



**TEMASEK
FOUNDATION**

Temasek Foundation Report 2021

amplify

Content Page

Key Highlights

Our Leadership

Chairman's Message
CEO's Message
Temasek Foundation Ltd Board,
Executive Boards & Management

Our Stories

Building Resilience, Together
Inspiring Change, One Conversation at a Time
Building a Shared Future, Nurturing Leaders
of Tomorrow

Waves Forward

Leading the Way
Facing the Unspoken

Navigating New Frontiers

Stronger Together
Transforming Traditional Arts for a Digital Generation

Augmenting Transformation

Making Waves for the Future of Marine Life
Milking Tech for Tomorrow

03

04

08

12

14

18

22

24

26

28

30

32

34

36

38

42

Key Highlights

Total Programmes

1,240 Cumulative till FY20/21

170 in FY20/21

Outreach

More than **1.5M** Lives touched across
Singapore and Asia
Cumulative till FY20/21

Additional outreach to

1.5M HOUSEHOLDS

in Singapore through our
community initiatives

Funding Committed

S\$879M Cumulative till FY20/21

S\$83M in FY20/21

Follow-on Funding since 2016

41 Sustainability
innovations funded

From S\$43M in grants attracting

S\$260M

in follow-on funding



Watch our
2021 Highlights
video





In Conversation with Our Chairman Benny Lim

It has been a year of marked changes for Temasek Foundation as it underwent significant organisational restructuring. What are your thoughts on this?

The real challenge was ensuring that we were able to bring all our people, at all levels, on-board the change. The team worked adaptively and evolved quickly to institutionalise an effective structure, where diversity of experience remains valued even as a clear and focused direction in leadership is forged for the entire organisation.

The Board members – those who remain and those who have retired – have been a source of wise counsel and encouraging support. In particular, they helped ensure that the establishment of the Executive Boards and the re-configuration and consolidation of their various domains and portfolios were effected without losing a step in the delivery outcomes of programmes to beneficiaries. Indeed, where disruptions did occur, it was not because we were not ready to move, but because the pandemic situation prevented our supported partners from operationalising their work on the ground during this period.

The team worked adaptively and evolved quickly to institutionalise an effective structure, where diversity of experience remains valued even as a clear and focused direction in leadership is forged for the entire organisation."



While it is still early days, how has Temasek Foundation made progress through the re-organisation?

What our people and partners did well and good in the previous structure was operationally sustained and not distracted or disrupted by the re-organisation. This was invaluable especially in such a transition.

Our beneficiaries has and will always come first.

What we gained was that our people now had a keener and fuller shared awareness of the larger purpose and the potential opportunities across the various domains, where we could work together synergistically or address emergent gaps more effectively. This subsequently led to the creation of joint teams to develop projects and programmes in the areas of Disease X, Climate Change, Mental Well-being and Youth Engagement.

To enable us to develop deeper and more strategic capabilities, we also had a newly created function to strengthen partner relationship engagement, as well as to convene thought leadership. With people being our most valuable resource, we are also in the process of creating more opportunities for staff to grow and reach their fullest potential, with inter alia cross postings and multi-disciplinary training for career and professional development, across the Temasek Foundation family and possibly even beyond to our collaboration partners.



The year has been exceptional not just for Temasek Foundation, but for everyone in Singapore and beyond as the pandemic has affected the way we all live, work and socialise. How has this affected the philanthropy sector and the Foundation’s work?

The COVID-19 situation has forced us to think of and operationalise alternative ways to engage and meet the needs of the vulnerable and needy within the context of the various restrictions.

However, I think our work is, and should always remain essentially people-centric. Nothing can replace the value of the human touch, the compassionate engagement and trusted relationships between people that must sustain programmes in this sector.

The pandemic situation dislocates this direct connection, but the stronger the cultivated relationship had been, the more resilient it is in spite of these dislocations. Eventually when the dust settles, we will have to revert to a people-centric service model, but now broadened and equipped with other means and resources to engage and deliver, aided by technology and the persistent ingenuity of our people in the face of this adversity.

The disruption has also made us realise how fortunately well-placed Temasek Foundation is to be able to mobilise its considerable resources and expertise across its full reach within, and also beyond to our network of partners to innovate, adapt and deliver real solutions and capabilities of different scale to address urgent needs arising from the crisis.”

A simple example is how we trialed the use of vending machines to distribute hand sanitisers to all Singapore residents; this may have been the first of its kind in the world.

Apart from such efforts, we also believe that a way to strengthen Singapore’s philanthropic ecosystem is to create a convening platform to bring together the best ideas and practices from the various foundations in Singapore and the region for exchange and collaboration. We should look beyond today; beyond the pandemic at hand, and look at other pressing complex challenges of the future that Singapore, the region and the world face.

This year, we had the Temasek Shophouse Conversations, a series of thought leadership conferences that brought leaders from the public, private and community sectors together to forge multi-sector collaboration on subjects like the “next” pandemic and climate change. The Conversations will culminate in our inaugural Philanthropy Asia Summit in November 2021.

What do you look forward to in the next year? What would be the aspirations for the Foundation for the year ahead?

As a country, I think we have weathered this pandemic well. While there are still uncertainties and risks, we are in a better position today than we were a year ago. Hardships including the unseen stress on mental well-being will continue to be real for many. We should not underestimate this and should do what we can to reach out to help even if or when it is each one at a time.

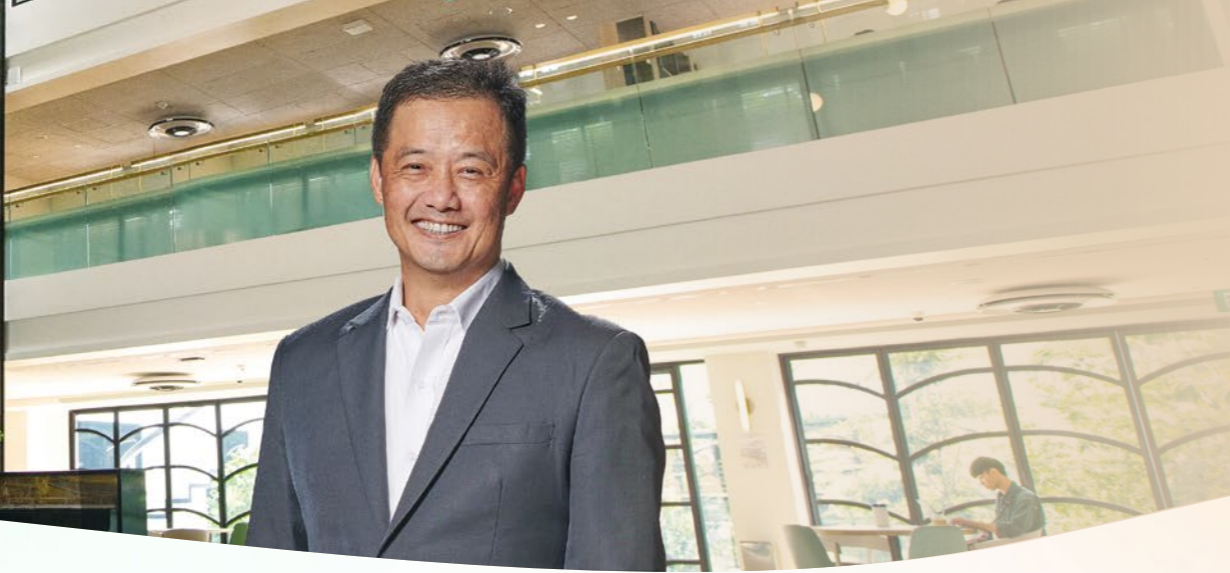
Providing support and assistance to the person whose family is in urgent need is always about the last mile – was the need addressed, and were we able to fully meet that need? While it is necessary to design programmes with our minds, we should implement it with our hearts knowing that we are dealing always with a whole person, and therefore a situation which is typically complex and multi-dimensional in terms of needs. We should always pay keen attention to the last mile and listen with our heart. That would be my advice to all working in this sector.

During this adversity, we have seen a lot of people and organisations stepping up to help those in need. Temasek Foundation had a very active year with strong corporate participation and volunteering in distributions, as well as with individuals who stepped up wanting to play their part – big or small – to help their neighbours and their community. This is truly heart-warming and bodes well for Singapore as a nation.

And just as the Singapore community will, in my view, emerge stronger and more confident having experienced and overcome COVID-19 together, I believe that together with our ecosystem of partners, we as an organisation, will also grow to be more resilient and confident in our ability to make a difference.”

In the next year, I look forward to our continuing renewal journey while growing our extended family to welcome even more partners across the society in and outside Singapore to collaborate and join us to help each other do good and to do it well.





In Conversation with Our CEO Ng Boon Heong

How has the year been for Temasek Foundation and what can we expect in the year ahead?

2021 reinforced the need to listen deeply if we wanted to adapt to the disruptions brought on by the pandemic. Shared learnings from our partners and our teammates helped us shape our future as we continued to build upon our strengths as active and agile pathfinders in programming. To this end, we focused our efforts to expand from programming into capabilities building; ‘investing’ in building and growing socially responsible institutions, so that the impact can be more enduring and sustainable over the longer term, independently.

We called for cross-functional project groups targeting priority focus areas like Crisis X, Climate Change and Mental Health. Such a setup helped us to harness synergies and creative talents within the Foundation and concentrate our limited resources to work on emergent and urgent issues faced not just by the Singapore community, but as a region as well.

