CASE 104

Clustering Urban Farming, Climate Change and Real Estate Valuation

Executive Summary:

A huge portion of the world's less privileged population does not have easy access to fresh and healthy fruit and vegetables. With rural areas becoming more sparsely populated and cities growing till they are bursting at the seam, food security is becoming a worldwide point of concern. In response to this, peri-urban and urban farming are evolving. Through integrated bio-systems that cascade nutrients and energy, one can remedy soil deemed unfit for farming. Urban farming creates value out of unused spaces, such as flat rooftops, but can also be incorporated into urban design, to transform the interiors of buildings. By doing so, not only would one be growing food but also increasing the real estate value of the building by generating additional revenues, reducing costs and increasing the flow of people through these facilities. Furthermore, plants can be used in sewerage systems as part of waste water treatment, to recycle the “waste” into nutrients. This farming system offers new targets for resource efficiency and contributes to the mitigation of climate change.

Keywords: Urban farming, Peri-urban farming, Integrated bio-systems, greenhouses, practical sustainability, waste equals food, Five Kingdoms of Nature, climate change.

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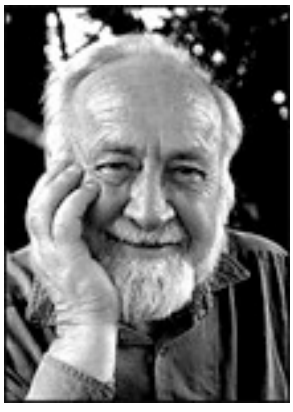
Photographs The ZERI Network, Kono Design, John Todd

Integrated Bio-systems and farming:

Meeting Prof. George Chan in Beijing in 1994 drastically changed my views on farming. This Mauritian-born sanitary engineer with a degree from Imperial College of London, worked for two decades for the American Environmental Protection Agency (EPA) in the Pacific Islands under US control. At the age of 59 he decided to take early retirement and return to his ancestral land in Guangzhou (China). He intended to restore his grandparents' home and establish a library containing all his work and simultaneously learn traditional Chinese farming methods. He witnessed the emerging urbanization of China and observed how the traditional techniques blended into the new fast growing cities. George became my grandmaster in farming, particularly urban farming. He initially called it integrated farming systems but over the years we started calling it integrated bio-systems (IBS), since we intended to go beyond the idea that we are merely farming.

Prof. George Chan

Prof. Li Kangmin



Bill Mollison

Jerome Ostenkowski

The next year (1995) I met Bill Mollison, the founder of the Permaculture. It was interesting to learn that George Chan and Bill Mollison had worked together in Australia and realized that they had a lot in common, but decided to go separate ways. Permaculture was originally inspired by the rock gardens of the Native Americans in New Mexico, and followed the logic of the early biological insights of combining plants, animals and minerals. The results are impressive and Permaculture turned into a global trend for efficient small scale farming using available resources. While I never worked with Bill Mollison directly, we did work extensively with Jerome Ostenkowski[1], one of the founders of Permaculture in the USA and extended the permaculture farm in Basalt, Colorado with additional mushroom and algae. He demonstrated first how peri-urban agriculture at 2,000 meters altitude in rock soil could generate food all year. However, our interest in enhancing output using available resources has been inspired by the out of the ordinary work of George Chan.

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[1] www.aspentimes.com/article/20110918/NEWS/110919857

George created productive food and energy units, operated with plants, animals, bacteria, and algae, on plots where it was thought that nothing would grow. According to George, those who believe the soil is poor, lack an understanding of Nature. He firmly believed that every soil type could be dramatically improved, provided we designed an integrated farming technique where the digester and the cycling of organic waste stands central. Prof. Li Kangmin, of the Asia-Pacific Regional Research and Training Center for Integrated Fish Farming (IFFC) based in Wuxi (China) enhanced George's IBS with his insight on how to farm fish, efficiently cascading nutrients and energy. They have a great mutual respect for each other. I was so impressed with the hands-on approach of George and Prof. Li that I funded the creation of an integrated biosystem at the Montfort Boys Town in the periphery of Suva, the capital of Fiji. After a visit, organized by HE Robin Yarrow, the Ambassador of Fiji to Japan based in Tokyo, I decided that this vocational training school was an ideal platform to demonstrate the logic advanced by George. He was pleased to lead the IBS project, integrating all five kingdoms from beginning to the end. He settled in Fiji for 9 months to supervise the initiative and build the facilities.

