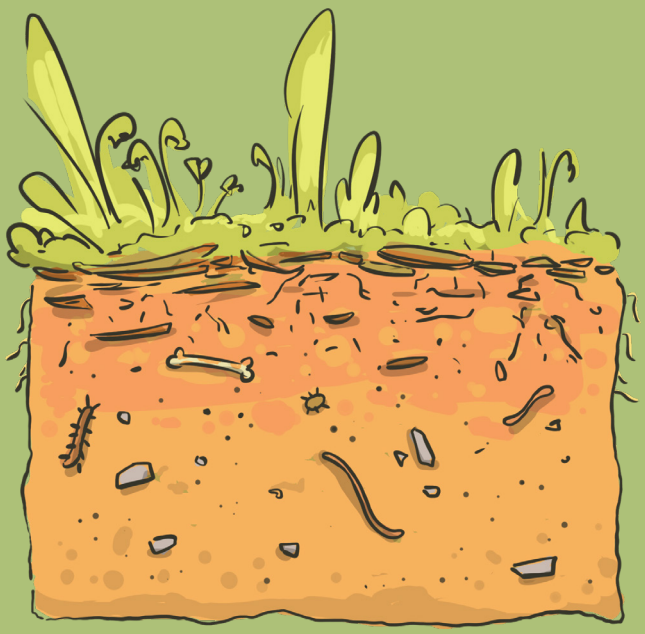
A Manual for Community Soil Action

A *Soil Regeneration Project* Initiative



Content Page

A Note

By Huiying Ng

Like any actually useful thing, soil management practices can be an enabler of green growth opportunities in multiple industries. Key pathways for creating value include: soil nutrition, reduced waste disposal, ecosystem services, the commercialization of associated technologies and urban rejuvenation.

Yet, societal expectations, standards, and underestimations stand in the way. Youth, soil, care, possibility, and curiosity are things hierarchies and institutions stamp(ede) over.

One purpose of the Soil Regeneration Project is to show how the social sciences and natural sciences can work together to create a conversation with relevant government and industry stakeholders, while pointing to areas relevant to research, environmental benefit and commercial impact. It is building a space where learning, practice, and research are never far from each other. Histories of human life have focused a great deal on search, discovery, collection, and adventure; with our Project, we show the ground on which search, discovery, collection and adventure enriches life—through reciprocity and relationship.

This short foreword draws on a longer manuscript in preparation, with the early support of Asia Research and Engagement (ARE).

Agriculture and community—based solutions

Agricultural soils are rarely discussed as crucial interfaces in the environment, and as environmental media on which accumulations, discharges, and distribution of other material—by or affecting microorganisms—takes place. While water bodies have been studied (e.g., for plastic contamination), soils have not been seen as a single body until recent years. Working through soil as a body, not merely as matter, this manual is the first of more resources to come from the Soil Regeneration Project.

Community—based solutions are becoming clear, important steps for humans to care for themselves, with a changing climate. From solar panels in the US[1] to hydropower in the Mekong[2], environmentalists and homeowners, farmers and land defenders[3], have stood up to push for smaller, local systems that respond to the specific qualities of place, wind, and sun, rather than large—scale, centrally powered systems.

These respond to the systemic ways that large—scale centralized systems fail to address the specific needs of both mobile communities, and communities who live in place alike. Local capacities provide protective structures against the decisions of a few, that affect many. Knowledge—building institutions have been shown to cave in to pressures to lead by reinforcing market competition where public leadership was necessary, moving the production of public health from public money to private capital—Oxford University's reversal of decision to offer vaccine rights to any vaccine developer, is a case in point.

While we might argue, like Bill Gates, that the Intellectual Property system "is a wonderful mechanism that is necessary for innovation and prosperity"[4], it is equally important to differentiate between ideology and practice.

In practice, the IP system has contributed to increasing corporate power, grabbing of materials, "resources" and indigenous knowledges, in order to build a specific model of innovation and prosperity that is based on a logic of scarcity.

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1 Penn, Ivan and Clifford Krauss. "More Power Lines or Rooftop Solar Panels: The Fight Over Energy's Future." New York Times. 11 July 2021. Available at: https://www.nytimes.com/2021/07/11/business/energy-environment/biden-climate-transmission-lines.html?referringSource=articleShare

2 Soukhaphon, A.; Baird, I.G.; Hogan, Z.S. The Impacts of Hydropower Dams in the Mekong River Basin: A Review. Water 2021, 13: 265. https://doi.org/10.3390/ w13030265

3 Chia, Jasmine and Al Lim. ""Rice for Fish": Karen counter-narratives of self-sufficiency and Thainess." New Mandala. 13 July 2020. https://www.newmandala.org/rice-for-fish-karen-counter-narratives-of-self-sufficiency-and-thainess/?fbclid=IwAR2dudA7en0kg0Z5y9WFe5FiVwdp0u6GHNtiVV683wvGzRUlRXM4DvBCFw8

4 The right citation for footnote 4, as in the text, is: Hancock, Jay. They Pledged to Donate Rights to Their COVID Vaccine, Then Sold Them to Pharma. 25 August 2020. KHN.org. Available at: https://khn.org/news/rather-than-give-away-its-covid-vaccine-oxford-makes-a-deal-with-drugmaker/

This is the system that groups across the world, from the Global North (e.g. Pirate Care), to indigenous groups working in the Global South (such as the People's Coalition on Food Sovereignty), are challenging.

In this manual

In Marcus' plot we see how an individual can work with a community, being aware of their preferences while focusing on the community's needs at large. Marcus works towards growing food plots in a neighbourhood, that carry an optimum range of nutrients, with minimal dependence on corporate power in order to increase dependence on self and community.

In Oi Lian's soil science we see how the practice of expertise and knowledge is insufficient in providing the simplest possible solution—often referred to as Occam's Razor—when limited to the province of companies, and heavily guarded by proprietary logics of market—competitiveness.

This manual is not a complete guide to improving soil health for tasty, flavourful food. But it is the start of a set of guides for direct climate action in Singapore working with and through soil, community responses, integrating empathy, humility, collective capacity, and

shared co-learning. Knowledge is power, and communities fare as well as their slowest member. (In this case, the slowest members are not the oldest or least "educated", but those championing individualizing, isolating, and zero-sum narratives that are rooted in scarcity and a specific idea of the ideal human condition.)

The Soil Regeneration Project celebrates the diversity of peoples and ideas, and multi-strata biodiversity. It is supported by Aerthly and Potato Productions, and works closely with the National Parks Board's Plant Science and Health Lab headed by Dr Philip Varughese to collect and coordinate soil sample analyses across 10 gardens from 2020—2022. It has consulted with soil scientist Dr Subhadip Ghosh at the Centre for Urban Greenery and Ecology (CUGE, NParks), and has benefited from a small but vibrant community of scientists, social scientists, geographers, foresters, botanists, ecologists, biologists-turned-start-up founders, digital government and technology creators, and university faculty members who have worked with issues of disaster, resilience, and food systems.

