

Agriculture, in Architecture, in Cities

In Pursuit of Sustainable Urban Landscapes

私たちはもっと身近な空間で農業をすべきである。街のなかで、ビルのなかで食べられる植物を育てれば、空気はきれいになり、人々は健康になる。

Maria Mynn Porciuncula-Alfonso

Architect / Eco-Landscape Designer / Consultant
Assistant Professor II, College of Architecture, University of Santo Tomas, Philippines

Abstract

By 2040, Metro Manila will have a population of 13,788,000 (13.8M) up from a 2010 population of 11,552,100 (11.6M) reported by National Statistics Office (NSO). Future urban life will face graver conditions not only from global climate change but from the high cost of electricity, transportation and food due to our dependency on diminishing fossil fuel. There will be insufficient land in the rural land for food, and further, an increased demand for fuel will make the production and transport of these products to urban areas highly expensive.

Presently, for our food supplies, we need to conserve rural farms and start a renaissance of urban agriculture in our land and houses for subsistence and commercial agriculture in our public and private land and buildings in the cities. Thus, transporting food from the rural to urban areas will decrease, as will the number of vehicles and carbon emissions. An abundance of vegetation, especially edible plants, in the cities means cleaner air, fresher food and healthier people.

This paper will demonstrate how edible plants can visually enhance the city landscapes and functionally make food more available. Horizontally, we need to grow organic plants in plazas, parks, streetscapes, squatter-free rivers and esteros, school yards, under overpasses, residential front and back yards and other easements. And vertically, we need to grow plants in buildings like barangay halls, public market, residential condominiums, high-rise buildings on their façades breezeways, walls and roofs.

The vision of appropriate environmentally balanced cities utilizing vegetation that integrates fresh and healthy edible plants in culturally and architecturally acceptable ways, may provide urban livelihood and healthy, cool and green living conditions for sustainable urban landscapes.

Keywords Sustainable Urban Landscapes, Urban Agriculture

Megacity Metropolitan Manila, Philippines

Metropolitan Manila is a megacity comprised of 16 cities: Caloocan, Las Piñas, Makati, Malabon, Man-

daluyong, Manila, Marikina, Muntinlupa, Navotas, Parañaque, Pasay, Pasig, Quezon City, San Juan, Taguig, Valenzuela and the municipality of Pateros. From its center and capital Manila, it grew by 14.6



City of Manila—Photo courtesy of Landscape Architect Paolo Alcazaren

square kilometers every year from 1948 to 1996. As reported by the National Statistics Office, in the 2010 Census the population was then 11,552,100 (11.6 M) and by 2040, Metro Manila will have a population of 13,788,000 (13.8 M). Not only in Metro Manila, but around the world, people migrate to cities for new opportunities for livelihood, especially for employment.

How should Metro Manila residents live in the future? Are we ready to be environmentally sustainable by then? How are we to feed the new millions in the cities?

Project objectives of this paper are:

- To reintroduce food production in urban areas, as well as join the world in pursuing a shift to natural food systems. To create edible landscapes instead of ornamental landscapes in our public and private places.
- To educate and encourage design and planting edible plants in our cities which will visually enhance the city landscapes and functionally make food more available and healthier.

Thus, transporting of food from the rural to urban will be lessened and there will be fewer vehicles and lower carbon emissions. Abundance of vegetation in the cities means cleaner air, fresher food and healthier people.

My Understanding of Agriculture

I was born in Manila. From age 1 to 4, I grew up in Munoz, Nueva Ecija in Central Luzon Agriculture College (now Central Luzon State University—CLSU). It is one of the premiere institutions for agriculture in the Philippines and in Southeast Asia known for its research in aquaculture, ruminants, crops, orchards, and water management research, where my mother was a teacher while my father worked in the Mountain Province as an engineer. I remembered our native house made of wood and sawali surrounded by mango trees and at the rear were cornfields.

At 5, we moved to my parent's hometown Tanay, in the province of Rizal, where my lolos (grandfathers) were farmers while my lolas (grandmothers) were meat and grocery store vendors in the public market. My paternal grandfather was a rice and crop farmer. He always brought me and my cousins to his farm across the river and we enjoyed the day gathering guavas, kamachile, aratiles and kasoys and swimming in his "Batil" – a meter-high hollow block, rectangular-shaped pool where water from the river were pumped up and contained before releasing to the land to irrigate it.



