

Re(de)fining Decomposition: Entangling the Experiential Lens and Ecological Functions in the Deadwood Management Strategy

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ABSTRACT

In a high-density, human-centric urban setting, trees are often considered only as materials to structure spaces. The multiple damages and related causalities caused by fallen street trees in Hong Kong, China contributed to a destructive cultural connotation. Instead of ending up on top of a landfill, fallen trees on the Observatory Hill, an urban forest in Charlottesville, the USA are landing on the ground peacefully, nurturing the microcosm and teeming with new life for the ecosystem. It is a dead bounty and just the beginning of the tree's life. Inspired by such as opposite experience of encountering fallen trees, this project started by challenging the cultural misconception of deadwood.

As a design project for the first foundation studio of the Master of Landscape Architecture program at the University of Virginia, the proposal aims to redefine decomposition as a joyful process and refine people's general perception of deadwood through light interventions on the ground. Simple manipulations through landform, material assembly configuration, and visual prompts encourage interactions between people and deadwood. By navigating the amplified wood decomposition setting, a reciprocal relationship will be the productive result, acting as the agency for soil incubation. By experiencing the temporal evolution of decay spatially, one can recognize and embrace the beauty of deadwood.

HIGHLIGHTS

- Points out an experience gap to the public perceiving wood decomposition as a productive process in an urban setting
- Deadwood management serves both human experiential and ecosystem functioning purposes
- A proposal to redistribute nutrients of coarse woody debris on the ground to underground
- A proposal to make marks on the ground as a wayfinding device to give perspective and orientation
- Proposes a design paradigm to enhance tree system resilience

KEYWORDS

Wood Decomposition;
Succession;
Soil Incubation;
Forest Management;
Urban Forestry;
Fallen Trees

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1 Introduction: About Death

In September 2018, Typhoon Mangkhut had swept through Hong Kong, China with unprecedented strong wind and left the concrete jungle naked. The terrifying force uprooted more than 7,000 tons of trees, and more than 60,000 reports of fallen trees were received.^[1] Overnight, the city truly became an “urban forest”—giant trunks and massive branches lay across streets and claimed the spaces they should have been given. Surely, all the fallen trees were soon cleared and relocated to resume the normal operations of the city, as well as to ensure “public safety.” The fallen trees were being treated the same as construction waste, ended up in landfill, buried with tons of other non-degradable trash.^[1] It was a brutal funeral for them but not many people cared. In this highly packed city, the tree is seen as a potential threat that demands meticulous management and assessment of potential risks.^[2] After multiple tragedies of people killed by fallen trees, the cultural connotation regarding deadwood as destroyer or useless and decay as a deconstructive process is understandable. Unfortunately, tree haters are more common than tree huggers in Hong Kong. Having grown up and lived in Hong Kong with a similar impression of fallen or decaying trees, the contrasting experience of encountering decomposing trees (Fig. 1) on the Observatory Hill in Charlottesville, the USA inspired me and sparked the design proposal.

“Re(de)fining Decomposition” is a landscape design project for the first foundation studio of the Master of Landscape Architecture

program at the University of Virginia. Coordinated and taught by assistant professors Leena Cho and Matthew Seibert, the studio aims to prompt students to engage in and explore materiality, movement, and spatial-temporal relationships in landscape architecture. The studio’s design site is the Observatory Hill, an urban forest on the campus with a long history of human interventions and material extractions. When looking for landscape elements and a medium for the project on Observatory Hill, the extraordinary and spiritual configurations of dying trees impressed me. It is not the end of their life. Beyond providing shade and cleaning the polluted air when a tree is standing healthy, it can continue to contribute itself after “death” or when it starts decaying. The journey of experiencing the afterlife of a healthy standing tree in-person prompted me to understand the true agency of a decaying tree and the importance of keeping them in the right place. The process of decomposition is indeed productive.

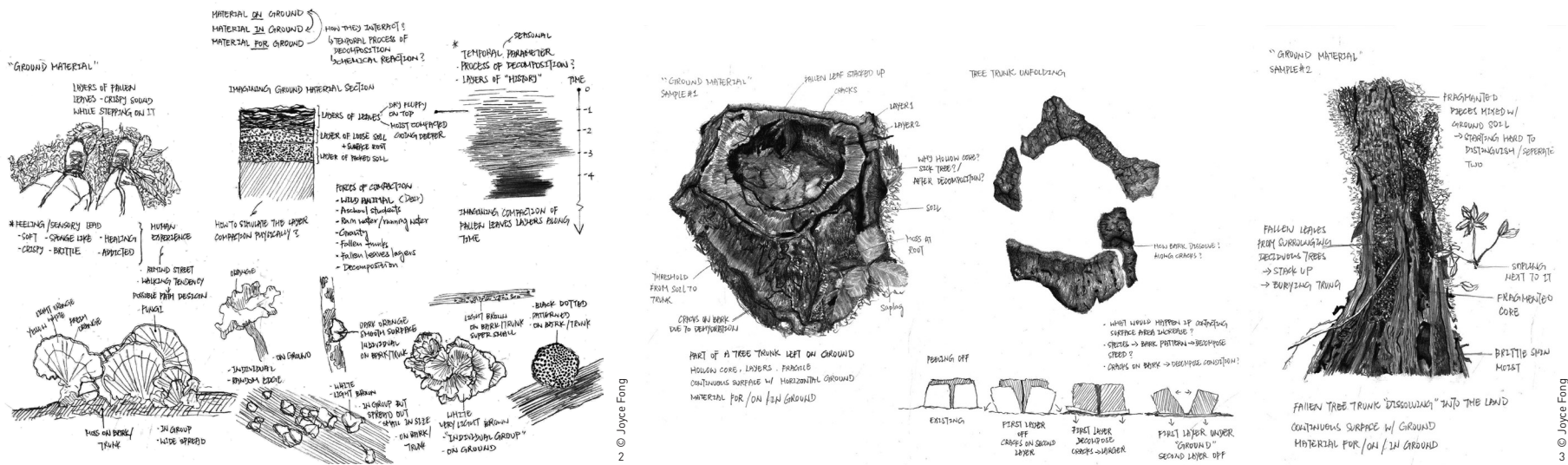
2 Reveal: Opening to the External World

Used to be the material-sourcing forest for the university, Observatory Hill today serves as a staging area where fallen trees and leaf matter gathered on campus are accumulated and composted for future use.^[3] It is a land supporting various research and recreational activities as well. Without any prior knowledge about the forest, I was amazed by the complex layers of texture on this continuous surface both horizontally and vertically when speculating ground