We thank especially individuals who discussed, supported, and inspired us in many ways: Sarah Ichioka, whose independent practice showed us how one can chart a course of one's own, despite all; Jacqueline Chua and Kay Pungkothai at the National Parks Board, for seeing the value of this project and supporting it through time; Dr Marvin Montefrio and Dr Michiel van Breugel, who brought their enthusiasm for the project to multiple meetings; Adeline Setiawan, who lent her fierce enterprising spirit to scheming up indie business plans for the project. To everyone who has challenged and supported us—thank you!! Finally, for the researchers, policy-makers and knowledge practitioners who'd like to read something denser: the project is part of an action research process embarked on—and documented—since 2015—in academic pieces and shorter blog pieces, with the belief that edible urbanism can be made accessible to all.

Further Reading

Groups mentioned:

Pirate Care. https://syllabus.pirate.care/

People's Coalition on Food Sovereignty: https://foodsov.org/

Other references on urban soil in Singapore:

Fung, Tze Kwan, Daniel R. Richards, Rachel A.T. Leong, Subhadip Ghosh, Christabel W.J. Tan, Zuzana Drillet, Kit Ling Leong, and Peter J. Edwards. 2021. "Litter Decomposition and Infiltration Capacities in Soils of Different Tropical Urban Land Covers." Urban Ecosystems. https://doi.org/10.1007/s11252-021-01126-2.

Ghosh, Subhadip, Bryant C. Scharenbroch, and Lai Fern Ow. 2016. "Soil Organic Carbon Distribution in Roadside Soils of Singapore." Chemosphere 165: 163–72. https://doi.org/10.1016/j.chemosphere.2016.09.028.

Leitgeb, Ernst, Subhadip Ghosh, Marcus Dobbs, Michael Englisch, and Kerstin Michel. 2019. "Distribution of Nutrients and Trace Elements in Forest Soils of Singapore." Chemosphere 222: 62–70. https://doi.org/10.1016/j.chemosphere.2019.01.106.

Ghosh, Subhadip, Bryant C Scharenbroch, Daniel Burcham, and Lai Fern Ow. 2016. "Influence of Soil Properties on Street Tree Attributes in Singapore." Urban Ecosystems 19: 949–67. https://doi.org/10.1007/s11252-016-0530-8.

Food and action research in Singapore

Ng, Huiying. 2021. "Scaffolding Transitions of Possibility: The Food Walk as Embodied Method in Singapore." Journal of Urbanism: International Research on Placemaking and Urban Sustainability 00 (00): 1–22. https://doi.org/10.1080/17549175.2021.1941203.

Ng, Huiying. 2020. "Recognising the Edible Urban Commons: Cultivating Latent Capacities for Transformative Governance in Singapore." Urban Studies 57 (7): 1417–33. https://doi.org/10.1177/0042098019834248.

Foodscape Pages: https://foodscapepages.org/

What have we been up to?

Sometimes things move slower than we like. Projects take time to find support, and we have to move at their speed. Working with soil has led our community down different paths, finding the best way to tell its story. This little booklet brings together the down times and the up—times, as a reminder and inspiration that sometimes, the hardest going moments are also those moments of immense learning, and the opportunity to act differently.

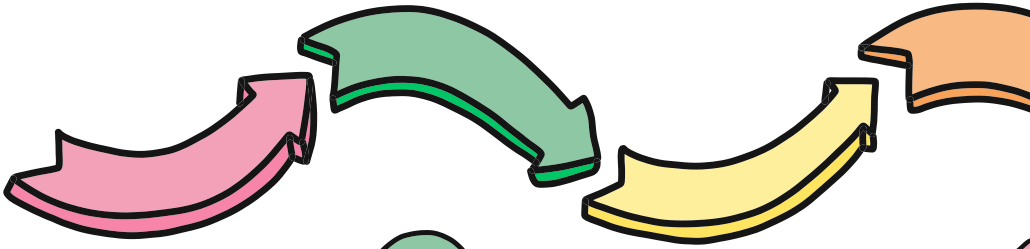
As we each act differently, see how we collectively step into a new timeline?

june 2019

Public Panel

sept

Site visits
- Derrick'



Community literature review

may 2019

Planning Session

aug 2019

t 2019

s and soil care discussions
s plot

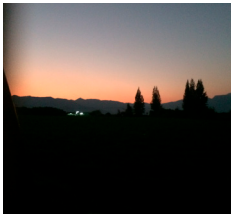
nov 2019

Site visits and soil care discussions
- Wah Son Aerospace Facility
- Veronica's plot

Site visits and soil care discussions
- Wah Son Aerospace Facility
- Marcus' plot

oct 2019

We take a breather, to reflect, and prepare for the new year.



dec 2019

Healthy Soil Guide

A guide to setting up a soil bed for edible food growing — using only what you have in your garden!

A journey of re—learning soil worlds

By Aditi Punj Sood

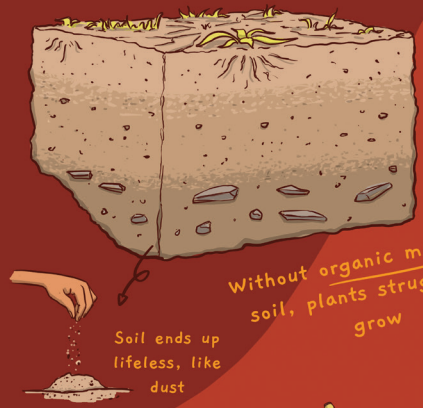
Since March 2020 we've been designing and writing a soil-centered curriculum for secondary school students. While soil has been and continues to be the central frame, as we design each week's lesson it became increasingly clear that it is simply impossible to build a conversation around soil without including every single thing, living and nonliving, into the framework. This is because, as you unpack each layer, soil reveals itself to be connected to everything; beginning with its physical structure, to the organisms it houses, and the surrounding cycles and processes to which they are inextricably linked. Soil is an enabler and a crucial part of these systems and processes (take water, carbon, nitrogen, or each and every element you choose to explore). Soil expands and folds itself into all aspects of the living and elemental world!

What began with a mission to put soil at the center of the conversation fortuitously grew into something more. Beneath each lesson there was a pesky intruder who kept popping into the conversation — us human beings! Just as soil and all the life it encompasses expands its reach across processes and ecosystems, so do we. Without thinking about it, you and I are currently participating in the biological worlds around us, even while reading this — by simply breathing. Taking in oxygen from the air and releasing carbon dioxide makes us a crucial link in two important cycles, the carbon and oxygen cycle. This ties us to every other being on the planet! So breathe in and out, my friend, and continue to do your part.

