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**SG** Nippon  
Aquaponic



**Building Resilience through  
Total Community Defense &  
The Future Of Food**

## Harmonizing Growth: Cultivating Sustainable Futures Locally & Globally



In our quest to bring the vision of urban farming to life within Singapore and globally, we are met with the need for time and careful consideration. Our dream is to see iconic Singapore landmarks, from Changi Airport to Marina Bay, and beyond, thriving as beacons of sustainable agriculture.

We envision a future where diversity and harmony reign, where individuals of all backgrounds unite under the banner of shared progress. Yet, to turn this dream into reality, we recognize the crucial importance of securing longer land leases and safeguarding Singapore's technological advancements.

Nippon's lifelong dedication to pioneering innovative farming methods, particularly in vertical farming, underscores the significance of our mission.

Let us press forward together, driven by the belief that a greener, more sustainable future is not just a dream, but a promise waiting to be fulfilled. **37**

# EMPOWERING Singaporean Agriculture : Nippon **SG** Aquaponic's Commitment to Sustainable Solutions

## Nippon **SG** Aquaponic

VERTICAL ECOSYSTEM (PATENTED)

- ✓ Urban Farming
- ✓ Carbon Neutral
- ✓ Eco Green & Scalable
- ✓ Bio-Secure & High Organic Levels
- ✓ Weather Resilient
- ✓ Zero Exchange Water
- ✓ Sunlight, Space, Energy
- ✓ Super High Yield
- ✓ Sustainable Future Farming Methods
- ✓ Utilization & Efficiency Rate



Nippon SG Aquaponic has accomplished 10 significant achievements through its innovative breakthroughs in new creation. These achievements include Urban Farming, Carbon Neutrality, Eco-Friendly Scalability, Biosecurity with High Organic Levels, Weather Resilience, Zero Water Exchange, Optimization of Sunlight, Space, and Energy, Superb High Yields, Sustainable Future Farming Methods, and Utilization & Efficiency Enhancement.

This New Food System reflects our perseverance and dedication, overcoming challenges with determination and hard work. It stands as a breakthrough milestone for Nippon towards achieving the objectives of the 30 by 30 initiative.

# WORK TOGETHER TO CREATE A BETTER FUTURE

THE NIPPON SG AQUAPONIC  
COLLABORATE & JOINTLY SHAPE  
THE FUTURE OF FARMING



# PREFACE

To our esteemed leaders, President, Deputy Prime Minister,  
Ministers & cherished Compatriots ,

ensure Singapore's food security

## Green Plan

Allow me to share with you a tale of unwavering determination and collective triumph that resonates deeply within the heart of our nation—the saga of the "30 by 30 Green Plan." This noble initiative, forged by the Singaporean government, stands as a testament to our resolve to nourish our people and safeguard our sovereignty.

By striving to fulfill 30% of our nation's nutritional needs by 2030, we pave the path towards food security and liberate ourselves from the shackles of dependency on foreign imports.

In the face of daunting odds, Singapore, with its limited land and manpower, has long grappled with the challenge of modernizing its agricultural landscape.

Yet, amidst these trials, there emerges a beacon of hope in the form of Nippon—a stalwart soul with over four decades of dedication to the cherished Japanese koi ornamental fish industry. Despite the ache in his heart, Nippon bravely ventures forth into uncharted waters, embracing the arduous journey of advancing edible fish farming - SG Aquaponic .