1. Imagining Hong Kong people navigating through fallen trees in a different spatial context and setting



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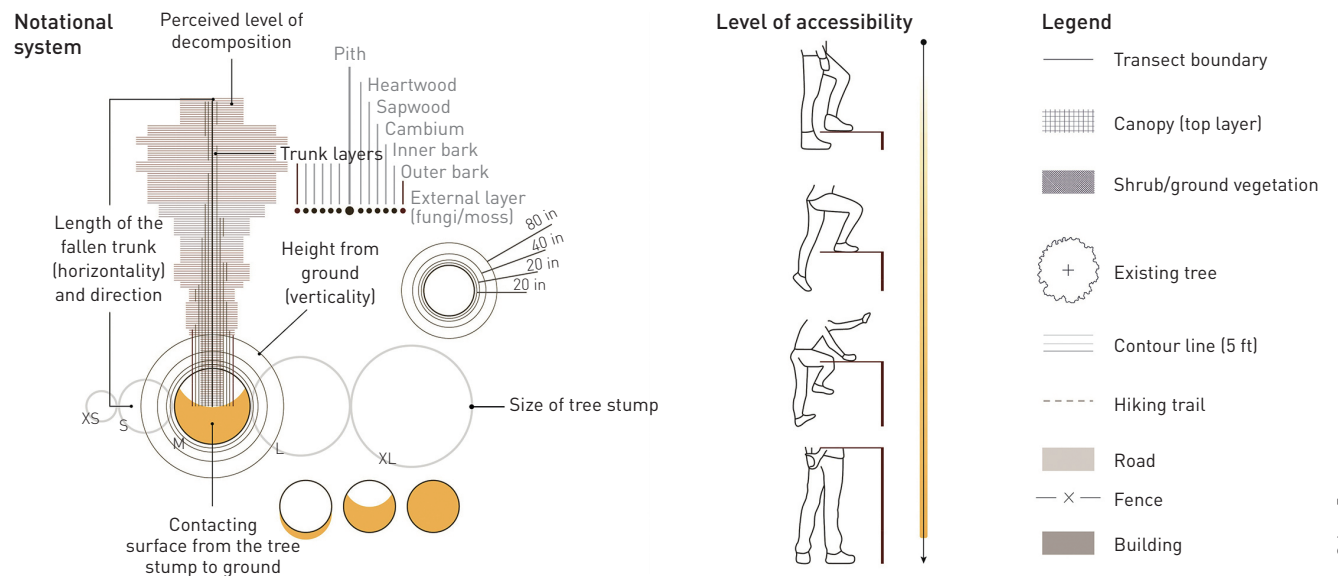
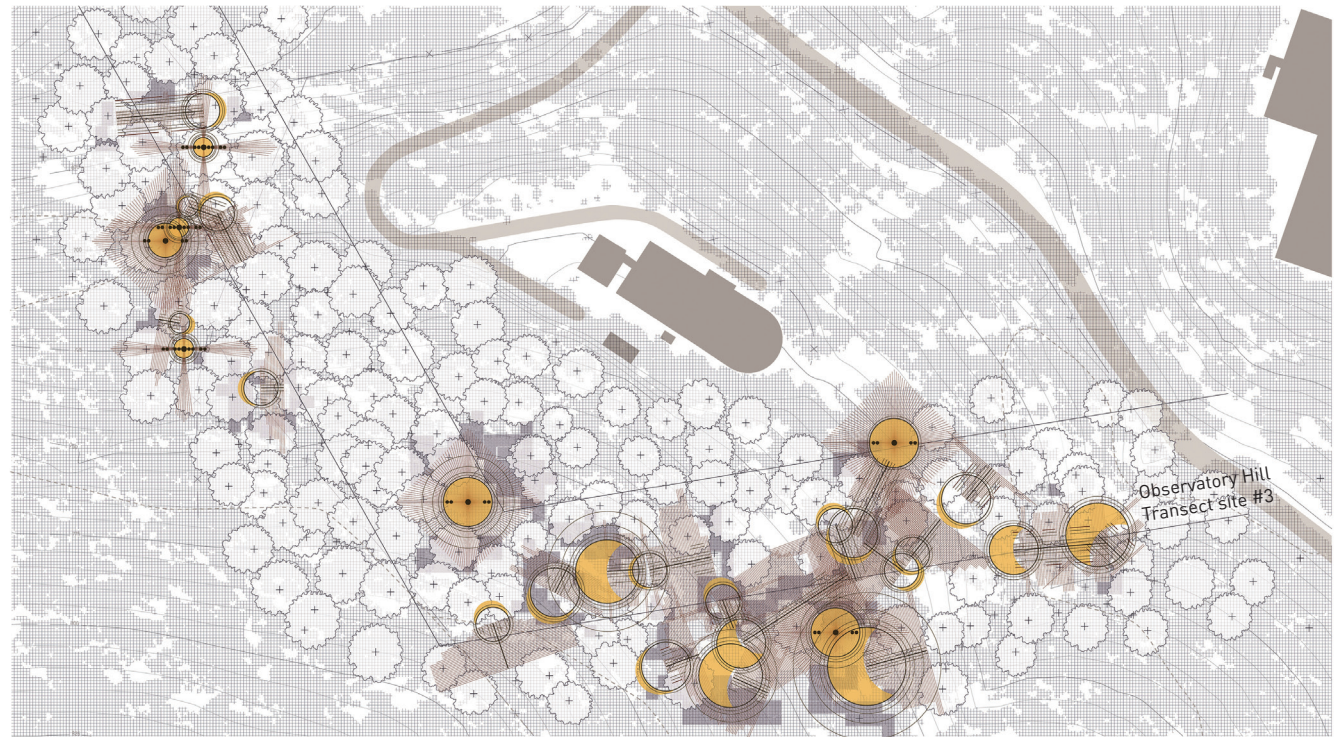
materials along the designated transect (Fig. 2). Thick layers of fallen leaves accumulated and piled up around. As I shuffled through, a satisfying crackle reverberated with each step. While in some humid spots, they were soft and fluffy, feeling like stepping on a sponge. Meandering through the undergrowth and attempting to avoid any skin contact with the spider webs hidden between branches, I kept my head down all the way. Consequently, I managed to catch a variety of ground conditions and observe the nuances in this extensive woodland. The jumbo “chicken of the woods” (*Laetiporus sulphureus*) in shiny yellowish-orange stands out the most (Fig. 2). The traces of various types of fungi and patches of moss drew my attention to their habitat: the standing snags and fallen woody debris (Fig. 3). Although they were hollowed and fragmented, and their

cores were exposed to the external world, they stood or laid on the ground quietly in distinctive forms and elegant shapes. Multiple new leaves and twigs sprout from the ground around them.

