ASD) and attention deficit hyperactivity disorder (ADHD). There is substantial evidence that exposure to traffic-related air pollution is associated with an increased risk of childhood leukemia. Several studies have found associations between prenatal exposure to AAP and higher risks of retinoblastomas and leukemia in children.

There is also clear, compelling evidence of a significant association between exposure to air pollution and a range of adverse health outcomes. Evidence suggests that prenatal exposure to air pollution can predispose individuals to cardiovascular disease later in life (WHO, 2018b).

## **We all have a part to play in protecting children from dirty air**

Air pollution can be fought on many fronts including houses, clinics, schools, institutions, municipalities, national governments, and the global community.

There are many recommendations to fight air pollution and protect children from dirty air. Some require political decisions and commitment at the government level. Some are quite technical recommendations targeting health care professionals. Still, there are many recommendations that are easy to follow by the public. We all have a part to play in protecting children from dirty air.

At the level of global commitment, there are resolutions adopted by the World Health Assembly. There are also political declarations adopted by the United Nations General Assembly. The World Health Assembly in 2015 raised the concern that half of the deaths due to ALRI might be attributed to household air pollutions, making it a leading risk factor for childhood mortality. It then adopted the resolution WHA68.8 on health and the environment: addressing the health impact on air pollution and urged its Member States to redouble their efforts to identify, address and prevent the health impacts of air pollution, by developing and strengthening multi-sectoral cooperation at the international, regional and national levels, and through a targeted, multi-sectoral measure following national priorities (WHO, 2015). The United Nations General Assembly in 2018 convened the third high-level meeting on the prevention and control of NCDs and adopted a political declaration committing to scale up its efforts to address NCDs for the health and well-being of present and future generations. It committed to increase global awareness, action, and international cooperation on environmental risk factors to address the high number of premature deaths from NCDs attributed to human exposure to indoor and outdoor air pollution, underscoring

the importance of cross-sectoral cooperation in addressing these public health risks (UN, 2018).

In 2018, WHO published a report (WHO, 2018b) summarising the latest scientific knowledge on the links between exposure to air pollution and adverse health effects on children. It was intended to inform and motivate individual and collective action by health care professionals to prevent damage to children's health from exposure to air pollution.

WHO has also developed a set of recommendations to help protect our children from air pollution, which are easy to follow. There are six ways to help protect our children from HAP:

1. Don't smoke indoors or near children, but ensure they remain supervised
2. Use cleaner fuels and technologies to cook, heat, and light your home – choose electricity, natural gas, liquefied petroleum gas, biogas, or solar stoves or ovens
3. Use ultra-low emission stoves with processed solid fuels (wood pellets) if cleaner options are not available
4. Always cook in a well-ventilated area, or outside if it's hard to ventilate your kitchen or cooking area
5. Avoid using kerosene lamps or stoves for cooking or lighting
6. Don't burn candles or use air fresheners, which add toxic chemicals to the air

Another six ways to protect our children from AAP are:

1. Stop burning household and agricultural waste
2. Reduce air pollution caused by vehicle exhaust emissions
3. Keep children healthy—make sure they are up to date with their immunisations, have a healthy and plenty of opportunities to play, and be physically active

4. Maintain and improve monitoring system for air (for governmental agencies/policymakers)
5. Monitor air quality and effects of air pollution on children to know when and how to take protective measures (e.g. staying indoors for individuals)
6. Raise awareness among your community about the health impacts of air pollution and promote policies that reduce air pollution and protect child health

Children are the society's future. But they are also its most vulnerable members. For healthy children and a healthy future, actions should be taken urgently to keep clean air in our planet. We all have a part to play in protecting children from dirty air.

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# Air pollution and ECD in the Asia-Pacific region

Peck Gee Chua

## Introduction

In recent years, there has been increasing recognition of the influential role of the physical and built environments on people – particularly the most vulnerable. This is partly due to greater advances in neuroscience on how the environment can impact our genes, paired with a global shift in attention to the issues of environment and sustainable development. Sectors are increasingly looking to reimagine their field with a more holistic lens by considering complex challenges of climate change and the fragility of our physical environment. The early childhood development (ECD) sector is no different as it considers ways of responding to the challenges brought about by changing environments.

Through their work and programming, ECD organisations are featuring more prominently the relationship between physical environments and the well-being of young children to ensure that children have the foundational conditions to develop and thrive. The theme of using the physical environment to promote nurturing and sustainable environments has been the focus of recent conferences led by ECD organisations, including the Asia-Pacific Regional Network for Early Childhood (ARNEC) and the International Step by Step Association (ISSA). Early childhood institutions – such as the UNICEF, Save the Children, and the Children’s Investment Fund Foundation (CIFF) - are sharpening their focus on climate change and adaptation. The Bernard van Leer Foundation (BvLF) has also initiated urban planning work on child-friendly cities.

The issue of air pollution stands out among the suite of physical environmental challenges. Every day, children are breathing in toxic air<sup>2</sup> that penetrates their lungs, weakens their hearts, damages their brains – and shortens their lives (Health Effects Institute, 2019). This is particularly alarming as seven in 10 of the world’s children will live in cities by 2050, the majority of them in Asia and Africa (United Nations, 2019). As urban environmental threats that are damaging to children’s development and well-being increase, climate change will only intensify these adverse impacts.

Globally, the momentum to tackle the air pollution issue across sectors is growing – however, a lot more needs to be done. The last President of the UN General Assembly called for the need for concerted efforts in tackling pollution (Bernard van Leer Foundation, 2019). The most recent flagship report from the BvLF highlights the severe consequences of air pollution on children. ‘Beat Air Pollution’ is the theme for the 2019 UNEP World Environment Day campaign. Mayors of 35 cities globally, which include New Delhi, Jakarta, and Quezon City in the region, have pledged to meet WHO air quality guidelines by 2030. A new USD \$50 million Clean Air Fund initiative was launched during the 2019 UN Climate Action Summit with the backing of at least two children-focused funders, the BvLF and CIFF.

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<sup>2</sup> Both ambient (outdoor) and household (indoor) air pollution



Children develop in a complex layer of relationships between their immediate context and larger cultural, socio-economic, political, and environment systems (Bronfenbrenner, 1979). In particular, how children experience and interact with their physical environment shapes their health and development (UNICEF, 2018). Given numerous recent initiatives to put a spotlight on the importance of physical environments to children, more advocacy efforts to increase our understanding of the influences of physical environments on the experiences, health, and behaviours of children are necessary to enable them to receive the best possible nurturing care.

### Why should we care: air pollution and young children

This year, cleaner air may seem to be one of the few silver linings from the COVID-19 crisis as a result of restricted air travel and industry restrictions. However, this relief from toxic particulate matter is temporary as cities re-emerge from lockdowns. Although research on the effects of air pollution and COVID-19 is still developing, it is clear from available evidence that exposure to outdoor air pollution potentially contributes to the transmission and severity of respiratory viral infections, including COVID-19, as well as complicates recovery (Domingo & Rovira, 2020). Furthermore, COVID-19 increases our vulnerability to air pollution's effects (World Resources Institute, 2020). This is especially true for patients with respiratory complications. And just last year, school closures due to polluted air have affected many countries globally: Thailand, Malaysia, Viet Nam, India, Pakistan, Mexico, America, Australia – many of them in Asia.

According to WHO Director General Dr. Tedros, "Air pollution kills about 7 million people every year, and 9 out of 10 people globally breathe air that is not fit for human consumption." The greatest burden of the

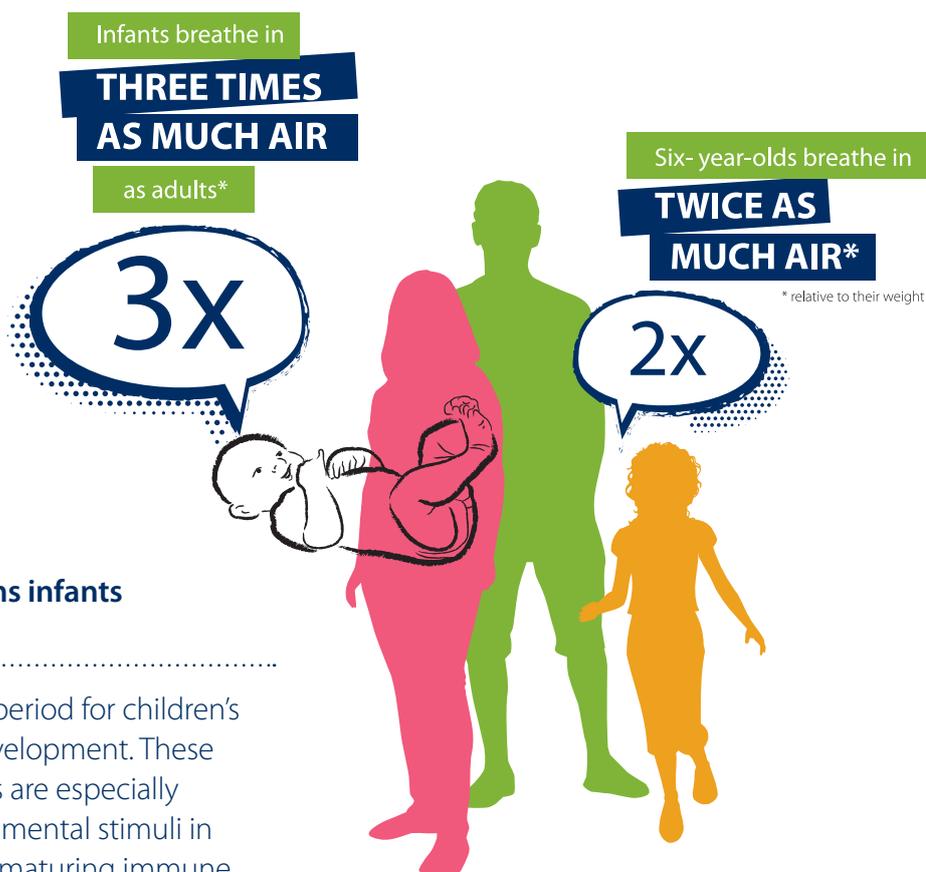
ill effects of air pollution, however, is shouldered by children. Air pollution kills about 600,000 children annually, and over 93% of the world's 1.8 billion children breathe polluted air, including 630 million children under the age of five<sup>3</sup> (World Health Organization, 2018a). Asia accounts for a majority of child deaths attributable to air pollution (UNICEF, 2016).

Not only does air pollution negatively contribute to climate change and impact the economy, it is also a public health crisis for young children. The following points highlight the detrimental impacts of air pollution on young children:

- **Air pollution and adverse pregnancy outcomes**

Air pollution can affect unborn babies during pregnancy with potential lifelong consequences. The 2019 report of the Lancet Countdown on Health and Climate Change (Watts et al., 2019) indicates that climate change and air pollution from fossil fuels are threatening child's health, starting in the mother's womb. The links between exposure to toxic air and increased miscarriages, premature births, and low birthweights are well established (UNICEF, 2016). Black carbon inhaled by a pregnant woman can travel through her bloodstream to the placenta (Bové et al., 2019) – an indication that unborn babies are directly exposed to these pollutants. Climate change can exacerbate these risks. A recent study has shown that pregnant women, particularly African-American mothers, who are exposed to high temperatures or air pollution are more likely to have children who are premature, underweight or stillborn (Flavelle, 2020).