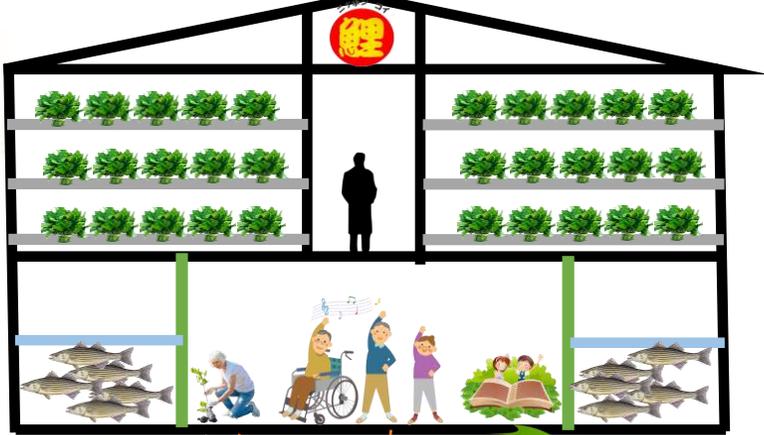
**Civil Defence:** With tensions rising around the world, a dependable system for growing local food is more important than ever. The ongoing Russia-Ukraine war has highlighted the fragility of global supply chains, impacting food prices worldwide. Our validated system offers Singapore a way to lessen its reliance on external food sources, promoting stability. Recognized for its excellence in community engagement, we were honored with the 'Best Community Initiative 2022' award at the Zenith Vertical Farm Global Awards. Through our comprehensive workshops and programs, we equip common citizens with the knowledge and skills needed to cultivate resilience from within, fostering a sense of ownership and empowerment as they harvest together and undergo workshops aimed at sustainable farming practices.

**Social Defence:** Rooted in the belief that social cohesion is essential for resilience, our system transcends traditional farming practices to foster meaningful connections within communities. Despite being outdoors, our weather-resilient design ensures that temperature conditions remain cool and non-humid, making it comfortable for individuals, including the elderly, to engage in harvesting activities. Recognized for its outstanding design, our system received the prestigious 'Best Farm Design 2022' award, underscoring its scalability, mobility, and user-friendly features.

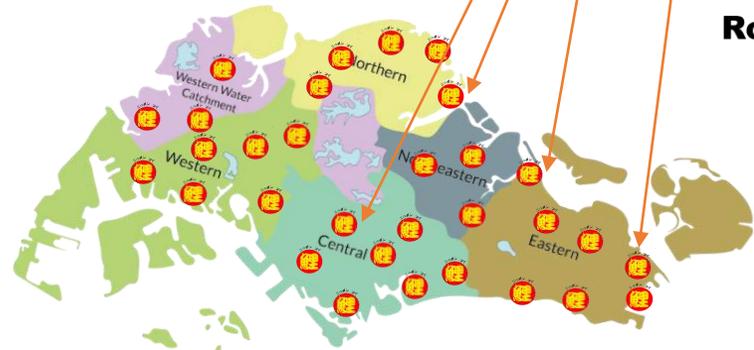
**Economic Defence:** As Singapore charts a course towards greater self-sufficiency in food production, our system emerges as a catalyst for economic resilience. By providing communities with the technological infrastructure needed to embark on their farming journeys, we empower them to chart a path towards sustainability. Through collaborative efforts and resource-sharing facilitated by our system, citizens are not only equipped to meet their immediate food needs but also poised to contribute towards broader economic objectives. With its flexible and expandable design, our system plays a pivotal role in assisting the government in achieving its 30 by 30 Green Plan objectives. It enables communities to adapt quickly to complex economic circumstances while remaining steadfast in their dedication to food security for universal defense.

# Total Defence (Civil Defence, Social Defence, Economic Defence)

Nippon SG Aquaponic



Roof Top / Community Gardens



**Introduction:** Singapore faces a growing challenge in securing its food supply. Over 90% of its food comes from external sources, making the country vulnerable to disruptions caused by factors like geopolitical tensions. In response to this, we have developed an innovative solution aimed at empowering communities to take charge of their food sustainability efforts. Our integrated approach combines cutting-edge technology with community engagement to address the multifaceted dimensions of food resilience

In 2023, after a decade of unwavering perseverance, Nippon's dedication to vertical agriculture shines on the global stage at the **Zenith Global World Vertical Agriculture Awards in London**. Through sheer determination, we secure the title of **Best New Vertical Farming Facility**, marking a transformative moment for Singaporean agriculture and the human spirit.

Nippon's innovative system, tailored for Singapore's urban landscape, not only revolutionizes agriculture but also fosters unity among diverse communities, planting the seeds of racial harmony and shared stewardship of our land.

This journey embodies our nation's resilience, transcending mere innovation to reaffirm our commitment to a sustainable future. We raise the banner of Singaporean excellence, ensuring that hunger finds no place among us.