We challenge ourselves to constantly seek new pathways to strengthen the philanthropic ecosystem. One of the ways is that of being a convener to bring together thought leaders from various foundations in Singapore and Asia for collaboration opportunities. The Temasek Shophouse Conversations that we initiated this year aims to fill this role through a series of thought leadership conferences that bring together leaders from multi-sectors to

forge collaborations. This will culminate in the Philanthropy Asia Summit (PAS) in November 2021. PAS is designed to be a collaborative platform to convene and connect global and regional philanthropists with the objective of developing a shared framework for philanthropy, catalysing new partnerships and initiating innovative programming. We look forward to having robust discussions with impactful action and outcomes from this conference.

To connect with future leaders, we will also be embarking on a series of curated programming aimed at engaging with the youth generation. These efforts include Momentum Tea where we organise dialogues with youth leaders to address societal issues like mental health, economic and social trade-offs and biodiversity in urban cities. We will also run a series of short courses for Singapore youths to inculcate a deeper appreciation of societal and technological trends and challenges, and inspire a sense of community resilience towards a shared future.

Only through shared awareness, collective planning and deliberate actions, can we deliver the maximum returns for the precious philanthropic gifts that has been entrusted to us. Together, we can deliver a multiplier effect for greater impact and benefit.”





Has the pandemic changed the way Temasek Foundation works?

Temasek Foundation started its journey by focusing on the delivery of good quality programmes. As we progressed and grew, we saw the importance of building strong partnerships through collaborations with organisations who share the same intent of doing good.

Over the past year, we accelerated collaboration efforts with existing partners, corporate groups as well as other foundations in Singapore and the region to help communities in need.

We also extended our networks and built new connections. As an example, Temasek Foundation joined hands with a group of committed and driven donors consisting of Indonesia and Singapore companies, to provide more than 12,000 oxygenators to Indonesia

to support their fight against the pandemic. It was a humbling and gratifying opportunity to come alongside likeminded partners. Through the pooling of resources, the impact of this collective donation by a network of donors was amplified in response to a dire need.

Only through shared awareness, collective planning and deliberate actions, can we deliver the maximum returns for the precious philanthropic gifts that has been entrusted to us. Together, we can deliver a multiplier effect for greater impact and benefit.

Similarly, for our inaugural Philanthropy Asia Summit, we hope to create a multiplier effect of partnerships which is not just about giving, but to ignite a movement of collaborations and stepping forward with active involvement.

With so much uncertainty and disruption, has it affected how Temasek Foundation works with the community?

To better identify needs and opportunities to support meaningful and innovative programmes, we will focus on deeper engagements with our grassroots and micro-communities, and support more ground up initiatives.

We will do this with empathy and deep listening, so that we can energise individuals to step forward and work together with us. If we do this well, we hope to build up an engaged pool of leaders and stakeholder base, to be community champions alongside us as we continue our support to:

- Build a Resilient Singapore to care for underserved individuals, families and communities; and to nurture the growth and development of our future generations;

- Build a Connected Asia Community through international multilateral capacity and capability programmes; and
- Build Future Ready Societies through seeding innovations in science and advance capabilities for livability solutions, climate change, and public healthcare innovations.



Our Leadership

Temasek Foundation Ltd. Board of Directors



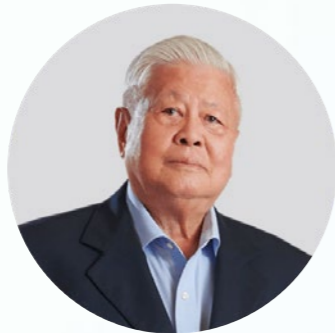
Mr Benny Lim
Chairman



Mr Richard Magnus
Deputy Chairman



Ms Jennie Chua
Board Director



Mr Goh Geok Khim
Board Director



Mr Koo Tsai Kee
Board Director

Our Executive Boards

Cares Executive Board

Mr Richard Magnus
Chairman

Prof Chong Yap Seng
Board Director

Prof Koo Tsai Kee
Board Director

Ms Vemala K Rajamanickam
Board Director

Mr Zainul Abidin Rasheed
Board Director

**Mrs Wong Kan Lai Chung @
Aline Wong**
Board Director

International Executive Board

Ms Jennie Chua
Chairman

Mr Goh Geok Khim
Chairman Emeritus

Mr Albert Chua
Board Director

Mr Goh Yong Siang
Board Director

Tan Sri Faizah Mohd Tahir
Board Director

Mr Tony Tan Caktiong
Board Director

Liveability Executive Board

Mr Teo Ming Kian
Chairman

Dr Howard William Califano
Board Director

Prof Cheah Horn Mun
Board Director

A/Prof Lim Tit Meng
Board Director

Mrs Trina Loh
Board Director

Ms Janet Sarah Neo
Board Director

Prof Quek Tong Boon
Board Director

Mr Rajiv Wahi
Board Director

Our Management Team



Mr Quek See Tiat
Board Director



Professor Leo Tan
Board Director



Mr Tan Soo Nan
Board Director



Mr Teo Ming Kian
Board Director



Mr Ng Boon Heong
Chief Executive
Officer



Mr Benedict Cheong
Chief Executive,
International



Ms Jennifer Lewis
Head,
Philanthropy Advocates



Mr Lim Hock Chuan
Chief Executive,
Liveability



Ms Woon Saet Nyoon
Chief Executive,
Cares



Building Resilience, Together

That has been our Singapore story: In crises, we have never failed to wrest opportunity from danger.” - Singapore’s Prime Minister Mr Lee Hsien Loong

Courage. Unity. Resilience.

In the face of the unknown, communities have shown that by coming together, we can overcome all obstacles to emerge stronger.

Since 2020, Temasek Foundation has stood in solidarity with the community in tiding through these difficult times, rendering assistance through our Stay Prepared initiatives, to build resilience together as one community.

We provided the Singapore community with reusable masks, surgical masks, oximeters and hand sanitiser to keep residents safe, while also providing essential medical supplies to over 40 countries globally.

#StayMasked

Reusable face masks were distributed to residents in Singapore through the StayMasked campaign. In total, over 30 million reusable masks were redeemed through vending machines located across Singapore.

Li Jian Xing, an alumnus of the Temasek Foundation Sunburst Youth Camp, was one of many volunteers who stepped up to assist with the distribution exercise. “I’m really glad I’m able to help assist the residents in their mask collection, address any questions and make the process more seamless.”

Medical grade surgical masks and disposable N95 masks were also distributed by Temasek Foundation to Singapore residential households.



Hear what Jian Xing had to say about his experience

#BYOBclean

Under the second #BYOBclean initiative in March 2021, residents in Singapore were encouraged to bring their own recycled bottles to collect alcohol-free hand sanitisers from vending machines. These vending machines were the first in the world to be customised to automate the entire process of mixing sanitiser concentrate with clean water, and dispensing ready-to-use hand sanitiser into reusable bottles.

Over 120 service ambassadors and 200 public volunteers stepped up to assist the public in collecting more than 230,000 bottles of sanitisers dispensed through the vending machines.

Sonny Prithvijaj Naidu, a Singapore Airlines cabin crew member, who was a service ambassador managing one of the distribution stations, shared, “Everyone has a vital role to play (in this pandemic). This is my way of giving back to the nation.”



Hear what Sonny had to say about his experience

#StrongerWithSunshine

Staying mostly indoors through this pandemic has meant less exposure to natural sunshine, and a decrease in essential Vitamin D intake, which is vital in maintaining healthy bones and teeth, and strengthening our immune system.

The #StrongerWithSunshine campaign raised public awareness about the importance of Vitamin D, and provided 100,000 bottles of Vitamin D₃ supplements for low-income families, seniors and expectant mothers.

“It is important for pregnant women to get an adequate amount of Vitamin D as it is proven to reduce the risk of complications in pregnancies such as preterm birth and low birth weight in infants,” said Professor Jerry Chan, senior consultant at KK Women and Children’s Hospital’s department of reproductive medicine.





Oximeters to fight 'silent pneumonia'

The COVID-19 virus can cause blood oxygen to drop to dangerously low levels, even if the person feels well, or has no other symptoms.

As a preventive measure, Temasek Foundation provided free oximeters to every household in Singapore, in a bid to allow residents to monitor their blood oxygen levels.

Dr Lee Kang Hoe, Lung Specialist and Pulmonologist at Gleneagles Hospital, explained, "Despite having COVID-19 infection, some patients remain asymptomatic. This is what we call 'silent pneumonia'. Now, we have a simple medical device, the pulse oximeter, which allows us to measure the oxygen level in our bloodstream."

Over 1 million oximeters were collected at supermarkets and pharmacies across Singapore, including NTUC Fairprice, Sheng Siong, Giant, Cold Storage, Watsons, Unity and Guardian.

Khoo Suk Li, a staff member at Sheng Siong, was glad to be part of the distribution exercise. "I find it meaningful to be able to contribute to the fight against COVID-19."

Our company is honoured to participate in this national distribution and our staff are happy to be part of the community to help," added Nigel Lin, Executive Assistant to the CEO of Sheng Siong Group.

Overseas Donations

We continued our partnership with public and private sector organisations globally to bring essential supplies to communities beyond Singapore in our fight against the COVID-19 virus. We stand united in keeping communities safe through a shared responsibility towards the pandemic.

Essential and medical supplies were provided to over 40 countries, including diagnostic test kits which enabled over 1 million tests, medical equipment, and masks for hospitals and frontline workers, and reusable masks for the community.

Building Resilience, Together



100,000
BOTTLES OF VITAMIN D₃ SUPPLEMENTS



830,000
BOTTLES OF HAND SANITISER



> 1 MILLION
OXIMETERS



> 30 MILLION
REUSABLE MASKS



> 84.4 MILLION
MEDICAL GRADE SURGICAL MASKS
AND DISPOSABLE N95 MASKS



Inspiring Change, One Conversation at a Time

Bringing together thought leaders to address challenges and drive action.