In 1960, author and mother at Central Luzon Agriculture School, Munoz, Nueva Ecija, Philippines

Green Revolution "Masagana 99"

During high school, in our parish school, we were asked to start planting vegetables in vacant land as part of the government program Green Revolution without understanding what was it really.

From the 1940s through the 1970s, to increase world food production, the Green Revolution was



In the 1970s, high school students were asked to plant vegetables in vacant land. The government introduced Masagana 99 to local farmers



Studying is more fun at the University of Santo Tomas, Manila, Philippines



Ondoy Flood 2009 at Tanay, Rizal, Philippines

introduced in poor countries such as Mexico, India, Pakistan, and the Philippines, through crop breeding and increased use of fertilizer, pesticides, and irrigation. Under the regime of former President Ferdinand E Marcos, the Green Revolution was about planting varieties of Rice “Masagana 99,” developed by the International Rice Research Institute (IRRI). “Masagana 99” was under the IRRI’s technology and financial management. Masagana is a Tagalog dialect word meaning bountiful, while the 99 referred to the target harvest of 99 cavans per hectare per season for the well-irrigated rice with the increased use of fertilizer and pesticides.

While I was in college, my grandfathers died and the farm of my paternal lolo, who was able to send all his sons to college, was left to caretakers with 70/30 proportion of income in goods or money. My maternal lolo left his farm to his high school-educated son. Thus, my old uncle is still trying his best to manage the farm. He reaped a lot of benefit from the farm and provide a comfortable living for his children better than my family.

Now, I am teaching Architecture at the University of Santo Tomas (UST) in Manila on weekdays and on weekends I am in my hometown Tanay. Most of us Filipinos are residing in Metro Manila and its fringes because it is more fun to study then work in Metro Manila, Philippines.

The state of agriculture in Tanay is not that good due the Ondoy flood in 2009 which destroyed the irrigation dams and mango and fruit orchards, as

well as the soil, and according to the farmer on my father’s land the soil became ferrous making planting difficult. But to address the challenges of Metro Manila as a megacity in the promotion of urban agriculture, it is important to understand its beginnings

History of Urban Agriculture

Man’s evolution from hunters to farmers to industrial workers to technological urbanites overshadowed the transition of forests to farmlands to towns whose densities gave birth to the cities that rose vertically worldwide. The growth in population that propelled this journey required parallel advances in agricultural production.

Our early ancestors and my grandparents spent the majority of their waking hours planting crops, searching for edible plants and roots and hunting wild herds, and later carrying for livestock. The discovery of agriculture (the Neolithic Revolution) transformed our relationship with the planet and each other. Man’s creative ability to adapt was demonstrated by the Ifugaos in Banaue and Batad Rice Terraces in the transformation of slopes of the mountains into terraces for planting rice, the Filipino staple food, without leaving their habitat.

The social and political organization of the population in the widely scattered 7,000-plus islands evolved into a generally common pattern. As population grew, more food and new settlements had to be established leading to the the concept of territori-



Batad Rice Terraces,
Ifugao, Philippines

ality, supported by farming of permanent rice fields in the lowlands and uplands.

When the Spanish arrived in the sixteenth century, the majority of the estimated 500,000 people in the islands still lived in barangay settlements. In 1571, Lopez de Legazpi laid out the first plan for a capital city in the Philippines, which became a walled area called “Intramuros,” later on, part of city of Manila. From 1896 to 1898, the Philippines fought for independence from Spain, with aid from the United States, which eventually resulted in Philippine colonization by the U.S.

In 1904, Burnham was asked by the U.S. Commissioner to the Philippines, William Forbes, to redesign Manila, which had greatly increased in size since the first plan by the Spanish. The preservation of the planning of the Intramuros followed by the subsequent development carried out in Burnham’s general plan allowed Manila to reach its place as an international city today. By increasing public open space, he opened up more opportunities for recreation and public life. His inclusion of new landscaping also improved the aesthetic appeal of the city’s core by supplementing the buildings with lawns, groves, and tree-lined streets. Agriculture occupied the outskirts of the city and other goods were coming from different regions and islands of the country. The growth of the population led to specialization in agriculture differentiated by the soil, climate, and demand.

Thus Central Luzon developed as the rice capital of the country, the Mountain province for green “temperate” vegetables, the Ilocos for garlic, Tarlac Province for sugar, Bicol province for copra and pili, Batangas for beef, just to mention a few.