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## Vision 2030 Objective Projections

Up Date: 21.09.2012

Fish & Vegetables : **1,500 Tons**



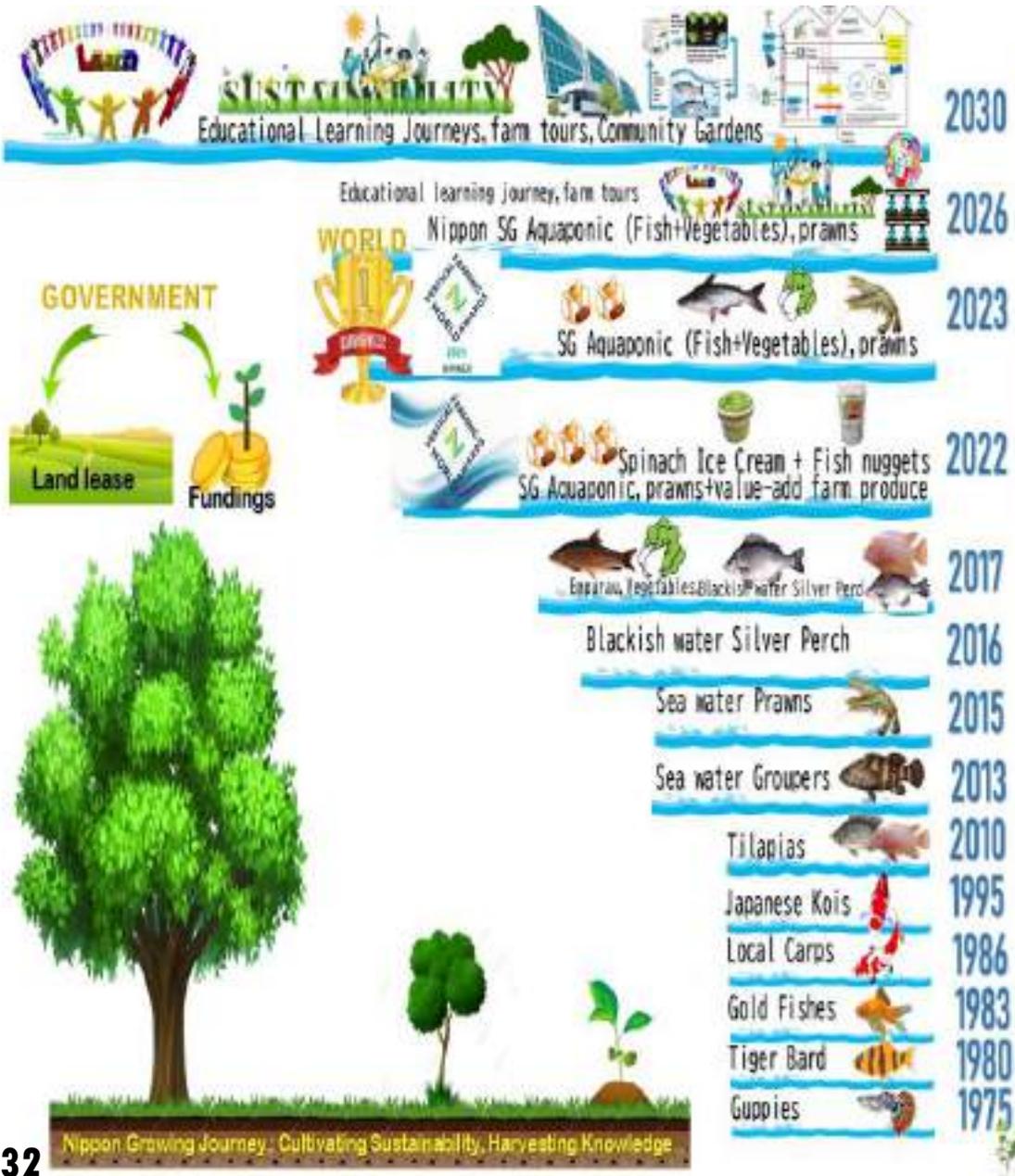
Due to the implementation of this cutting-edge system, it possesses the capability to not only support but also foster the robust advancement of urban agriculture across diverse communities.