About Temasek Shophouse Conversations

A series of hybrid events organised by Temasek Foundation, bringing together leaders from the public, private and community sectors, to forge multi-sector collaboration.

20 Jan 2021

COVID-19 Lessons for Disease X

Public health emergencies and preparedness for future pandemics

Key speakers:

- Deputy Prime Minister, Heng Swee Keat
- H. E. Suryo Pratomo, Ambassador of Indonesia to Singapore

09 Apr 2021

Climate Action

Youth, community and corporate leadership and action on climate change

Key speakers:

- H.E. Siti Nurbaya Bakar, Minister of Environment and Forestry, Republic of Indonesia
- Mr Desmond Lee, Minister for National Development

07 Jun 2021

First 1,000 Days – Maternal and Child Wellness

Quality care for mothers and newborns to strengthen maternal and child health and resilience

Key speakers:

- Mr Masagos Zulkifli, Minister for Social and Family Development, Second Minister for Health
- Dr Tedbabe Degefie Hailegebriel, Senior Adviser, Maternal and Newborn Health, United Nations Children's Fund

“With so much resources available, and with such a willingness of hearts, we must be able to act, to do what is right, and not what is easy,” said Richard Magnus, Deputy Chairman of Temasek Foundation, at the inaugural session of the Temasek Shophouse Conversations in January 2021.

Inspiring change, creating positive impact and building a better tomorrow. That is what the Conversations aim to do.

As a convening platform, the Conversations bring together public, private and community sectors leaders, to discuss collaborations and to propel actions to address societal challenges.

COVID-19 Lessons for Disease X

There are three fundamentals to strengthen the world's ability to deal with Disease X – collaboration, innovation and readiness for the future. The lessons learnt from the COVID-19 pandemic must prepare us well for future disease outbreaks and crises.

1. The key to fighting future pandemics will be a coordinated global response

“COVID-19 has shown us that global cooperation involving multiple stakeholders at significant scale and complexity is possible, if we have a common cause. The pandemic has also highlighted the importance of collaboration at home, so that we can face crises with unity and solidarity.”

Mr Heng Swee Keat
Deputy Prime Minister,
Singapore



2. Build trust and support among stakeholders to share and exchange knowledge

“ASEAN can have its own regional Centre for Disease Control and Prevention to pull together localised resources and ideas around innovation. I love the idea of an ASEAN centre for public health emergencies and emerging diseases, but we've got to look at the sustainability of such a centre. There has to be commitment from members of ASEAN states to fund systems and establishments that actually benefit the greater good.”

Tan Sri Dr Jemilah Mahmood
Malaysian Prime Minister's
Special Advisor on
Public Health



3. Establish networks and communication channels that would be called upon in times of crisis

“We must preserve both the spirit of what we have built, and the pathways we forged together, because the time will come when we will have to apply these together.”

Mr Dilhan Pillay Sandrasegara
Executive Director and
Chief Executive Officer of
Temasek International



Watch
highlights
of the first
Conversation





Inspiring Change, One Conversation at a Time

Climate Action

Climate change is a complex multifaceted challenge that requires partnerships and collaboration across sectors to bring together different strengths and expertise. There is now an even greater urgency to take action as the world reels from the effects of climate change. In a post-pandemic world, we need to commit to building a better, greener and a more sustainable world through collaborative partnerships. These can help to deepen knowledge, build capacity, and share information to drive collective action to mitigate climate change.

1. The urgency of action today for tomorrow

“Don’t lay the burden on future generations. We have to invest now for tomorrow, and we have to do it now; we have to be very concrete and specific.”

Prof Jan Peter Balkenende
Former Prime Minister
of The Netherlands



2. Climate action must take place not just globally but locally too

“We often hear the phrase ‘think globally, act locally’ – each of us should continue caring for the environment, greening our lifestyle, speaking up for nature and taking action in our own communities and cities.”

Dr Herlina Hartanto
Executive Director,
Yayasan Konservasi
Alam Nusantara Indonesia



3. The rise of youth climate activism

“We turn risks into opportunities where action is driven. We think fast on our feet because we know that we’re pressured. The time that we are living in, we can no longer do business as usual. We have to find more circular, sustainable solutions.”

Melati Wijsen,
Founder, YOUTHOPIA



Watch highlights of the second Conversation

First 1,000 Days – Maternal and Child Wellness

The first 1,000 days of a child’s life, from conception to the second year, are a critical period to optimise their health, growth and development. Studies have shown that experiences and interactions during this period can have an impact on the child’s behaviour, language, cognitive and social emotional abilities. By providing a holistic network of maternal and child care, we can provide a positive environment for both mother and child to build a strong foundation.

1. Provide strong community support to disrupt intergenerational transfer of trauma

“Educate and empower: this means providing policymakers, practitioners and parents with useful credible information about the factors that impact on early childhood development, and what they need to do to optimise health, public health, and what do we need to do to make sure everyone, including professionals understand the importance of these issues.”

Dr Tim Moore
Senior Research Fellow
Murdoch Children’s Research
Institute The Royal Children’s
Hospital Melbourne, Australia



2. Optimise a child’s early life and development to ensure healthier outcomes

“The child’s ability to see themselves as an individual, to understand that when they need something, someone will respond to their need; that they have their sense of self, their sense of feeling will be taken care of; and feeling seen becomes an incredibly important capacity for adulthood.”

Dr Salam Soliman, Director
Center for Prevention and
Early Trauma Treatment
National Service Office for
Nurse-Family Partnership
and Child First, United States



3. Active fatherhood plays a key role in early childhood development

“When a father is bonded with his newborn, it lays a strong foundation for their relationship which helps to foster a healthy self-esteem in the child. This in turn, buffers them for stress-related problems and mental health conditions later in life. As children grow, the rough and tumble play with the father, provides the experience of thrill and excitement. The outpouring of bonding chemicals such as oxytocin and dopamine will help enhance the relationship and build mental resilience, as well as physical coordination and social skills.”

Assoc. Professor Helen Chen
Director, Postnatal Depression
Intervention Programme at
KK Women’s and Children’s
Hospital Singapore



Turning Discussions into Action

Beyond just discussions, individuals and corporate organisations were called to step up and participate through various calls-to-action to translate ideas into action.

More than 350 volunteers responded to the call to assist with Temasek Foundation’s nationwide distribution of reusable face masks and hand sanitiser.

Others came forward to pledge towards joint research, and technical and financial support for the conservation of mangrove ecosystems in Indonesia.

The parenting community came forward to support the Temasek Foundation Community Milk Bank Programme, a partnership with KK Women’s and Children’s Hospital to support premature and sick infants; and ParentWise, an inclusive community for new parents to share tips and provide mutual support.

Youths were called to contribute ideas to the different topics – preparing for future crises, climate change and maternal and child wellness through the Youth Action series, in partnership with Heartware Singapore. Youths were paired with mentors and journeyed through ideation workshops to translate their ideas to implementation.

Watch highlights of the third Conversation





Building a Shared Future, Nurturing Leaders of Tomorrow

Leaders of tomorrow; Changemakers of today.

Temasek Foundation has been engaging with youth leaders through various partnerships and programmes to support their passion and aspirations to build a community of good.

Through areas such as sustainability, entrepreneurship and innovation, like-minded youths are brought together and empowered to bring their ideas to reality.

These are some of the youth programmes supported by Temasek Foundation:

Youth Call-to-Action

The Youth Call-to-Action programme supports young leaders to act and address societal challenges within Singapore and the region. A spinoff from the Temasek Shophouse Conversations and developed in collaboration with Heartware Network, the programme mentors and guides potential youth leaders through to tackle themes such as climate change and future pandemics.

Ng Sze Min and Nicole Ng are co-founders of Terra House, an initiative to encourage sustainable green living in the community. Using common objects found in the home, they hope to simplify steps and provide tips for anyone in search of indoor gardening ideas.

Heartware Network paired Sze Min and Nicole with their mentor, Shakilla Shahjihan, to guide them through their ideation process. Sze Min shared that it was during the mentorship “where we learned to distil the ideas we had”.

Sustainability has been a unifying concern of the global community, and even more so for future generations at risk of the effects of climate change.

Temasek Foundation partnered World Wide Fund for Nature Singapore, Green Is The New Black and Grey Singapore on a digital campaign titled We Got This, to build a community of youth sustainability advocates who communicate effectively through social media outreach and storytelling.

The programme consists of a series of masterclasses, bootcamp, and mentorship to empower youths with the knowledge, skills, and tools to design and implement sustainability-focused projects.



Find out more about Sze Min and Nicole's green idea



Young Sustainability Champion Programme

In April 2021, over 4,000 participants aged 13 to 17 years old from across 50 schools in Singapore participated in Temasek Foundation's Young Sustainability Champion Programme.

Organised by the Science Centre Singapore, the students were challenged to complete sustainability-related tasks via Science Centre's online platform, “I am a Young Scientist”, and propose innovative and sustainable solutions.

For me personally, the biggest takeaway was to be willing to try. For this hackathon, we had to venture into a lot of unknown territories, so we need to keep learning. It was a lot of trial and error, and a lot of things I wouldn't have done if I haven't had this opportunity.”

Celestar Hong, Wastebusters, Young Sustainability Champion Programme, Winning Team 2020



Tesla Initiative

To spur interests in Design & Engineering, and Science, Technology, Engineering and Mathematics among the youths, Temasek Foundation partners with the NUS High School of Mathematics and Science to provide students and staff with opportunities such as educational support, development of research skills and training and development.

One of these programmes is the Tesla Initiative which develops the maker mindset and pioneering spirit in students by engendering a maker culture and building skillsets. Students undergo

learning journeys, workshops, job-shadowing programmes and short-term immersions in tech-based start-ups and high-value engineering companies.