The integrated farm at the Montfort Boys Town Vocational School in the urban area of Suva, Fiji © 2000, Luis Camargo

As soon as the program initiated, a broader support and additional funding came from UNDP (Pacific Office), Hiroyuki Fujimura, the CEO of EBARA Corporation (Japan), and Kazuhiko Nishi, the President of ASCII (Japan). George had an epochal insight that if one integrated the 5 kingdoms of nature in all farming, as classified by Dr. Lynn Margulis, the co-author of the GAIA Theory with James Lovelock, the output level of food and energy would be greater than what even the most chemically intensive and

genetically advanced programs could achieve. This hypothesis had to be tested. Professor Motoyuki Suzuki, from the Institute of Industrial Science (IIS) of Tokyo University, visited the site and demonstrated with a team of doctoral students that the farming method was carbon neutral. Mr. Nishi, the Japanese entrepreneur, shipped the scientific equipment to Fiji to undertake the food and energy cycle with the aim to demonstrate the carbon neutral research.


Dr. Lynn Margulis


Hidoyuki Fujimura


Dr. Kazuhiko (Kay) Nishi


Dr. Motoyuki Suzuki

Integrated Bio-systems in action:

George designed the complete system, starting with a piggery. He carefully divided the one hectare into two piggeries with 60 pigs each. He mastered every detail, even potty training the weeners to defecate in certain areas, keeping the pens clean beyond belief of the student farmers and simplifying maintenance. The pigs were fed mainly spent substrates from mushroom farming, which primarily were spent brewery grains from the local beer producer, located a few miles from the Montfort School. The pig manure was channeled into a three chamber digester which produced the biogas used to sterilize the mushroom substrate. The slurry from the digester was further mineralized in algae ponds, and the algae was used as a feed additive for the pigs. The water flowed from the algae ponds into the fish pond, stimulating the growth of zooplankton and phytoplankton. The quality topsoil was used to create dykes, which were covered with grass that was cut daily and thrown into the fish pond, causing the three meter deep pond to be built by increasing the dykes only one meter.

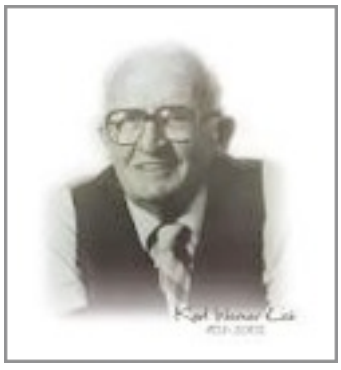
The rich pond water had fish living at seven different trophic levels and was used to irrigate the clay-like soil, originally classified as unfit for farming. Thanks to the pond water, it provided at least two harvests per year defying the fertility logic. George concluded with a smile, “We are farming fish without feeding the fish. We feed the feed of the fish!" I visited Fiji five times, and saw the project unfold. George and his team created courses at the University of the South Pacific and we witnessed the production of animal protein, the harvesting of starch and carbohydrate rich plants and algae abundant in betacarotene. The excess of nutrients in the ponds were removed through floating rice gardens. There was nothing more rewarding than drinking that first pot of

tea in 1997 brewed on biogas from the digester together with HE Ratu Kamisese Mara, the President of Fiji.