<sup>3</sup> See also WHO Social Media Toolkit: Air Pollution and Child Health for key messages and statistics



- **Air pollution harms infants more than adults**

Infancy is a critical period for children's brain and body development. These precious early years are especially sensitive to environmental stimuli in regard to relatively maturing immune systems, lungs, hearts, and brains – making children more vulnerable to air pollution than adults. As shown in the image, children breathe faster than adults (UNICEF UK, 2019). They are more likely to be damaged by toxins in the air given their relatively smaller lungs in proportion to their bodies with limited space to exchange oxygen and carbon dioxide. A British study revealed that young children were exposed to 30% more pollutants than adults accompanying them on school runs along busy roads because their height puts them closer to exhaust pipes (Open Access Government, 2018). All of these factors compounded mean that air pollution poses greater danger to the youngest ones. It is unfortunate that 17 million infants under the age of one live in the world's most polluted regions globally with outdoor air pollution over six times higher than international safe limits (UNICEF, 2017).

- **Air pollution limits children's physical development**

Exposing children to unsafe levels of air pollution – ambient (outdoor) and household – during early childhood, as well as early exposure in the womb, will put them at higher risk for a lifetime of heart and lung issues. Studies show that the lung capacity of children exposed to air pollution can be reduced by 20%, similar to growing up in a home with secondhand smoking (American Lung Association, 2015; Aubrey, 2019). In the short-term, toxic air increases the risks of children under five years in contracting asthma, pneumonia, and lower acute respiratory infection. Over the long-run, sustained exposure to air pollution during early childhood can increase risks of lung cancer, heart disease, and strokes in adulthood (World Health Organization, 2018a).

- **Air pollution affects children's growing brains**

Breathing in particulate air pollution can undermine children's cognitive development as their brains and central nervous systems are still developing, forming critical connections between neurons. In particular, prenatal exposure to high levels of air pollution can be damaging to children in utero with lifelong implications – such as potential developmental delays at age three and a reduction in IQ by the age of five, as well as psychological and behavioural problems later in childhood (UNICEF, 2017). Children's mental health is also at risk. Emerging evidence shows that air pollution during early childhood may contribute to anxiety, depression, suicidal thoughts, and a range of other mental health issues in adolescence (Cincinnati Children's Hospital Medical Center, 2019).

These tragic evidence and statistics are taking place against the backdrop of unhealthy and, at times, hazardous levels of air pollution. Children, especially those in cities, continue to be threatened by air pollution due to traffic, polluting cooking methods, the lack of urban planning, and limited access to quality green spaces (Arup, 2017). This is compounded by an increasing number of hot days more favourable to ozone or smog formation with weather patterns, unmanaged emissions, and transboundary pollution in Asia.

### Do we care? Survey findings

While tackling the air pollution issue is gaining traction, how it relates to young children is still relatively new and oftentimes being approached in a fragmented and haphazard manner. This project on Air Pollution and Young Children in Asia-Pacific has been undertaken as part of the Global Leader for Young Children

in Asia-Pacific program, an initiative of the World Forum Foundation. The project's primary objective is to highlight the urgent issue of air pollution and children by documenting expressed opinions from regional stakeholders across key sectors through a survey. These survey results are complemented with a quick stocktaking of evidence available, as noted in the section above.

Methodology: An online regional perception survey on the Survey Monkey platform was developed with guidance from Dr. Sheldon Shaeffer, the Asia-Pacific mentor for the World Forum Global Leaders for Young Children and Chair of the Board of Directors of ARNEC. It was also revised based on consultations and inputs from colleagues from the Bernard van Leer Foundation and the UNICEF Regional Office for South Asia. The survey was open for a month and circulated for input via direct email and social media, including Twitter, LinkedIn, and Reddit. Preliminary findings from the survey and brief documentation were presented during the 2019 ARNEC Conference in Ha Noi, Viet Nam.

### Results



ignorance waste regulation political traffic public awareness **lack awareness** commitment  
political will biggest air etc. **vehicles** enforcement policies collective  
issue give **government** public **lack** think **people**  
proper **air pollution** know **awareness** building burning  
emissions **pollution** education **change** may take responsibility **open burning**  
reducing **country** neighbourhood **impact** laws increasing will **work**

A total of 195 survey respondents across sectors in the Asia region were reached. Most respondents were ECD professionals with others from key sectors of urban planning and climate change. About 69 percent of the respondents were female. The geographical distribution of respondents was: Singapore (25%), India (16%), Pakistan (13%), Malaysia (12%), and Nepal (8%).

Air pollution is ranked by respondents as the number one threat among the seven indicated threats to healthy environments for children.

The survey also found that:

- 18 percent respondents said that they are not well informed or not informed at all on the impact of air pollution on children;
- 67 percent respondents rated that air quality in their neighborhood has deteriorated or significantly deteriorated compared to five years ago;
- 61 percent respondents identified traffic congestion as the main source of air pollution; and
- 41 percent respondents noted their concerns that children in their neighborhood are very much affected by air pollution.
- Respondents highly agreed on the need for better urban planning and monitoring of air pollution levels: 76 percent wanted better urban

planning for children; 75 percent wanted to keep factories and construction sites away from schools and parks, and 57 percent wanted to put in place systematic air quality monitoring and reporting in childcare centers and preschools.

On the biggest perceived challenges in resolving the air pollution issue (refer to word cloud image), respondents thought that both top-down and bottom-up solutions are needed. Governments are thought to lack the incentives, willingness, and initiatives to tackle the issue, primarily due to their prioritisation of economic growth. There is also inadequate cooperation between countries to drive solutions forward. On the other hand, respondents thought that resolving the air pollution challenge requires a change in people's perceptions: communities are still lacking in air pollution awareness and do not understand the health, economic, and social consequences that come with it. Of those who are aware of the issue, resistance and apathy dominate justifying that the air pollution issue is not their responsibility and is beyond them to address.

Additionally, respondents agreed on the common outdoor settings where children in the neighbourhood are most exposed to air pollution: streets (83 percent), public transit areas (75 percent) and parks and playgrounds (46 percent) were identified – an indication

of the respondents' awareness of outdoor air pollution. This coincides well with a recent King's College London study which shows that children's lung growth can be stunted by 12.5 percent from roadside air pollution (Walton, 2019). It is also important to consider children's exposure to indoor air pollution (e.g. caused by polluting cooking methods), as the home is where they spend much of their time.

Finally, 75 percent of respondents thought that policymakers can best resolve the air pollution issue. This was followed by community-based organisations (52 percent) working on children, health, and environmental issues; families and communities (49 percent); national and sub-national air quality regulators (42 percent); and urban planners (42 percent).

## Discussion

The environment where children grow up matters. To thrive, little brains and bodies need a clean environment – starting from the mothers' womb. It is unacceptable that every day, 630 million children under five years breathe polluted air, with nearly one in 10 deaths of children under five years linked to air pollution (World Health Organization, 2018; 2018, October 29).

The science is clear: reducing air pollution can save children's lives (UNICEF, 2016). Studies and initiatives with measurable results have been undertaken to reduce children's exposure to air pollution. UNICEF, for example, has identified a four-pronged approach<sup>4</sup> with suggested concrete measures that include:

3 Reduce air pollution; reduce exposure; improve child health; improve policy and monitoring

## Selected quotes from survey respondents

**"A child needs to be close to nature for early brain development."**

**"There should be more green pocket parks in neighbourhood areas rather than just bare playgrounds."**

**"Be honest about the readings and the problem, inform people, collect health data."**

**"Globally, strong advocacy initiative should be taken."**

**"More engagement. More education." "Need to initiate movement and massive campaign against air pollution."**

**"Education starts at home. Parents should be well informed about the effects of air pollution." "Children should be made aware and encouraged to keep them from air pollutions."**

**"Need to influence the government officials and politicians for legislation."**

**"More research on air pollution or air quality on children and community."**

**"We need to look for more sustainable and low-cost measures for dealing with air pollution."**

- Adopt cleaner cooking and heating fuels;
- Restrict highly polluting traffic around areas where children spend time – schools, playgrounds, parks, and residential areas;
- Improve child nutrition;
- Monitor air quality systematically.

However, uncoordinated and piecemeal actions will only bring about short-term changes. As ECD professionals who want only the best for children, we have to change the status quo. We need to continue to raise this issue to key stakeholders at various levels – from governments to households and local communities – and bridge across sectors to help ensure a safe, healthy, and sustainable environment for children. Unless the air pollution issue is addressed, children will continue to be profoundly harmed by the ill effects of air pollution – limited by their capacities to learn and to grow into healthy, happy, and productive adults who can reach their full potential.

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# Environment for healthy development of young children: the policies and practices of a carbon-negative country

Karma Gayleg

## Introduction

This paper highlights the issue of climate change and its impact on human society, particularly on young children. It also looks at how the negative impacts of climate change could be mitigated. The paper then underscores how the environment conservation and sustainable development policies and strategies of Bhutan are contributing to mitigating health and developmental risks for children and ensuring a sustainable future for the world.

The pursuit of human happiness has never appeared more paradoxical. On one hand, gross domestic product is supposedly viewed as the most important measure of success and all resources and energies are dedicated to increasing it, even as skepticism about its impact on human well-being grows. On the other hand, the ramification of today's economic well-being and pursuit of happiness appears to be putting human progress and the ability of the planet to sustain life in peril, in the form of environmental degradation and pollution. Nunez (2019) agrees that human activities are causing climate change, with drastic consequences for life on the planet, but the question of whether it can be effectively dealt with remains controversial as economics, sociology, and politics are all equally critical in planning for the future. Even as the global conversation on climate

change continues, climate change is affecting every part of the world disrupting economies, lives, and weather patterns. Glaciers are melting, sea levels are rising, and weather events are becoming more severe. Landrigan et al. (2015) observe that diseases caused by air, water, and soil pollution were responsible for nine million premature deaths, which comprise 16 percent of all global death. Exposure to contaminated air, water, and soil kills more people than smoking, hunger, natural disasters, war, and diseases.

The earth is heating. Climate scientists confirm that the average global temperature is increasing at the rate of 0.07 degree Celsius per decade and that temperature and atmospheric carbon dioxide are significantly correlated over the past 30 years, an average increase of temperature by 0.07 °C per decade (Lindsey & Dahlman 2019).

## Impact of climate change on children

Children are most vulnerable to the impact of climate change. Of particular concern are the changes in environmental risks that could influence children's development both directly through increasing levels of exposure and indirectly through intermediate effects on social and economic systems. For example, smog and polluted air threaten children directly by exposing them to respiratory



illnesses and making it harder to learn and play outdoors. The indirect effects are warmer temperatures resulting in floods, drought, and crop failure that would affect economies and food supply. According to the Lancet Countdown report on health and climate change (2019), a child born today faces far-reaching health impacts from living through a world 4 °C warmer than humans have ever experienced. The report warns that children are particularly vulnerable to climate change because a warming world exposes them to more infectious diseases, malnutrition and stunted growth, and dirty air that hinder their growth and development.