Here at NIPPON, we recognize the pivotal role of the farm as the cornerstone, offering essential services and technical guidance to perpetuate the essence of urban vertical farming in Singapore.

With unwavering dedication and our whole life's devotion, NIPPON has devoted its existence to nurturing this farm and driving agricultural innovation forward. Thus, we appeal for an extended timeframe to meticulously strategize our farm's future and facilitate the subsidization of modern urban farming developments within the nation.

I hope that with the strong support of the relevant authorities, NIPPON can ensure the farm's continuity for the next generation.

# Nippon's Dream : Visionary



## Background

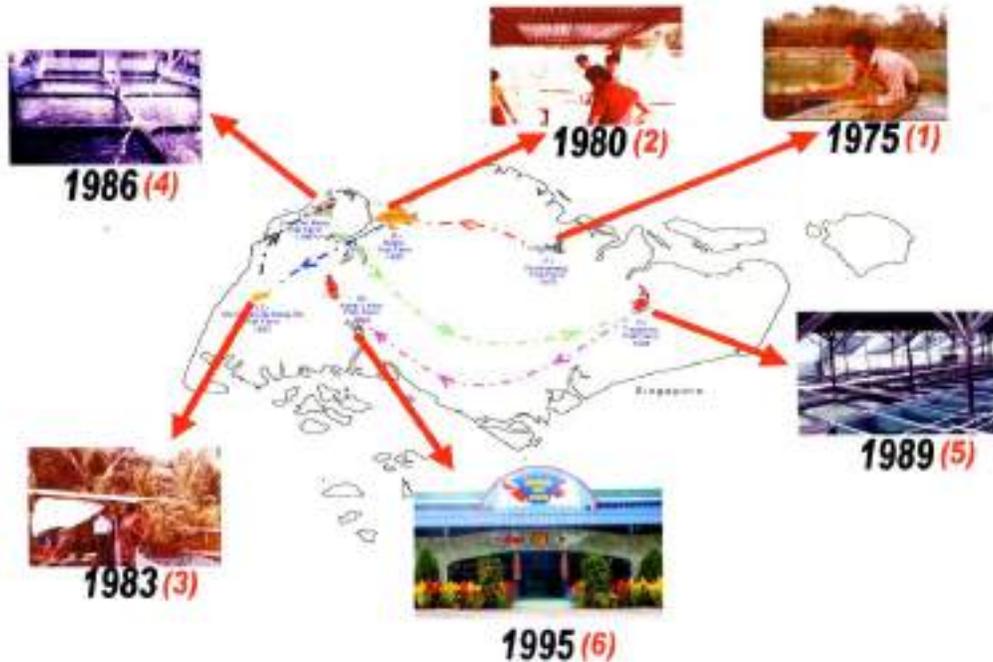
Pay Bok Sing shares his family's agricultural heritage, which traces back to their origins in a Sembawang poultry farm.

From his early years, he actively participated in farming tasks, ranging from caring for crops and livestock to breeding ornamental fish.

Their journey has been defined by resilience and adaptation, navigating through resettlements and challenges. Despite obstacles, their dedication to farming persisted. Specializing in ornamental fish farming from 1975 to 2010, they built a solid reputation within the industry. However, recognizing the government's call for enhanced food security and sustainability, they decided to transition their expertise towards cultivating edible fish, and give up Japanese koi. This shift aligns with Singapore's 30 by 30 food security initiative, showcasing their commitment to contributing to a more sustainable food future.



## Resilience in Adversity: A Journey Home



Rooted in Sembawang until 1975, Pay Bok Sing's journey began with upheaval. From Kranji to Choa Chu Kang, then to Lim Chu Kang and Tampines, the fish farm endured displacement, akin to refugees facing relentless challenges.

In 1995, it found solace at the Japanese Koi Farm in Choa Chu Kang, its permanent haven. Amidst the turmoil, the farm's tale mirrors that of resilient souls, grappling with displacement's agony.