This design project is a culmination of four exercises in the studio. In doing the fieldwork documentation of the site for the first exercise, students were expected to explore various spatial, physical, material, and temporal aspects of the site that contribute to human movement and experience. Being told to take our own body as a trusted tool for sensing and surveying, the site readings and interpretations started with a focus on human movement. The lively choreography curated by the fallen trees on Observatory Hill while we moved through displayed the relationship between people and deadwood (Fig. 4). It recalled my memory of navigating



2. Fieldwork sketches: complex layers of ground material
3. Fieldwork sketches: various conditions of decaying tree
4. Fieldwork photo montage: choreography in moving through the deadwood
5. Notational map of deadwood on Observatory Hill with a complex notational system describing the dimensions and level of decomposition



in Hong Kong after heavy storms. Moving through and engaging with deadwood in a similar way but with a joyful emotion is the key I would like to reveal through this design proposal, taking Observatory Hill as a testing ground (Fig. 1). A notational map documenting different compositions and states of decaying trees in relation to my body is helpful for the project design in later phases (Fig. 5).

3 Assemble: Channeling Through Space and Time

Building upon the previous observation of body movements

in relation to deadwood, derived from both post-typhoon experiences in Hong Kong and fieldwork conducted on Observatory Hill, eight verbs were being adopted from the Verb List of Richard Serra.^[4] These verbs are used to describe the movements that are most intriguing for people to explore the deadwood forest. They are to lift, to rotate, to drop, to bend, to bounce, to stretch, to grasp, and to flow, which helped me picture and foreground the relationship between humans and deadwood in a very specific way. Therefore, by understanding the specificity of each motion in relation to the deadwood, including spatial quality, materiality, and the process of movement, a series of designed

units composed of different materials and spatial configurations were created (Fig. 6).^[4] The unit catalog was then used to test out multiple iterations by assembling the units in several ways. Through the lens of experience, the scale of attention was the key parameter being manipulated to bring people closer to the process of decomposition (Fig. 7). Beyond visuals, the engagement should embrace all the other senses in understanding and feeling the process of decomposition to distill the tiny transformations happening within the microcosm (Fig. 8).

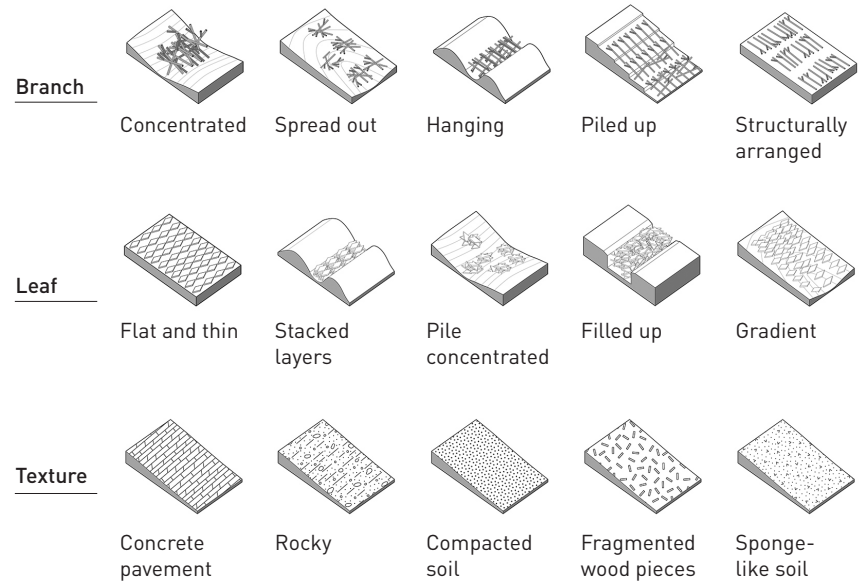
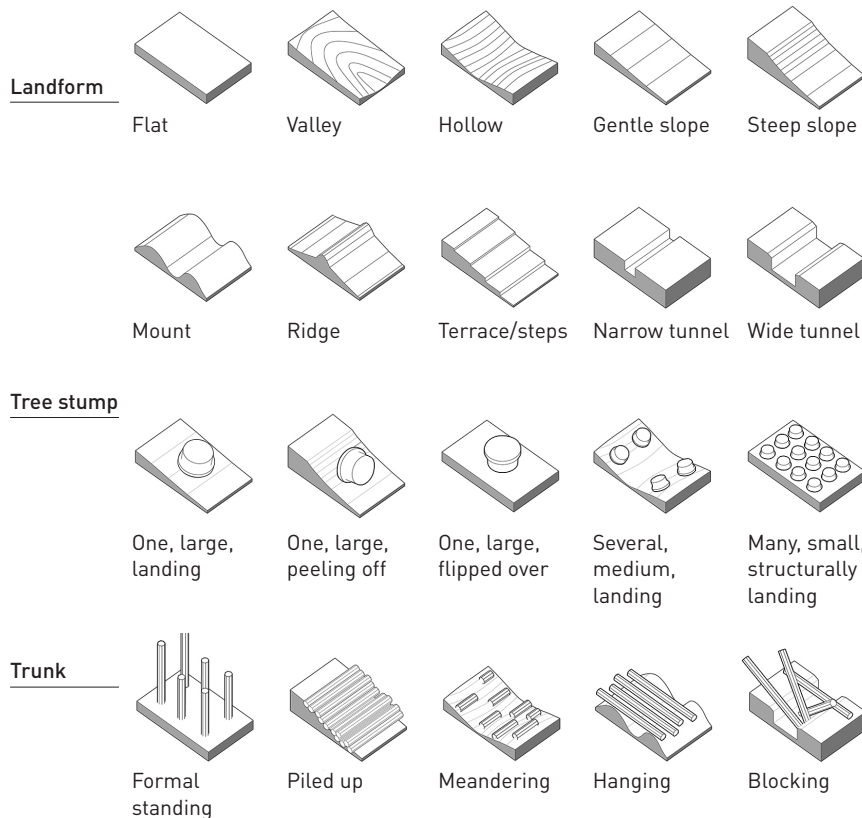
Other than the colorful fungi and mosses, the unexpected moments running into the excrement of wild deer next to a fallen trunk, the settlement of snakes beneath a lifted tree stump, and multiple nests of ants in hollowed branches revealed that a tree is an important agency as it influences the ecosystem and surrounding organisms in its dead form.^[5] However, we might have failed to recognize or respect its role in providing the ecosystem services^[5] because the “dead” trees usually end up in a landfill. To enable people to experience the microcosm of decomposition, a matrix of gradients with varying decay intensity and density of deadwood was formed by assembling the generated units. This design proposition amplifies the moments of decomposition

in space and time. An in-person journey to truly experience this magnified process of decomposition could re-establish a mutual and reciprocal relationship between humans and deadwood.