According to Landrigan and Garg (2004), infants are particularly vulnerable because of their rapid growth and cell differentiation, immaturity of metabolic pathways, and development of vital organ systems. Sunyer (2008) points out that environmental exposure during the prenatal stage and early life may permanently change the body's structure, physiology, and metabolism, and lead to diseases in adult life. According to UNICEF (2015), children are also affected when climate change hits their parents and other caregivers, such as loss of livelihoods and crop productivity, thus paying the price for the actions of adults.

Even as it is clear that children are most vulnerable to pollution and climate change, children are often not even included in discussions about responses to climate change, while they should be central to these debates as they have a much larger stake in the outcomes of those discussions. Currie and Deschênes (2016) point out that climate change will fundamentally alter the earth's climate system in many ways that threaten children's physical and mental well-being, particularly children in developing countries and countries with weak institutions face the greatest risks. Moreover, their resilience to cope with additional problems caused by climate change may be weaker to the extent

that children in developing countries are already more vulnerable to other threats such as their health and well-being. The indirect effects of climate change could also disrupt children's developmental trajectories, making it harder for them to reach their full potential. According to the WHO, it is estimated that children suffer more than 80 percent of the illnesses and mortality attributable to climate change (Landrigan and Garg 2004).

### **Legislation and political will for minimizing impact of climate change on children**

Legislation and political will for environment protection and climate change are critical to not only ensuring the safety of children and communities in the present setting, but also having an enduring impact on the health, well-being and disposition of children growing up in such an environment as future custodians of the world. According to UNICEF (2020), climate policies are not addressing children. Only 42 percent of all Nationally Determined Contributions in the Paris Agreement to mitigating global warming contain a direct reference to children, while only 20 percent mention children specifically. Less than two percent mention the rights of children.

While governments are primarily responsible for adopting policies that respond to climate change, many countries are less likely to support this effectively, leaving future generations at risk of harmful consequences. For example, major emitting countries such as Russia, Turkey, and Iran have yet to join the Paris Climate Agreement, while the United States is already processing withdrawal from the pact. Even though policies surrounding climate change require fairly long term vision as the consequences are not vividly tangible or pressing, delaying action is not an option given that children are already exposed to the risks. The Sustainable Development Goal 13 rightly urges action to curb climate change,

where it is described as the single biggest threat to development since it could disrupt the basic necessities for human health and well-being and will impede the realisation of almost all the other SDGs.

In Bhutan, even though children are hardly mentioned in climate-related policies, the existing legislation aimed at reducing greenhouse gas emissions, encouraging greater energy or fuel-efficiency standards in vehicles, buildings, appliances, etc. and encouraging the use of renewable and less-carbon-intensive alternative energy sources, including wind, solar, and hydropower do contribute to reducing risks for children and enhancing their well-being.

### The case of sustainable development policies and practices of Bhutan

Even as the threat of the impact of pollution appears grave, risks can be lessened through environment-friendly policies, strategies, and technology. In Bhutan, the conservation of natural resources has been placed at the heart of all developmental policies. Conservation of the environment is one of the four pillars of the philosophy of Gross National Happiness.<sup>5</sup> Article 5.3 of the constitution of Bhutan reads as follows:

<sup>5</sup> Gross National Happiness, or GNH, is a holistic and sustainable approach to development, which balances material and non-material values with the conviction that humans want to search for happiness. The objective of GNH is to achieve a balanced development in all the facets of life that are essential; for our happiness.



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“The Government shall ensure that, in order to conserve the country’s natural resources and to prevent degradation of the ecosystem, a minimum of 60 percent of Bhutan’s total land shall be maintained under forest cover for all time.”

The national environment protection act (2007) articulates that in order to achieve sustainable development, natural resources such as forest, water, air, biodiversity, soil, minerals, and the overall integrity of the environment should not be degraded. In line with the government’s middle path strategy<sup>6</sup>, economic development and

.....  
 5 The Middle Path is an approach to development that ensures balancing economic development with environmental protection and cultural preservation. Such a strategy is integral to the fostering of Gross National Happiness.

environmental conservation would receive equal priority. It further elaborates that the people and the government in succession shall perpetually strive to consider and adopt its developmental policies, plans, and programs in harmony with the environmental principles. The act also enunciates that every person has the fundamental right to a safe and healthy environment with equal and corresponding duty to protect and promote the environmental well-being of the country.

Bhutan is the only carbon negative country in the world. According to recent figures, Bhutan emits about 1.5 million tonnes of carbon every year while its forests absorb more than 6 million tonnes. In spite of the efforts, Bhutan is not free from air pollution. Significant air pollution, largely attributed to external sources such as industrial pollution and vehicle emission is a cause for concern that could result in decreased crop output and increased concerns about the health of adults and children. In line with the national environment protection act (2007), strategies have been clearly enunciated in the aspiration for a green and sustainable Bhutan as follows:

**Green targets**

Although Bhutan absorbs more carbon than it produces, there is no reason to rest on its laurels. The country is aiming for zero net greenhouse gas emissions and also plans to go 100 percent organic. It is aspiring to be a zero-waste country by 2030. Given that such targets cannot be achieved only through mere official declarations and policies, the government and the people put in efforts such as banning the use of plastics, prohibiting the burning of trash, and encouraging the use of renewable energy. In addition to ensuring effective practice, it is also equally vital to ensure that the practice is passed on through generations and sustained through education and established systems. Environment education is included



as an important subject area in school curricula. At the early childhood level, Early Childhood Centres are encouraged to use locally produced toys and environmentally sustainable practices. The national environment protection act (2007) articulates that the present generation must ensure that the health, diversity, and productivity of the environment is maintained or enhanced for the benefit of future generations.

### **Forest cover**

Bhutan presently has 72 percent of its land covered in forest even though the constitution mandates a minimum of 60 percent forest cover. The rich forest cover has helped the country to be recognized as a biodiversity hotspot and counted among 234 globally outstanding eco-regions. More importantly, the forest cover keeps climate change at bay. Various strategies such as banning the export of timber and strict regulation on the cutting of trees have been adopted. On the other hand, tree plantation is encouraged in all parts of the country. The fact that Bhutan holds the world record of planting 100 thousand trees in one hour is testimony to the seriousness and sincerity with which the policy is pursued. Tree planting on world environment day is a mandatory co-curricular activity of all schools, institutions, and Early Childhood Centres.

### **Renewable energy**

The commitment to renewable energy in Bhutan started in the 1980s with the construction of the first hydropower project. The country has currently achieved self-sufficiency in clean electricity and exports 70 percent of the total production. In an effort to further encourage the use of renewable energy and to decrease carbon emission, households in rural villages are provided free electricity, which is aimed at reducing the use of fossil fuel, firewood, and gas. While Bhutan produces 1.5 million tonnes of carbon, the

country's clean energy offsets approximately 6 million tonnes of carbon dioxide, which is why Bhutan is popularly known as the only carbon negative country in the world.

### **Environment-friendly vehicles**

In the drive to reduce carbon emission, one of the strategies is to encourage zero-emission vehicles. Towards promoting this strategy, the government has waived import duties and taxes on electric cars and levied something called the green tax in addition to other duties on carbon-emitting vehicles. Additionally, penalties for pollution are also articulated as follows in the national environment protection act (2007): "A person polluting the environment or causing ecological harm is responsible for the costs of containment, avoidance, abatement, medical compensation, mitigation, remediation, and restoration."

### **Eco-tourism**

The tourism industry in Bhutan is founded on the principle of sustainability, with strong consideration of environmental and ecological impact. Given the high level of awareness of the negative impact of the influx of uncontrolled volume of tourists on the environment, the policy of "high value-low volume" tourism, has been adopted from the very beginning. Over the past few decades, this policy has helped to ensure that only a manageable and environmentally sustainable number of tourists are allowed and that pollution and environmental degradation because of tourism is limited.

### **Educating for Gross National Happiness**

Gross National Happiness (GNH) is a holistic and sustainable approach to development, which balances material and non-material values with the aim to achieve balanced development in all facets of life that are essential for happiness. The four pillars

of GNH promote values of sustainable economic development, cultural values, protection of the natural environment, and good governance, which are of critical importance in shaping a sustainable world. In this context, educating for gross national happiness aims to cultivate GNH principles and values, including ecological literacy, a holistic understanding of the world, care for nature, and sustainable behaviour and living. The National Early Learning and Development Standards emphasise the development of understanding and care of the natural environment as an important competency that children must develop. Accordingly, Early Childhood Education programmes and practices are mandated to promote eco-friendly materials and environmentally sustainable practices. Furthermore, children are encouraged to learn values, skills, and attitudes such as sustainable utilisation of resources, proper waste disposal and management, and understanding and caring for the environment. Early Childhood Care and Development centres regularly coordinate programmes to engage parents in the development of locally available resources and incorporate the practice in parenting education sessions to promote environmental conservation in communities.

Within the larger policy goals of GNH and environment conservation, the need to educate young children early and instill in them the values and ethics is critical for their future well-being and the success of the noble vision for a sustainable world. As much as adults make efforts to conserve the environment and promote sustainable development, children need to be actively engaged in these activities as part of their learning process. If families and society succeed in passing on these values to children, they would have also passed on to children the opportunity to contribute actively to mitigating climate change and becoming responsible custodians of the environment.

## Conclusion

Climate change is taking place and continuing to take a toll on the world but our behaviour and action need to change if we are to slow it down or stop it. Children are also bearing the brunt of the crisis very early in life, affecting their survival, optimal development, and future well-being. The vicious cycle will also continue, contributing to a worsening situation from one generation to another. Government policies are central to whether the planet continues to deteriorate or this process is slowed down and reversed. In any case, the wisdom and insight that humanity as a whole demonstrates would matter more than anything. Therefore, the education of individuals and groups would make a difference in how the crisis is viewed and understood. The GNH policies of Bhutan,



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in sense, would contribute to creating an enabling environment for children to develop and grow up to be strong custodians and advocates of a sustainable world where they, at the same time, are afforded the opportunity to learn and internalise deep spiritual values and environmental ethics. More importantly, the opportunity to grow up in such an environment would make a significant contribution to maximising the likelihood of children developing to their full potential and living a healthy, happy, and productive life.

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# Early childhood development and air pollution in Mongolia

Ulziisaikhan Sereeter

## Introduction

Mongolia's winter is long and oftentimes extremely cold. Between October and March, average night temperatures are -10 °C or lower and can reach -40 °C around December and January. During the winter time, young children must stay warm for survival and good health. To stay warm, poor families rely on using an inefficient stove that works on burning raw coal to warm their often poorly insulated homes. In addition, a significant number of kindergartens are dependent on burning raw coal because of lacking connection to the city's central heating system. In the capital city of Ulaanbaatar, host to 1.5 million people (50% of the total population), and in smaller cities around the country, the above-mentioned situation is causing an extremely high level of air pollution which has become an unprecedented maternal and child health crisis, putting every child and pregnancy in these cities at risk in terms of stillbirth, preterm birth, lower birth weight, and pneumonia, bronchitis, and lower lung function amongst children.