Hunting for deer, wild pigs and wild labuyo by the natives could no longer be sustained as forests were largely overtaken by land development and the aborigines were absorbed into the domestic fabric of the existing socio-cultural structures. Others fled to the deepest mountains.

To meet the exponential increase in demand for protein, western techniques in livestock and poultry farming on small, medium and corporate scale were introduced and always accepted by Filipinos as the practical way to supply food for the metropolis and the entire country.

The Green Revolution

In 1968, the former United States Agency for International Development (USAID) director William Gaud, introduced the term “Green Revolution” and explained to the world the new revolution in food production: “*through crop breeding and increased use of fertilizer, pesticides, and irrigation.*”

In our country, rice is the most staple food and is produced extensively on every island in the lowlands and uplands. The government under former President Marcos and the IRRI took specific measures to achieve the goals to increase the production of rice but accompanied by use of chemical fertilizers and pesticides as well as building of irrigation dams in almost all of the farmlands. During the fifteen years that the system was implemented, the rice yields tremendously increased but various problems sprouted such as later droughts, typhoons and flooding, economic and political crisis, and, in recent years of over-production of rice, the long-term use of heavy fertilizers and pesticides created environmental problems that made the ricefields unproductive. Also, the use of chemicals in farms resulted in various diseases for humans, such as cancer and leukemia, as well as degradation of the environment.

Now, the world and the Philippines are resorting to producing food employing organic farming methods in response to side effects from their adoption of Green Revolution agriculture techniques.

Future Urban Life

Future urban life will face graver conditions not only from global climate change but from worldwide over-population and from the high cost of electricity, transportation and especially food due to our dependency on diminishing fossil fuels which is part of every aspect of our modern lives.

The population of the Philippines in 2014 (current figure) as reported by the National Statistics Office in 2010 census is 100.6 million, In Metro Manila, based on the 2010 census results (the next census will be in 2015) the population was then 11.6 million but Metro Manila area was spilling out more along its fringes. Thus this means more people, more food, and food—both local and imported— will be more expensive.

To make things more complicated, our country has had numerous natural calamities such as floods, landslides, earthquakes and sadly, the recent storm surge “Yolanda” in the Visayas, in the central islands of the Philippines. The rice paddies have turned barren in Rizal, Bulacan, Pampanga and Pangasinan provinces while coconuts and fruit trees were destroyed in Laguna Province. Thus, local food produce and livestock were limited and expensive. There will be insufficient land in the rural land for food, as well as the increased demand for fuel will make the production and transport of these products to urban land highly expensive.



Recent flood and storm surge destroyed farms and fruit trees

Feeding more people in the city, we find ways

Presently, for our food supplies, we need to conserve our rural farms and start a renaissance of agriculture in our land and houses for subsistence, and commer-

cial agriculture in our public and private land and buildings in the cities. There is a need to simplify the food supply cycle to eliminate excessive transport fuel expenses and harmful chemical fertilizers and pesticides, and provide a selection of nutrients with beneficial and healthy effects on human consumption.

According to Peter Moore, author of the book *Agriculture and Urban Areas*, “the breeding of cattle produce while producing large carbon dioxide emissions consumes green food of which only 10% is able to be passed on to the human consumer. A short food chain is important economically because at each stage energy is passed from one organism to another. For example if we grow lettuce and consume it directly, then we are acting as sole grazer. And where we consume, digest and assimilate a plant or animal into our bodies, there is a very high level of waste. Exactly how inefficient such transfers can be varies with the different exchange and organisms but as general rule about 90 percent of available energy is lost at each transfer. When we can consume our lettuce, we only succeed in obtaining about 10% of that energy that is available to us from the source.”

By growing our own food in our garden and in our city and then eating them the same day, this reduces transportation miles, energy and carbon footprint of the food produced. It is apparent that the phenomenon of global warming has direct links to food production and urban agriculture is a work in progress in the development of the multi task of addressing the need for food while protecting human health and helping alleviate environmental problems.

The ill effects that emerged from the previous efforts to address the huge world demand for food through the “Green Revolution” has brought about new paradigms in food production: Organic Farming, Urban Agriculture, Green Architecture and Edible Aesthetic Urban Landscape Architecture.