4 Entangle: Motions in the Unseen Microcosm

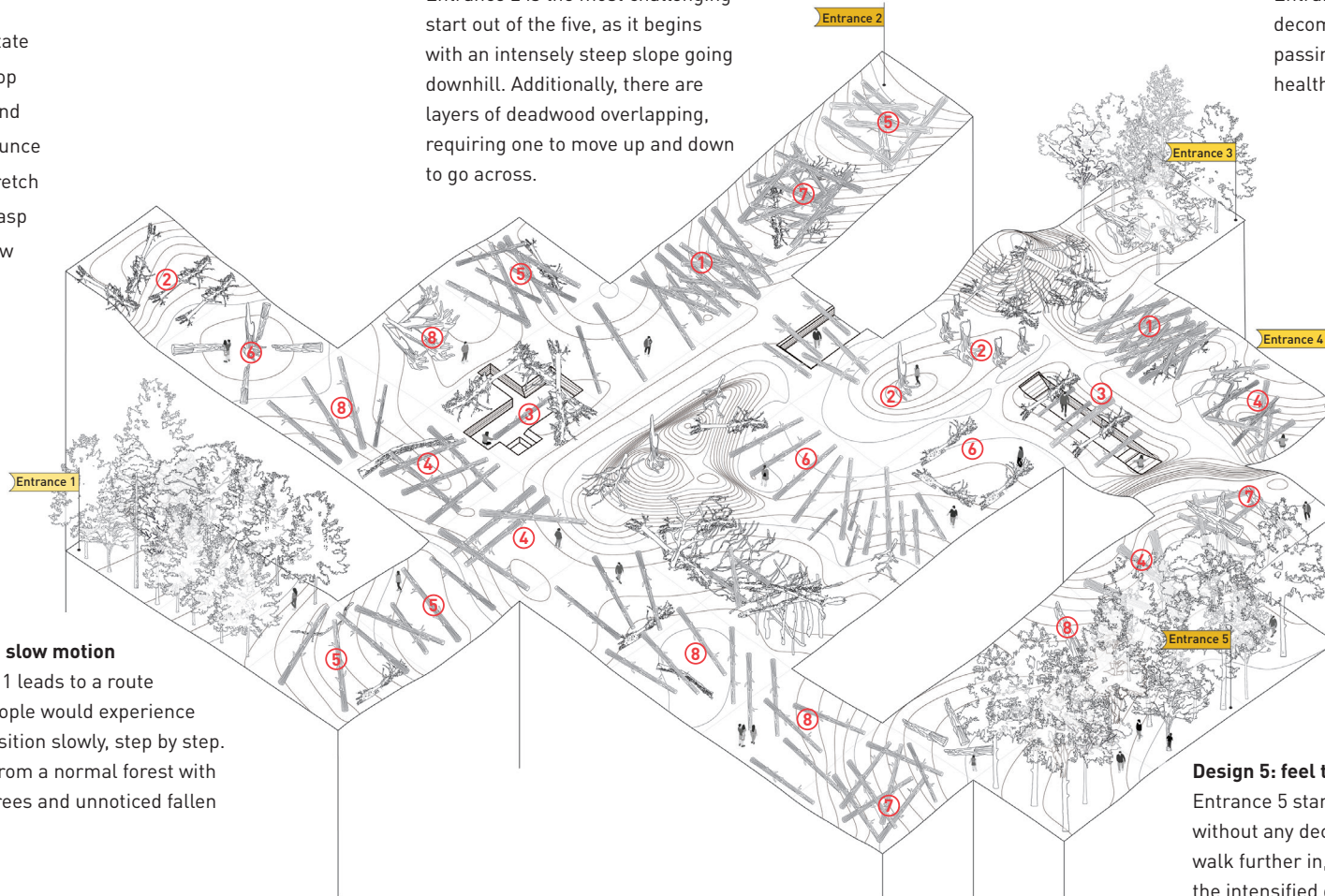
In an urban setting bounded by concrete slabs and bustling streets, the deadwood is being perceived as a threat. While in the forest, it is the cradle of ecosystem diversity^[5], and the core convener in gathering all kinds of lives in the forest during the long and rich afterlife of decomposition.^[6] Deadwood not only serves countless species as nesting habitats and food sources, but also plays a leading role in the ecosystem nurturing the ground and enriching the soil. Beyond acknowledging the importance of deadwood, embracing the life transforming over time, less as static or immobile, is key in taking decomposition as a productive process.^[7] The third exercise of the studio expanded beyond the human-centered focus to explore an interspecies entanglement. This additional ecological layer aims to root the design within the environmental system and accommodate ecological interrelations. It also seeks to facilitate multispecies interactions through the

Unit catalog



Imaginary assembled site design

- ① To lift
- ② To rotate
- ③ To drop
- ④ To bend
- ⑤ To bounce
- ⑥ To stretch
- ⑦ To grasp
- ⑧ To flow



Design 1: slow motion

Entrance 1 leads to a route where people would experience decomposition slowly, step by step. It starts from a normal forest with healthy trees and unnoticed fallen trees.

Design 2: intense decomposition

Entrance 2 is the most challenging start out of the five, as it begins with an intensely steep slope going downhill. Additionally, there are layers of deadwood overlapping, requiring one to move up and down to go across.

Design 3: fade in

Entrance 3 highlights the most decomposed types of trees after passing through the normal, healthy forest.

Design 4: watch out

Entrance 4 starts with an intense steep slope. People can not only experience the landform, but also see the trees at eye level and go under.

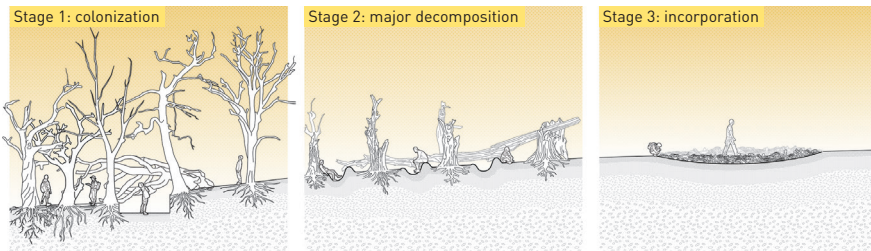
Design 5: feel the contrast

Entrance 5 starts from a healthy forest without any decaying trees. As people walk further in, they will be able to see the intensified decomposition process.