The Fiji case permitted me to see how IBS evolve from idea to reality and how this could be implemented in a peri-urban environment. Hundreds of young boys learned how to operate the farm, graduating with the technical insights to recreate it on their islands. George enjoyed the experience and when the opportunity emerged to implement the same concept in Tsumeb, Namibia, we quickly deployed the knowhow in Africa. After meeting all expectations in the hot and humid islands of the South Pacific, George set up to work on site in Namibia for 9 months in a desert-like environment. It was a challenge, especially the cold and windy winter nights. But George was determined to complement the construction of a sorghum brewery of Namibian Breweries with an IBS that included a mushroom farm on the sorghum waste (the raw material for the beer), a piggery, a digester, an algae pond and a fish pond. Mr. Werner List, the chairman of the Ohlthaver & List Group, with the support of his Vice-Chairman, Udo Stritter, and Bernd Masche, the CEO of Namibian Breweries, lent their full cooperation and co-funded 50% of the program, with the ZERI Foundation covering the other half. HE Sam Nujoma, the President of Namibia, even came to drink a pot of tea in support of sustainability that was not merely theoretical, but practical. When, years later, the brewery folded due to a lack of demand for the industrially produced sorghum beer, the mushroom farm continued with elephant grass and the pruning's of the local orchard as the substrate. Both heads of state from Fiji and Namibia participated in the 3rd World Congress on Zero Emissions held in Jakarta, Indonesia in 1997 delivered a vivid testimony of how IBS had changed their perception of food security and climate change.

HE Ratu Kamisese Mara

HE Sam Nujoma



Werner List

Udo Stritter

The IBS in Fiji worked exceptionally well until a coup d'etat forced HE Ratu Kamisese Mara, known as the Founding Father of Fiji who had been a strong support for the project, to leave office. The school was forced to close down. The Brother Thomas who was managing the facility had so many challenges to face that the operations suffered greatly and the equipment was left without maintenance for nearly one and a half years. We have a documentary film from Australia and a grand photographic report by Luis

Camargo who visited Fiji just a few months before the political upheaval caused discontinuity. The Montfort Boys Town project was one of the seven highlights at the World Expo 2000 in Hanover, Germany, and two of the students spent 5 months at the expo explaining what they had learnt to the audience.

The edited version of the proceedings of the regional science meeting on Fiji, funded by UNDP in 1998, organized by the University of the South Pacific and documented by the United Nations University and the University of Namibia. By 1998 Prof. Dr. Keto Mshigeni, the Pro-Vice-Chancellor of the University of Namibia[2], had become the successor of Prof. Dr. Carl-Göran Hedén on the ZERI Scientific Advisory Council, and thus was part of the documentation process. He had documented the IBS of the Tunweni Brewery of the Ohlthaver & List Group in the mining town of Tsumeb, just next to the Etosha Pan in Namibia in another set of UNESCO supported proceedings. This documentation and the experience of the Songhai Center in Benin (case 101) provided a first hand understanding of how peri-urban farming could work which sets new standards for farming. The key conclusion was that George's and Prof. Li's approach not only had the highest efficiencies in output, their design provided the best revenues for the farmers, and an independence from synthetic outputs since the combination of the Five Kingdoms "waste equals food" was driven by abundance of sun and water.[3] The performance was not only embarrassing for the believers of genetic modification, it demonstrated that farming communities are key to livelihoods for poor people, and quality of food for the whole population.


Dr. Keto Mshigeni


Dr. Carl-Göran Hedén


Dr. Shu-ting Chang


Cassio Taniguchi


Dr. John Todd

Farming for a city:

One has to make a jump from peri-urban to urban farming, designing food and energy systems for high density living areas. To fully understand the potential, I organized field trips to China, USA, Brazil and Cuba. The visit to the Qingyuan (清远) in Guangdong

[2] Prof. Dr. Keto Mshigeni is today the Rector of the Hubert Kairuki Memorial University in Dar es Salaam, Tanzania

[3] The website <www.zeri.org> provides additional detailed insights on how Prof. George Chan designed these integrated bio-systems.