As neighbors succumbed to the pain of relocation, some abandoning farming altogether, Pay Bok Sing's resolve remained unyielding. Despite the allure of leaving for greener pastures, rooted in patriotism and love for agriculture, torture remained steadfast. For him, serving Singapore's agricultural legacy demanded unwavering commitment, a commitment he continues to uphold, refusing to relinquish his agricultural dreams.

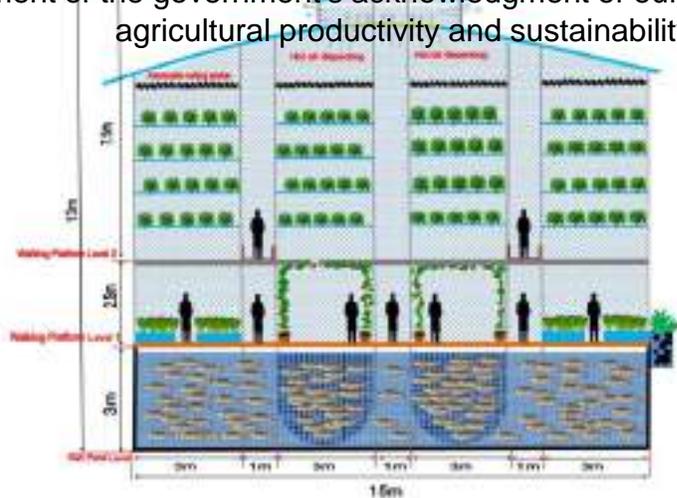
# CULTIVATING UNITY & COMPASSION

Being hailed as champions in the Best in Community Initiative category at the esteemed World Vertical Farming competition is a testament to our unwavering dedication to nurturing a profound sense of community in the vibrant tapestry of Singapore. Our innovative system blueprint is meticulously crafted to seamlessly integrate into diverse landscapes, whether within the embrace of tight-knit neighborhoods, burgeoning urban farming hubs, or the bustling heart of cityscapes. Our overarching aspiration is to kindle the flames of the Kampong spirit, transcending barriers of creed and culture, bolstered by the steadfast support of governmental agencies, philanthropic endeavors, social workers, tireless volunteers, and the enthusiastic involvement of bright minds from esteemed universities and polytechnics.



# AGRICULTURE PRODUCTIVITY GRANT (APF)

For over three decades, since our establishment in 1975, we have dedicated ourselves to the art of cultivating ornamental fish. However, it wasn't until 2010, prompted by the government's rallying call, that we truly grasped the profound significance of aquaponics for the future of agriculture. With unwavering determination, we embarked on a journey of experimentation, delving into the realms of 5E high-tech vertical farms. Through numerous trials and tribulations, we persevered, refining our methods until we achieved the elusive feasibility of our mechanical principles. In 2015, we took a momentous step forward, officially commencing construction and submitting a crucial APF (Agricultural Productivity Fund) grant application, focused on "increasing productivity." This marked a pivotal milestone in our relentless pursuit of agricultural innovation. When the long-awaited letter of offer arrived in 2017, we were filled with confidence in the efficacy of our technology and the depth of our expertise. This letter bestowed upon us the opportunity to realize our vision—a commercial-scale Nippon SG Aquaponic system—a testament to our steadfast commitment to sustainable farming practices. With a budget of S\$1 million allocated to the project, we find ourselves buoyed by the prospect of receiving 70% compensation, a clear endorsement of the government's acknowledgment of our efforts to enhance agricultural productivity and sustainability.



# INTERNATIONAL INTEREST



During the recent World Aquaculture Exhibition, held in Singapore, our innovative aquaponic system garnered significant interest from international attendees. Representatives from countries such as Dubai, Oman, America, Australia, Thailand, Japan, Taiwan, Malaysia, Indonesia, Brunei, and China expressed keen interest in collaborating with us to bring our technology to their respective countries.

These expressions of interest underscore the global recognition of Singapore's expertise in sustainable agriculture and aquaculture. As a pioneer in **"NEW FOOD SYSTEM CREATION,"** we are eager to explore opportunities for international collaboration and knowledge exchange.

# RECOGNITION & UPGRADES CELEBRATION INNOVATIONS

In response to these challenges and to showcase the capabilities of our Nippon SG Aquaponic system as a pioneer in "NEW FUTURE FOOD SYSTEM CREATION," we participated in the Zenith Global World Vertical Farming Awards.

