

In “The Pond in Winter”, he presents five instances of ice engagement: 1) simple drinking / fishing holes, 2) linear sounding and survey lines, 3) landlord and 4) industrial ice extraction, and finally 5) consumption in India, as Walden water, “mingled with the sacred water of the Ganges”. Instead of focusing only on that final sublimation, I diagrammed Thoreau’s different excavation and distribution processes as related types, working from immediate drinking holes to sub-continental shipments (Fig. 4, 5). Thus, read typologically, Thoreau’s skeletal sketches can be filled out with period records (to be discussed below) as the foundation for researching and extrapolating the regional effects and externalities of industry.

4.2 Surveying Territories and Pastoral Quantities

Turning from scientific depiction to cartographic records, an additional array of research has focused on how surveying, Thoreau’s commercial profession from 1849 ~ 1862, conceptually inflected his writings on natural history, civil rights, and abolition. In *Thoreau the Land Surveyor*, Patrick Chura demonstrates that Thoreau’s negotiation of personal and civic authority often took the form of selecting cartography symbols, triangulation points, and state records. By

Walden’s revision and publication in the 1850s, Thoreau was not only familiar with bureaucratic, territorial data sources and types but, in Chura’s reading, treated them with the same cunning and craft as his literary sources. If we thus re-read Thoreau’s acerbic accounting as both addressing a cartographic and administratively attuned audience, it only makes sense to contextual *Walden* amidst relevant industry and state statistics, layering this archival data into modified GIS maps.

For example, in the “Re-Surveying Walden” series, I started with 1848 *American Almanac* accounts to fill in regional and national consumption patterns, working from materials that Thoreau likely referenced in his own *Walden* revisions.^④ I then supplemented these sources to develop the secondary, spatial impacts of refrigeration and iced transport. I mapped census studies, shipping logs, and, among other policy, dairy reform recommendations from the Massachusetts Sanitary Commission (Fig. 6 ~ 10).

5 Beyond “Productive” Landscape Harmony

In drawing the larger market, transport, and legislative pressures reshaping Walden, Concord, and Boston (and so on), my synthetic scale may seem an odd match

for Thoreau, the local poet-surveyor. His perspectival position, peering up and out from the pond (with interspersed aids), is a deliberate inversion of “pastoral prospects” and the colonial, economic, and even statistical use of such enlightenment “over-views.”^[8] And yet, it is precisely in negotiation with those images, ends, and “invisible hands” that Thoreau’s accounting is pitched. By fleshing out the material and logistical links — between Walden’s ballast ice and slave products, between its frozen water and the sub-continental cotton trade — my maps make it easier to locate Thoreau’s abolitionist alliances and market critiques (Fig. 9, 10).

As an active designer, I have often turned to Keller Easterling’s “El Ejido” and Pierre Bélange’s “The Agronomic Landscape” for contemporary examinations of agriculture, optimized logistics, and geo-political externalities.^{[9][10]} The benefit of revisiting *Walden* is thus similar: to highlight the complex, dynamic, and process-based alliances of industrializing agriculture, its lurking contests and socio-economic conflicts, its global means and measures. Ironically, re-reading Thoreau is an additional way to guard against self-contained images of pastoral resolution or a simplistic idea of “productive” landscape harmony. **LAF**

NOTES

- ① Good examples are: Buell, L. (1995). *Environmental Imagination: Thoreau, Nature Writing, and the Formation of American Culture*. Cambridge, MA: Belknap Press of Harvard University Press. Sattelmeyer, R. (2000). *Depopulation, Deforestation, and the Actual Walden Pond*. In R. Schneider, L. Buell (Eds). *Thoreau’s Sense of Place* (pp. 235-243). Iowa City: University of Iowa Press.
- ② To be discussed further are: Walls, L. D. (1995). *Seeing New Worlds Henry David Thoreau and Nineteenth-century Natural Science*. Madison, WI: University of Wisconsin Press. Chura, P. (2010). *Thoreau the Land Surveyor*. Gainesville, Fla: University Press of Florida.
- ③ Literary commentators have often focused on the seasonal and diurnal cycles across Walden as a whole. Throughout, Thoreau rhetorically shifts between “clock” time and “natural” rhythms, in much the same way that he shifts,

spatially and technologically, between hand and industrial encounters.

④ Wyeth, N. (1848). *The Ice Trade of the United States*. In *The American Almanac* (pp. 175-180). Boston: Little & Brown. Thoreau, of course, playfully misdirects readers to the *New England Farmer* and *Boston Cultivator* in his 1853, 1854 edits (while trimming down the harvesting description from nine to six paragraphs).