Province (广东;) organized by Prof. Shu-ting Chan, then the Dean of the Faculty of Biological Sciences at the Chinese University in Hong Kong was an eye opener: a city with the same area as San Francisco employed 250,000 people in inner-city mushroom farming. We view mushroom farming as one of the greatest potential applications of urban farming. The thousands of initiatives we witnessed and inspired in mushroom farming offer us a first hand perspective on how to possibly feed 75% of the citizens of the world packed on a few square meters in shanty towns. While this article will not go into detail about mushroom farming which is the subject of another case study, it is important to point out that ZERI teams and Blue Economy practitioners around the world have designed programs for food security in the villages, towns and megalopolis, each time starting from a simple mushroom farming unit that converts readily available fibrous waste into food and feed. It is the same logic of the Five Kingdoms of Nature that inspired us to look at plants as food (coffee grounds) for mushrooms, then using the spent substrates enriched in amino acids as animal feed and finally collecting the manure for composting, thus using four of the five kingdoms of nature in a local system.

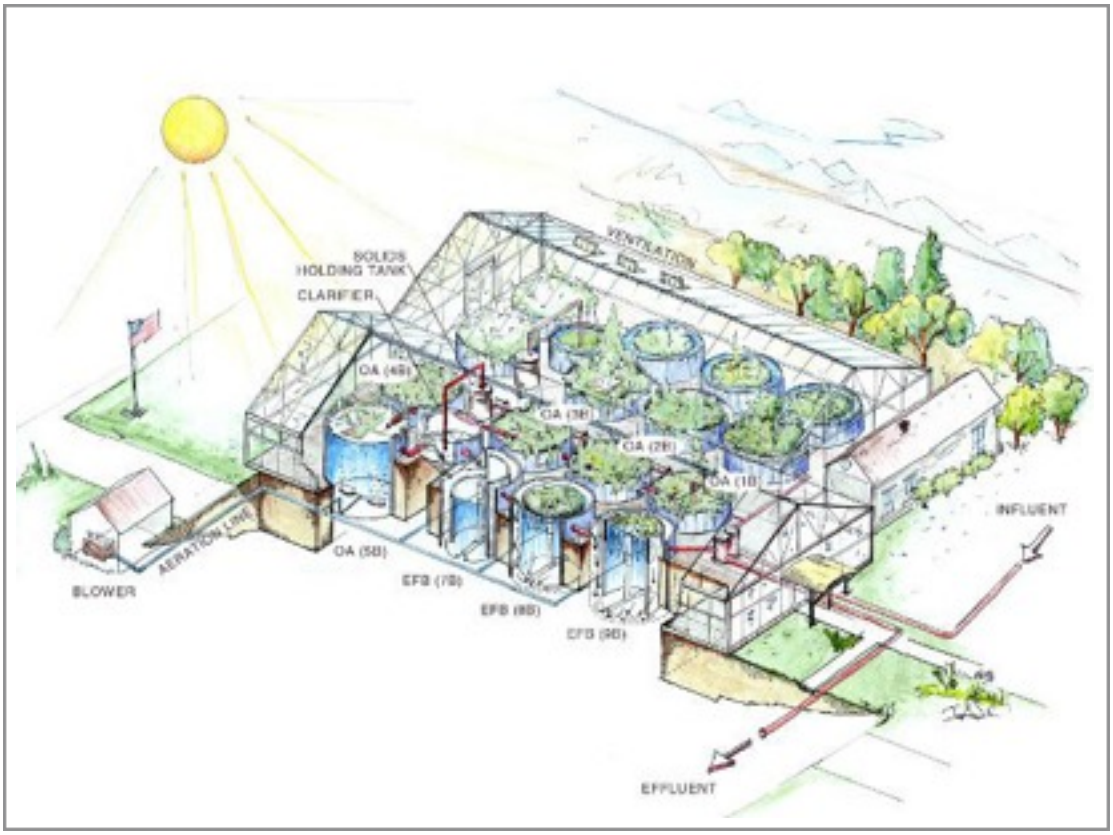
The second field trip was to Wuxi (无锡) in Jiangsu Province (江苏省). Our host was Prof. Li Kangmin who had participated in the ZERI World Congresses in Namibia, where he visited the beer brewery site, and in Colombia, where he saw the inner-city farming of mushrooms in the City of Manizales. I have returned four times to Wuxi: first because of the interesting inner-city farming techniques; then because of the IFFC and finally because my first fables in Chinese were published in cooperation with the Wuxi Association for the Promotion of Science and Technology. This fast industrializing region has a GDP in excess of one trillion dollars- half of California's and 50% bigger than India, has maintained its farming component of the local economy. This may have a historic reason: the population of Wuxi was saved during the early sixties from hunger by its inner city farming of water spinach, azola, chlorella and its integrated fish farming technique which are century old traditions and part of the water management. While this approach to food security is only viable in cities with abundant water, it has been pointed out that every large city, even when there is a (perceived) shortage of water, has an excess of waste water. This water is considered polluted by some and excessively rich in nutrients by others, but remains unused for productive purposes by most.