For this reason, the last few sessions of the curriculum are deliberately self reflective. Where do we place ourselves within these larger processes, of which we are both a willful and, simultaneously, unwitting part? Furthermore, what outcomes do our intentional and unintentional actions have? Most importantly, what do we want to do about this?

Similar to this booklet, our intention with this curriculum has been to lay bare these parallels and fold the world in which we live into that which lives beneath our feet and enables our continued existence. So the next time you're outside, I highly recommend taking a deep breath: look around and marvel at the spectacle that encompasses us.

SOIL STRUCTURE



Soil ends up lifeless, like dust

Without organic matter in soil, plants struggle to grow

Just these components are not enough...

Sand

Silt

Clay

Air

Water

These are important too!

Microbes

Organic Matter

Living Organisms

Healthy soil needs a healthy community!

Soil holds itself together

Illustrated by Ng Wei Yang

Recipe for home—grown soil

By Huiying Ng

"Soil is made up of mineral particles, organic matter and pore spaces which may include air, water, and organisms. Compost is not soil. It is an important component of soil in the form of organic matter, but it is not true soil. Earthworms and other organisms that live in the soil help to break down the organic material into a form that plant roots can use to get nutrients."

— Rain Garden Initiative

We can make living soil, believe it or not! While observational soil science found that soils form over geological periods (that's tens of thousands of years!), active scientists — farmers working on their land — know that soils can be cultivated, cared for, and improved, not only in a generation, but within a growing season.

Here're some tips for you, on growing your living soil community.

Prep Time: 30 minutes a week, over 6—10 weeks

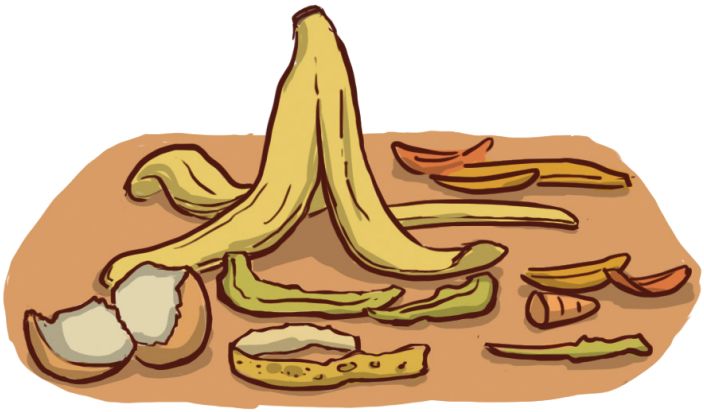
This is the minimum amount of time you need to see results, but the longer you go, the richer your soil gets. And it feels great to create a closed loop right at home, so you might just keep going!

Ingredients:

- Ready—made compost OR homemade compost (see next page)
- Existing garden soil, or already—purchased soil
- Resources you find around you: branches, dried fallen leaves, twigs
- Food scraps

Method 1:

1. Dig under the surface of the soil, and add a layer of food scraps.
2. Add soil back to surface.
3. Cover with mulch.
4. Leave for 3—4 weeks; checking once a week.
5. If food scraps have disappeared, you can repeat these steps, adding on to the biomass and macronutrient profile of your soil.



Method 2:

1. Compost food scraps.
2. Add composted food scraps just under the surface of soil.

Ingredients for homemade compost:

1. Green matter:
   - Vegetable scraps (e.g. carrot tops, onion skin, broccoli stems, avocado skins, viney stems, things you usually dispose of)
   - Fruit peels
2. Activators
   - Used tea leaves
   - Used coffee grounds
3. Brown matter:
   - Best: Leaves, branches, twigs
   - Acceptable: Cardboard, recycled paper without ink
   - Not desirable for edible gardens: Newspaper or other papers made with chemical products which are not tested for food consumption
4. Water to moisten your compost: tap water works, or also try with rice water or harvested rainwater and see if there's any difference!

Making your compost bin:

Find a plastic bin, or a garden pot. Drill holes into the base of the plastic bin, making sure to drill at the corners and across the lowest parts of the container. Drill along the sides as well — this allows your compost bin to receive some air ventilation — for aerobic composting.

Cover your bin with a piece of breathable fabric and tie a loose knot around it to prevent the cloth from coming loose.

Daily — Meal preparation time:

Gather fruit peels, vegetable scraps, anything you have on hand. Collect these in a large plastic container in your kitchen. Containers for new year goodies (like love letters) are a perfect size!

Weekends/once a week:

Depending on the size of your household, you may fill your container to the brim in a week, sometimes more or less. Prepare to tip these into a compost bin once a week, e.g. each weekend.

To add food scraps into your bin, first give your compost a turn with a spade or similar tool (aerate it!). Then, add in the scraps, and cover them with more brown matter. Sprinkle some water, enough to moisten it, not to drench it entirely.

Weeks 1–4:

1. Welcoming newcomers:
   - As your compost bin gathers green matter, the green matter starts to break down. You'll find that insects will start to gather too. This is good! It means you have a growing community that will add life to your soil after.
2. Observing with patience:
   - If a week seems particularly lively, wait, and it will pass. In 2–3 weeks, once most of the matter is decomposed, the activity dies down, and you'll find that any smell you observed has gone, and the compost has started to shrink in volume and settle down. The more water/green matter in your bin, the longer this period takes. Smell your compost too: you want to keep it smelling more like the rainforest and vegetable matter, than eggs gone bad. Ensure good airflow and drainage, and stir weekly.
3. Smelling the forest:
   - Sometimes this comes quickly and sometimes more slowly. When it finally starts to smell like leaf litter in the forest, it's almost ready. Technically, compost is ready when it's crumbly, dark, loose, and moist but not wet. You can sift it out from the larger pieces at this point. If you want something already, you can bury these under your garden soil: it will continue its work in the soil and start adding life to it!

Try this: #GrowSoilChallenge

Grow your own living soil community, with nothing but old soil from your garden, and resources you can find around you — without paying a cent for input. What leaves, branches, twigs, cardboard, paper, tea bags, can you use to improve the quality of your soil?

Snap a video or picture of your soil's journey over time and tag @soilregenerationproject and #growsoilchallenge!

Community Inspiration

Soil Companions and Fieldworkers

What would you like to share with others, about the life behind the Soil Regeneration Project?