The social and economic costs of early life exposure to polluted air are also significant. Exposure during early life can cause lasting damage to brain function, diminish the ability to concentrate, and disrupt behaviour; thus, reducing educational attainment, mental development, and lifetime earnings. One of the essential tasks in Mongolia is reducing children's exposure to air pollution. Using sustainable energy solutions has been proposed as the most efficient way of solving this challenge in order to support

vulnerable families. Thus, UNICEF Mongolia has implemented two projects: "Surviving Mongolia's Harsh Winters: Protecting Children from Severe Air Pollution and Keeping Warm" in 2018-2020 and "Impact of Air Pollution on Maternal and Child Health" in 2018-2022.

## Goals of the projects and approach

The goals of the projects are to improve learning and survival conditions for young children in the targeted areas by promoting innovative methods to reduce the level of air pollution, improving indoor air quality (IAQ) through innovative sustainable energy solutions, and providing educational access to young children of vulnerable families.

The projects piloted two interventions to reach the most vulnerable children to (i) protect them from air pollution retrofitting the old building of a kindergarten in Bayankhongor province and (ii) increase access to kindergartens. Three ger<sup>6</sup> kindergartens have been built in the Bayanzurkh district of Ulaanbaatar.

## Results

Under the project on "Surviving Mongolia's Harsh Winters: Protecting Children from Severe Air Pollution and Keeping Warm" initiated by UNICEF Mongolia, 1,605 children who are in kindergarten in Bayankhongor Province and Bayanzurkh District in Ulaanbaatar have been protected from severe air pollution. The government's

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<sup>6</sup> A traditional Mongolian dwelling.

commitment to addressing air pollution and providing favorable learning conditions for vulnerable children has been institutionalised which is significant for project sustainability. For example, the Ministry of Education, Culture, Science and Sports (MECSS) and sub-national governments (aimag/district) in Bayankhongor Province and Bayanzurkh District are committed to supporting the running costs needed for the operation and maintenance of the retrofitted kindergarten and newly established ger kindergartens.

## Discussion

Under the retrofitting of the old kindergarten building in Bayankhongor Province, structural upgrades of the kindergarten have been completed to improve indoor air quality (IAQ) by applying innovative sustainable energy solutions. In Bayanzurkh District, three new ger kindergartens were established. In addition, window filters for 10 kindergartens were installed, benefiting 1,300 children.

UNICEF Mongolia and the Provincial Governor's Office selected the kindergarten No. 5 based on the findings of the Assessment on the Quality Status of Kindergarten

Buildings in the provincial centre. This kindergarten has been fully renovated along with the improved IAQ and energy efficiency in October 2019 to February 2020 with the support of UNICEF Mongolia. The kindergarten's Water, Sanitation and Hygiene(WASH) facilities were also remodeled and supplied with new facilities which would be the model kindergarten for scaling up by the Government.

In addition, the model kindergarten piloted the so-called integrated approach of ECD with energy efficiency and WASH programmes. A total of 180 children have directly benefitted from the improved facility and learning environment. The renovation work was completed in February 2020 at the same time as kindergartens were closed due to COVID-19. Eleven members from the Kindergarten's Parent Council visited the kindergarten on 10 February 2020 and expressed their satisfaction and excitement with the improved environment for their children. It was quite rewarding that the kindergarten teachers were encouraged to decorate the classrooms and the best decorations received prizes from the principal.

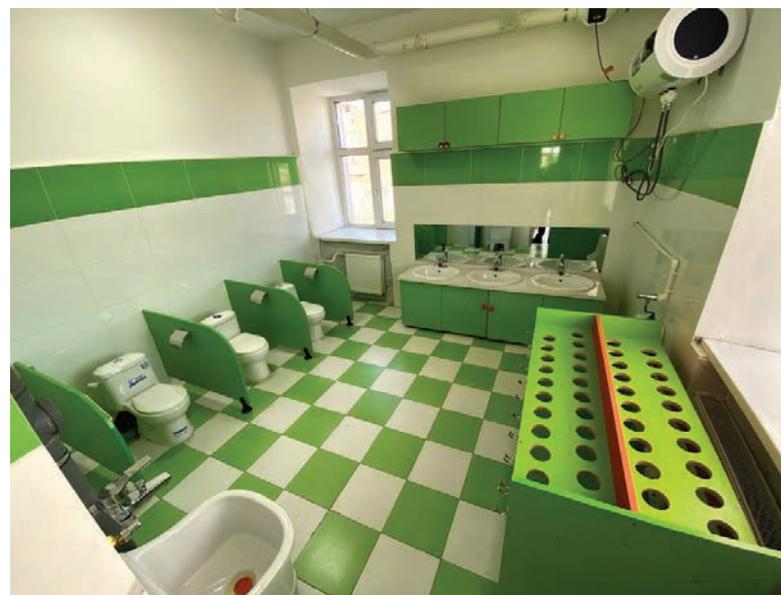


Also, teachers painted the walls, crafted shelves and chairs, set up corners to play chess, and displayed traditional items.

Under the second activity on the establishment of the ger kindergartens in Bayanzurkh District in Ulaanbaatar City, UNICEF Mongolia first administered the experiment to use new building insulation materials and new design of the ger kindergarten in collaboration with local, national and international partners as part of the UNICEF 21st Century Ger Challenge in 2019. Based on this experiment, three new ger kindergartens were established which have been installed with improved insulation materials and electric heating technology. This activity gave the opportunity for an additional 125 disadvantaged children living in ger areas of Bayanzurkh District to have access to early childhood education services. The location of the ger kindergarten provides easy access for families, with one being attached to the building of Kindergarten No. 211 in Bayanzurkh District. The Governor's Office in Bayanzurkh District has co-funded some expenses related to maintenance and the salary of teachers and staff since its establishment in 2018.

Most kindergarten buildings in Ulaanbaatar lack proper air ventilation system. Usually, windows are open to let the fresh air in classrooms during the winter period when air pollution is high. Another activity initiated by UNICEF Mongolia was to renovate windows in some kindergartens around the ger<sup>8</sup> to prevent air pollution. Over 1,300 children in 10 kindergartens in ger areas of the Bayanzurkh District benefited from this activity as their kindergarten buildings have been installed with improved window filters. The improved window filters can prevent air pollution when windows are open. The window filters from UNICEF Mongolia and air purifiers provided by the Government resulted in a 20 percent increase in the IAQ during the pilot period. The Government banned the burning of raw coal during the winter of 2019–2020. As a result, the level of air pollution was decreased by 41 percent compared to the previous winter of 2018–2019. However, over 4000 cases of carbon monoxide poisoning have been reported including at least 12 fatalities, of

<sup>8</sup> Gers produce more air pollution as it is heated by a traditional stove using coal. A third of population in Ulaanbaatar live in a ger.



Retrofitted Kindergarten No.5, Bayankhongor province / © Ulziisaikhan Sereeter

whom six were children. The net impact of the introduction of refined coal on health is yet to be substantiated. This is also the reason that UNICEF has not and will not engage in any activity that would involve the burning of any type of coal or other solid fuel. Monitoring over IAQ in kindergartens will be continued in the winter of 2020–2021.

Monitoring the use of the installed system is part of the planned project activity. This has been done in collaboration with the University of Pennsylvania and Washington University of St. Louis in the USA. The thermal monitoring sensors and IAQ sensors were installed in 24 pilot kindergartens in Bayankhongor Province and Bayanzurkh District. The installation process took in two stages: first, five kindergartens were completed in December 2019; an additional 19 kindergartens were installed in May 2020. Mitigation measures were put in place and the devices were shipped from the United States.

The installation process has been guided and monitored virtually by the experts from the above two universities.

However, monitoring activity over the functionality of IAQ in these kindergartens has been delayed due to the COVID-19 outbreak as kindergartens were closed from early February 2020 until the end of the academic year. The monitoring of IAQ data is incomplete at the time of reporting but will be continued in the winter of 2020–2021 which would provide more comprehensive data. The activity will be supported by the ongoing UNICEF project on “Impact of Air Pollution on Maternal and Child Health.”

In conclusion, UNICEF Mongolia could prevent 1,605 children from air pollution during the winter of 2019-2020 and it will continue its efforts to support model kindergartens through piloting the integrated approach towards ECD with improved insulation and indoor air quality in the coming years.



Friends, Ulaan Bataar, Mongolia/© Budka Damdinsuren/Unsplash

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# Growing up in cities: empowering early childhood services in Da Nang, Viet Nam to deal with urban barriers to learning

Chau Nguyen Thi, Lieve MRD Leroy, and Duy Nguyen Dinh Khuong

## Introduction

The world is changing fast and with it, the context in which children grow up, learn, and develop. Education systems must adapt; however, they are challenged by the rapid pace of change. One of the often underestimated but very present challenges in development today is the fast-urban growth and quality of life in cities (Beall et al., 2010). The United Nations New Urban Agenda (2017) recognises the key importance of urban planning, agile local government institutions, and quality education.

Da Nang is a typical example of such a fast-expanding city (Ostojic, Dejan, Bose, Krambecj, Lim & Zhang, 2013). The Da Nang city services are working to ensure that the full potential of urban development benefits all citizens – including many newcomers from rural provinces. However, urban growth can soon put pressure on the educational system: it can exhaust the capacity of public schools and contribute to increasing urban stress.