Prof. Li showed me how the city biological waste system in Wuxi could create a large food production system. He never trained as a biologist, but as a junior military officer he was concerned with the livelihoods of people in Wuxi and initiated the farming of water spinach when the needs had been high. Without biological waste rich in nutrients, spinach would not grow. When spinach grows, its roots provide outstanding feed for grass feeding carps. The more carps would nibble on the suspended roots, the better the spinach would grow. Prof. Li saw this symbiosis unfolding. It was in line with the proposals of Prof. George Chan. According to him, a high biological oxygen demand (BOD) is not a problem, it implies a high concentration of nutrition and therefore the

need to design intensive removal of these nutrients through plants (floating gardens), algae (azolla and chlorella) and fish (at every trophic level).

Farming and waste water:

The third fields trip took us to the United States. While the country has not excelled in sustainability, there are numerous scientists and entrepreneurs who have broached new and inspiring techniques to combine water treatment, food production and energy requirements. It was the Canadian scientist, John Todd, and his wife, Nancy, who opened my eyes to the opportunity to use greenhouses to treat sewage and convert the abundant nutrients into feed for plants and fish. Richard Perl, a New York-based social activist and entrepreneur who has been supportive for decades to numerous of my initiatives took me to South Burlington, Vermont (USA) to see the pioneering work of John in 1999. The City of South Burlington was a well known area to me. It is close to the headquarters of Ben & Jerry, the socially committed ice cream maker. I had visited Ben Cohen, one of the co-founders, in 1993 and travelled the region to discover the impact of social leadership as demonstrated by Ben & Jerry. In order to have a functioning waste water treatment year around in a region that is characterized by hard and cold winters, John proposed and installed the facility in a greenhouse. John located



South Burlingon, Vermont (USA) waste water treatment plant designed and implemented by © Dr. John Todd

the first such municipal facilities at the outskirts of the city. I had learned that plants go into a winter sleep from the biological waste treatment at my detergent factory in Belgium, while operating on reed beds. I had thought of using the exothermal reaction of soap to control the air temperature of a large greenhouse, but my team considered it cost prohibitive. I did not yet know that John Todd could generate the additional income to finance that extra investment.

The waste water treatment system of John Todd in South Burlington converted 10% of the sewage of the city into a nutrient feed and clean water. Its success led to a broad interest from investors and one made a financial offer John could not refuse. Unfortunately, the pure focus on money and profit resulted in a fall-out with the social and ecologically inspired John Todd: he would share his know-how with students who came from around the world, only to upset the investor who used trademarks and intellectual property (IP) as the basis of his revenue model. It took over a decade for John Todd to recover his name and fame. In spite of his hardship, his ecological design company has gone from strength to strength. Meanwhile he was named Professor Emeritus of Natural Resources at the Rubenstein School of Environment and Natural Resources at the University of Vermont. Unfortunately, John Todd is not alone in his fight to keep a balance between open source access to the knowhow, and the preservation of original IP.