Soil is a magical element that holds so much healing properties. From working hands—on with soil, I've personally gained so much benefit in how I experience calm and contentment while working in the garden. Scientists have shown that the bacteria Mycobacterium vaccae in soil, stimulates the brain cells to release serotonin, a neurotransmitter — also known as the 'happy chemical' — that is a natural antidepressant that also strengthens our immune systems. More recently, a new strain of bacteria, Streptomyces sp. myrophorea, found in the soil in Northern Ireland, has been reported to be effective against four out of six top superbugs that are resistant to antibiotics. What we know about the complex microbiome of soil is fascinating and there is soooo much more to learn from this element that nourishes us!

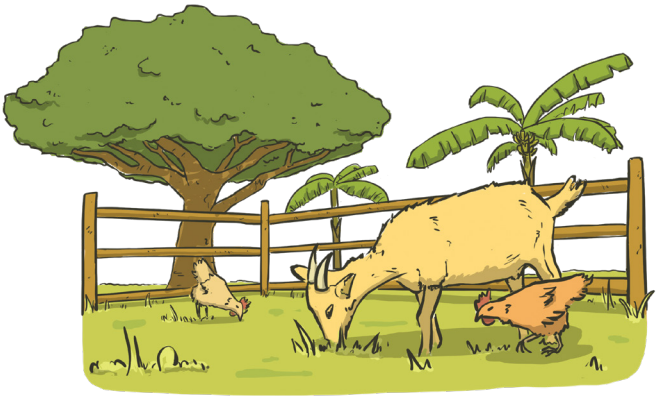
–Vivian Lee

Soil regeneration is an entirely new horizon for me and I'm appreciative of the generosity and hospitality of the soil companions, as well as my colleagues within this project. As a student of both human and nonhuman histories, the initial stages of the Soil Regeneration Project has been a fascinating process of unearthing different perceptions of soil, seeing how such perceptions come into harmony or friction with one another. I look forward to working more closely alongside communities in, under, and above soil.

—Marcus Yee

Working on the illustrations and logo for the project was a unique experience, one that slowly took shape over time, just like the project itself. I took the important values about the project and used that to direct the decisions I made throughout the design process for the illustrations and logo.

—Wei Yang



It's not just fun and games people! Its an urgent political battle for our land, our soils, and our ecosystems against the onslaught of concrete, commerce, and sterilisation. I'm developing my site as a proof—of—concept for soil—based, small—scale, community supported farms in Singapore's neighbourhoods. The more people are interested and support such systems, the more effectual change we can make! Reach out if you'd like to support my project in any way!

—Marcus Koe

The act of restoring soil is the act of restoring life. Where there is soil, there is life. When you have good soil, it affects you in more ways than you ever imagined. Soil health impacts the air we breathe, the food we eat, the water we drink, the land we live on, and most importantly, Man's connection to Nature. To say that mankind is not connected or dependent on Nature is a fallacy. We are Nature just as much as Nature is us. To destroy Nature is to destroy ourselves. In destroying soil, we are partaking in the slow death of Nature, of mankind. To save soil, is to do save lives.

–Toh Hanjing

"The joy of smelling and feeling good soil in your hands."

—Ong Chun Yeow

While death is a taboo in society, working with nature allows one to see the cycle of life and death.

—Ee Peng

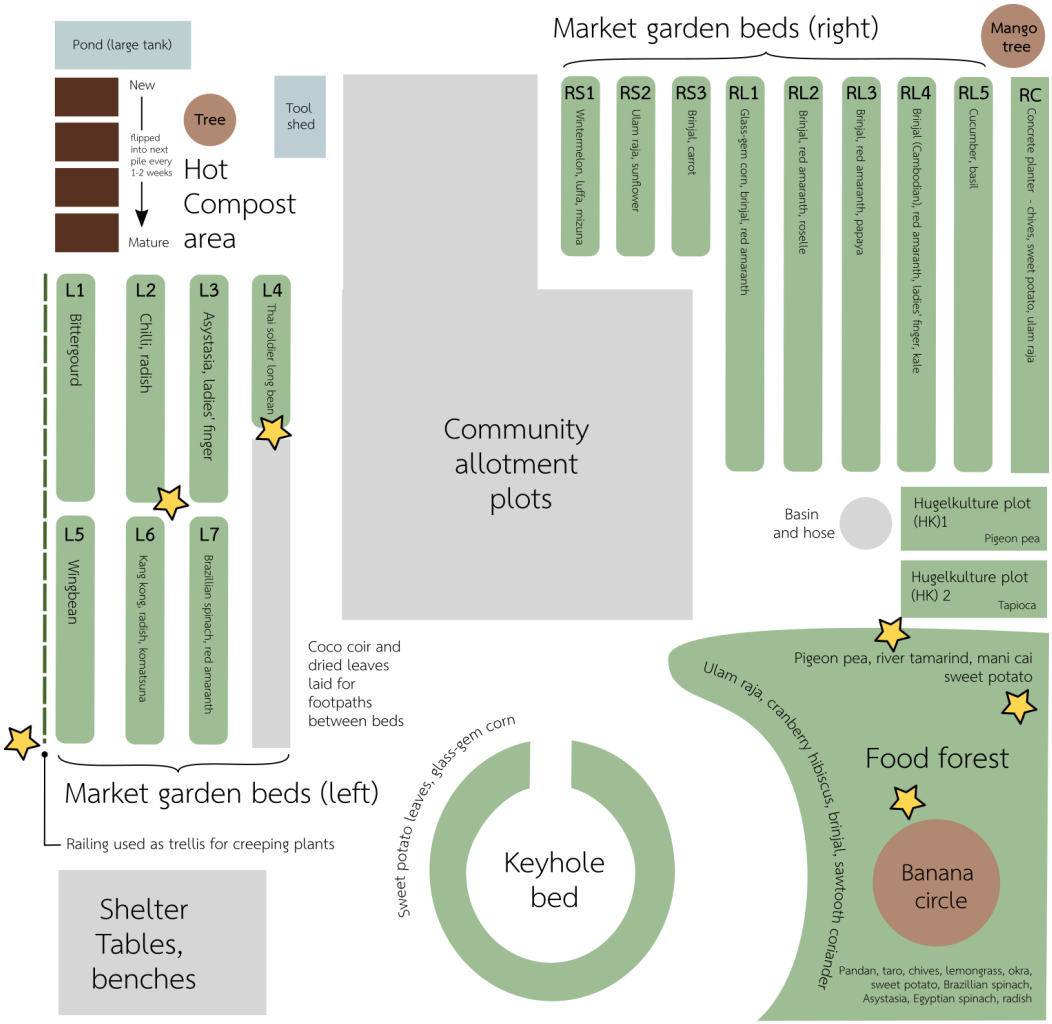
A Garden Plot

By Marcus Koe
Annotated schematic by Tan Jun Qi

A garden holds its gardener's philosophy. So no two gardens are exactly the same. Here's a glimpse into what soil life in a garden can show us of the practical philosophy of a gardener, from a garden that occupies part of the Jalan Senang Community Garden in Kembangan.