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- [2] Jackson, J. B. (1970). *Jefferson, Thoreau and After*. In: E. Zube (Ed), *Landscapes* (pp. 6). Amherst: U Mass Press.
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- [5] Corner, J. (1996). *Taking Measures Across the American Landscape*. New Haven, CT: Yale University Press.
- [6] Waldheim, C. (2010). *Notes Toward a History of Agrarian Urbanism*. In: M. White, M. Przybylski. (Eds), *Backet 1: On Farming* (pp. 18-23). Barcelona: Actar.
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- [8] De Bruyn, F. (2004). *From Georgic Poetry to Statistics...* *Yale Journal of Criticism* (17.1), pp. 107-139.
- [9] Easterling, K. (2007). *El Ejido*. In: *Enduring Innocence: Global Architecture and Its Political Masquerades* (pp. 39-62). Cambridge, MA: MIT Press.
- [10] Bélange, P., Roth, C. (2011). *The Agronomic Landscape*. *GAM*, (07), pp. 167-182.

曼谷水文和农业网络的重新构想

Re-envisioning Bangkok’s Hydro and Agro Network

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摘要 ……

作为一个拥有动态潮汐变化和快速城市化发展背景的地区，湄南河河口340km²的废弃水产养殖景观为那些旨在应对城市扩张、生态衰退、水文涨落、淡水供应，食物生产以及废物处理等多重挑战的景观设计干预提供了新的机会。水是一种活跃机体。潮汐过程的引入是恢复多样化生态性能、支撑经济和推动曼谷潮间带景观的城市转型的一种城市设计途径。建立等级和水文分流意在提升城市适应多种水文情况的能力，而非对水文情况加以控制或逆之而为。作为一座位于季风河口地带的城市，曼谷必须是柔软的、吸纳力强且具有适应性的。该项目的操作策略可以应用于现存的其他水文和农业网络，以建立一种能够体现综合性的水文生态功能，并能够应对多种时间跨度和空间维度上的环境变化的新的景观基础设施。