Urban Farming and self sufficiency:

The fourth field visit to study urban farming brought me to Brasilia, the capital city of Brazil. Mr. Cassio Taniguchi, the former Mayor of Curitiba and the Brasilia Minister of Planning, showed me how the city planners in the sixties had allocated land around the newly created city to immigrant farmers, mainly from Japan. This farm land, combined with an ample supply of water, secures today 90% self-sufficiency in fruits and vegetables for the two million city inhabitants. Food is cheap in Brasilia, not because of the efficiency of large scale farming in the Mato Grosso or cheap imports from Chile, but because of the ingenious design of the founding fathers of the new Capital to include food and water security. The only other city in the world that matches this level of food security within its city boundaries is La Habana (Cuba), our fifth field study. This was not by design, but by necessity. The determined and creative citizens of Cuba were, due to the boycott by the United States and the demise of the Soviet Union, deprived of fertilizers and food. This imposed a fresh start in farming. The results are equally impressive: not only has the city been able to provide food security, the diet of the people changed for the better, as can be seen from the health indices. The limited availability of dairy and meat put the population on a healthy diet which translated into a significant drop in heart diseases and diabetics.

The experiences from these different continents, and the expert insights provided by ZERI's network of scientists, stimulated us to advance on the challenge of urban farming. Our young research team, at the UNEP offices in Geneva, documented many

additional cases through desk research. By the beginning of the third millennium we knew that every corner of a city, be it a balcony, a roof, kitchen or bathroom, could turn into a green oasis. We envisaged the creating of the "vegetable city" as the design team of the Politecnico di Torino, under the leadership of Prof. Luigi Bistagnino, demonstrated that it would be an opportunity to make cities self-sufficient in food and carbon neutral mitigating climate change risks, enjoying full employment and improved healthy living conditions.

The Innovations of inner city Farming:

Tina Schmidt, from the German Entrepreneurship Institute, and then a colleague of Prof. Günter Faltin who teaches entrepreneurship at the Free University of Berlin, taught students how to use the humidity in kitchens and bathrooms to farm mushrooms. The course was repeated and backed-up with more science at the Technical University of Hamburg-Haarburg, under the direction of Prof. Dr. Ing. Ralf Otterpohl, director of the Institute for Sewage and Water Protection[4], who initiated courses on integrated water use. Prof. Otterpohl had organized the first courses at the ZERI Pavilion at the World Expo in Hannover in the Fall of 2000, and went on to become one of the founders of ZERI in Germany. Over the next two years more than 200 students put the experiments into practice especially the farming of mushrooms in the inner city. The smallest, productive vegetable gardens are only 1,20m x 1,20m. Since balconies are calculated to support 300 kg/m², a lot can be placed in a small space well exposed to sun and rain. All non-cooked biomass would end up in an efficient composting cycle. Food would be produced with fast rotating herbs, vegetables and flowers, ensuring that food is available, practical and beautifies the house. We realized whilst working with the students that there is an additional reason to farm in dormitories, homes and every possible corner: it reduces costs, thus increases buying power, while offering healthy food, usually too expensive for limited budgets, for free.

The power of urban farming is not only in food, it is also about money. Whatever is locally produced and consumed requires a fraction of packaging, improving resource efficiency. This brings us to the impact of urban farming on climate change. A recent assessment of urban and peri-urban farming in nine African and Asian cities[5] indicated how significantly the Third World can contribute to climate change mitigation if food is sourced locally. The potential contribution of industrialized countries and megalopolises is even more extreme: food is part of a supply chain that include trucks in traffic jams, refrigerated distribution centers with energy intensive chemical controls for pests and moulds that are a health hazard. For long the ZERI network found few creative

[4] Institut für Abwasserwirtschaft und Gewässerschutz <www.tuhh.de/aww/home.html>

[5] Dar es Salaam (Tanzania), Ibadan (Nigeria), Dakar (Senegal), Addis Abaga (Ethiopia), Tamale (Ghana, Kampala (Uganda), Chennai (India), Dhaka (Bangladesh) and Katmandu (Nepal).

approaches in the Northern Hemisphere. The most inspiring initiatives were in the developing world.