Marcus Koe's garden

I joined a community garden back in 2018, and like most of them, this one had a number of allotment—style, raised bed plots meant for members to take ownership of. I was more interested however, in an over—trampled, sometimes cracked— earth, other times waterlogged corner of the garden sparsely populated with weeds. The incumbent members had no luck growing much in this plot, and I was granted the liberty to do my gardening here. Two and half years later, this is a thriving mini—food forest, with an iconic banana circle and winding keyhole pathways generously mulched with leaf litter and broken twigs. Approximately 50 varieties of edibles have made their home here, all



** Plants are regularly intercropped within the same bed, and the crops planted in each bed are rotated regularly. The plants labelled in the various plots are plants that have been observed to be growing over a period of observation from March - July 2021*

Soil sample site (samples taken on 2 July 2020)

finding ways to thrive in the multitude of micro—climates created across the sun—soaked zones to water—abundant shadows. This progress took patience and keen observation, a desire to work with nature rather than against it, and the acceptance that failure is necessary for wisdom. I learnt how the sun rays angled differently on the garden across the year, how rainwater moved across the plot, and how different plants found their niche areas amongst the organised mess of a food forest.

Over on the opposite side of the community garden is another plot I started managing more recently, together with a composting station (fed with food scraps from neighbours, regular volunteers, and visitors) that tries its hardest to feed the whole garden. After sharing with other members that I wished for more space to prototype a model for a small—scale regenerative farm, we carved out another weedy, underutilised section of the garden for that purpose. Here, I've designed a row cropping zone similar to what you'd call a market garden overseas. The aim here is to experiment with growing a selection of weekly household vegetables (leafy greens, fruit vegetables, root vegetables, and a sprinkling of herbs) that a small—scale farm could imagine supplying neighbouring households through a weekly subscription, or CSA (Community—Supported Agriculture) offering. We practice our market gardening with no—tillage, prioritising soil health through building an active web of soil life. No two adjacent rows share the same primary crop (intercropping), and every row is intercropped with companion plants as much as possible.

Between the food forest and market garden, I see some hope of feeding a nation without utilising an extractive form of agriculture. There is a respect for nature here as the epitome of technology, and in our exploits, we build a philosophy of letting nature be the farmer. With just rainwater, sun, soil, and an appreciation for life, we already have the foundation for a thriving and productive ecosystem.

Engaging the senses & the community

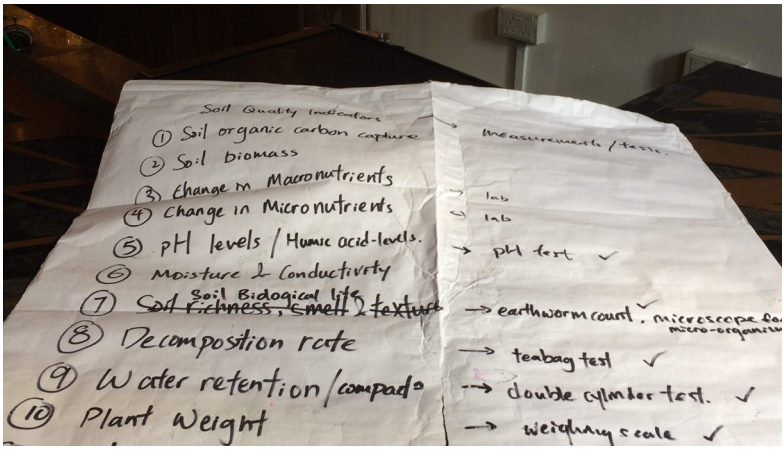
Planning with a social soil community

By Huiying Ng

It can be challenging to plan ahead, when people, spaces, resources, and dates can't be secured. Huiying lists some examples of events we ran, how we did them, and the lead time you might give to them.

Then check out the second section, where Hanjing shares three tips for successful soil regeneration—with familiar and unfamiliar communities.

Event	Frequency	Details/Tips
Community literature review **May 2019**	4 sessions, 1 month concurrent	This initial search was conducted with a small group of community participants through an open call done by Foodscape Collective, in effortvs to have the review process guided by the questions of interests from individuals working with soil and urban agriculture in Singapore. It included the following sessions: • Planning session: 2 participants • Session 1: 2 participants • Session 2: 6 participants • Session 3: 2 participants **each session had a mix of recurring and new participants*
Soil public panel **29 Jun 2019**	2 months prior	Make in advance: Email templates and write—ups come in handy — prepare them in advance!
Soil Science Exploration & Planning Session **9 Sept 2019**	1 month	It can take time to fix a date with many people: the clearer your event description and aims, the more likely people will be able to commit to a date and time with you. Make in advance: A checklist of steps to achieve (see facing page) Keep: A summary of things discussed



Left: Drawing up a working set of soil indicators

Checklist of steps	
Introductions	
☐	Who's who & background of project (15 min)
Aims: what indicators are we looking out for?	
☐	Presentation of literature review and process so far (15 min)
☐	Discussion (15 min)
☐	Existing examples of soil sensors
☐	Break (10 min)
Site examples (20 min)	
☐	Introductions by each site's representative
Discussing expectations of ways forward	
☐	Sort through soil indicators (get a sense of interest)
☐	Tests and site data (types of plants, soil base, tests and types of neighbourhoods)
☐	Regularity of commitment: meetings, work times
☐	Working groups and roles • Types of roles could be: ◊ Test indicator leads: to develop parameters for soil tests, decide on regularity ◊ Soil practices lead: to initiate discussion on soil practices ◊ Coordination lead: Simple administrative/ coordination support with dates, scheduling, venues etc. ◊ Documentation leads: Website and wiki (if you use one) updates
☐	Coordination platform (WhatsApp? Telegram?)
☐	Before the meeting ends, set up a next time to meet

Event	Frequency	Details/Tips
Visit to Wah Son (prep) **Sept 2019**	—	It's useful to make regular visits as a small team to the sites you want to work with. This month, we make a visit to Wah Son to look at what's already growing. Checking out the tree and compost pile beneath. The pumpkins sprawling in the yard behind. Derrick brings a mixture of Biodynamic (BD) preparation, and we stir that into water until it creates avortex, alternating clockwise and anti-clockwise for an hour; and spray that over the plants, sending forth a wish that they grow well.