In 2022, we were selected as finalists in three categories: **Best in Sustainability Initiatives**, **Best in Energy Efficiencies**, and **Best in Community Initiatives**. Despite this recognition, we remained unsatisfied with the status quo and relentlessly upgraded our system.



# Farmers' Markets & Exhibitions



Minister Vivian Balakrishnan for Foreign Affairs



Mr Teo Ho Pin - Former Mayor of North West District



Miss Ng Ling Ling - Jalan Kayu GRC MP



Minister Grace Fu & Mr Koh Poh Koon- Sustainability & Environment



Mr Lawrence Wong - Deputy Prime Minister & Minister Grace Fu - Ministry of Sustainability & Environment



Dr Amy Khor-Senior Minister State for MSE



Mr Masago Zulifli- Minister of social & Family Development



Mr Desmond Tan - Minister for Deputy Secretary NTUC



Minister Chan Chun Seng - Ministry of Education



Mr Melvin Ong - MP



MP of Punggol West & Minister of Home Affairs Social & Family Development



Mr Zhulkarnain Abdul Rahim - CCK GRC MP



# Sustainability Farming Presentation talk at Ministry of Education



We are deeply grateful to the Ministry of Education (MOE) for extending the invitation to us. Additionally, we express our sincere appreciation to the Singapore Food Agency (SFA) for granting approval and to the Singapore Agro-Food Enterprise Federation (SAFEF) for selecting Nippon to be honored with the opportunity to deliver a Sustainability Farming Presentation Talk at the Ministry of Education.

This recognition underscores the importance of sustainable farming practices and serves as a testament to our dedication to advancing agricultural innovation and promoting environmental stewardship. We are truly honored to have been entrusted with this platform to share our insights and experiences with the broader community.

## CHALLENGES FACED

However, our journey has been fraught with challenges, particularly exacerbated by the COVID-19 pandemic and the increasing urgency of climate change. These disruptions have necessitated a restructuring of our project to align with the principles of sustainability and resilience.



During our journey towards achieving productivity enhancement, Nippon encountered unexpected challenges, notably the disruptive impacts of the COVID-19 pandemic and the increasing urgency of climate change. These disruptions significantly affected our supply chains, manpower, and project schedules. Moreover, escalating electricity bills further compounded our challenges, necessitating a restructuring of our project to align with principles of green energy, eco-friendliness, weather resilience, carbon neutrality, zero discharge, zero exchange, and zero pollution.



## Farm Visits & tour

2013 Minister Khor Boon Wan's Visit



## Educational Learning Journey Farm Tours



# NATIONAL PRIDE WORLD NO 1

Nippon SG Aquaponic system as pioneer in  
Zenith Global World Vertical Farming  
Awards



WINNER

Best New Vertical Farm Facility



Nippon Koi Farm Pte Ltd – Singapore SG Aquaponic

The following year, at the 2023 Zenith Global World Vertical Farming Awards in London, our efforts bore fruit as we clinched **The Best New Vertical Farming Facility award** and emerged as finalists in the categories of **Best Farm Innovation** and **Best Technology Development**.

This achievement not only fills us with pride but also brings honor to Singapore through our locally developed "**Singapore SG Aquaponic**," as stated in the certificates.

# Zenith Global World Vertical Farming Awards 2022



# EMPOWERING COMMUNITIES THROUGH SUSTAINABLE AGRICULTURAL INITIATIVES



At Nippon, our resolve to spearhead such initiatives remains unshakable. Moreover, our pioneering system holds profound promise in providing solace and purpose for seniors and individuals navigating the spectrum of autism, granting them a meaningful outlet through agricultural pursuits while fostering bonds within the community. Furthermore, our steadfast commitment to sustainable farming practices ensures a bountiful harvest of compassion for marginalized families grappling with economic hardships. Nestled within sheltered greenhouses, our revolutionary Vegetable Aquaponic system stands as a beacon of efficiency and sustainability, embodying our steadfast dedication to cultivating a brighter, greener future for all.