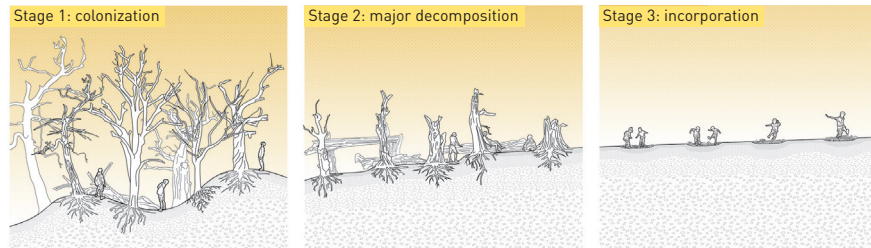
- 6. Unit catalog of the wonderland of decomposition
- 7. Design iterations of the wonderland of decomposition
- 8. Ideogram of human engagement in the microcosm of decaying trees



Iteration 1



Iteration 2



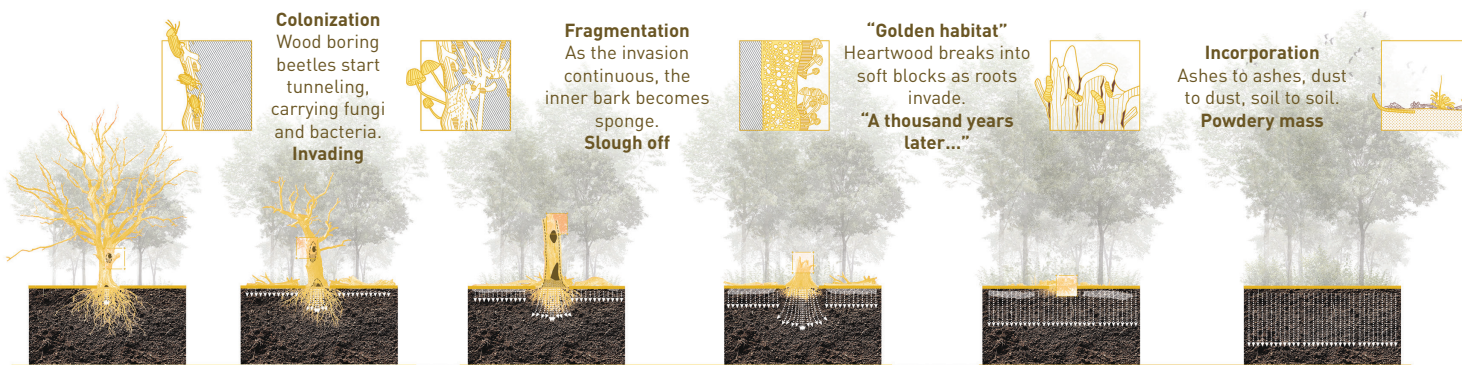
design in the spatial-temporal dimension (Fig. 9). Decomposition generally has three stages: colonization, fragmentation, and incorporation (Fig. 10). The decaying tree provides a golden habitat for all the surrounding living species such as insects, fungi, birds, and mammals. Wood decomposition is a process of dissolving, shifting, contributing, donating, returning, and creating. All the

tissues disintegrate and become part of the other living systems, where the succession could take decades. The moment a tree falls is the start of countless new life—wood-boring beetles, termites, ants, fungi, wasps, earthworms, moths, etc. Beyond the experiential lens going through the succession, ecological functions served by decaying trees are the key to why they should be kept in place.

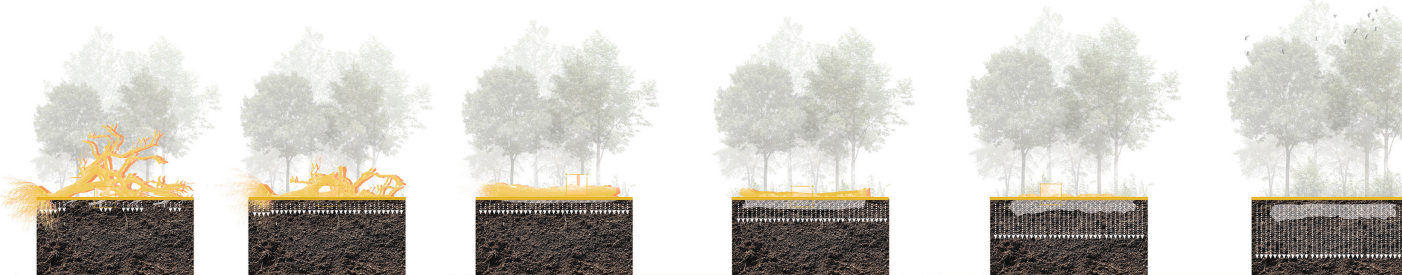
5 Inscribe: Wayfinding in the Deadwood Wonderland

Moving forward to the last exercise in redefining decomposition and the general perception of deadwood through landscape design, introducing landforms, rearranging materials, and a simple visualization strategy are the key methods to build the deadwood wonderland (Fig. 11). Meanwhile, to recreate and evoke the impressive moments of observing the deadwood during site documentation, eight different types of decaying trees were classified: flowing in, dissolving in, kissing on, peeling off, parasitizing on, colonizing on, detaching from, and pointing at (Fig. 12). This classification is being incorporated into the design. Three different shapes and sizes of landforms (Fig. 13) are proposed to accommodate various group sizes, social, and ecological functions. Simply painting the deadwood and the landform in bright red accordingly could provide flexibility for the visitors to find their own way exploring the dynamic nature of decomposition instead

Dead standing (snag)