This paper shares the approach and initial outcomes<sup>9</sup> of the “Communities of Practice Inspiring Teaching Innovations in the Early Education System in Vietnam” project (CITIES). It includes approaches that WOB, a non-profit organisation working on education for development, and its partner, the Da Nang

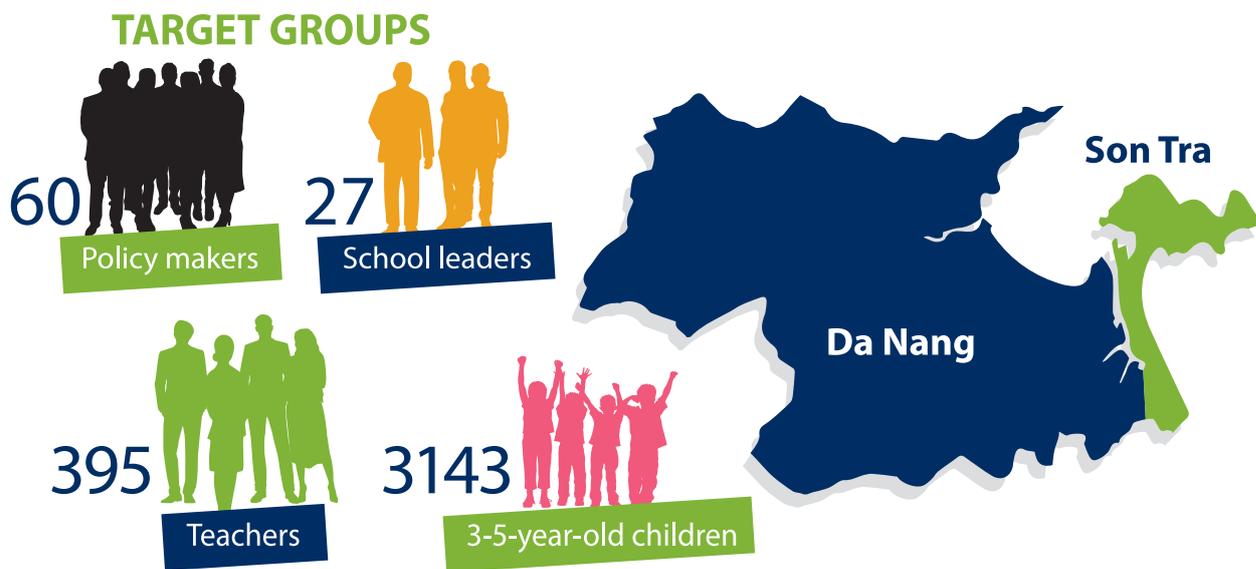
Department of Education and Training (DOET), are applying to improve the quality of preschool education in public and private preschools in a fast-growing city (WOB, 2019). The paper explores how the education system can adjust its access, services, and the pedagogical approach to help children cope with the changing urban environment. The classroom, in this paper, is considered the place where many of the interlinked societal evolutions that impact children come together.

## Background information

The project, which runs from June 2019 until February 2021, focuses on the Son Tra District, Da Nang City, Viet Nam. Son Tra is an industrial port district with many seasonal and migrant workers. Due to the fast increasing population, and the limited capacity of public services, the number of private preschools and home-based groups have grown drastically, currently standing at 15 and 137 respectively, with lower qualification levels for teachers in private schools than in public schools (Son Tra Bureau of Training and Education, 2019).

The direct beneficiaries of the project are the teachers and school leaders of eight pilot preschools (6 public, 2 non-public) and the government officials of the Da Nang DOET and Bureau of Education and Training (BOET) (Figure 1). In the preschools, the project focuses on the 3 to 5-year old children.

<sup>9</sup> At the time of writing this paper the project is in its sixth month (November 2019).



**Figure 1:** Infographic CITIES project

### Methods

In one year, the project seeks to identify key barriers to learning that are typical for vulnerable boys and girls in an urban context as well as identify and implement innovative ways of mitigating some barriers.

The project assists Da Nang preschools to apply the Process-Oriented Child Monitoring methodology (Laevers, Moons & Declercq, 2012) to assess the well-being and involvement of preschool children as a proxy for learning and participation (Box 1, Figure 2). Based on the results, teachers implement a more differentiated pedagogical approach to preschool pupils experiencing barriers to learning.

Furthermore, a group of international and national artists expose participants to and let them try out applied artistic practices and interactive theatre methods (see Table 2) to build socio-emotional skills and resilience in children that grow up in an urban context. Although a city creates challenges, it also offers opportunities for learning (André, 2012; Bernard Van Leer Foundation, 2019).

In a second phase, this project explores how the availability of arts and real-life learning opportunities in the city (such as storytelling murals, design for play in public space, storytelling in the park) can be an educational asset to overcome barriers.

The capacity development of teachers, school leaders, and education officers consists of a modular training approach, complemented by on-site coaching, collaborative learning, and study visits.

The process is documented and analysed, creating a body of knowledge on urban barriers in the education context. The project gathers academic and government experts to support and learn from these findings. It is intended that a community of education practitioners explores the concept of urban barriers to learning, exchange ways of mitigating these barriers, and provide policy advice. The project aims to organise an exchange between representatives of the DOET from different cities in Viet Nam to disseminate experiences and create momentum for replication in other cities.

**BOX 1**

**Process-oriented child monitoring**

**Process-oriented child monitoring methodology (Laevers et al., 2012) is an experiential education method which helps teachers to observe the (1) level of well-being and (2) involvement of children, identify (3) barriers to learning and (4) participation, and taking action to mitigate these barriers and to ensure deep learning of all children.**

**1** Children who are in a state of well-being feel like a ‘fish in water’. They radiate vitality and inner peace. They are spontaneous and comfortable. They show

self-confidence and self-esteem. They are receptive to their environment.

**2** Children with a high level of involvement are highly focused and absorbed by their activity. They show interest, motivation, and deep satisfaction. There is an intense mental activity. They operate at the limits of their capabilities.

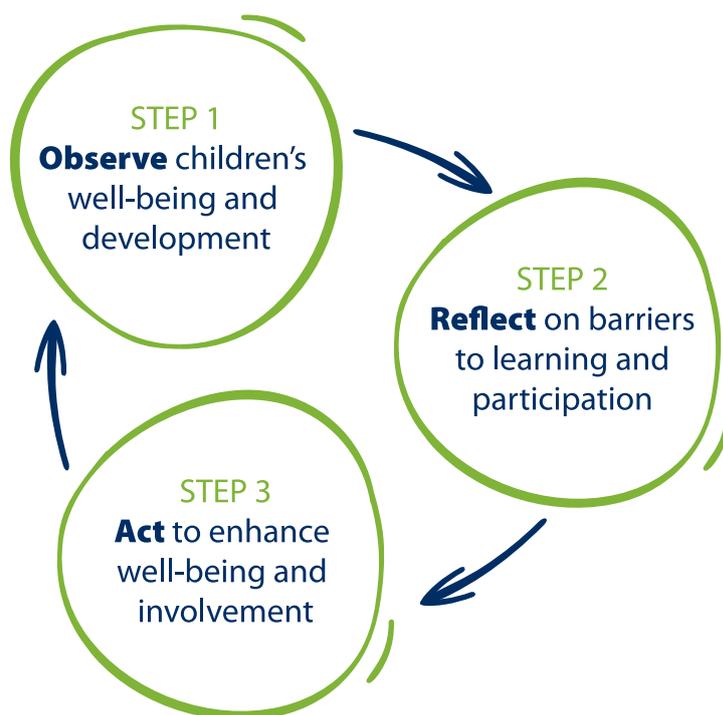
**3** Once teachers have monitored children’s levels of well-being and involvement, they identify which children are doing well and which are at risk of not learning.

The teachers reflect on barriers to learning and participation (Booth, 2016) experienced by children at risk.

**4** Based on the reflection, teachers prioritise changes in:

- the physical space of the learning environment and the corners;
- the materials used in classroom corners and activities;
- the activities (learning activities, play activities, outdoor, free play); and
- interactions (1) among teachers and the children, (2) among children.

**Figure 2:** The process-oriented child monitoring approach



## Results

Through the varied capacity development methods (modular training, complemented by on-site coaching, collaborative learning, and study visits), teachers, school leaders, officials of Da Nang DOET and Son Tra BOET improved their skills of observing children’s well-being and involvement, and analysing barriers to learning and participation.

It was difficult for the target group to look for barriers beyond the classroom and see the link between the urban circumstances the children live in and their learning and participation in the classroom. The project then built awareness and understanding of urban challenges. Participants identified educational barriers (such as limited and unattractive materials, inappropriate didactics,

etc.) and urban barriers to learning (such as too much screen time for children, lack of parental time) [Table 1].

The planned additional data collection, both qualitative data from focus group discussions with teachers, school leaders, and parents, and quantitative data from questionnaires to be completed by teachers and school leaders mapping both the impact and frequency of the perceived barriers, will complement these findings.

From the barrier analysis, participants applied eight possible action points, initiating changes in the learning environment, activities, materials, and interactions (Table 2). On-site coaching helped them to deepen their understanding and improve implementation.

**TABLE 1** Educational and urban barriers

Educational barriers	Urban barriers
<ul style="list-style-type: none"> <li>Limited and unattractive learning materials</li> <li>Inappropriate didactics</li> <li>Teacher/children ratio</li> <li>Limited parent-teacher contacts</li> <li>Pressure from parents on teachers, children</li> </ul>	<ul style="list-style-type: none"> <li>Too much screen time</li> <li>Lack of parental time</li> <li>Changes in social cohesion</li> <li>Limited access to green spaces</li> </ul>

**TABLE 2** Eight possible action points

1	Rearrange the classroom in appealing corners or areas	5	Support ongoing activities with stimulating impulses and enriching interventions
2	Check corners to replace unattractive materials with more appealing ones	6	Widen possibilities for free initiative, support them with sound rules and agreements
3	Introduce new and unconventional materials and activities	7	Explore and improve the relationship with each child and between children
4	Discover children’s interests and find related activities	8	Introduce activities that help children to explore the world of behaviour, feelings, and values

Changing the activities (Hoang Yen Preschool, Da Nang, January 2020)/© Nguyen DK Duy



Change in the learning environment, activities, and materials (Hoi An, March 2020)/© Nguyen TT Trang



The visits also stimulated the teachers' confidence and openness to reflect on and discuss their teaching practice. The collaborative learning via group work, sharing and exchanging experiences and results, and discussions, stimulated learning with and from each other. Study visits exposed them to new ideas and concrete examples of how to implement action points and innovative methods.

Participants indicated how this approach supports the implementation of directives on child-centred approach and daily child-assessment as requested by the Viet Nam Ministry of Education and Training (Socialist Republic of Viet Nam, 2017; 2017; 2018; 2019).

So far, these findings are in line with what VVOB and DOET experienced in a similar programme in rural provinces such as Quang Nam, Quang Ngai, and Kon Tum.

### Challenges

The project found that participants were generally unaware of urban barriers and their potential effect on the holistic development of children. In addition to this, the project identified some additional and unexpected challenges.

Firstly, the interactions with the target group were different than in the above-mentioned similar project in three central provinces of Viet Nam. School leaders and teachers were more hesitant to share opinions, ask questions, and interact. The project adjusted its facilitation methods accordingly, providing more individual and smaller group interaction prior to bigger group activities. Coaching visits stimulated the confidence of participants. This observation will influence the project's approach towards the sharing and exchange activities planned further in the project.

Secondly, the start-up phase of the project revealed a difference between the teaching staff in private schools as compared to public

schools. Private schools see a higher turnover of teachers and lower levels of teacher professional development. While this already brings clear challenges for the quality of education offered, private schools also seem to have less time for in-service training and participation in the project.

### Next steps

The next step will be exposure to an experimental innovative method. This will be facilitated by a joint group of international and national artists. The workshop will help participants to be exposed to and try out applied artistic practices and interactive theatre methods to build socio-emotional skills and resilience in children that grow up in an urban context. The innovative workshop will be followed by an analytical workshop where participants will analyse how the innovative method fits in the Vietnamese education context and policy as well as how it affects well-being and involvement of children.

This will be further complemented with the above-mentioned additional data collection, quantitative and qualitative, describing the preschool child in the urban context. This information will be linked to existing research on urbanisation (desk study).