I aimed to gain a greater insight into how aquaponics systems work, as well to put my engineering skills and knowledge to good use to engineer innovative solutions. One of the most memorable experiences was the completion of the aquaponics system. It felt like a great achievement, one shared with the company. Multidisciplinary knowledge is all the more essential, and this internship has utilised knowledge from various fields from Engineering to Design Thinking, as well as Biology and project management skills.”

Joel Ku, Year 6 student in NUS High School, Aquaculture Design Intern, Reaped Farming Company



Temasek Foundation Inspire Fund

Athletes who are passionate and committed to sporting excellence can now tap on the Temasek Foundation Inspire Fund to pursue their sporting interests.

Jointly administered by SportSG and National Youth Sports Institute, the annual funding of \$100,000 under Temasek Foundation's E W Barker Endowment supports young athletes representing Singapore at international competitions to pursue their dreams.

Youth Exchange Programmes

To be global citizens in the highly interconnected world of today, youths need to foster a greater understanding of regional and global issues and deepen their appreciation of culture and diversity across different communities.

Temasek Foundation supports a series of exchange programmes for regional youth leaders that provide opportunities for cultural exchange, networking, community engagement and leadership development:

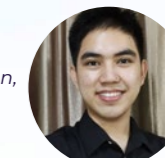
- Leadership Enrichment and Regional Networking (LEARN);
- Specialists' Community Action and Leadership Exchange (SCALE); &
- STEP

These programmes enable participants from institutes of higher learning across Asia to connect and engage in cross-border community projects.

One such programme is the STEP Asian Undergraduate Summit (AUS), an annual student-led international programme supported by Temasek Foundation and the National University of Singapore's University Scholars Programme. It aims to build an integrated platform for undergraduates across Asia to engage in meaningful academic and cultural exchange.

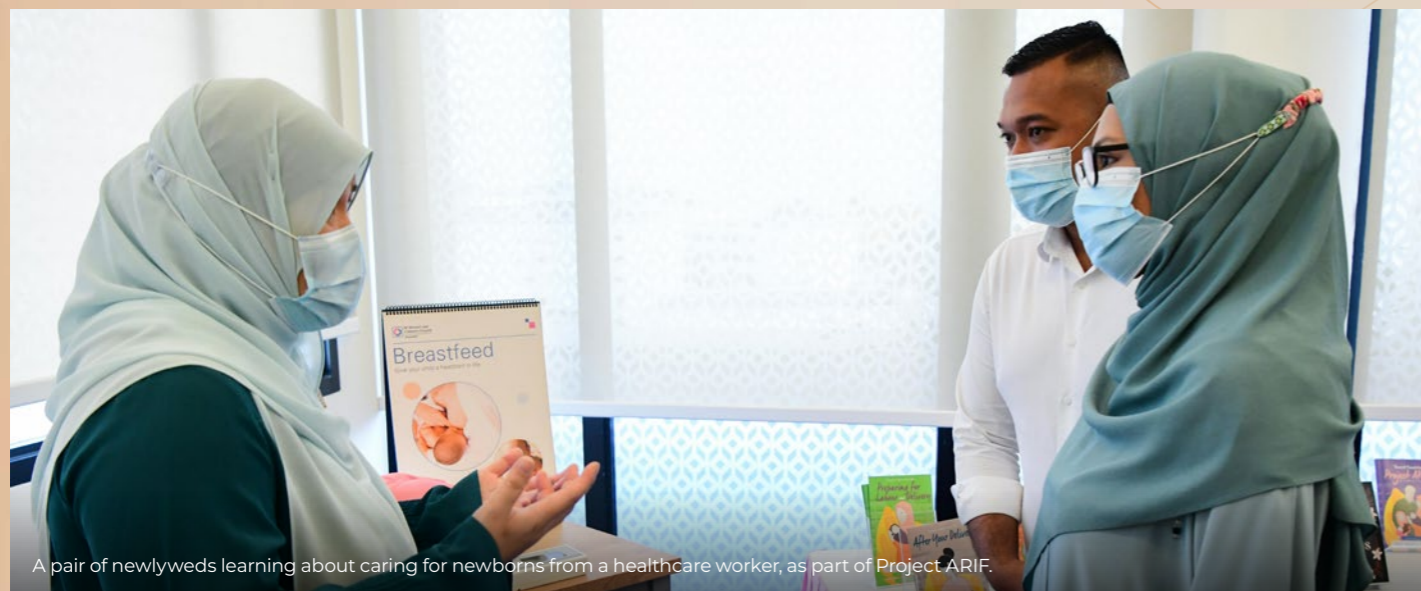
AUS made me hungry for knowledge and ready for action. The programme has equipped me on thought processes to form solutions for relevant issues of today. Applying my takeaways from the programme, I am leading a community project together with my sisters for 30 out-of-school children in our community.”

Arvin Rick S. Omac from Messiah College Foundation, Inc. in the Philippines was one of the participants of STEP AUS 2021.



Waves Forward

We pilot innovative solutions and programmes that promote community good and aspire towards a more socially resilient society.



A pair of newlyweds learning about caring for newborns from a healthcare worker, as part of Project ARIF.

01 Project Achieving Resilient and Inspiring Families (ARIF)

A resilient family starts from having a good foundation," said Associate Prof. Muhammad Faishal Ibrahim, Singapore's Minister of State for Home Affairs & National Development, at the launch of Temasek Foundation Project Achieving Resilient and Inspiring Families (ARIF).

Project Achieving Resilient and Inspiring Families (ARIF) is a two-year pilot programme that prepares Malay/Muslim newlyweds for married and family life, maternal wellness, and child development. It is developed in collaboration with KK Women's and Children's Hospital (KKH), the Islamic Religious Council of Singapore (MUIS), and the Registry of Muslim Marriages (ROMM).

Associate Professor Faishal added, "Project ARIF adopts a collaborative whole-of-community approach, taking inspiration from the phrase, "It takes a village to raise a child", thus the close collaboration with partners such as Temasek Foundation, KKH, MUIS, mosques and M3 agencies."

Under the programme, Malay/Muslim newlyweds will receive guidance on pregnancy, parenting and marriage from their "Naib Kadi", or wedding solemniser, as well as healthcare professionals from KKH.

The Naib Kadis have been receiving training from KKH and MUIS on topics such as maternal mental health, parenting and couple engagement strategies to enhance their capabilities in providing guidance to new couples.

Dr Suzanna Sulaiman, Co-Lead, Temasek Foundation Project ARIF, as well as Head and Senior Consultant, Department of Obstetrics and Gynaecology, KKH, said, "New or fledgling marriages are like newborn babies. You need to give them support, provide them with love, nourishment and patience."

Project ARIF has supported 223 couples between October 2020 to September 2021. The programme is expected to support up to 800 couples to prepare for marriage and family life over two years.

There is no doubt that many couples will benefit from the programme as they look forward to building strong families and nurturing future generations.

02 Sustainability Initiatives with Kindred Studio SG

Building a kindred community, encouraging children to be creative and have fun in a green and sustainable manner – this is what drives the team behind Kindred Studio, a community sustainability initiative supported by Temasek Foundation.

As the first co-working lab and resource-sharing hub for preschool educators and the public, it aspires to help children unleash their creativity the greener way, using recycled and discarded but still usable materials, and instill a sense of responsibility for sustainable learning and living from young.

Kindred Studio conducts sustainability-related workshops and events for preschool educators and provides recyclable materials for use in their projects so they are equipped with creative ideas and competence in sustainable education.

To help plant the green message early, Kindred Studio has set up a recycling and re-use hub within Singapore's preschool ecosystem where discarded but still usable materials can be collected and shared.

To protect and save the environment, it requires our collective effort. A small effort from every one of us can make a big difference," shared Kindred Studios.

03 Commissioned and Arrangement Works with Singapore Chinese Orchestra

Over the years, the Singapore Chinese Orchestra (SCO) has been bringing melodic tunes to audiences not just in Singapore, but globally. As Singapore's national Chinese orchestra, it is renowned for incorporating local and regional elements in its music, establishing a unique identity that showcases Singapore's culture.

With Temasek Foundation's support, SCO was able to produce unique repertoires with Chinese orchestra tunes with distinctive Singaporean sound. The commissioned range of arrangement works included traditional and classical, pop to western adaptations and Nanyang-themed music pieces. These compositions were performed at various events locally and overseas, including Germany, Italy, and Prague during SCO's Europe Concert Tour in 2019.

Some 149 works were born from this effort between 2016 and 2018.



A pre-schooler picking up bottle cap and other recycled items for craftwork.



Leading the Way

Increasing Accessibility for the Visually Impaired in Museums

Courtesy is for free. Courtesy is for you and me... sang Mdm Wee Pek Ling, as she fondly recalled Singapore's earlier years. She learnt the iconic jingle from the "Make Courtesy Our Way of Life" campaign back in school.

Her memory was sparked after a recent visit to the National Museum of Singapore's special exhibition *Home, Truly: Growing Up with Singapore, 1950s to the Present*.

The exhibition explores the moments and experiences in Singapore's past and present that express our national identity and collective memory as a people.

This museum experience was unlike any other for Mdm Wee and her husband, Mr Toh Ah Hock, both of whom have visual impairment.

"The museum I went to before was overseas – we couldn't touch anything, so I had to keep as close as possible to a guide, to listen to his commentary," shared Mr Toh.

However, the couple could explore the Home, Truly exhibition independently and freely this time around, with control over their pace and the commentary, thanks to a new smart cane feature, the first of its kind to be used in a Singapore museum.