From left: Wah Son's garden plot; Derrick's Biodynamic (BD) preparation,

Check In + Visit to Derrick's plot **22 Sept 2019**		To find: • double ring infiltrometer To bring: √ Portable microscopes √ Tea bags (standardizing the same brand's teabag) √ Conductivity tester Take notes of what you need to acquire when you visit a site. Site visits are very important — visiting a site tends to bring up surprising insights into the suitable materials and tools to use. Our notes from this site visit:

Left: Derrick's garden plot

Event	Frequency	Details/Tips
Visit to Marcus' plot (Kembangan) + demo soil tests **6 Oct 2019**		Updated checklist of equipment: √ Double ring infiltrometer (to check if we can borrow, standard equipment is useful, otherwise we will make a DIY set.) √ Portable microscopes √ Tea bags (anyone has lots of used tea bags for use? Let's standardize the same brand's teabag) √ Conductivity tester

These activities are suggested to attune our senses to different ways to perceive the world. Recognising that each person perceives the world through theirunique senses, we encourage educators to use these methods in ways that emphasise diversity and strength, rather than deficit and lack.

Three tips for successful soil regeneration: working with un/familiar communities

By Toh Hanjing

To regenerate soil is to bring life back into soil; to regenerate soil is to create a conducive space where nematodes, mycelium, earthworms and other soil creatures can interact with one another to create a healthy ecosystem.

Just as with creating the conditions for a balanced soil ecosystem, it is important for people to come together to work on soil. It is not feasible, sustainable or regenerative if we (changemakers who want to regenerate soil) are to work on the garden alone here in Singapore. Land and gardens are often shared spaces, with people of all walks of life coming in with different opinions and methods to tend to the soil. Soil regeneration practices are relatively new to people in Singapore, and with all things new, there will be some resistance towards the unknown and foreign.

What is the key to successful regeneration?

One key is having an open mind to learn together and to have effective communication within the garden's community. This ensures that everyone has a shared understanding of the chosen regenerative practices and minimises potential conflicts in the long run. If and when conflicts inadvertently arise, learn to have healthy communication instead of avoiding it. Seek mediation support if necessary and not let any conflict fester into resentment.

Here are some regenerative activities that you can do with your community.

1. Build some worm towers.

Do you have some bamboo sticks or broken pots lying around? Extend their life further by repurposing them as worm towers! If you haven't heard, worm towers are basically small towers where you can drop food scraps (vegetable scraps, and fruit peels) so as to feed the worms in the soil. As you pile the food scraps in the little vessel, the earthworms will make their way to the worm tower and in turn create little tunnels in the soil.

From left: Worm tower made using PVC pipe at Siglap South CC Garden; Broken pot as worm tower at Wah Son

The gardens in the soil project have fashioned different variations of the worm tower. Some lined bamboo sticks in a circle to create a rustic looking worm tower, others have used broken pots and PVC pipes which are buried halfway in soil too. It is best to create the worm towers at opposite ends of your garden bed so that the worms can tunnel their way through the beds and create little tunnels in the soil.

Once the worm towers are done, get the community to come in and take turns to feed their food scraps to the worms! Once the worms get cosy in the towers, you will be able to see the little worms feeding on the food scraps. Expect some Oohs and Ahhs (and possibly some shrieks) when kids come along to visit the worms! Definitely a good way to add some liveliness to the garden ;)

From left: Earthworms from a worm tower; Bamboo worm tower at Wah Son.

2. Start a harvest and exchange corner.

One of the major sources of conflict in our local gardens is that of "theft" of plants and produce. The outlash against theft and ownership is often one that stems from the mindset of scarcity; that we do not have enough and therefore it is outrageous for someone else to snoop around and take what is supposedly ours. Is it wrong to feel upset when someone removes produce from our gardens or damages a plant? Of course not! Is there a better way to turn the situation around and build a regenerative and positive culture in the community? Absolutely.

A wise uncle once told me, "Change the world and watch your world change!"

The quote holds immense power to help us reframe our thoughts. At least it has helped me to do so. Rather than getting upset about garden thieves who come stealthily in the night, how about changing the situation around by offering them produce instead? Oh what blasphemy!

Hold on, hear me out.

I was in Brisbane, Australia, when I first witnessed this in a community garden right smack in the city centre. There was high foot traffic and the garden was open to the public, there were no fences around, but

Sign in Epicurious Garden, South Brisbane

Sign in Epicurious Garden, South Brisbane

boy were there amazing vegetables, flowers and herbs growing in that garden! The garden wasn't in mayhem and I was befuddled for a good few minutes. How was this possible? That we can have an open garden with an abundance of produce and not have it be vandalised or have people clawing at each other's faces?

I sat right next to a pot of mint (which had a sign that said "smell me!") and took a good look at the garden and its community. It then dawned upon me that the answer was "abundance"— and it was beautiful.

The following steps are derived from what I have learnt from that open garden in the city of Brisbane. Here is how you can create a harvest corner.

- Set a day and time once a week when you and other garden members can gather to harvest the garden produce.
- Make several signs with the harvesting day and time to visit and place it in an obvious spot. Add some smiley faces (: (: (: Place them in the "hot spots" of the garden.

Create signs near the plants that get over-harvested, asking the visitors to please let the plants come to maturity. Direct them to the harvest corner or person to call if they wish to harvest anything in the garden.


LUX-TOOLS

Gardener working in the Epicurious Garden, South Brisbane

3. Grow some popular edible plants outside the garden for people to harvest.

There is an uncle who grew two moringa trees; one in his garden and one outside.

Every week, a few elderly folks will stroll past his house and harvest some moringa leaves to cook. Although the uncle never spoke to the elderly folks before, he was aware that the moringa tree was being harvested and let them help themselves to the produce. Two moringa trees, one for me and one for you!

—

Some of these points may seem radical for the community gardens here in Singapore, but if we want to change the culture here in Singapore, we need to start doing something different. There have been far too many gardens which get torn down or shut off simply because of livid conversations and conflicts over plants and produce. Isn't it a real pity to close off gardens on this island that claims to have limited land? The future of soil regeneration and community regeneration lies in our hands and heart: let's make some magic with both our hands!

Resident Science for Soil Advocacy

By Liow Oi Lian

A community–led research process takes time and effort, because it is genre bending and goes beyond a single group of specialised individuals. By assembling a diverse network of individuals, such a process brings together multiple, important perspectives. Oi Lian shares her methods and steps in collecting soil data. Gathered from actual working files and images she has used, these offer a glimpse into simple steps for a community–led research process on soil.

My Compost Bin


weekly I divert
75kg foodscrap
from incineration


My corridor
compost bin

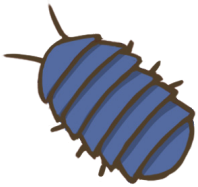

Through doing
composting,
I appreciate
nature, food,
health & humanity
more.