### CONCLUSIONS AND RECOMMENDATIONS

The challenge of sustainable urban development is increasingly being recognised as a key development challenge, although only a limited number of organisations have dedicated programmes in place. The national government of Viet Nam has engaged in earlier World Bank projects to address urban expansion. Additionally, at the start of the school year 2018-2019 the Vietnamese prime minister called for dedicated attention to the quality of schooling for children in industrial zones, thus creating an ideal policy base and

political buy-in from the highest level – important in a centralised country like Viet Nam (Socialist Republic of Vietnam, 2018). Da Nang, often considered Vietnam’s third city, was the second Vietnamese city to participate in the Child-Friendly Cities Initiative in 2019 (Weedy, 2019; United Nations Children’s Fund, 2004; 2018).

There is a high level of commitment to and appreciation for this project from all levels in the education system, from the Ministerial level, city authorities in Da Nang, to the school level. So far, very few initiatives target education in an urban context. Despite the commitment, the project reveals a general lack of awareness on how growing up in a city can affect the learning and participation of pre-school children and on what role a school can play in mitigating the barriers.

This small-scale intervention creates awareness and builds capacity in adjusting practices. It also led participants to see implementation opportunities for the

early childhood education curriculum and directives by the Ministry of Education and Training. The planned exposure to experimental innovative methods will help participants to specifically address urban barriers to learning and participation.

Due to the limited capacity of public services, the presence of private schools catering to the disadvantaged is a specific urban reality. Guaranteeing the quality of education for all children is a responsibility of the DOET and BOET. These initial lessons are very relevant for the learning trajectory of the government officials DOET and BOET, i.e. “what role can they play?” and will be further analysed and discussed throughout the pilot year.

Parallel with the continuation of capacity development, the project continues to collect data and information from literature, Da Nang DOET, Son Tra BOET, teachers, school leaders, and parents. The project will, thus, contribute substantially to the currently limited body of knowledge on the potential effect of cities



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on the holistic development of children. Learnings will be collected in high-quality dissemination materials in video and print.

Growing up in a city offers tremendous potential for a child. Cities, however, also create specific barriers to learning and participation that carry the risk of increasing inequalities and affecting the most disadvantaged much more strongly. The project accompanies key actors in the education system to find the opportunities of urban living to tackle the urban barriers to learning. While it is not without its challenges, this approach is already uncovering its potential added value.

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# Raising awareness of climate change and ocean acidification effects on young children's development

Maria Raquel da Costa and Silvana N.R. Birchenough

## Introduction

Early childhood experiences can have a continuous impact on a person's lifetime (Raykes, 2017). The scientific evidence on exposure and stress in the environment, and how it affects the development of the brain, is of utmost concern for agencies fostering the rights of children (UNICEF, 2014a).

This paper aims to highlight the importance of positive environments to foster early childhood development (ECD), and in particular, on the examination of the oceans as a less associated physical environment for ECD. This area of study has particular importance for families and children living in coastal areas in the Asia-Pacific region. In doing so, it examines the evidence of effects of climate change in the oceans' ecosystems and the extent to which ocean environments can provide clean, safe, and secure conditions for ECD in the context of the SDG 2030 Agenda.

This paper raises awareness of two interrelated but different processes which could affect lives and ecosystems, both climate and human-driven: firstly, one that is mainly climatic and defined as warming; and secondly, another resulting from an increase of carbon dioxide (CO<sub>2</sub>) in the atmosphere that is absorbed by oceans causing its acidification (OA).

This paper argues that it is relevant to understand the scientific evidence on the importance of preserving the oceans, as enabling settings to support child development, as well as an important goal for sustainable environments in the SDG 2030 Agenda, and for human capital development. In this respect, the role of policymakers, the civil society, and the private sector becomes paramount in defining effective policies to mitigate the negative effects of OA on young children and families and to promote ECD as the main driver for achieving the SDG 2030 Agenda (UNICEF, 2017).

## Positive environments for fostering ECD

The relevance of providing a safe and sustainable environment for ECD has been made explicit in the Nurturing Care Framework (UNICEF-WHO, 2018). It emphasises that safe and secure environments should be free of hazards, including those in the physical environment caused by pollution, unsafe drinking water, sanitation, and exposure to toxic chemicals. However, less attention has been paid to change taking place in the oceans and its connections with ECD.

ECD is a process that takes place during the early years of a child’s life, starting at pregnancy through the early years in school (0 to 8 years old). ECD includes the formation of skills and competencies of cognitive, physical, and social-emotional domains. Throughout the first 1000 days in the lives of children, the development of the brain is at its best, where quality early experiences are relevant, together with appropriate food and nutrition. In addition, low levels of emotional stress are most optimal for young children’s development. It has been established that increased stress can have a negative impact on child development (UNICEF, 2014 a.), and related to this paper, stressors include those experiences caused by sea disasters (i.e. tsunamis). The reduction and/or disappearance of sources of income and food due to pollution in oceans also can have tremendous long-term impacts (Doney, Ruckelshaus, and Duffy, 2012). In some cases, coastal and marine dependant populations,

tend to diversify their activities to secure their livelihood. Taking all into consideration, it is relevant to highlight the importance of a positive physical environment and the extent it can constructively influence the basis for establishing a strong foundation in life. In addition to the genetic material of each child (nature), the environment (nurture) plays an important role for children to achieve their full potential. Current research in neurosciences has highlighted the importance and types of interactions between the child and the environment as a key factor for ECD (UNICEF, 2017). This paper examines the safe physical environment factors affecting ECD, including the natural environment free from pollution and contamination.

In recent years, the effects of climate change and the developmental needs of children have been highlighted (UNICEF, 2014b). Topics of climate change, including environmental pollution in cities and how it affects children’s



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health, have been diligently examined. A topic perhaps less examined with respect to influencing ECD is how climate change may also affect the eco-diversity of oceans. The effects on the livelihood of children and families who live in coastal areas are of concern under the SDG 2030 Agenda. Scientific research has signalled how climate change accounts for variations in OA levels for marine life and species of commercial importance (Birchenough, 2017; Birchenough, Degraer and Reiss, 2015) and taking into account that a large number of children and their families live near oceans in the Asia-Pacific region (nearly 70 percent of those close to coastal areas), the question of the extent to which the OA can adversely affect lives of young children by increasing their vulnerability and thus reduce their chances to reach their full developmental potential is relevant.

One aspect of child physical development which suffers most from the effects of climate change is health (i.e. increase in child pneumonia and respiratory illnesses) and consequently, has a knock-on effect on other areas of ECD, such as cognitive development. In coastal areas, this may be exacerbated by the stress of lacking food security and the accessibility of nutrients for young children and mothers during pregnancy and the early years of life. Furthermore, when countries are considering the development of the human capital, Perera (2014) explains that besides effects on health and nutritional status, families who have lost their food sources due to climate effects (including changes in the ocean) are less likely to send their children to school, hence raising the chances of remaining in poverty and perpetuating their marginalisation. In the case of young children and families living in coastal areas, such as in the Asia-Pacific region, the effects of climate change are apparent and reflected in the migration of the family or one or both parents, leaving young children behind to find other

sources of income (ILO, 2017). Research focus on the effects of climate change in the lives of children has been given primarily to the urban children in poverty, the built environment where they live under precarious conditions, and the use of fossil fuels, but less attention has been given to how the effects of climate change and the rise of CO<sub>2</sub> in the natural environment of the oceans and the eco-diversity can change the lives of children.

### **ECD and the ocean as a supporting and enabling environment for development**

As many young children and their families in the Asia-Pacific region live in coastal areas, the implication is that their livelihood depends largely on the availability of the biodiversity of species and habitats of ecological and commercial importance (FAO 2016). To secure young children's positive development, to grow healthily and thrive, parents provide

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## **Sustainable Development Goals**



mainly by using and managing the resources available in their immediate environment. In coastal areas, it is likely that the main source of income generation will come from the oceans (FAO, 2016). However, research reports that species and habitats experience climate-driven effects (Birchenough 2017). In recent years, the effects of climate change including the variations in oceans' ecosystems have been highlighted as adversely affecting the lives of young children and families (UNICEF, 2014b), even more so today given the worldwide COVID19 pandemic. The immediate effects have resulted in increasing young children's vulnerability through limiting means of family support and exacerbating the need for internal displacement to look for alternative sources of work.

More often, coastal communities that depend on the ocean for their only source of income are at risk of being unable to secure enough to live and of becoming even more

vulnerable. Coastal areas in the Asia-Pacific region have been affected by climate change, and in particular changes in ocean chemistry due to increasing CO2 concentration from the atmosphere (i.e. gases from factories, industry, cars and trucks). Oceans are the largest natural reservoir of dissolved carbon and hold an immense buffering capacity for changes in atmospheric CO2 concentrations (Birchenough, 2017).

Ocean acidification has affected commercial species in the Asia-Pacific, and indeed all over the world, by becoming smaller and limited. Shells and skeletons are made from calcium carbonate and the more acidic the ocean becomes, it is likely to affect the species' ability to grow and reproduce (Birchenough, 2017; Birchenough, et. al., 2015). Species that can survive become smaller and potentially will affect the food chain that relies on ocean ecosystems. In some cases, their nutritional levels will also be compromised

Figure 1. The United Nations Sustainable Development Goals



Source: <https://sdgs.un.org/goals>.

(San Martin, Gelcich, Vasquez, Birchenough, and Vargas, 2019). The effects of OA have been analysed over economic scenarios, for example, shellfish and aquaculture. Results have predicted severe future consequences for such resources, demonstrating limited species' availability leading to compromised food security (Mangi, Lee, Pinnegar, Law, Tyllianaki & Birchenough, 2018). When sources of food and income are limited, additional social consequences are to be expected. For example, children may engage in informal family-income generation activities, resulting in low or unpaid, work and unsafe consequences (ILO, 2017). Furthermore, the result from such activities could mean that children of school-going age miss out on their education and consequently, increase multi-dimensional poverty (ILO-UNICEF, 2020). The long-term effects of limited sustainability of an enabling environment, such as the oceans, will eventually result in the inability to secure a safe and clean environment, which will impact young children's ability to reach their full developmental potential.

## **Understanding the implications of OA for ECD and the SDG 2030 agenda**

ECD is a key component of the 2030 transformative agenda, and thus, an international priority. This transformative agenda is part of governments of the Asia-Pacific region, and indeed the whole world strategic plans with global targets. As stated in the UN SDG 2030 Agenda, there are over 17 goals which form a "blueprint to achieve a better and more sustainable future for all" (See Figure 1). SDGs 1, 2, 3, and 4 are the most relevant to ECD, and can only be achieved if children are at the centre of policy and actions and given opportunities to become the human capital of nations. SDGs 13 and 14 aim to minimise and address the impacts of climate change and oceans, which calls for enhanced scientific cooperation across disciplines. Lastly, SDG 16 promotes peaceful and inclusive societies. To address such goals and priorities, there is a need to strengthen multi-sector partnerships, promote education,



and make available the interconnections among the SDG targets and the key role of ECD. Only by complementing such actions is there hope to achieve the SDGs in 2030, as well as promoting equity and opportunities for building the human capital of nations. The scientific information about human development and the natural sciences of the environment provides evidence for joint actions for new research for policymakers to prioritise and maximise the role of enabling physical environments for young children.