Supported by Temasek Foundation, the smart cane experience was jointly developed by the National Heritage Board, Nanyang Polytechnic and Guide Dogs Singapore to make museum exhibits accessible to persons with visual impairment as a way to build a more inclusive society.

"We wanted to ensure that the exhibition content resonated with, and was accessible to our diverse audiences from different segments of the community – including youths, seniors, and persons with disabilities," shared Ms Wong Hong Suen.

"We thought it was important to engage the visually impaired community to ensure they too could be a part of this special exhibition, by including their experiences of home and its non-visual elements, to ensure an accessible and meaningful exhibition experience for them," shared Ms Wong Hong Suen, Senior Deputy Project Director at the National Heritage Board.

Besides the smart cane initiative, Temasek Foundation is also supporting the museum in another similar initiative that enables children with special needs to enjoy visits to this exhibition. This programme, titled "What Makes Singapore Home?", comprises a guided tour with a focus on family interaction and tactile experiences, with each family receiving a bag of sensory materials. A visual schedule and social story are sent out before each session for families to prepare for their visit. There is also a dedicated Quiet Room at the museum for children with special needs who might experience sensory overload to calm down in.

With Mr Toh using the smart cane, and his wife holding out the accompanying mobile phone for them to listen to the commentaries, the excited and enthused couple re-lived their younger times together hand-in-hand.

The smart cane is useful because we can trail along and follow the instructions to find the various places to pause and listen to the commentary near the exhibit. Pek Ling is very good with the phone!" Mr Toh commented with a laugh.

Mdm Wee chimed in enthusiastically, recalling her favourite moments of the experience, "I did enjoy going to the museum. My favourite part of the visit was listening to the songs – it reminded me of my younger days."

As a potential solution that could be expanded to other galleries within the museum, Nanyang Polytechnic, the research partner for this project, will continue to refine the smart cane experience and improve the wayfinding solution with feedback from users over the course of the exhibition.

If the ambition of this pilot project is anything to go by, it is likely that Mdm Wee and Mr Toh will be making visits to the museum a regular pastime soon.



Mr Toh and Mdm Wee listening to songs at the "A Singing Singapore" exhibit.

Home, Truly Smart Cane Pilot Programme

The programme aims to enable people with visual impairment to access Home, Truly, an exhibition that explores elements of nation-building by the National Museum of Singapore, and pilots the use of smart cane to allow persons with disabilities to explore and navigate museum exhibitions independently.

Expected Beneficiaries:
50 visually impaired individuals

Programme Duration:
January 2021 to October 2021



Mr Toh is seen using the smart cane that is fitted with sensors. It is paired with a web app accessible via mobile phone to provide wayfinding instructions, enabling Mdm Wee and Mr Toh to listen to the audio commentaries while navigating the museum independently.

Join Mr Toh and Mdm Wee on their experience at the museum





Facing The Unspoken

Artificial intelligence as a complementary tool to conventional counselling to support the mental wellbeing of seniors

“It’s not easy for the elderly to change. That’s why it’s important to gradually work with them, to journey with them over time,” said Stephanie Goh, Senior Case Manager at Lions Befrienders.

Stephanie was a social service worker before she joined Lions Befrienders as a case manager six years ago. It is a role that she relishes as it allows her to leverage her experience to provide support and care for socially isolated seniors, particularly on the state of their mental health.

“When I first saw her, her facial expression was totally blank,” Stephanie recounted a case which left a deep impression on her. She had first met the 60-year-old elderly lady who had fallen into depression as she could not keep her job as a cashier due to the medical condition. There was no family support to provide the needed care for her recovery.

It took almost three months of consistent befriending by Stephanie before the elderly felt assured to share about the real issues troubling her, and only then was she able to receive the appropriate advice and counselling.

From her experience, Stephanie knows that uncovering the root cause is the key to the mental wellbeing of seniors. “That is why it is important for us to always address the root of the problem as early as possible, to prevent depression,” she added.

To enable earlier and more accurate diagnosis of mental health issues such as anxiety, stress and depression in senior citizens, Stephanie and her co-workers at Lions Befrienders are piloting the Temasek Foundation Facial Analysis Correlation of Emotions (F.A.C.E.) Programme.

Developed by A*STAR using local data, the evidence-based software uses artificial intelligence (A.I.) to measure facial expressions by mapping positive and negative emotions in real time.

While demonstrating the application of the tool on 79-year-old Mr Yin Chee Keong, a senior participant of the pilot programme, Stephanie explained how the A.I. software helps with immediate intervention during a counselling session, be it physical or virtual.

For example, if Uncle Yin is smiling, but the analysis picks up the feeling of ‘annoyance’, it’s a hint to us that there is a disconnect with how he actually feels. This is an indicator for us to probe further, to find out if he is being bothered by something –because sometimes, our seniors may not want to share too many details with us.”

“This software is quite new, and we are still monitoring and learning from it. But based on the initial results of a trial of 30 participants, there was about 85% accuracy in the readings when compared with our assessments. So yes, we think this is a tool that could help in early detection and preventive intervention, for both diagnosed and undiagnosed mental health cases,” Stephanie commented.

While the new initiative is showing promise in helping social workers and case managers better assess at-risk seniors, Stephanie reiterated, “at the end of the day, I feel that A.I. cannot replace the human touch and the skills of our workers that are very much needed in our line of work. It is meant to complement and support the work we do.”

The tool is especially helpful for newer or less experienced case workers who have yet to develop the full suite of skills to manage complex cases. For them, the digital analysis of the facial emotions serves as a cross-check of the visual cues observed during a session. It not only enhances the accuracy of the diagnosis but also speeds it up. Then we can quickly intervene and make the right care plans for the seniors. Besides that, we can also use it for group counselling and monitor multiple seniors, complementing the work the counsellor can do.”

Temasek Foundation Facial Analysis Correlation of Emotions (F.A.C.E) Programme

- A two year pilot programme in collaboration with Lions Befrienders that taps artificial intelligence (AI) to measure facial expressions, mapping positive and negative emotions in real time to diagnose mental health concerns such as anxiety, stress and depression in senior citizens
- Programme is expected to benefit 4,300 seniors during the pilot phase



79-year-old Mr Yin Chee Keong, a senior participant undergoing the pilot F.A.C.E Programme, which analyses facial emotions as a supplementary tool to counselling.

Navigating New Frontiers

We create new opportunities to build networks of collaboration and promote dialogue among leaders in Singapore and beyond.



President Halimah Yacob speaking at the opening of Faithfully ASEAN.

01 Faithfully ASEAN

“Interfaith communities play a crucial role in tackling these challenges, especially in such a religiously diverse region as ASEAN. Religious leaders can guide their faith communities to live in harmony with our environment, help them navigate through uncertainties, and cope with the impact on our economies and social life. These challenges are not insurmountable, as long as we commit to fight them together,” said Singapore President Halimah Yacob at the second edition of the Faithfully ASEAN programme that was launched on 14 December 2020.

Organised by Humanity Matters and supported by Temasek Foundation, the three-day programme was attended by 30 ASEAN in-person delegates and 40 virtual delegates of different faiths who exchanged insights and participated in workshops on topics such as climate change, radicalism and terrorism, and the spread of infectious diseases.

In her opening speech, President Halimah spoke about the roles religious leaders play in helping their communities navigate through the uncertainties of the pandemic, and its impact on economy and social life.

“As religious leaders, you can guide your faith communities to live in harmony with our environment, so that we can pass on a sustainable legacy to generations after us,” she said, stressing the importance of collaboration and open dialogue between faith communities and the governments and corporations.

Reflecting on the programme, Pastor Harun from Indonesia shared, “It is eye-opening for me, to meet up and to hear the wonderful speakers and to connect with my new friends in the group. Instead of looking at the differences, let us continue to work together for one purpose –to build the nation, to build the people, to respect, care and support each other.”

02 Disaster Management Preparedness

The global impact of the COVID-19 pandemic has made transboundary coordination and cooperation much more critical than ever before, and in times of crisis, the need to save lives is imperative and the speed of response and access to humanitarian aid is critical.

Together with The Logistics Institute Asia-Pacific at the National University of Singapore and The AHA Centre, Temasek Foundation is supporting two regional programmes with a focus on digitalisation, innovative technologies, and digital capabilities to increase the speed of access to humanitarian aid supplies and improve the coordination of disaster relief operations during disasters in Southeast Asia.

Participants from the region will exchange ideas on utilising digital technologies in times of crisis through a series of online courses and webinars. Discussions will include the development of a digital humanitarian supply chain management framework, a digital dashboard for disaster management, and digital and technology-driven supply chain management, towards a more robust humanitarian response when disasters occur in the region.

03 STEP Youth Regional Affairs Dialogue 2021

In January 2021, some 81 aspiring youth leaders from Singapore and the region attended the STEP Youth Regional Affairs Dialogue held in Singapore to discuss potential solutions to the region’s social inequality.

The week-long event hosted at Singapore’s Nanyang Technological University provided a platform for university students in Asia to enhance their leadership skills and broaden their understanding of geopolitics through cross-cultural exchanges and dialogues.

“If we all agree that we want to be greener, fairer, and more giving, there are many things we can do: policy changes, attitude and mindset changes, and specific actions that we can all champion as well. I would encourage all of you to continue to keep in touch with one another, to build bridges and enduring friendships,” said Mr Lawrence Wong, Singapore’s Minister for Education who graced the opening dialogue.

Guest speakers for the Dialogue included Dr Yaacob Ibrahim, Singapore’s former communications and information minister; Ms Debbie Fordyce, president of Transient Workers Count Too (TWC2), an organisation that promotes the rights and wellbeing of migrant workers; and other

leading social innovators who shared their perspectives on social inequality affecting businesses and occupations; culture and heritage; gender and diversity; healthcare and well-being; and knowledge.