Horizontally

We need to grow organic plants in plazas, parks, streetscapes, easements and esteros, schoolyards, vacant lots and lower levels of interchanges. In Chile, they planted corn in the Forking Paths Park, while in another country, they planted edible plants in the lower levels of interchanges.

In schoolyards—as part of the education system, incorporated in the elementary and high school curriculum, vegetable gardening in the schoolyard and cooking of their produce in school.

The Philippine Dept. of Education (DepEd), in cooperation with the Oh My Gulay! (OMG), food advocacy program, started to expand its vegetable garden project in schools called “Gulayan sa Paaralan” (gardens in schools) to address malnutrition due to Filipinos non-consumption of vegetables. Vegetable gardening to be part of the curriculum of schools.



Gardens in schools

Large residential lots—the residents in their front and back yards, to plant edible plants and fruit-bearing trees instead of ornamental plants. For residences without yards, a practical option is for vegetables to be grown in recycled containers. Also utilize creative methods of drip irrigation with recycled materials. Bio-gradable garbage can also be composted for fertilizer.



Vegetable garden in front yards - Photo courtesy of Agricultural Training Cebu, Philippines



Plant nursery owners to sell weeks-old vegetable plants

We also encourage

plant nursery owners to sell weeks-old vegetable plants, herbs and medicinal plants. They can sell them in parks or flea markets and even market them in carts in different villages and subdivisions.

In conjunction with the establishment of urban farms, undertake initiatives to urge the government to implement the 1989 rainwater-collection law, Philippine Republic Act No. 6716 (1989). It states: The Department of Public Works and Highways (DPWH) shall, within thirty (30) days after the approval of this Act, undertake construction of rainwater collectors in all barangays in the Philippines in such number as may be needed and feasible, taking into consideration the population, hydrologic conditions

The disconnection of the idea of growing food in the mega-city urban setting has already been bridged through real experiences that now form the justification for urban agriculture.

Quezon City has launched its “Joy of Urban Farming” program. Quezon City Mayor Herbert Bautista, Vice Mayor Joy Belmonte and Agriculture Secretary Proceso Alcala formally inaugurated a 700-square-meter urban vegetable garden at the Quezon Memorial Circle to serve as the showcase of the program with the technical training by the Department of Agriculture. The city government is encouraging residents and schoolchildren to grow their own vegetable patch in their schools, homes and on idle land.



Urban Farming (Demo Farm) at the Quezon Memorial Circle (Park), Quezon City, Metro Manila

Vertically

We need to grow plants in buildings like barangay halls, public market, residential condominiums, high-rise buildings in their façade, breezeways, walls

and roofs. Part of a bigger picture of urban greening, urban agriculture can have significant impact on food security in cities.

The San Miguel Corporation Building at San Miguel Avenue, Ortigas Center, Pasig, Metro Manila, constructed 1975-1984 and considered to be one of Architect Francisco Mañosa's best projects. The San Miguel Corporation Headquarters takes its formal name from the Banaue rice terraces. If the



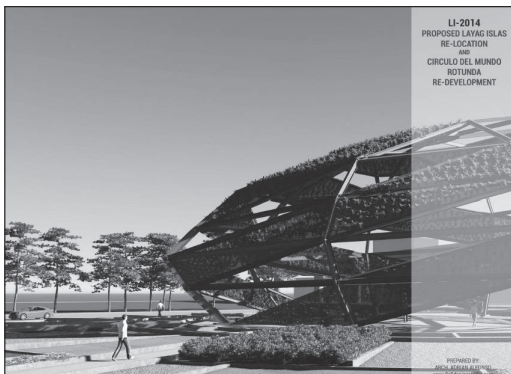
Edible plants in walls, in balconies etc.



San Miguel Corporation Building



Layag Islas designed by architect Adrian P. Alfonso Near Ninoy Aquino International Airport 3, Andrews Avenue, Pasay City, Metro Manila



Edible aesthetic landscape

building is retrofitted with edible aesthetic landscaping like lettuce, it will be the first and only vertical urban farm in the Philippines, and truly in spirit with the Banaue rice terraces.