### Policy implications

Several policy implications arise for consideration.

- First and foremost, the need for a multisector approach in policy and actions. There needs to be a priority given to building the human capital of a nation and to minimise the effects of OA on children's rights.

- Second, this will ensure children have a healthy development, protection from harm and exploitation, and improved participation in education.
- Third, the provision of access to quality early learning and keeping young children in schools must be a priority (Barnett, 2010). Policymakers should take into consideration the clear benefits of ECD in reducing social inequalities, fostering sustainable environments, and promoting peaceful societies.

### CONCLUSIONS AND RECOMMENDATIONS

The study and monitoring of OA effects are advancing rapidly. Ongoing research has shown that further understanding of changes in oceans and other stressors affecting ecosystems is also needed. Within such ecosystems of coastal areas and the impacts on children are important to consider.



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Research also indicates that children need safe and protective environments to achieve their full development potential. As the marine environment forms the basis for the livelihood of children who live in coastal areas, it is important to study the social implications that such changes may impinge on food security, health and nutrition, the elimination of poverty, quality education and to accelerate progress towards a more peaceful and sustainable world for all.

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# Nature and the brain: the answer is in the trees

Caroline Essame

**“Look deep into nature, and then you will understand everything better”**

(Albert Einstein)

The natural world is shrinking. Not just its size as rainforests are cut down and urbanisation spreads, but the diminishing place it has in children’s lives is also getting smaller. Over the past 200 years, more people have left the countryside and, according to a report in the Economist, three-quarters of humankind could be living in cities by the year 2050 (Burdett, 2014). This is a dramatic and relatively recent change. In other words, humans

evolved to live in natural surroundings over six million years and have moved into urban environments in the last few hundred (Song, Ikei & Miyazaki, 2016). That’s 0.01% of our time as a species. To consider the impact specifically on children, this paper draws on academic literature on the beneficial impact of exposure to the natural world on mental health and early childhood development, and the author’s clinical practice working



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with children from both highly urbanised (Singapore) and rural (India and the Philippines) environments. It proposes a research agenda into how best to create and study a meaningful connection between children and nature in an increasingly urbanised world, and the implications of such a connection for the future of the planet.

People of all ages experience higher levels of stress in urban than in natural environments (Beil & Hanes, 2013), and spending time in natural environments can reduce that stress (Ulrich et al., 1991). Studies have looked at how simply being in nature lowers the heart rate, blood pressure, and cortisol levels (Selhub & Logan, 2012; Lee, Park, Tsunegetsu, Kagawa & Miyazaki, 2009), and in Japan, people speak of restorative 'forest bathing' or *shinrin-yoku*, immersing oneself in greenery to bring calm to the soul (Lee, Park, Tsunetsugu, Ohira, Kagawa & Miyazaki, 2011).

If it has such an effect on adults, what more impact can it have on developing children? According to a report for the UNICEF, the first 1,000 days of a child's life are critical in developing foundational skills (Cusick &

Georgieff, n.d), and Richard Louv (2008) has coined the term 'nature deficit disorder' to describe the behavioural problems in children that accompany a lack of time spent outside. Play in nature is a crucial part of giving children the best start in life for the best chance in life.

First, therefore, this paper considers what happens when children are exposed to the natural world. The changes to their brains are physical and measurable, and one recent study suggested that exposure to green space during childhood is associated with beneficial structural changes in the developing brain, measuring more white and grey matter in the brains of children surrounded by nature, both of which are associated with stronger cognitive functioning (Dadvand et al., 2018). Nature helps children be friendlier and more sociable: Rachel and Stephen Kaplan (1989) observed that exposure to the natural world lights up the anterior cingulate and the insula areas of the brain which are linked with empathy and altruism. It builds cognitive skills (Bratman, Daily, Levy & Gross, 2015); humans need to understand form and shape in order





Developmental play pyramid / © 2016 Caroline Essame

to develop sophisticated language, which is wired into the brain first by seeing in 3D which gives a sense of shape which our minds treat as 2D and which is in turn processed as a language (Williams, Happé & Jarrold, 2008). The complexity of nature gives a richer source of 3D patterns, ultimately strengthening language skills. Children who play in forests have more complex language than those who play inside, linked to the stimulating input into the child's brain, the complexity of the emotions aroused by interactions with such stimulation, and the language they use to describe it. The author Robert Macfarlane (2015) speaks of 'childish' as a language, developed by playing amidst the complexity of the great outdoors.

Time spent in the natural world is also important for emotional regulation – something any parent will recognise is rarely innate in small children but which must be nurtured. While urban living is stressful and causes the body to release the stress hormone cortisone, being in nature has a counterbalancing effect and encourages the body to release serotonin, the calming hormone. All children have outbursts or tantrums and, according to Alison Chown

(2015), they benefit from having big spaces for their big emotions. Working with children with attention disorders, particularly, having them run along a beach with the ocean crashing next to them, or through a forest of towering trees, or through the wide-open spaces of the desert or prairie, is more therapeutic than intense work in small rooms where the emotions can bounce back off the walls.

Further, moving in and through nature is critical for a child's physical development. Running is key for building strength and gross motor skills, and running over uneven ground develops all the fine micro-adjustments needed to stay upright, developing vestibular awareness and core skills which help children regulate their bodies and develop focus skills for school readiness. In urban Singapore where I work and where the ground is usually smooth pavement, tiled floor, or running track, stories abound of young people who feel anxious when they walk along a forest floor or a muddy track. By contrast, having worked with children in the Philippines and in rural India who have grown up navigating their way through complex landscapes, over potholes and uneven pavements – like a parkour enthusiast dodging obstacles, turning

# NATURE PLAY

## 10 ways nature supports development and wellbeing

- 1 Nature is relaxing. Just being in natural environments releases the 'happy hormone' serotonin which balances out the 'stress hormone' cortisol.
- 2 Nature stops short sightedness. Playing outdoors in natural daylight for at least 1.5 hours a day helps prevent myopia.
- 3 Playing in nature builds language skills in children by strengthening the neuron pathways for complex thought.
- 4 Playing in nature gives us big spaces where we can express big emotions — and nature just absorbs them.
- 5 Nature lowers the heartbeat — another reason why it is an antidote for stress.
- 6 Being away from urban pollutants improves memory, focus and regulation.
- 7 Playing in nature builds stronger bodies and helps build our brains through integrating all our sensory processing skills.
- 8 Nature play builds balance and dexterity as we walk on uneven surfaces.
- 9 Nature builds our social brain by lighting up the areas associated with empathy and caring.
- 10 Playing in nature gives us a soul that cares for the environment for future generations.

*The answer is in the trees*

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sharp corners, climbing walls and fences – have remarkable core strength and fine motor skills. Naturally, any correlation between the development of a child’s motor skills and the environment they grow up in which may be observed in future studies will not indicate causality, but these examples offer anecdotal evidence which may be taken as an illustration of an observation that coincides with many findings of the studies noted here.

Nature sharpens the senses. The complexity of woodlands, shades and textures, light and dark, shifting as the wind blows the leaves, is far more stimulating to the eye than the smooth, square, grey, regular, plain shapes, and limited vistas of the average city. Related to this, all our senses are best integrated by being in nature; it develops our physical bodies and is imperative for sensory processing and integration (Ayres, 2005) – a

foundation skill for many aspects of learning (Williams & Shellenberger, 1996). With shifting strength and direction of the wind, changing light, near and far distances, visual complexity to assess and understand, subtle sounds each of which carries a meaning – all of these sensations feed into the brain to help children make good decisions when moving through a landscape. It's been a matter of survival for our species for millennia, and even today if you climb a tree you need to have sight, balance, proprioception (being aware of the position and movement of your body), and hearing all working together or else it can all go wrong.

Right across the spectrum of abilities, children benefit from time in the natural world. One study that took 'underachieving' children and exposed them to a series of child-led activities in nature concluded that "the more natural outdoor spaces in which child-initiated activity took place appeared to amplify the effects of child-initiated learning and diminish the perception of underachievement" (Maynard, Waters & Clement, 2013: 212). All the beneficial effects described in this paper so far are more pronounced among children with special needs: when children with ADHD spend time in nature, for example, their level of arousal diminishes as the natural world improves their ability to self-regulate (van den Berg & van den Berg, 2010), although the study stopped short of a causal connection, given the complexities of ADHD and the variety of contributing factors; nor were the authors able to identify clear reasons why the diminished levels of ADHD occurred. Urbanisation, meanwhile, may negatively trigger sensitive brains; and Taylor, Kuo, and Sullivan (2001) observed a connection between the urban environment and increased activity in the amygdala, the 'reptilian' part of the brain responsible for the flight, fight and fear emotional reactions. Constant traffic noise and artificial light may be problematic to children on the autistic

disorder spectrum (ASD), too, and one study in China found that "exposure to nature provided motor-sensory, emotional and social benefits to children with ASD" while acknowledging the barriers to taking children into nature (Dongying et al, 2019: 71). Dongyang and colleagues instead argue for bringing the countryside into the city, which this paper echoes.

Second, the role of play is also essential in early childhood development (e.g. Olfman, 2003; Nicholson & Wisnewski, 2019), and by way of illustration, the four stages of the Developmental Play pyramid each offers an insight into how play in nature affects a child (Essame, 2020). The basic stage is sensory body play where a child gains confidence and agency by playing among the (messy) cornucopia of smells, textures, colours, movement, and sounds of the natural world. At this stage too, immersion in nature reduces stress hormones so that children feel safe if they are supported by a parent or caregiver as they encounter the natural world. Building on this sense of confidence, the second stage is exploratory creative play where children explore using different modalities in the complexity of nature, as they play with the mud and puddles, sticks and leaves, and rocks and sand. Third is meaning-making play, where children look for patterns to make sense of the world around them. This is the foundation of the fourth stage of higher play, where children create games with rules and roles. As Robert Macfarlane (2015) says, the countryside is an ideal place for games of fantasy and imagination to run riot. Play in the natural world also helps children's language to develop, enriching this higher play even further.

Finally, beyond the benefits to the individual child, there are wider implications for the environment and the future of the planet. If children are encouraged to play in nature, they are more likely to value the natural world

and it will be less alien to them – and they will be more concerned with protecting it. Catherine Broom (2017) found an association between how much adults played outside as children and their positive attitudes (although not always actions) towards the environment in later life; while those who did not play outdoors as children rarely reported in the survey that the environment was a priority. In her study, 87 percent of respondents who had played outside as children said they loved nature; and of those, 84 percent said they thought it was important to care for the environment: “Further, the more positive the experience in nature was selected to be, the stronger the participants identified themselves as adults who loved nature” (Broom, 2017: 39). By contrast, there was a perfect correlation between not playing in nature and feeling neutral about the natural world. The alternative is a vicious circle of diminished natural world which inevitably leads to reduced time in nature and less care for nature. It is one thing to experience nature through Netflix documentaries; it is another to have lived it, breathed it, and got it under your fingernails. Children who have grown up immersed in nature are therefore more likely to see their value. Conversely, children who have grown up a long way away from forests and oceans will see them in abstract terms and will be less concerned as they are polluted and destroyed.