“During the Dialogue, my fellow youth leaders shared their observations of unequal access to education in their home countries. After attending the Dialogue, I was motivated to contribute to education-related causes and joined Advisory, a non-profit initiative in Singapore to help youths make informed decisions on further education and their careers,” shared Daphne Tang Zhi Ling, a participant from Singapore.



Youth leaders from across the region in a discussion, as part of STEP Youth Regional Affairs Dialogue 2021.



Stronger Together

Building a More Resilient Asia

I think all the countries that participated in the programme share the same objective. We want to contain the effects of the pandemic by controlling the number of COVID-19 cases, reopen borders while balancing the economic impact.” said Mr Saifuddin Abdul Rahim, CEO of the Johor Economic, Tourism and Cultural Office (JETCO) as he reflected on the Temasek Foundation Resilience in Crisis Governance Programme (TFRCG) held in June 2021.



Supported by Temasek Foundation and organised by Singapore’s Civil Service College, the programme attracted more than 30 senior public sector participants from across the region, including Malaysia, Bhutan and India. The programme covered topics on different aspects of crisis governance such as institutional and regulatory mechanisms and policy and execution capabilities. Participants and their teams had to discuss a challenge related to crisis response work they were facing and present an action plan at the end of the programme.

Mr Saifuddin added, “What I liked about the programme was its topic on resilience in crisis governance. It came at a very apt time. Another plus point is having the benefit of learning from the sharing of experiences by the other participants.”

Prior to the pandemic, the Johor-Singapore Causeway was one of the busiest border crossings in the world, with over hundreds of thousands of travellers daily. However, all of that came to a standstill when borders were closed in March 2020.

Mr Saifuddin and his team presented the Johor ImmuPlan Project which aims to prioritise vaccination for 100,000 Malaysians, who hold Singapore work permits. The efforts will facilitate their return to work in Singapore when the border reopens.

Mr Saifuddin shared that the project, which was implemented in July 2021, had made good progress and would be on-track to be completed by the end of the year. “We hope to have this group of vaccinated Malaysians ready to work in Singapore, which will be mutually beneficial for both countries.”

“Unlike Singapore, which is a city-state, we have rural areas in Johor that may have internet connection issues. There are many people who do not have smartphones or who are not used to registering online for their vaccinations. The Southern Volunteers initiative comprise youth volunteers that help the residents with registration, explain the processes and manage crowd control at the vaccination centres. They also provide mobile vaccination to aid bedridden citizens or those who are not able to travel to the vaccination centres.”

Being a part of TFRCG was phenomenally insightful and thrilling! TFRCG and especially Singapore presentations, showed how important it is for governments to build trust with their people. We have all seen how COVID-19 is rooted in individual behaviour as much as the community. Thus, correct outreach is critical.”

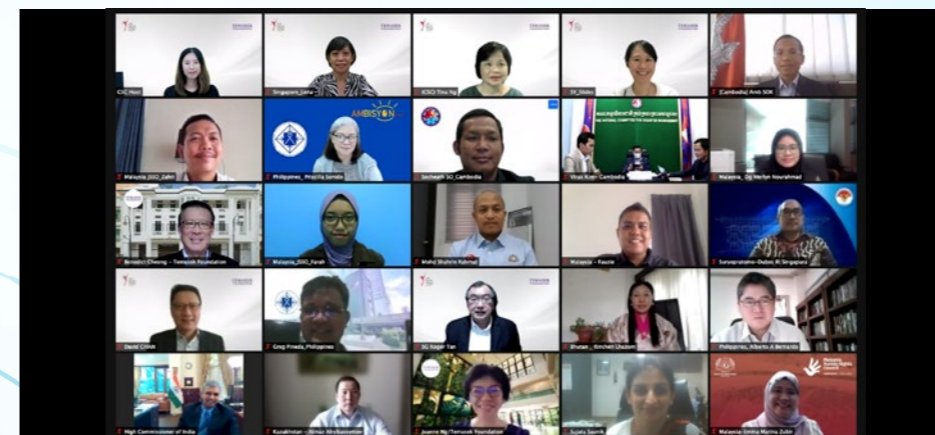
Programme Participant, Dr Mittali Sethi, Head of Prevention Sub-Division of the Government of Maharashtra, India, presented their project on improving India’s crisis management system.



As a landlocked, import-driven nation, one of the challenges that Bhutan faces is that of food security. The Bhutan team’s project focused on strengthening their national supply chain resilience in food and medical products. Mr Sonam Tenzin, Additional Chief Secretary (ACS), Ministry of Economic Affairs from the Royal Government of Bhutan commented, “TFRCG made us realise that we are not in it alone. It is a global phenomenon, yet there was no dialogue between countries to share their experiences or ideas to face this common enemy. Although it was online, TFRCG provided that much needed platform for these dialogues to happen.”

As the world slowly emerges from the pandemic, it is paramount for communities to continually strengthen their crisis resilience and stay prepared. Through shared knowledge and exchanges, global and regional communities can work together to mitigate risks and develop solutions.

Mr Saifuddin summed up his reflections. “We must ask ourselves –after COVID-19, will we be ready for similar or worse situations in the future? Hopefully we don’t have to deal with another pandemic, but we must be prepared.”



About Temasek Foundation Resilience in Crisis Governance Programme

A platform for practitioners in crisis governance to exchange experience and insights on various aspects of crisis response by drawing lessons from the COVID-19 pandemic.

The programme comprises virtual workshops, e-clinics, and study visits to strengthen leadership capabilities in crisis mitigation and governance in Asia.

Participants:
32 participants from seven countries

- Bhutan
- Cambodia
- India
- Indonesia
- Kazakhstan
- Malaysia
- Philippines

Read more about our outreach in Asia and beyond



Transforming Traditional Arts for a Digital Generation

Preserving Culture for Future Generations

We were excited to be invited to bring the show to Guangzhou, but alas, with the COVID-19 pandemic, it was all not meant to be,” lamented Ms Sally Low, playwright and performer with Chinese Opera Society (Singapore).

The new show, *Tiger Tally: Saving Zhao Kingdom*, was invited to a regional operatic arts festival in Guangzhou, China in November 2020 before the pandemic disrupted the plan.

These days, operatic arts audiences are on the decline. Opportunities to create and perform works are also limited. However, with the global pandemic situation, alternative opportunities also began to appear, shedding some light in the dark days. Thanks to the availability of digital technology, local arts groups were encouraged to turn to digital presentation and live streaming of works.

For the Chinese Opera Society (Singapore), traditional scenic set-ups gave way to green screens and computer-generated effects. Operatic gestures had to be adapted for the screen, and collectively, a new hybridised performance language was born.

The script also had to be tailored for web broadcast, making it suitable for the film medium, while retaining Cantonese opera conventions.

“Talents from across the world can exchange tips and experiences via the Internet. That makes me excited about the future possibilities of Cantonese opera,” Sally said.



Similarly, Era Dance Theatre and Apsaras Arts Dance Company also had to pivot and adapt to the changing situation, as they planned for their respective landmark events – the Muara Festival and the Dance India Asia Pacific (DIAP) 2020.

“We felt strongly that it was important to keep up the annual ritual of the Muara Festival that our community has grown to look forward to,” said Zairin Abdul Latiff, one of the lead choreographers with Era Dance Theatre.

As such, the dance festival became a fully digital event. The performances were live-streamed

to audiences across the region, and has been archived on a dedicated website for new audiences to enjoy the performances.

For Apsaras Arts Dance Company, their annual meeting of Indian dance enthusiasts in Singapore – Dance India Asia Pacific (DIAP) 2020 – became a hybrid event, with a range of conferences and masterclasses taking place both physically and via the web.

This opportunity allowed more people with an interest in the art form to participate in the events.

“It’s wonderful that a hybrid format is born out of these unprecedented times of a pandemic. DIAP 2020 shows the stability of the future of Indian classical dance and arts,” said Mohanapriyan Thavarajah, a faculty member at DIAP 2020.

With Temasek Foundation’s support through the National Arts Council’s Sustain the Arts (stART) Fund, traditional arts groups like Era Dance Theatre, Apsaras Arts Dance Company and Chinese Opera Society (Singapore) were able to make the switch to performing to online audiences. The stART Fund aims to conserve traditional arts and make it accessible to a wider audience.

Despite the challenges posed to the performers such as not being able to see the facial expressions and respond to a live audience, the digital experience helped these groups to

introduce the art form to other countries. For Era Dance Theatre, audiences from countries like Japan, Thailand, Malaysia and Indonesia were now able to catch the performances without travelling to Singapore.

Chinese Opera Society (Singapore)’s *Tiger Tally* also broke new grounds and made its way to audiences in China, and also the rest of the world through digital platforms. Agreeing that there is now a new world of opportunities, Sally added that “Talents from across the world can exchange tips and experiences via the Internet. That makes me excited about the future possibilities of Cantonese opera.”

And these are just some ways traditional arts companies have changed from their usual formats of physical presentations, connecting with a wider audience.