Urban Farming in the First world:

There are of course exceptions. For example, there are a few initiatives with catfish farming, started in the 1960s in the Mississippi Delta (United States). Initially feed was organic waste, but as farmers searched for more productivity and faster output, the feed shifted to GMO soy and slaughterhouse waste, unfortunately imported and thus draining revenues from the local economy. There is a team in Berlin that proposes to farm rooftop catfish with imported feed from the Netherlands. It is easy to understand how expensive this process can be. The only one making money is the hardware salesmen and the suppliers of the fish feed. The ZERI network goes beyond replacing one "input-output" model with another and sees through the simplicity of "food in - meat out". We implement the cascading of nutrients and energy and use existing infrastructure for a new purpose, as Jan Willem Bosman Jansen did by converting the old greenhouses of flower bulbs in the City of Egmont (the Netherlands) into mushroom farming units, or Siemen Cox en Marc Slegers, who converted an old swimming pool (Tropicana) in Rotterdam into a mushroom farming and training center.

The greenhouse experiences from the US to the Netherlands are interesting for urban farming in a temperate climate. Encouragingly, former Mayor Michael Bloomberg strongly promoted urban farming because it captures storm water and diverts it from the sewer and reduces the number of trucks on the road, which cuts greenhouse gases. Today, New York is the urban city farm leader in the United States, which in America doesn't necessarily mean that there is a huge volume, but that there is capital flowing into commercial ventures. To name a few: Gotham Greens (gothamgreens.com) was founded in 2008 by Vijay Puri and Eric Haley; Brooklyn Grange (brooklyngrangefarm.com) was set up by Ben Flanner, Anastasia Cole Plakias and Gwen Schantz; Bright Farms (brightfarms.com), established by Ted Caplow and run by Paul Lightfoot, the CEO who raised 20 million in capital and supplies major supermarkets for an annual food sales value of $130 million. The City of New York is pushing to the next level and decided to initiate a 20,000 square meter rooftop farm on its food distribution hub in the Bronx.

Urban farming and Real estate value:

Mohamed Hug, Lufa Farms Founder

While I appreciated all the initiatives, visited them to understand the business logic, especially the capacity to raise money and the power to communicate a need to change with exceptionally designed websites, it was only after seeing the Lufa Farms in Montreal (Canada) that I got a clear picture of the emerging business model: an increase of the value of real estate. Mohamed

Huge, the founder and driving force behind the Lufa Farm concept went back to his childhood dreams in the outskirts of Beirut, where all houses had a farm, to see that the most logical place to farm is a roof. The power of Mohamed's proposal brought together a diverse team: an internet entrepreneur who immigrated to Canada, Yahya Badran, a Rumanian immigrant with a construction engineering degree and Lauren Rathmell, a Canadian graduate student keen on applying plant studies. The creation of this team was likely the most important success factor of Lufa Farms. They were even able to change the city building codes to facilitate urban farming, just as New York had done.

The key lesson was not just the logic of the greenhouse and the selection of the fruits and vegetables; it was the relevance of the financial advantages beyond the sale of produce, what we call in the Blue Economy "the multiple benefits including multiple cash flows". The building of a greenhouse is an additional cost for the farmer, but is a major energy saver for the occupants in winter and summer. Similarly, buildings that are energy efficient command a higher value on the market and buildings (especially shopping malls) that are unique garner more traffic which generates additional revenue. Extra income for the occupants of a development translates to a higher value. This allows for partnerships between people who have - at first sight - little in common, but who can jointly design a very competitive model for urban farming. A member of our research network commented that rooftop urban farms have a major competitor in rooftop solar installations. While I would welcome this, is it really competition? We see that urban farming and rooftop power generation as complementary initiatives. Considering the amount of unused roof space, which ranks in the millions of square meters, it will decades before we have a shortage!