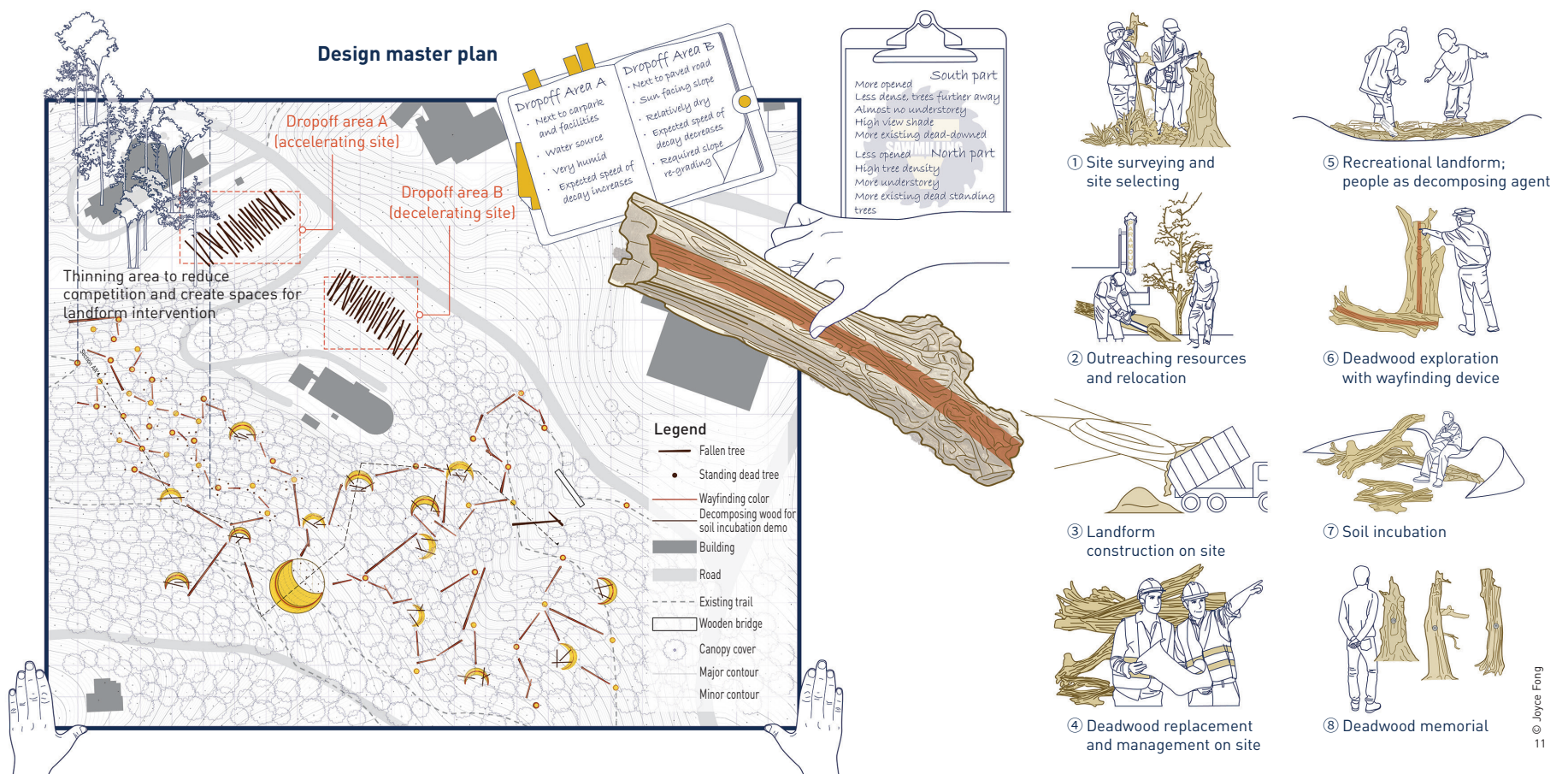


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9. Imagined ideal sections of human interacting with deadwood in different stages of decay
10. Operational diagram of wood decomposition and succession