Watch the performances

Muara Festival performance highlights from Era Dance Theatre



Dance India Asia Pacific (DIAP) 2020 performance highlights from Apsaras Arts Dance Company

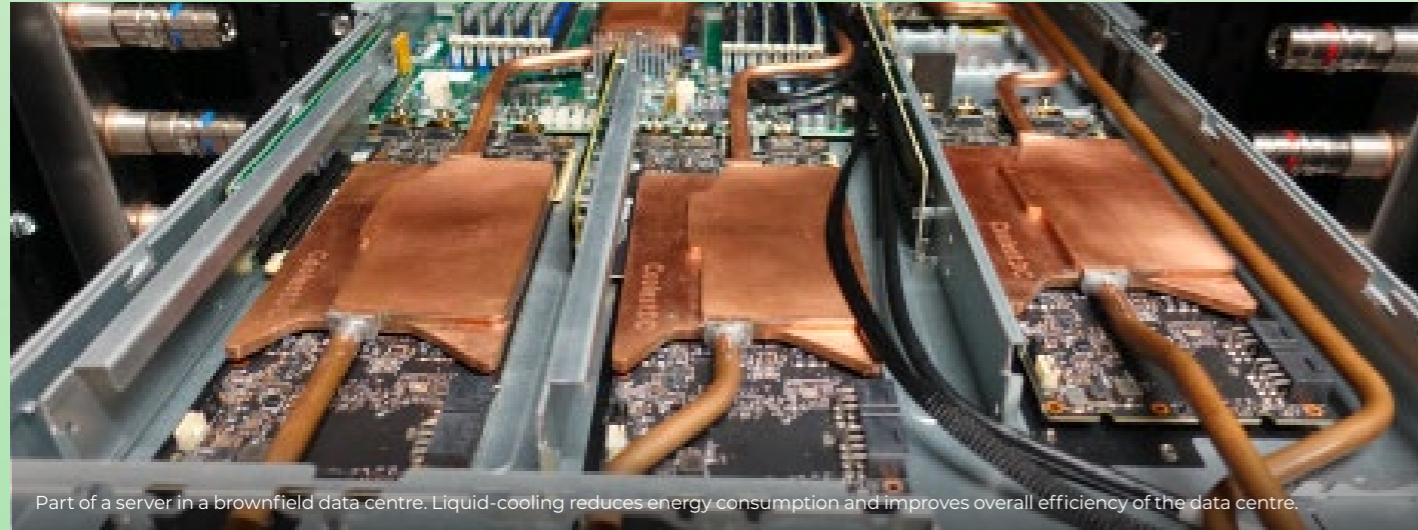


Tiger Tally from Chinese Opera Society (Singapore)



Augmenting Transformation

We support innovation to improve liveability and enable the sustainability community for the betterment of society.



Part of a server in a brownfield data centre. Liquid-cooling reduces energy consumption and improves overall efficiency of the data centre.

01

Liquid-cooled servers for brownfield data centres

Data centres form the backbone of a booming global digital economy, enabling communication, networking and data storage in a hyper-connected world.

Rapid data consumption has led to energy-intensive data centres using high levels of electricity as well as water which is needed to cool the equipment and prevent overheating. A sustainable ecosystem is much needed to balance the growth of data centres against environmental concerns such as greenhouse gas emissions and high energy consumption.

A spin-off of the National University of Singapore, CoolestDC improves the energy consumption and overall efficiency of data centres, as well as its long-term sustainability. In a pilot testing programme supported by Temasek Foundation, CoolestDC used its patented hybrid cooling technology to reduce the power consumption by half, in addition to significantly improving the performance of data centres by more than 30%.

The technology uses machine learning and artificial intelligence to predict and automatically adjust the temperature and system capacity of the servers depending on two factors: the load calculation based on past trends and the weather. This minimises the power consumption needed of the cooling equipment.

Since the solution can be implemented in both brownfield as well as greenfield projects, it can serve as a blueprint for sustainable data centre operation, enabling cities like Singapore to become a greener data centre hub.

02

Healthcare InnoMatch

Temasek Foundation and the Centre for Healthcare Innovation kickstarted the first ever healthcare sandbox event to call for innovative solutions that address critical and emerging healthcare needs. Known as the Healthcare InnoMatch, the challenge provides up to \$1.2 million in project development funding to the winners, and partnerships with local healthcare providers to test bed and possibly commercialise their solutions.

The Healthcare InnoMatch 2021 challenge which attracted 144 teams from over 30 countries was organised in partnership with the Singapore General Hospital, National University Hospital and Tan Tock Seng Hospital.

An artificial intelligence enabled physiotherapy app by RootAlly Ai emerged as one of the top three solutions. The CEO of RootAlly Ai, Jindal, shared that the app

provides instructions for patients to follow, and monitors their progress remotely. It also allows patients to set up their mobile device to film their movements, which will then sync with the AI system to track the joints of the body to assess their movement. This will be useful to minimise inconvenience for elderly and frail patients with limited mobility, and yet allow them to be monitored by healthcare professionals.

The other two solutions which won were Epilog-NV's digital platform that helps doctors analyse brain activity of epilepsy patients, as well as a robot system by Articares where seniors use their arms to interact with an on-screen game to stimulate their mental and sensory abilities.

03

Dyslexia App

Dyslexia, a reading disability, affects some 20,000 children in Singapore's primary and secondary schools. It is often associated with difficulty in identifying speech sounds and learning how they relate to letters and words, which can impede a child's reading and learning development.

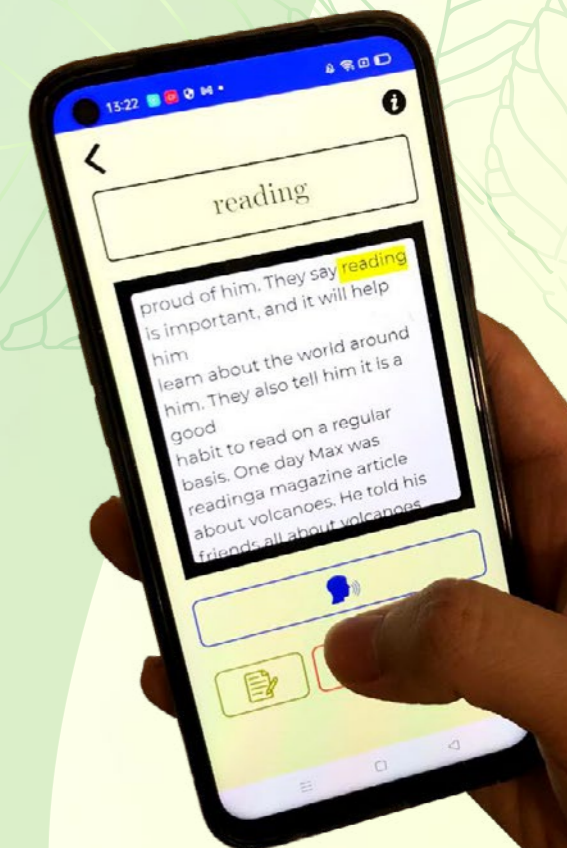
In a project supported by Temasek Foundation, the Singapore University of Technology and Design, and pilot partners, Woodlands Ring Primary School and the Dyslexic Association of Singapore, developed a mobile application to aid children with dyslexia to read and learn better.

The application uses word recognition technology that allows children with dyslexia to read and learn independently,

reducing their reliance on teachers. Additionally, the application's flashcard mode integrates the practice of flashcard use in dyslexia intervention to reinforce word learning through repetition.

To enhance the self-learning experience, students can also personalise the display on the app by choosing their preferred fonts and colours, as well as different voice options for aid in word pronunciation. There is also a separate mode for parents and teachers to keep track of the students' learning progress.

With the integration of assistive technologies in pedagogy and teaching, children with dyslexia in Singapore will have a head start in a more effective and enjoyable learning journey for the long run.



The app aids persons with dyslexia in their reading process.



Making Waves for the Future of Marine Life

Enhancing Mariculture Capabilities in Singapore

“Did you know that the biggest giant clam is about one and a half metres long? That’s as big and tall as me!” Dr Neo Mei Lin commented excitedly, gesturing with her hands to show just how big that is.

A marine biologist and conservationist, Dr Neo has been studying giant clams for more than 10 years, and is probably their biggest advocate. Her passion for these large marine shellfish has even earned her the nickname – ‘The Giant Clam Girl’.

The giant clam and many other marine invertebrate organisms are rapidly and unsustainably caught as either seafood or to support the global aquarium trade. In some instances, the intense pressures of exploitation have caused population collapses in commercially valuable marine species such as the sea cucumbers. As the global demands for certain marine species continue to grow, we face the possibility that none of them will be left to supplement our purposes.

Since October 2020, Dr Neo and a team of researchers from the Tropical Marine Science Institute and Department of Biological Sciences, under the National University of Singapore, have been leading a three-year mariculture research project supported by Temasek Foundation.

“There are two major goals that we have for this project. The first one is to improve the current culture protocols of three groups of marine animals – several species of the hard corals, one species of giant clam, and one species of cowrie. The second is to improve tracking and traceability of individual animals.”

Interestingly, their research to study these endangered, colourful corals has led them to something that is equally colourful – toy building blocks. But what do the much-loved toy blocks have to do with the cultivation of these marine animals?

“Hard corals are a fundamental framework of coral reef ecosystems, and we’ve always been finding ways to make coral propagation less invasive so that we don’t disturb the animals per se,” said Dr Neo. This has led the team to develop a novel method of using building blocks, like



Coral fragments mounted on colourful building blocks for propagation in the aquaria

Lego, to grow coral fragments. They are hung on fishing lines to create vertical nurseries that maximise tank space in an aquarium environment.

Just as the team is looking at propagating corals in a sustainable and less invasive manner, they are also investigating feasible ways to reproduce giant clams – specifically, the native boring giant clam – and the lesser known cowries.

Both these animals are highly sought for their ornamental value; the boring giant clams for their petite sizes and colourful tissues, and the cowries, for their beautiful and enigmatic shells. However, knowledge of their biology remains little known. The team has been building up their research on understanding these animals such as their living habits and behaviour, their diets and even the optimal water and temperature conditions they thrive in before they can successfully induce spawning and begin the process of cultivating their babies in captivity.