Lufa Farms in Montreal © 2012 Lufa Farms

The increased value of real estate is directly related to the savings in energy cost and the resultant improved cash flow that can be added to the urban farming business model. This is well established logic in real estate, but certainly not in the world of urban farming. Urban farming on the other hand is professionalizing its concepts and thanks to

the half dozen investments that have materialized in the US there is a solid understanding of the financial models. Now that there are hundreds of urban rooftop farms larger than one thousand square meters around the world we witness several pioneering initiatives like the micro-algae farming on rooftops in Bangkok (Thailand) by Saumil Shah of the start-up company EnerGaia (energaia.com). The production of spirulina is fast, doubling every 24 hours, capturing CO_2 and mitigating climate by supplying high quality nutrition.



Energaia micro-algae on rooftops in Bangkok designed by Saumil Shah © 2014, EnerGaia

Urban farming and design:

The most visionary one comes from Japan, where the Pasona Group (株式会社パソナ) created a landmark office construction with urban farming included inside the building. Standing inside the building, I feel about this construction the same way I did when I built the first green factory in the world, based in Malle (Belgium). The Pasona Group is a personnel recruitment company with offices around the world. Its headquarters in downtown Tokyo, Ohtemachi, was at first conceived as the restoration of an old office building. The dialogues between Yoshimi Kono, the designer, Kenji Furushiro, the President of Pasona and Yasuyuki Nambu, CEO, led to a most refreshing approach. The Pasona executive team had adopted as its corporate slogan "Solutions to Society's Problems". Everyone agreed that the best way to demonstrate that the company was serious about the development of people capable of addressing the key challenges society is facing, was to build a corporate headquarter that embodied what they stood for. When I first visited Pasona I felt like I was back in 1992 when I inaugurated the wooden factory with a grass roof. In the middle of Tokyo, the 20,000 square meter office building dedicates 4,000 meters to green space, housing over 200 species of plants, fruits, vegetables and rice. It is the largest farm-to-table office in any downtown of a city in the world: whatever is produced is consumed in the canteen. This kind of work environment changes the way people think: If your office is out of the box, you will think out of the box.

Pasona Office designed by Kono © Kono

Pasona does not only want to promote urban farming, they want to create new urban farmers. They want to create an interest in a modern lifestyle, with a different office environment, whilst ensuring that the busy lifestyle of their professionals is complemented by educational programs on farming practices in Japan, adapted to an urban environment. Inside the office tomato vines are suspended above conference tables; lemon and passion fruit trees separate meeting spaces; salads grow inside seminar rooms and beans sprout under the benches. The design is not determined by green building standards, energy saving practices or a desire for quality interior air. This is a place where people can think about daily chores, their personal career choices and the path everyone can follow towards the future.

Inner city Farming in the Future:

What Pasona does is what the Blue Economy is all about: changing the paradigm. The urban farming program offers a solution to certain societal problems. It is unique to find corporate headquarters that have introduced urban farming, and exceptional that it is used to transform staff. Here the case clearly demonstrates that the new business models cannot be fully captured into a classic business plan. We are convinced that the

urban farming will move from its 1,000 plus large scale initiatives around the world, to at least 10,000 initiatives in a decade.

Cities will change building codes and investors will search for economies of scale in urban farming constrained in size by the erratic building space available on rooftops, especially on commercial and industrial buildings. For every one thousand square meters of urban farms there is a potential to generate 12 direct and indirect jobs, reducing the miles traveled by people to get to work as well as by food. This implies that 12,000 jobs have already been generated but that we see worldwide a potential of at least 25 million jobs in urban farming in a decade. The projects we have worked with and learned from have mobilized investments in the order of €60 million. And, as Pasona and EnerGaia demonstrates, this is only the beginning.

Translation into Gunter's Fables

The business of farming in the city is translated into the fable #58 with the same title "Farming in the City". It is dedicated to Mohamed Huge, who inspired the creation of this cluster in 2008 with his decision to create the Lufa farm in Montreal. The fable will be published in May 2015 in China. Additional fables will be written on the urban farming case in 2016.

Documentation

http://start.org/urbanag/

http://www.dezeen.com/2013/09/12/pasona-urban-farm-by-kono-designs/