# Leading the agricultural Revolution : Empowering Future Generations



Our proven expertise in aquaculture, validated by our award-winning system, the Best New Vertical Farm Facility, exemplifies our dedication. Our pioneering concept promises to transform conventional farming practices, earning international recognition and acclaim. Our farm's primary focus lies in nurturing , particularly by imparting knowledge and skills in locally validated agricultural technologies. By championing local advancements, we aspire to empower forthcoming generations to contribute to the Green Plan's objectives through indigenous solutions, thereby bolstering 100% local enterprises and ideas.

## Best Sustainability Initiative Award 2022

By perfectly integrating fish farming and vegetable production in a fully sustainable three-dimensional vertical farm, Nippon SG Aquaponic defies tradition, making the most of available space and resources, and has the capability to produce over 1,000 ton/hect/yr of fish & vegetables.

The innovative agricultural feat is achieved by building a closed-loop urbanized farm powered by artificial intelligence. The result is a high-tech fully zero emission, multi-functional ecological vertical farm that can be purposed for education, tourism, and recreation.

Nippon SG Aquaponics hopes to inspire the next generation to utilise innovative technology and recyclable items to enhance the country's food production capability and to advance modern agriculture. Through knowledge impartation on agricultural technology on modern fish farming and vegetable symbiosis, to create a fully sustainable food production.

Our Aquaponic aims to be the place to learn about sustainability, food systems, and safety while taking a break from the frantic pace of city life. Using a fun and hands on approach, students and the community can learn about contemporary aquaponic farming technologies and procedures as well as the sustainability movement. Through this education process, we hope to cultivate interests and aspire the next generation urban farmers.

# Zenith Global World Vertical Farming Awards 2022



# Best New Vertical Farm Facility Award 2023

Elevate Your Farming Future with Nippon SG Aquaponic's Vertical Oasis!

Picture this: a vertical aquaponic system soaring 12 meters high, spanning 6 layers, perched above a 3-meter deep fish pond - all united under a visionary 2-in-1 integrated concept. Nippon SG Aquaponic has reimagined farming by seamlessly intertwining aquaponics and greenhouse structures into a groundbreaking space-saving, cost-efficient marvel.

Immerse yourself in a cascade of vibrant greenery, with tiers reaching 4 to 9 meters high, nurturing 1000 movable vegetables. Control their exposure to the sun's embrace with a remote, ensuring optimal growth. Biosecurity is paramount with netting veiling each row, flexible for stretch-and-retract ease during harvests.

Our ingenious lifting system transports you sky-high in mere minutes, enhancing efficiency. Beneath it all, the 3-meter deep fish pond cools the entire structure through a smart automated temperature control system.

But there's more - a dedicated germinating chamber, revolutionary toxin-to-nutrient conversion systems, and a unique waste diversion process systems for flourishing plant growth. Rainwater recycles, solar energy powers, and comprehensive monitoring optimizes both fish and vegetable realms.

Join us in sowing the seeds of innovation and sustainability. Experience the future of farming with Nippon SG Aquaponic's towering vertical wonderland!

# Zenith Global World Vertical Farming Awards 2023



## Best Energy Efficiency Award 2022

**Nippon SG Aquaponic** is a zero-waste ecological farm that utilizes artificial intelligence and multi-functional vertical farming. We pioneered the use of nanoengineering nutrient solution and titanium technology to extract and separate fish excretions and bio composes, converting them at accelerated rate into organic nutrients solution for vegetable farming, allowing for continuous and sustainable production of fish and vegetables.

Our symbiotic farm can produce up to 42 tons of fish and 18 tons of vegetables for every 600 square metres. Fish and vegetable production accounts for 8000w/h and 5000w/h energy consumption respectively. The farm can harness up to 5000w/h of solar power to supplement production. This translates to the eventual energy consumption of 1.02kw per kg of fish and 1.47kw per kg of vegetables.

Given the carbon emission rate of 785 gram per kw energy, this fish and vegetable production generates 150kg of carbon dioxide daily. The farm is able to achieve carbon neutrality by producing 95 kilograms of vegetables a day (50kg of vegetables and the remaining 45 kilograms of low-light symbiotic vegetables on the bottom fishponds of our multi-layer vertical farm), making it one of its world-first carbon neutral, zero waste and fully self-sustainable farm.