We would really like to see how our research outcomes can be fitted for the industry; in this case, the aquarium trade industry. As a start, we want to engage them by talking about the importance of choosing sustainable supplies of marine organisms in their practices, and discussing how our research can help to locally develop the infrastructure and capacity-building to support a sustainable trade,” Dr Neo said earnestly.

Dr Neo also hopes that more can be done to educate and raise environmental awareness such as incorporating environmental biology knowledge into the core education syllabus to spur future generations to have a deeper appreciation of local biodiversity.

“For me, our lives and well-being are very closely linked to Nature – the clean air we breathe and the fresh seafood we eat. I hope through the work I do, I can leave my daughter a better ocean, so that when she’s older, she will still be able to see some of these places that I enjoyed in my youth”.

Giant clams are reef builders, food factories, shelters for shrimps and crabs, and water filters all rolled into one,” shared Dr Neo. “When they start to disappear from the reefs, it is a clear indicator that their reef habitats are in trouble.”



Discover more about the mariculture research project



Mariculture Research Project by the National University of Singapore

What is the study about: To study and explore ways on enhancing mariculture capabilities of three marine organisms – hard corals, giant clams and cowries that will lend support in research, conservation and aquarium trade, including traceability of species.

Traceability of marine species allows traders to estimate the source localities of organism stocks, as well as how they are sourced and handled, all the way until they reach the import country. Furthermore, when the source is authenticated (e.g. comes from a sustainable supplier), the value of the imported animals will likely increase. Some of the tracing methods that the team are examining include techniques such as radio-frequency identification (RFID) tags and genome subsampling-based sequencing.

Besides its applications in research, the ability to tag and track sustainably cultured stocks is crucial in implementing and enforcing sustainable practices that allows management of demands in the booming aquarium trade industry.

The industry may also involve government agencies such as the National Parks Board (NParks) that is presently responsible for enhancing and managing Singapore's urban ecosystems, including the regulation and enforcement of wildlife trade as the Scientific and Management Authority of CITES (Convention on the International Trade in Endangered Species of Flora and Fauna).

Research team behind the project:

Dr Neo Mei Lin

Lead investigator of the overall project, and overseeing the giant clam and cowrie culture component.

Dr Jani Tanzil

Co-lead investigator, and overseeing the coral culture component.

Dr Huang Danwei

Co-lead investigator, and overseeing the genetic traceability component.

Dr Lionel Ng

Research fellow, and leading the ground works on the coral tagging and tracing protocols, including aquarium and field aspects.

Dr Randolph Quek

Research fellow, and leading the genetic research on corals for traceability studies, including the development and testing of protocols for tracing clonal individuals.

Mr Ow Yong Wei

Long Research assistant, and leading the ground works on scaling coral propagation, as well as the innovator of using the building blocks for vertical hanging culture of corals.

Ms Teresa Tay

Research assistant, and leading the ground works on giant clam and cowrie culture, including aquarium and field aspects.

Ms Yip Zhi Ting

Research assistant, and assisting the genetic research on corals for traceability studies, including the development and testing of protocols for tracing clonal individuals.

Why these three organisms and what have been done so far?



Hard Corals

- Builders of reefs, often used by hobbyists to decorate their marine tanks.
- Commonly seen fringing the southern islands of Singapore.
- Corals are like the trees in the rainforest – they provide shelter for small animals, a nursery for ocean-going creatures and protect the shorelines from strong waves, storms and erosion.
- NUS researchers are exploring new methods to nurture more hard corals, such as a vertical coral nursery where they suspend multiple layers of coral fragments mounted on building blocks to maximise the use of the whole water column.
- If the coral nursery technique is successful, the process can be replicated to sustainably mass produce the organism and restock populations.

Giant Clams

- Endangered animal that is vital to ensuring biodiversity of the coral reefs ecosystems.
- Harvested by collectors for their bright coloured mantle and ornamental shells.
- Research focused on boring giant clam species, to improve and innovate current culture protocols and raise production efficacy in laboratory settings in order to conserve the species.

Cowries

- Also known as sea snails.
- Vulnerable creatures are found in the aquarium trade and often killed for their beautiful shells by collectors.
- Limited information available so research is primarily focused on understanding the behaviour and living conditions of the animal, key in developing protocols for their culture.



How are building blocks (like Lego) being used in coral propagation?

Building blocks are used as substrates for the attachment of coral fragments, and then hung using strong fishing lines to create, literally, an underwater hanging coral nursery. This novel method combining building blocks and vertical farming maximises tank spaces at the marine station and allows for scaling up of coral production. The modularity of the building blocks also allows ease of transfer of the coral fragments into other tanks or sea-based nurseries once they have grown larger.

What is a radio-frequency identification (RFID) tag?

RFID tag is a physical tag that can be placed on the animal, and functions like the barcodes in a supermarket, providing information such as where it comes from.

What is genetic fingerprinting? Similar to the concept of PCR testing with a swab, genetic fingerprinting is basically going into the genes of the animals, and finding unique sequences that are like fingerprints to discover their origin.

Milking Tech for Tomorrow

Cell-based milk for future generations

Milk made with cell-based methods is fast becoming a reality, thanks to Singapore biotech start-up TurtleTree.

Its journey began rather serendipitously – first with the company’s CEO Lin Fengru’s hobby of making cheese, then followed by her chance meeting with TurtleTree’s Chief Strategist, Max Rye.

For Fengru, a passion to make good cheese meant finding herself on a determined hunt for good quality milk. She revealed, “I travelled all around Asia, but instead of finding what I was seeking, I soon realised that there were problems with cattle farming in the region – poor animal hygiene, as well as cows pumped with hormones, resulting in poor milk quality.”

As fate would have it, she would then connect with Max at an event where he was giving a talk about cell-based technologies. Together, they set their goal on creating milk in the laboratory and pulled in scientists to dive into the science, leading to the founding of TurtleTree in 2019.

The game-changing innovation won the company a grant of S\$1 million in funding from Temasek Foundation after winning The Liveability Challenge in 2020.

She added, “Our current food systems and traditional methods of dairy products are unsustainable. We believe that it is crucial to use alternative methods to produce milk that can nourish our planet and people”.

As the demand for dairy and dairy products increases with the rising global population coupled with food security concerns, novel strategies for milk production are more important than ever. The gravity of safeguarding food security is further amplified during times of crisis (such as the COVID-19 pandemic) when supply-chains are disrupted.

TurtleTree’s cell-based milk can influence dairy production and play a key role in global food security. The milk produced by their proprietary cell-based methods are less polluting, with 98% reduction in carbon footprint compared to dairy milk, and does not compromise on nutritional content, taste and quality.

Not only is their cell-based milk greener, it also has the potential to produce different types of milk ingredients from different mammals. This means the technology allows us to access the high value bioactive ingredients in milk that are inaccessible otherwise.

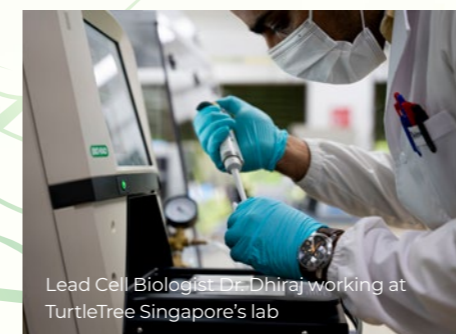
While the company started off by creating cow’s milk that is sustainable and nutritious, they have also been trying to replicate human milk that can provide infants with more nutrients than formula milk. Their next goal is to produce bioactive ingredients and this includes the human lactoferrin, which is a vital ingredient in infant nutrition, sports performance, and health food products.

Even though the team is optimistic about the potential applications of their technology, they are well aware that they have to face hurdles such as consumer acceptance and regulatory issues. Cell-based food is after all, still a novel concept in Asia, and globally. It will take time and effort to introduce the concept of alternative food sources to consumers and build their trust, and this has posed as one of the biggest challenges for TurtleTree today.

“To overcome these challenges, we intend to educate the consumers by showing how our technology can fundamentally change the way we provide nutrition.”

On what the future holds for the ambitious start-up, Fengru says it best: “My goal for the company is to be seen as the gold standard for sustainable food technology when it comes to milk nutrition, and our dream is to have the TurtleTree logo on most dairy-based products, as a renowned label for nourishing ingredients and sustainable innovation. We aim to become a biotech platform to transform performance nutrition, food systems, and cellular agriculture.”

Given the start-up’s ambition, and vision to provide food products without damaging the planet, one can surely expect to see their innovation scaling up successfully beyond milk into other dairy products, transforming the way food is produced and consumed.



Lead Cell Biologist Dr. Dhiraj working at TurtleTree Singapore’s lab

The Liveability Challenge Programme

Started in 2018 and presented by Temasek Foundation, TLC is an international platform that accelerates the launch of sustainable game-changing innovations through funding and other opportunities for development.

Past winners include RWDC Industries for its biodegradable straws, and Sophie’s Bionutrients for producing protein from microalgae using food manufacturing by-product, in 2018 and 2019 respectively.

About TurtleTree:

TurtleTree is the grand winner of The Liveability Challenge 2020. It is the first biotech company in the world to create milk and milk ingredients using proprietary cell-based methods.

With the awarded TLC grant, TurtleTree is expected to complete the commercial scale of a continuous flow bioreactor in Singapore by February 2022.

Project Milestones:

February 2021

Synthesized lactation media in house and optimized method for inducing cells.

June 2021

Completed the design of a continuous flow bioreactor

December 2021

To assess and validate milk produced

February 2022

Set up of a commercial bioreactor



TEMASEK FOUNDATION

Temasek Foundation Ltd.
UEN: 201621232G

Temasek Shophouse
28 Orchard Road Singapore 238832
www.temasekfoundation.org.sg
TFadmin@temasekfoundation.org.sg