Beyond the first 1,000 days of a child’s life, moving to a greener place at any age is associated with improved cognitive functions (Wells, 2000). If that is not possible, simply having trees in a city, a hedge around a school or a plant in your home makes a difference. If it’s difficult to take your children into nature, bring nature into your children’s life. The best approach, of course, is to teach outside and play outside. This paper does not argue idealistically for an exodus of children from the city to the countryside. That is unrealistic.

It does argue, however, for a research agenda into how best to bring the benefits of play in the natural world into urban settings. Given the evidence that both play and nature are beneficial to children (Olfman, 2003; Chown, 2015), particularly when combined (Louv, 2008), and that more children live in cities where they have less opportunity for play (Song, Ikei & Miyazaki, 2016), such a research agenda is timely and even critical. Initiatives such as helping children to plant fruit trees in their school playgrounds, suggest action which can subsequently be studied for its impact on attitudes towards the environment. Build schools with driveways away from main roads and not only line the pavements not only with trees but also plant bushes at a child’s height. And if in low-resourced areas, such as in migrant camps or tower blocks in underprivileged urban neighbourhoods, encourage children to plant seeds and watch them grow. The seeds will become metaphors of hope, teaching patience and wonder, and help counter the toxic stress which so many children are exposed to today. Even a small plant will help the brain release serotonin when kept in a classroom to counter stress. The answer, in other words, is in the trees.

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## SPECIAL FEATURE

# Green-blue schoolyards: an effective investment for early childhood, nature, and climate

Julien Vincelot and Esther Goh

### Introduction

In rapidly growing and urbanised cities, there is a need to ensure that cities remain sustainable and resilient, such that they support the health and well-being of its inhabitants, particularly the youngest. One such solution is in the provision of green and blue infrastructure. This refers to natural and semi-natural landscape elements on various spatial scales and includes a wide breadth of elements such as trees, grass, parks, pools, and ponds. This article shares a case study, originally featured on the Early Years Starter Kit Website, which was produced with the support of the City

of Rotterdam and Ian Mostert, project leader at IVN and former Director of Speeldernis. Following the case study, the article highlights some examples from the Asia-Pacific region and what implications it has for the region.

The Green-Blue Schoolyards programme is a subsidy and technical support programme by the City of Rotterdam for the period of 2019 – 2022. It addresses child-friendliness and climate adaptation agendas with a common solution: more nature in schoolyards. The programme supports schools to transform their outdoor spaces into natural play areas for outdoor educational projects and community use.



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The programme sits at the intersection of several strategies: child-friendliness, urban greening, and climate adaptation. It aims to increase the number of green spaces (such as parks) and blue spaces (such as lakes, canals, and waterfronts) to address both the problems of families living in neighbourhoods with few attractive natural play opportunities and the risks associated with climate change. Green and blue spaces are known to provide compound benefits to residents and city authorities: active and healthier lifestyles, lower stress levels and better mental health for residents, better stormwater management, reduced heat island effects, and increased real estate values for the city.

The programme has been funded through the municipality budget to focus on five or six schools in areas with fewer public green spaces and higher socioeconomic vulnerabilities. The schools are also selected to cover different areas of the city, through the lens of equity.

The implementation process is led by the schools. They can receive funding to engage in a significant nature-based makeover of their outdoor spaces. The design process is participatory, involving children, parents, and the community and must lead to the schoolyard being accessible to all residents outside school hours, including for families with children under school age.

## What worked well?

- 1. A strong vision with the child at the centre.** A vision that places children's well-being and development at the centre is sometimes hard to maintain when budgetary constraints arise or deeply risk-averse habits of adults (professionals and parents) prevail. The Green-Blue Schoolyards programme insists on a strong shared vision, which has helped schools manage resistance to changes within their neighbourhoods. This also helps to build resilience and sustainability; and to change the mindset of education staff, management, construction companies, and parents. This shared vision needs to be constantly maintained and refreshed among stakeholders to stay relevant and effective.
- 2. Smart spending – securing financing by identifying co-benefits.** By addressing several topics important to Rotterdam's leadership through a single intervention, the Green-Blue Schoolyards programme allows funding streams to be combined, thereby unlocking larger amounts of budget. In this case, it enables child-friendly initiatives to be added on to existing investments from the existing climate adaptation efforts that are underway.
- 3. A balanced and data-driven selection process.** Each applicant school goes through a selection process that uses criteria relating to

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“Our green-blue schoolyards are an example of how spaces can be more beautiful, healthier, and safer. The green reduces heat stress and the blue makes us smart with water, and children from the school and neighbourhood have a nice place to sport and play.”

(BERT WIJBENGA, COUNSELLOR AND DEPUTY MAYOR, MUNICIPALITY OF ROTTERDAM)

characteristics of the neighbourhood (50%) and the motivation of the school written in a project plan (50%). Data for the first half of the assessment is quantitative and comes from the City of Rotterdam, such as the area's proportion of green surfaces, spaces for play, vulnerability to flooding or urban heat, and socioeconomic indicators. The other half is qualitative and involves meeting with the school's leadership, understanding their motivation, and assessing their vision, engagement, and capacity for maintenance, programming, and training. The selection team, which also manages the programme, includes staff members of various city agencies such as education, health, and spatial planning.

#### 4. Schools leading implementation.

The leading stakeholder is the school. This allows the project to be anchored in the neighbourhood, closer to residents. The schools oversee maintenance and activity programming and retain ownership of the new green-blue spaces. They can adapt each project to their own identity – especially in the programming of activities. Changes

within the school's organisational culture are therefore driven by their own vision, rather than by top-down direction from city hall. This approach further enhances local ownership and the long-term sustainability of the project.

5. **Local technical support.** The green blue school year model<sup>10</sup> has been thoroughly tested in Speeldernis, a popular natural playground organisation that engages in nature-centred play as a way to solve social issues prevalent in Rotterdam. The local organisation's former director, Ian Mostert, has extensive expertise in the design and management of nature playgrounds and in the cultural and educational programming and community-building processes needed to turn these spaces into social hubs. By bringing local experts to support schools, the project is able to ensure that each space works for all neighbourhood residents. The local experts also act as hubs for peer learning among schools taking part in

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<sup>10</sup> The nature playground ensures that young children and families can learn and explore the natural environment safely within the city. It offers a safe space for young children to play naturally through inquiry-based learning and supports a deeper connection with the environment.



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the program and organise workshops for school managements to meet, inspire and support each other, and share their experiences.

## What didn't work well?

### 1. **Complex systems are hard to change.**

Green-Blue Schoolyards programme requires the cooperation of many stakeholders from city agencies to schools, parents, children, and neighbourhood organisations, each with their vision and objectives for the project. It is sometimes challenging to keep everyone aligned around the well-being and development of children. Each schoolyard renovation project needs to deal with various levels of risk-aversion and other constraints such as budget limits or construction protocols. It also faces different opinions within the community related to outdoor education, neighbourhood activities, maintenance standards, and tolerance of

noise generated by children. To mitigate these difficulties in implementation, the programme manager tries to devote a significant amount of time to vision building, strengthening and alignment among stakeholders before diving into implementation. This is important as the programme is looking to change not only the environments but also the minds of the stakeholders who will manage these playgrounds.

### 2. **Fragmented implementation requires more coordination.**

Having schools take the lead in implementing the programme helps tailor projects to specific neighbourhoods but means that overall coordination is more fragmented. This can prove challenging for assuring quality and ensuring that projects are following implementation protocols and conditions. Other cities such as Amsterdam or Paris have similar programmes for greening schoolyards but manage them centrally from within the city government to avoid this issue. In Rotterdam, the challenge is

addressed by having an external expert, Ian Mostert, who used the Speeldernis as a good example, the expert nature playground organisation, act as technical support and reviewer, as a hub for schools to meet and learn from each other, and get the training they need to carry out quality implementation.

### 3. Managing inconsistencies from city- to national-level policies.

When implementing Green-Blue Schoolyards projects, schools are confronted by a series of protocols, regulations, and entrenched practices related to risk, liability, construction guidelines, sanitation, and education that sometimes come into conflict with the objectives of the project. This stems from national-level regulations and laws that have not yet evolved to reflect the new mindset on play and risk that Rotterdam is adopting with this programme. For example, the national policy for schoolyards does not grant much financial freedom for schools to take the lead in organising their own education programming and environments for children, a situation that makes it difficult for schools in Rotterdam to adapt their budget to their child-centred vision.



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Stream as a green-blue public space which has proven popular for strolling, sportive activities, and community events (Development Asia, 2016). With strong political will, the Mayor of Seoul was able to gain approval and finance the project. This brought a paradigm shift in how citizens and children experience the city they live in, prioritising green-blue infrastructure, and an improved quality of life. Specifically, it provided a protected and engaging space for young children to play and interact with the built and natural elements around them.

## What does this mean for Asia?

Above we shared an example from Rotterdam, the Netherlands which highlighted how the local government is increasing green-blue infrastructure across the city. Across the Asia-Pacific region, there are also several examples:

- **Seoul, Republic of Korea:** From 2003 to 2005, the government demolished an old six-lane highway in need of repairs and restored the Cheonggyecheon
- **Ha Noi, Viet Nam:** Since 2017, the social enterprise Think Playgrounds has designed and built 167 playgrounds in Ha Noi and other provinces, with a focus on promoting play with children under 5 years old in consultation with local communities. Utilising natural materials sourced locally and sustainably, the organisation worked closely with the local government to identify potential public sites, with a commitment from the local government to maintain these sites. Despite initial skepticism, the local communities have now embraced the

playgrounds, with young children and caregivers frequently visiting to play. The playgrounds also bring nature and play together, particularly in Ha Noi, where the increasingly urban city has very few natural elements. This has led to increased public safety and social cohesion (Bernard van Leer Foundation, 2017).

In both examples, it was crucial that the needs of the community were considered and that the community was engaged in the process of developing the infrastructure. The early childhood development community can play a critical role in making evident the needs of the youngest children in order to increase the awareness of the urban community to the importance of including babies and toddlers in their designs and to bring their voices to the development of green and blue infrastructure.

By incorporating the experience of babies, toddlers, and their caregivers into urban planning and design, cities are enabled to help children thrive and become healthier, while also empowering caregivers. In addition, planning cities with the needs of babies, toddlers, and their caregivers in mind has

been proven to make cities more enjoyable, safer, and healthier for everyone else. Early childhood advocates should work across sectors – including unusual suspects such as urban planners and designers – to ensure that all children have a good start in life. More specifically, early childhood development networks in the region could act as forums to connect early childhood specialists with local urban planning organisations working on improving human well-being in cities, raise awareness that urban planners have an impact on child development – even if they don't always know it, and identify concrete opportunities for integrating the needs of babies, toddlers and their caregivers into city data and projects.

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