关键词 ……

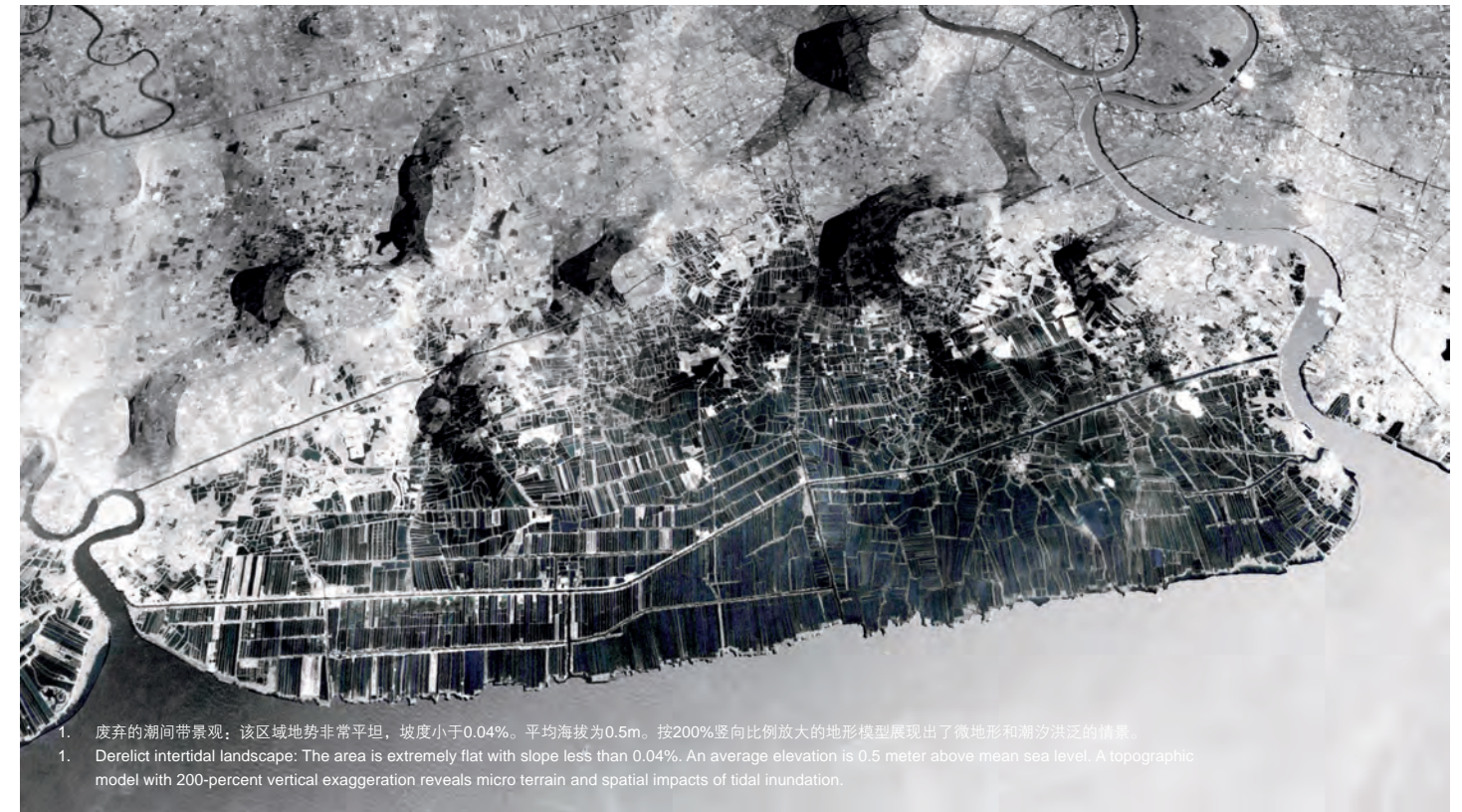
河口；动态变化；流动性；层级；操作

Abstract ...

As a conjunction of tidal dynamics and rapid urbanization, 340 square kilometers of the derelict aquacultural landscapes on the Chao Phraya Estuary offers a fresh opportunity for a landscape architectural intervention in addressing multiple challenges of urban expansion, decaying ecology, hydrologic fluctuation, freshwater supply, food production and waste. Water is an active agency. Introduction of tidal process is an urban program device that reactivates diverse ecological performances, underpin economics, and drive urban transformation over Bangkok’s intertidal landscape. Creation of levels and hydrologic distributaries aims to engage adaptability to multiple water regimes rather than control or work against it. Bangkok, the city in the monsoon estuary must be soft, absorbent and adaptive. The operative strategies of this project can be applied to the remaining hydro and agro network to build a new landscape infrastructure that performs mixed hydro-ecological functions and responses to environmental shifts in diverse range of times and spatial scales.

Key words ...

Estuary; Dynamics; Fluidity; Level; Operation



1. 废弃的潮间带景观：该区域地势非常平坦，坡度小于0.04%。平均海拔为0.5m。按200%竖向比例放大的地形模型展现出了微地形和潮汐洪泛的情景。
1. Derelict intertidal landscape: The area is extremely flat with slope less than 0.04%. An average elevation is 0.5 meter above mean sea level. A topographic model with 200-percent vertical exaggeration reveals micro terrain and spatial impacts of tidal inundation.

水文和农业网络

第二次世界大战后，快速城市化和工业化将曼谷以水路为特色的地貌转变为固化的基础设施性景观。曼谷大都会地区位于湄南河口漫滩，向南蔓延至泰国海湾。该地区为水文交汇区，上游来水与季风带来的暴雨和涨潮交汇于此。早期，全球对农产品的需求推动了该区域大规模的水网建造。这片肥沃漫滩中的农耕区与气候、地形和水文条件紧密相关，营养物质沿河流支流从山地雨林而来。市场崩盘之后，泰国经济向工业化全面转型，由此引发了在这一遍布农田和水系网络的地区兴建地面基础设施。这一变化产生了巨大的水文影响，包括纳水能力的丧失和功能性泄洪道的退化。结构性控制措施的构建明确体现了土地和水是可分离的这一态度，即曼谷必须是一片旱陆，而非水域；水应该被排走，而非被吸纳。

持续至今，城市化的模式已经彻底改变了城市的地理和水文结构。运输成为了一种核心的空间特性，以满足随着发展而不断向外延伸的城市扩张。大量修建的公路网络将“触角”伸向了价格相对低廉的农田，这些农田被购买下来并被划分为一个个小区块，以用作房产开发。这导致城市区环带布满破碎分隔的地块。尽管如此，这片丰饶之地至今依然剩

超过5 000km²（占曼谷大都会地区面积的66%）。正因为拥有如此巨大的尺度，曼谷的水文和农业网络为重新引入多样化水文生态服务的最大化战略和空间干预提供了新的机遇，这其中包括洪灾防治、污染控制、温度调节和供给城市的食物生产。