11. Design master plan—the wonderland of decomposition

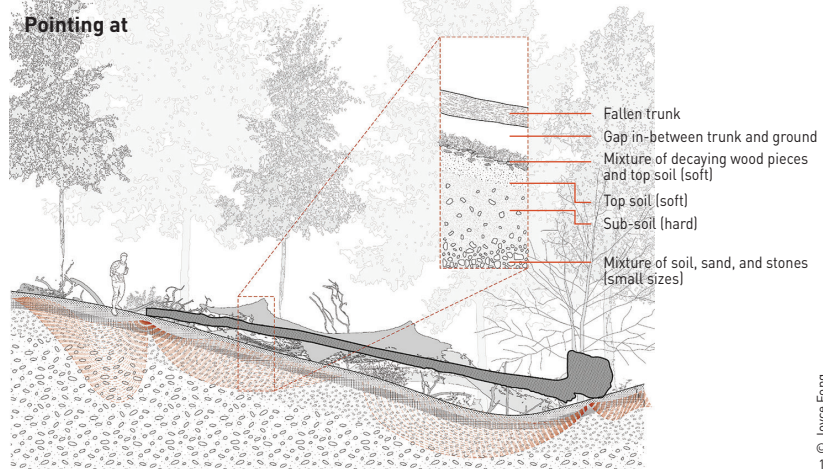
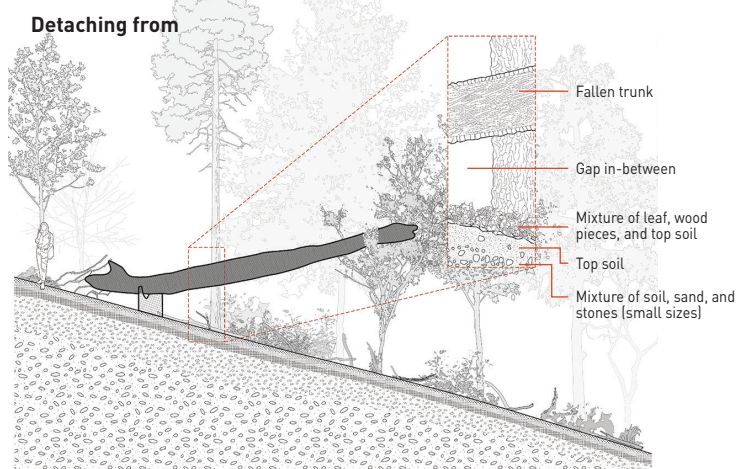
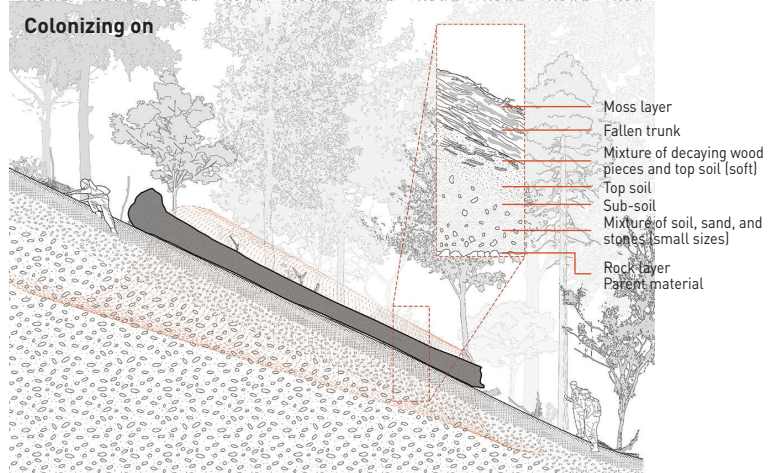
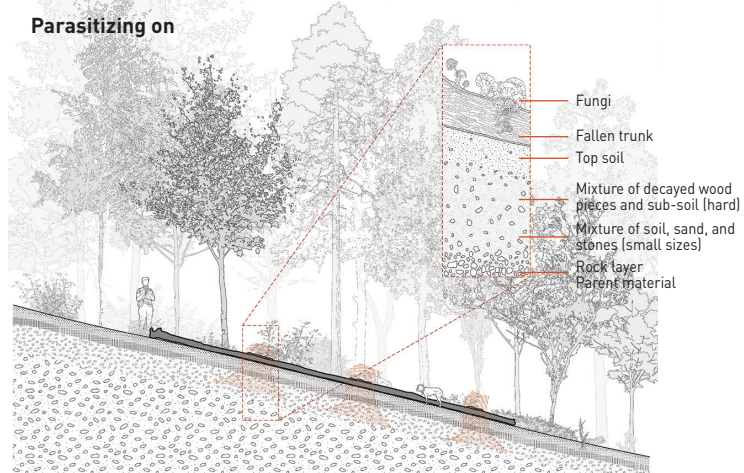
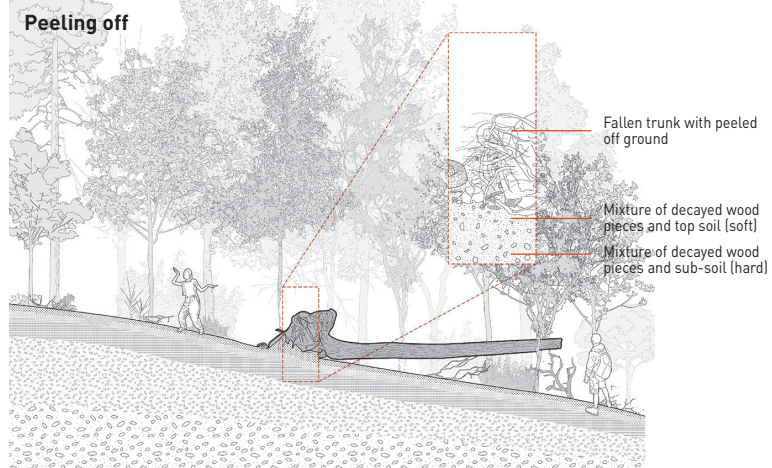
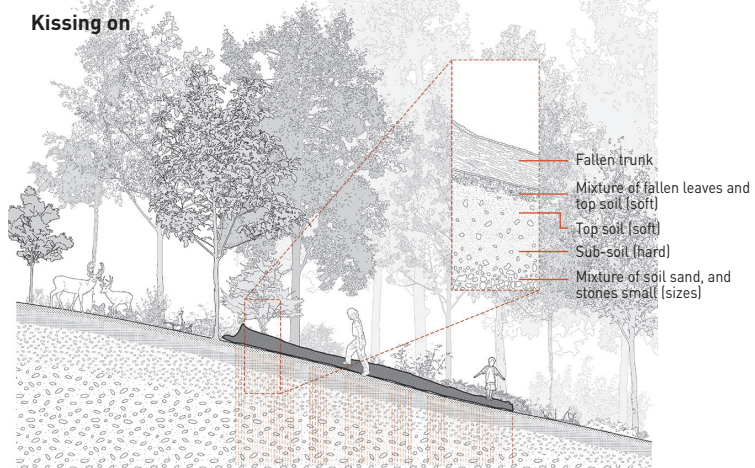
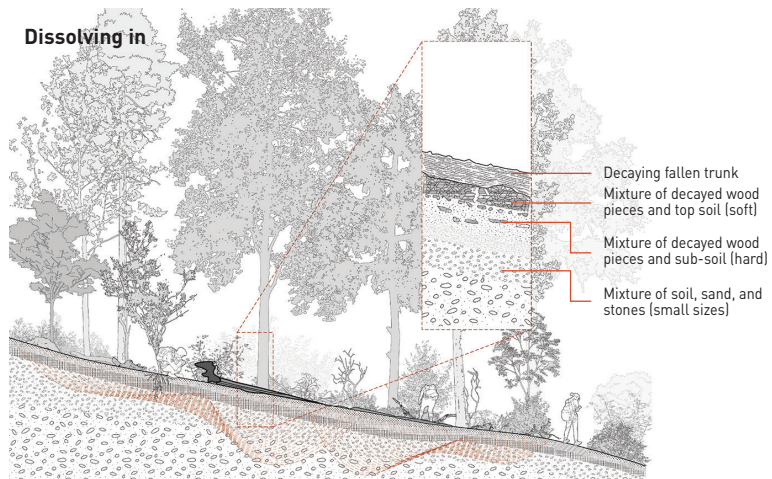
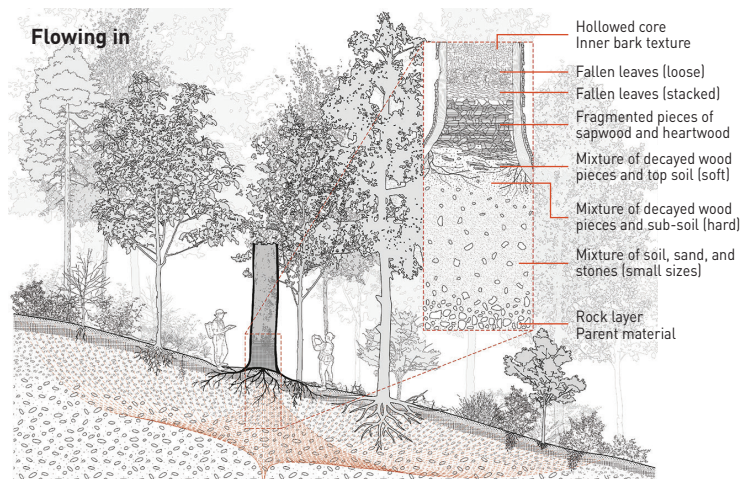
of prescribing a fixed path. Through time, the highlighted paint will fade away as the wood decomposes and breaks down, which could visualize traces of the material shift. Beyond recreation, the site will also serve as a soil incubation center, producing more high-quality soil for the ground. The landforms are designed to hold the coarse woody debris and keep surface runoff to speed up decomposition. To magnify both experiential and ecological functions, visitors are prompted to “disturb” the deadwood on the ground like a decomposer. In the wonderland of decomposition, visitors are encouraged to touch, to step, to kick, and to play (Fig. 11) with the deadwood in any way to accelerate decomposition.

Responding to the notion from Thomas Jefferson of utilizing the campus as an active laboratory for sustainability,^[5] as well as envisioning the future of deadwood in a larger scope, a comprehensive deadwood management scheme could be carried out by relocating coarse woody debris from Charlottesville (an urban town) to Observatory Hill (an urban forest) to maximize the capacity of deadwood.