# Zenith Global World Vertical Farming Awards 2022



# Best Technology Development Award 2023

Leading technological advancement, our breakthrough system extracts, converts, and initiates a bacterial transformation, seamlessly turning toxic fish waste into vital plant nutrients. Employing cutting-edge techniques, it fosters a closed-loop ecosystem benefiting fish and vegetables. This aligns seamlessly with our commitment to zero waste, zero emissions, and carbon neutrality.

As an innovative zero-waste ecological farm, we utilized artificial intelligence to monitor the optimal time for harvesting and multi-functional vertical farming techniques to redefine sustainability. Through pioneering nanoengineered nutrient solutions and cutting-edge titanium technology, we have developed a fish excretions extractor and bio-composites that swiftly transform into organic nutrients. This groundbreaking innovation drives uninterrupted and sustainable production of both fish and vegetables.

Our symbiotic farm boasts remarkable capacity, yielding 42 tons of fish and 18 tons of vegetables per 600 square meters. With energy efficiency paramount, consumption is 8000w/h for fish and 5000w/h for vegetables, complemented by up to 5000w/h of solar power—1.02kw per kg of fish and 1.47kw per kg of vegetables.

Contributing 150kg of CO<sub>2</sub> per day due to a 785-gram carbon emission rate per kw, we achieve carbon neutrality through daily 95kg vegetable production. Nippon SG Aquaponic's pioneering technology reshapes farming's future as the world's first carbon-neutral, zero-waste, fully self-sustainable marvel.

# Zenith Global World Vertical Farming Awards 2023



## Best Community Initiative Award 2022

**NIPPON SG Aquaponic** is a commercial, multi-function, urban sustainable, closed loop integrated vertical eco system farm – future farming method, that uses fish effluent and plants in a recirculating pond to grow organic vegetables and fishes at an accelerated rate.

An aquaponic system requires no irrigation, pesticides, herbicides, fertilizer, or expensive tilling equipment. Unlike traditional vertical farms, **Nippon SG Aquaponic** has a neutral carbon footprint, tapping on solar power and a sophisticated rainwater irrigation system for its operations.

This high-tech organic vegetable farm maximises space and resource efficiency – it has the capability of producing over 1,000 tonnes of fish & vegetables per hectares per year.

**Nippon SG Aquaponic** vision is to inspire the next generation of modern farms to embrace sustainable farming practices through science, technology, and food security.

Therefore, the premises of **Nippon SG Aquaponic** is designed to provide a comfortable and conducive environment for students and aspiring farmers to learn about modern aquaponics farming technologies and processes, as well as the sustainability movement.

For the community, the green space in **NIPPON SG Aquaponic** is also a sanctuary where they can relax from the hectic pace of urban life, while learning about sustainability, as well as food systems and safety.

# Zenith Global World Vertical Farming Awards 2023



# Best Farm Design Innovation Award 2023

Nippon SG Aquaponic stands as a vertical marvel, soaring 12 meters high with 6 layers, perched above a 3-meter deep fish pond under a visionary 2-in-1 integrated concept. Experience a cascade of vibrant greenery across tiers reaching 4 to 9 meters high, nurturing 1000 movable vegetables. Remote-controlled sun exposure ensures optimal growth, while flexible netting veils each row, easing stretch-and-retract during harvests for paramount biosecurity.

Our innovative lifting system swiftly transports you skyward, enhancing efficiency. Beneath it all, a 3-meter deep fish pond cools the structure via smart automated temperature control. Nippon SG Aquaponic reimagines farming by seamlessly blending aquaponics and greenhouse structures, delivering a groundbreaking space-saving, cost-efficient marvel.

At its core, our farm operates as a self-contained ecosystem, rapidly converting fish waste and bio-composites into organic nutrients using nanotechnology. This advanced aquaponic system is pesticide, chemical, and tillage-free, reflecting eco-awareness and efficient resource use. Powered by solar energy and sophisticated rainwater recycling, our farm excels in space and resource efficiency, yielding over 1,000 tons of fish and vegetables per hectare annually with zero pollution and carbon neutrality.