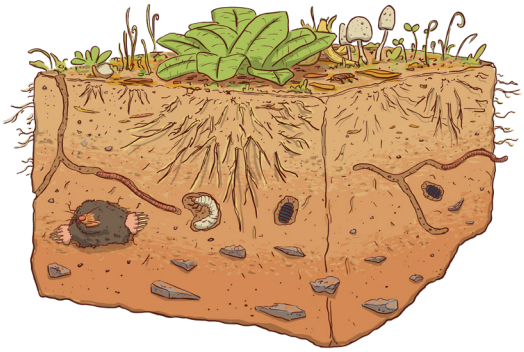

pound eggshells &
rooting mints near
basin


garden waste are
pour into compost


cover up the
aerated compo

Easy Peasy
Soil Life Monitoring





1	Identify a site approximately 20-30cm by 20-30cm
2	Give your site a name
3	Estimate the height of groundcover or mulch (cm)
4	Dig into the ground. Describe soil texture and color
5	How many types of earthworms do you see?
6	Count total number of earthworms
7	Measure longest biggest earthworm (mm)
8	Count soil insects (and compost insects)
9	Count ants & other predators
10	Place earthworms and all insects together, take a picture.
11	Describe soil texture and color
12	Dig until clay soil is seen: measure depth of topsoil layers (cm)
13	Check soil pH (if you have a kit)
14	Do the Soil Squeeze Test: squeeze soil, tap it to see how well it loosens. If soil is too dry, add water droplets, and pay attention to how much water is added
15	Do the Soil Drop Test: Prepare a dry surface. Record the diameter (cm) of a soil ball's "explosion" as it hits the surface.

Observations of soil in Singapore

In year 2010~2011 the land opposite Khatib MRT station was “topped up” and on one rainy day when I passing by, the surrounding pavement had an exodus of millions of earthworms. We were so scared to step on them, so we chose to walk on the tar road.

I started to observe the ground in Singapore more attentively.... where have our earthworms gone? Why does our clay soil crack on dry days, and pond water [collect water] on rainy days?

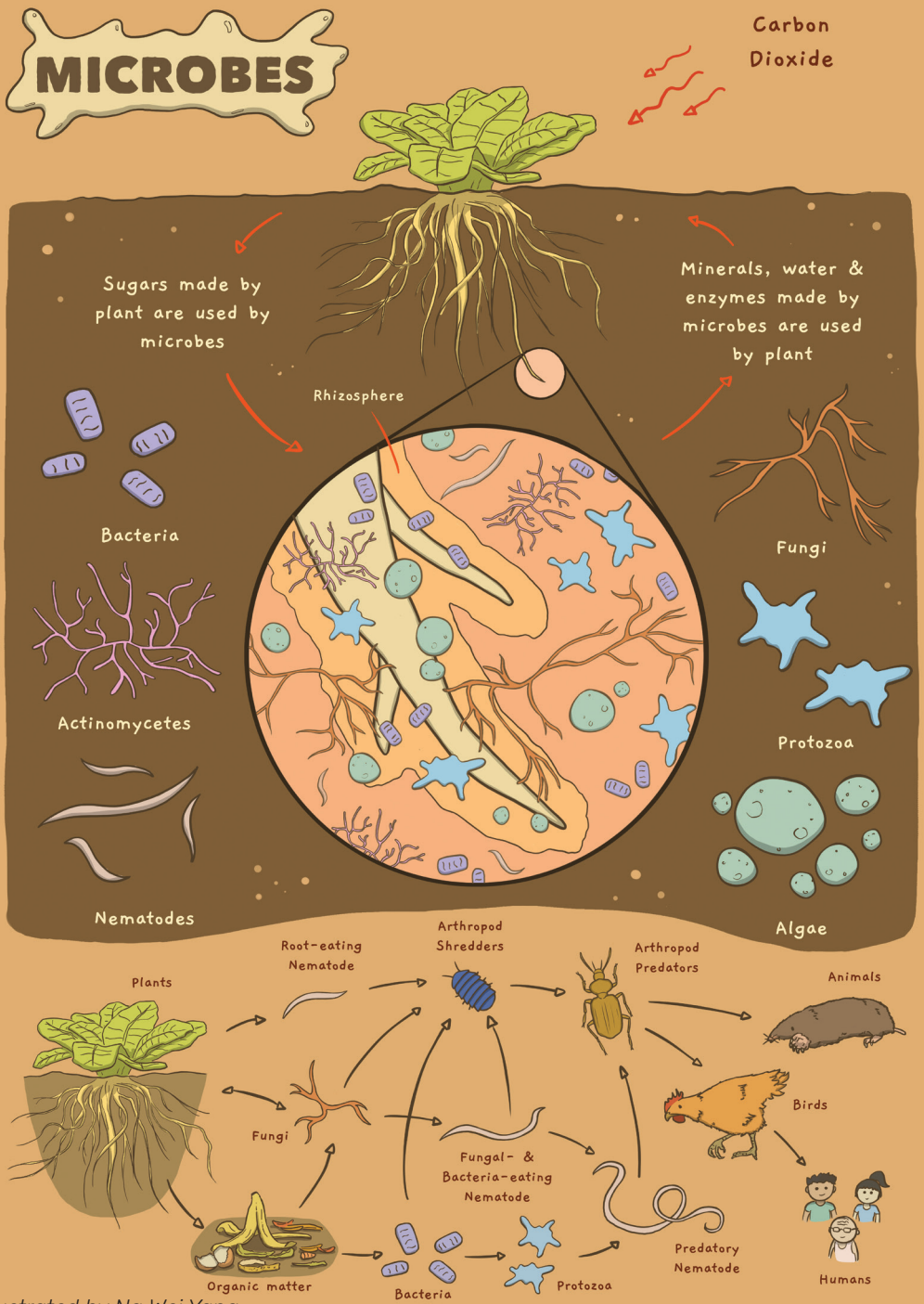
I wanted to test natural aerated composting and growing ground cover crops, but it took me three years to convince the gardeners and the chairman after they first see that my vermicompost was not smelly and good to use. They were finally convinced when newspaper and TV media made reports on composting to solve food waste and support gardening.

Since then, I have seen and touched good soil and plentiful diverse earthworms at the Ground—Up Initiative and Green Circle Eco—Farm. I believe that soil can be regenerated, its fertility revived, and its plants, critters, and diversity of lives can grow healthily.

Ground—Up Initiative’s society allows me and other people to propose and do self—learning discoveries, such as documenting earthworms and soil types. I am equally thankful and energised by Foodscape Collective friends who are not only interested in food waste management for Singapore on Semakau Island, but are also much more interested in building community and individual capability and strength to do good for our society and land.

Want to participate in a research project on home and community gardens with us?