6 Conclusion: About Rebirth

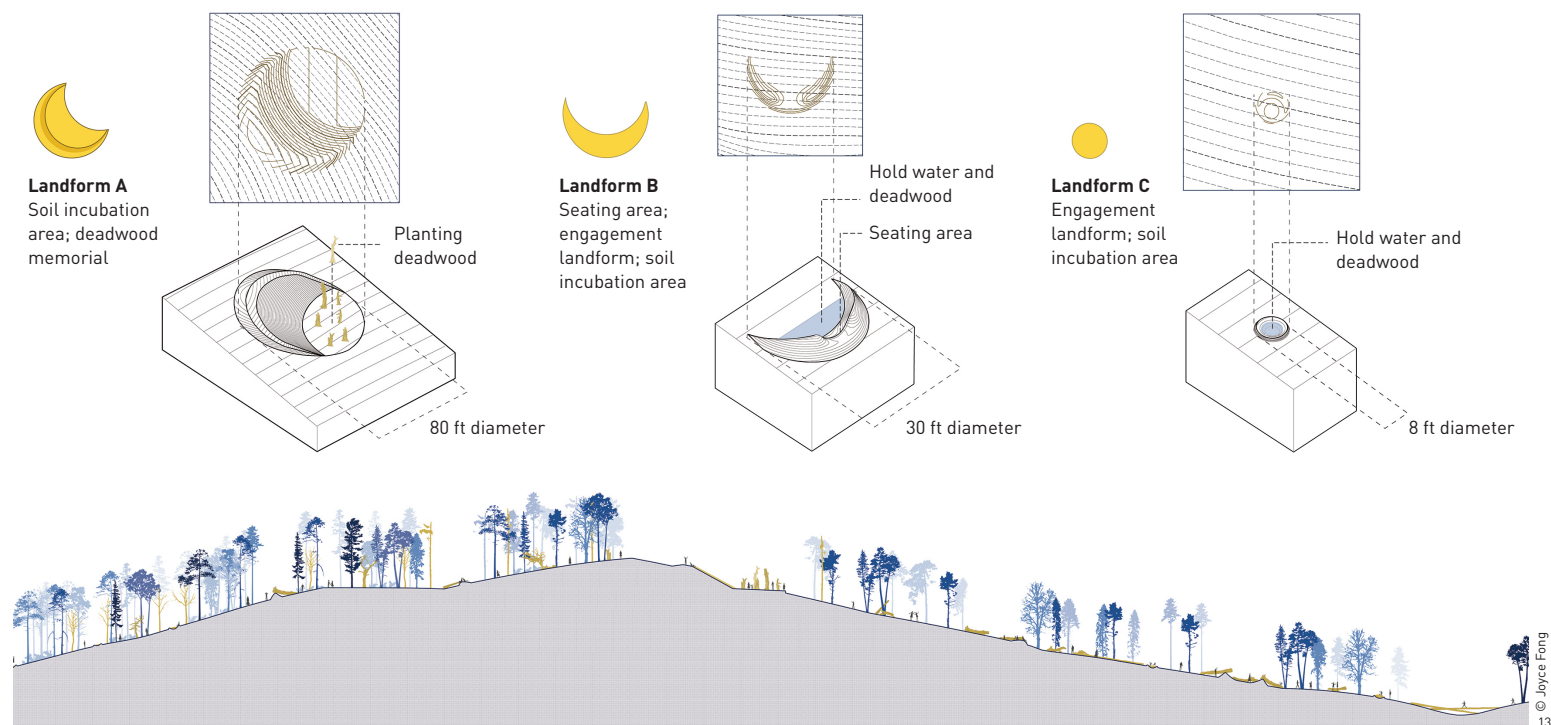
It is a circle of life! The moment a tree no longer grows to give shade, it starts breaking down, and redistributes itself to the ecosystem. Instead of a linear timeline, we should take the life of a tree as a loop. It grows, decays, and rebirths. The impact of a solitary tree on ecosystem services is remarkable. Despite their subtle aesthetics, plants hold cultural significance, provide ecological benefits, and contribute to human health and well-being.^[8]

The term “urban forest” is apparently a contradiction. “Urban” suggests artificiality and harsh living conditions, while “forest” evokes a sense of nature and tranquility that is often lacking in the city environment.^[9] When we are re-introducing nature to the city such as Hong Kong in creating an urban forest, the afterlife of a “dead” tree should also be part of the tree management planning strategy to allow the tree to perform its agency. “Right Tree, Right Place” and “Tree, People, Harmony” are the two promises advertised by Hong Kong. The city should put effort into keeping both the healthy trees



12. Sections of the eight documented types of deadwoods, showing how nutrients of the decaying tree are dissolving to the ground for each typology, based on the author's imagination and the condition of that type.

13. The three landforms inscribed in the design proposal as a deadwood management strategy



and the deadwood in place. Indeed, public safety is a key concern prior to urban forestry and tree management schemes. However, we can take one step forward in recognizing the whole life of a tree and carrying out the right strategy in managing deadwood. In the project “Re(de)fining Decomposition,” fallen trees in Charlottesville are proposed to be relocated and continue their role in creating soil through decomposition. While for Hong Kong, a unique urban city surrounded by mountains and forests, a similar strategy of relocating and re-purposing fallen trees could be a way of deadwood management. The fact that hiking is one of the most popular recreational activities in Hong Kong makes the relocation strategy even more inevitable. This way, people can interact with deadwood in a positive manner, actively acknowledging its value and usefulness. Treating deadwood as a living and beneficial entity could be a starting point for Hong Kong to overcome its deep-rooted fear of tree.^[2]

“Deadwood” is not forest ghost, it is still filled with life and soul. It is never the end of their life, not at all.

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重新定义“树木分解”： 基于经验视角与生态功能的枯木管理策略

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摘要

在高密度及以人为中心的城市环境中，树木通常仅被视为一种构造空间的材料。以中国香港为例，一旦遭遇气象灾害，倒伏的行道树会造成道路受阻等后果，倒木也因此逐渐被赋予了“具有破坏性”的文化含义。而在美国夏洛茨维尔的城市森林——天文台山上，倒木却摆脱了垃圾填埋场的归宿，平静地在地面上滋养着微观世界，为生态系统孕育新的生命。一树枯而万物生，这既是来自死亡的馈赠，也是树木的重生。受启发于倒木在香港和夏洛茨维尔两种截然不同的命运，本项目试图通过设计消解人们对枯木的文化误读。

本项目是弗吉尼亚大学景观设计学硕士课程首个基础设计课的设计方案。项目旨在将“树木分解”重新定义为一个令人愉悦的过程，并借助低干预手段来更新人们对枯木的惯常看法。笔者首先通过实地考察，以身体感知及测量了解场地，并在此基础上绘制场地地图。而后通过观察及描述人们当前与枯木的互动方式，进一步加深了对树木在分解过程中与周遭环境形成的空间构造的理解。在随后的项目发展中，笔者超越以人为中心的思想概念，着重研究枯木对生态系统的重要作用，从而构思能促进物种间相互作用的设计方案。最后，项目通过地形改造、材料重组和可视化设计等简单操作，鼓励人们更加积极地与枯木互动，从而促成与生态系统的互惠关系。唯有切身体验到枯木在特定空间中随时间流逝而产生的演变，人们才能够认识并欣赏枯木之美。当我们重新将自然引入城市，营建“城市森林”，枯木管理也将成为树木管理策略中重要的一环；通过设计途径引导大家将枯木视作有益的生命体，或许可以帮助人们克服对枯木根深蒂固的负面印象。

文章亮点

- 指出人们尚未充分认识到城市环境中的树木分解也是一种生产过程
- 枯木管理既能满足人类体验需要，也有利于生态系统功能的运作
- 通过设计将地面上粗木质残体的营养物质重新分配到地下
- 设计方案通过地面标记，为人们体验和观察枯木提供导向标识
- 项目提供了一种可提升树木系统韧性的设计范例

关键词

树木分解；
演替；
土壤培养；
森林管理；
城市林业；
倒木

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