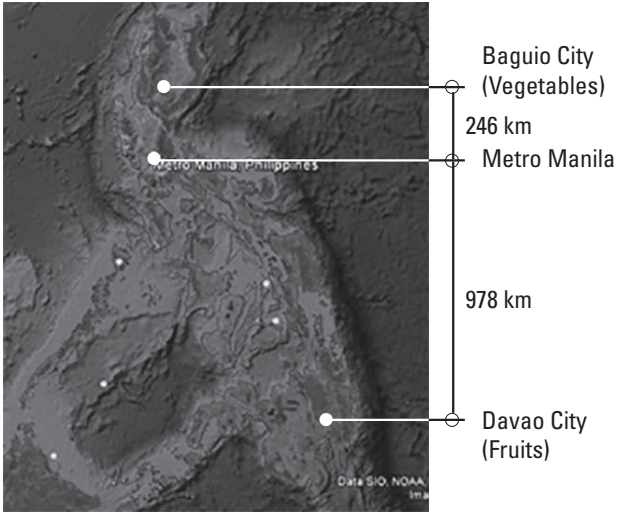
In China, Belgian architect Vincent Callebaut designed "Asian Cairns" farmscrapers while Spanish architect Javier Ponce designed the vertical farm tower in a series of circular farm plots with viewing platforms. Edible plants are grown with the concept of hydroponics and rotated throughout the year according to the season.

New forms of high-tech urban farming are emerging that will help other countries to pursue agriculture in architecture and in cities. As in Japan, they have tomatoes being grown in high-tech underground. Designer Natalie Jeremijenk proposes growing pods like cocoons or insect larvae for Tokyo's rooftops of skyscrapers that feed off the building's waste.

In Metro Manila and other developing Asian cities, we can create edible landscapes instead of ornamental landscapes in our public and private places.

Following the new concept of "Edible Aesthetic Landscapes," an urban agriculture that is planned and implemented following the principles of "Organic Farming" will make possible combined physical, physiological and psychic returns to Metro Manila and its people. To educate and encourage the government and citizens to plant edible plants in our cities which will visually enhance the city landscapes and functionally make food more available.

Let us reintroduce food production in urban areas, as well as join the rest of the world in pursuing a shift to natural food systems. The evolution of Manila from its early beginnings towards its growth into Metro Manila as it exists today was propelled by a combination of migration and administrative integration. This has resulted in the building up of green open spaces leaving the megacity fully dependent on food from distant sources **incurring huge cost of "food mileage."** The urban population of Metro Manila needs to be made aware that such food miles can be measured in the pollution that is caused that is detrimental to the environment.



Map of the Philippines with food mileage

The mileage of vegetables from Baguio is 246 km; garlic and tomato from the Ilocos, 402 km; fruits and vegetables from Cagayan Valley, 344 km; sugar, rice and mango from Central Luzon, 128 km; lanzones, coffee and dairy products from Calabarzon, 101 km; pineapple from Bicol, 355 km; bananas and durian from Davao, 978 km; cocoa from Surigao, 726 km. The aim is to develop urban agriculture at a viable level to reduce the impact of existing environmentally harmful total dependence on food mileage.

The success of any advocacy depends on how the people are motivated to rally support. In the promotion of organic urban agriculture for Metro Manila, certain statistics on health issues may generate quiet but determined initiatives.

As a conclusion, we should integrate the lessons in development that has led to the current situation that has made separate but coincident realizations of design professionals around the world that food security can be helped resolved through agriculture, in architecture, in cities. Simply stated, these lessons are:

1. Food cycles must be as simple and short both in time and space.
2. Use of artificial means, whether chemical or genetic, has led to disastrous harm to human health

3. Certain practices aimed at multiplying food production has led to environmental damage.
4. Diseases are related to food and select food can be cures for the most fatal ailments.
5. Creative landscaping can be edible and align with the positive aims of urban agriculture.
6. The advocacy of urban agriculture can only succeed if envisioned and implemented holistically.
7. The Philippines because of its generous sunlight, water, fertile soil, and hardworking creative people can spearhead urban agriculture in the context of the developing world.

It is my humble recommendation therefore that following the best incentive-driven practices in the world of developing spaces for agriculture in the cities backed by comprehensive research, that unifies standards for “Agriculture, in Architecture, in Cities” be developed for Metro Manila and other cities in Asia via multi-disciplinary, multi-agency, multi-institutional public-private cooperation among academic institutions, professional organizations, government agencies, non-governmental organizations, and corporate responsible businesses. These practices should be pro-actively discussed, formulated, tested, refined and eventually implemented to symbiotically to provide access to healthy food and protect ourselves and our environment from pollution and climate change. **Go Green!**



Thank you,
Architect Maria Mynn
Porciuncula-Alfonso