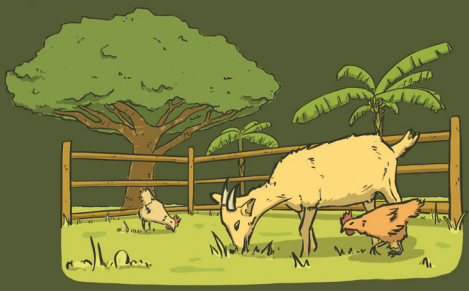
Write in to research@soilregenerationproject.com
Find tools and methods at soilregenerationproject.com



Illustrated by Ng Wei Yang

INCREASED BIODIVERSITY

Nature never plants a single species on its own, why should we?



ANIMAL INTEGRATION

They are part of the ecosystem

SOIL REGENERATION

SOIL ARMOUR

Let soil build up its own strength and health

Taking medicine everyday VS Eating healthy everyday

LEAST DISTURBANCE

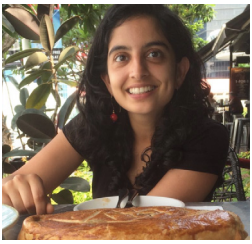
Do not till and interfere with the soil

LIVING ROOTS

Let plant roots and soil network grow naturally

Illustrated by Ng Wei Yang

The Soil Regeneration Project Team



Aditi Punj Sood's journey in Anthropology led to a deep exploration of food and agriculture. She has worked on farms since 2012, spanning the US, India and now Singapore. She's grown food in the ground and greenhouses, on rooftops and verticals racks. A big believer of food and farming as equalizers, she's been teaching and designing engagement programs on environmental education. Most recently, she's writing curriculum for the Soil Regeneration Project, with the intention of directing conversations from silos to soils and social—soil communities.

Living a self—sustainable way in a Japanese zen monastery for 3 years, organically farming up to 4 types of rice and more than 20 types of vegetables — **Ang Ee Peng** comes back to Singapore in 2015 and continues to farm in urban spaces. She has been actively transforming an industrial space in Seletar Aerospace into farming areas with regenerative farming practices.

Huiying Ng is reading and seeking future practices of food and agricultural economies shaped by agroecological principles. She is an initiator of the Foodscape Collective, and part of TANAH. She was a member of the former soft/WALL/studs. She is now continuing her research on agroecological futures in Southeast Asia and the environmental impacts of regional agri—food infrastructures, focusing on Thailand. She is currently based in Munich, Germany as a doctoral student at the Rachel Carson Centre for Environment and Society.

An urban farmer since 2017, **Marcus Koe** passionately pursues expertise in designing ecological food gardens, small—scale farming, permaculture inspired regenerative solutions, and community supported agriculture. He has worked at organic farms in Japan, and also with various urban farming companies in Singapore. Currently, Marcus is managing a community garden in Kembangan, which functions as his testbed and a showcase of his practices. He also freelances as a food garden designer and tutor, and consults on urban farming projects. In the long term. he hopes to have a small—scale farm to service Singapore and is searching for ways to realise this dream.

Lotus Liow Oi Lian enjoys nature and ulu ulu kampong walks. She feels good that it is healing, helping her to relax and off load her work stresses.

Oi Lian has witnessed seniors' vitality and happiness in the garden, when she brought them there to do harvesting, when they were reluctant to do exercises in the Elder Day Care that she used to work in.

Nature teaches her life philosophy, and she feels it is important to give thanks to Nature for the things we take from her and the early nation-building seniors of Singapore. In her words, "I can't do BIG enough but I do by returning nutrients from food scraps in vermicomposting, growing food to share and ornament flowers to add colors to life.

Marcus Yee is a student of Earth Systems Science and History, studying in Hong Kong, as well as an art worker, part of the Singapore–based collaborative project, soft/WALL/studs. His fascination with the entanglements between deep time and ecological histories informs his art practice. His writings have appeared in Arts Equator, ArtAsiaPacific, Global Performance Studies Journal, art–agenda, among other publications. He is also a cultivator of fungi, and is currently passionate about fluvial and coastal geomorphology.

Ng Wei Yang is a concept artist and illustrator based in Singapore. He graduated from the Singapore University of Technology and Design in 2017 and subsequently from FZD School of Design in 2020. His journey in art and design started from a couple of design courses in university, which eventually led him to pursue concept art. Wei Yang's interest in both real–life and imaginary environments drive him to create environment concept art and illustrations. Outside of work, he enjoys taking pictures and travelling.

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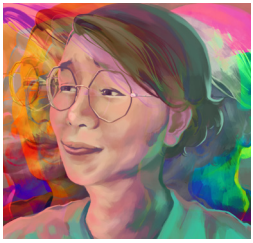
Unsociable pro–social, non–tech endorsing techie animated by ethics, climate, and food systems. In a former life, **Tan Jun Qi** was a senior software developer and tech lead at an international software consultancy, before deciding that society probably needs less techno–utopian, techno–pragmatic, or just plain tech–bedazzled types, and more idealistic bums. Jun Qi is now diving into regenerative soil–food–web–based work, grounding actions in community work, thinking a lot, taking maybe–too–detailed field notes and growing edible green stuff, while drawing and coding at Foodscape Pages.



Toh Han Jing is a soil lover who grows, cooks and compost along her HDB corridor. She grew up frolicking in her Grandma's garden with sun–kissed skin and dirt in her nails. In 2015, Han Jing started her green journey after learning about the terrors of environmental degradation and its dreadful impact on people living in peripheral countries. As a Sociologist and Educator at heart, Han Jing believes that soil regeneration is crucial for the improvement of society and hopes to make soil regeneration accessible to all.

Vivian Lee's practice of social artistry brings people together to explore new ways of being through food and community-building. Taking a holistic view to life, she works at the intersection of art, well-being and spirituality. Her time with the Transition Town community in Los Angeles, inspired her to co–create spaces for regeneration and resilience. She founded Garden of L.E.A.H., in Chiang Mai, where she holds space for mindful practices through natural farming, mudhouse-building, yoga and meditation. In Singapore, she is a somatic practitioner and mindful eating facilitator decicated to heart-crafting spaces for well-being. Vivian shares the vision of an agrihood as a member of Foodscape Collective and is the editor-in-chief of Foodscape Pages. She shares her personal ethos at gardenofleah.home.blog.

Acknowledgements

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Aditi Punj Sood
Liow Oi Lian
Marcus Yee
Vivian Lee
Huiying Ng

Soil Companions:
Ang Ee Peng
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Kiat Lay
Tang Hung Bun
Ong Chun Yeow

Editorial support:
Foodscape Pages (www.foodscapepages.org)

Illustrations:
Ng Wei Yang (www.ngweiyang.com)
Page 8-9: Graphics designed by freepik.com

Editorial design:
Grace Hong (www.gracehong.work)

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