废弃的潮间带景观

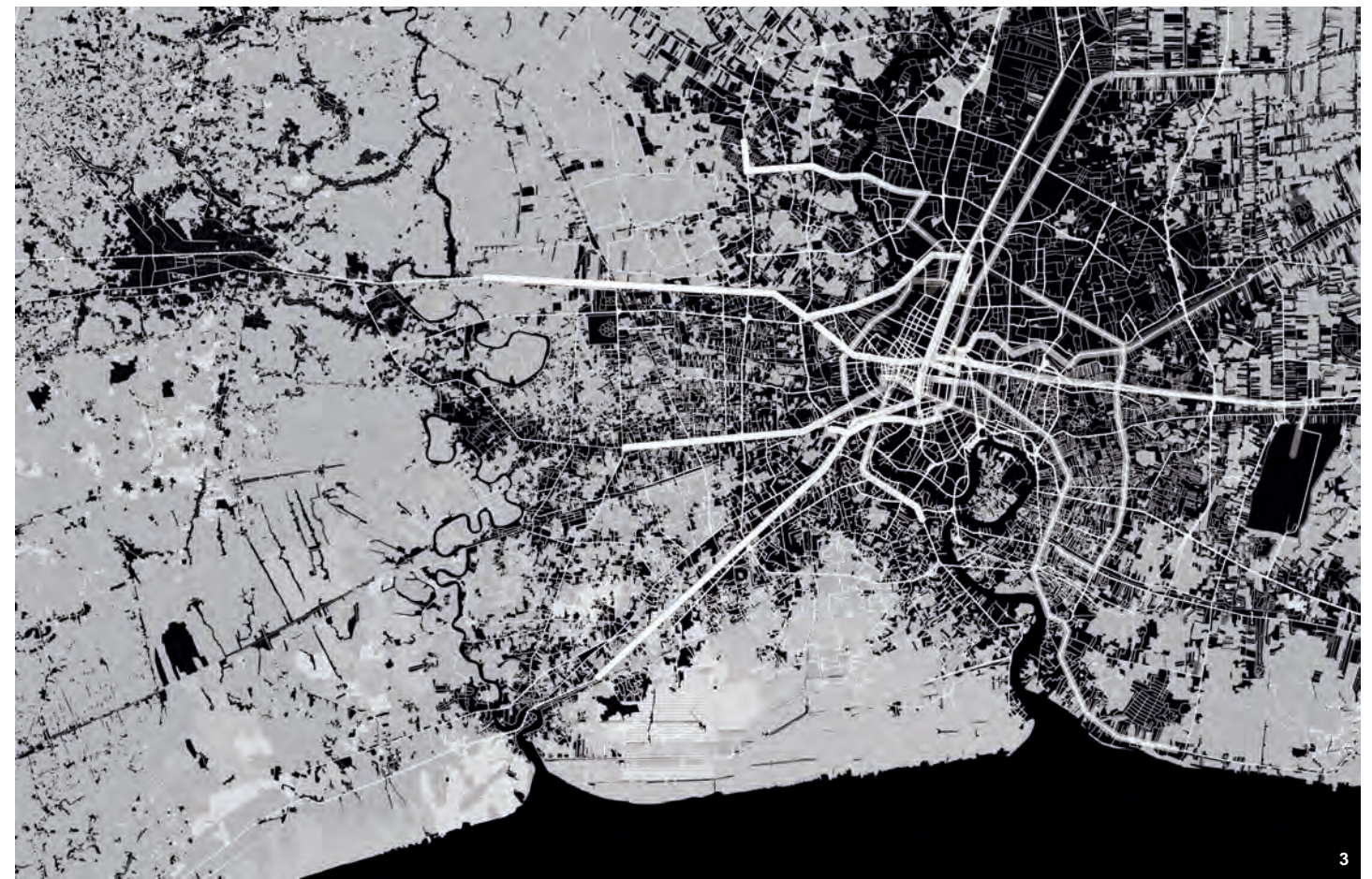
作为大规模水文和农业网络的一部分，位于湄南河和他金河之间的水产养殖废弃地被选定为恢复水文生态机能和重构城市环境的实验平台，其面积达到340km²。位于距海岸线20km的范围内，建于20世纪后期的拉玛二号公路成为了通往南部各省的捷径，并承载了横跨海湾上游的物流传输。这一新的通路加速了城市化进程和大规模沿海资源的开发。稻田和混交果园变为了住宅和工业用地，而剩余农田中的水污染程度不断加剧。为了获得水产养殖的短期利益，沿海岸线的红树林被征用改造。技术的进步和不断增长的全球虾类需求导致了密集化水产养殖系统的发展和养虾场的大规模扩建。虾类养殖业的繁荣导致该地区的红树林遭到大规模的破坏。10年间，位于曼谷大都会地区的龙仔厝省丧失了超过99%的沿海红树林——从185km²缩减到不足2km²。然而，在收获短暂的利益之后，超过80%的养虾场沦为

遗弃之地。1995年，随着水产养殖业的崩溃，大部分养殖塘都面临着潮水断流和高度污染等问题。根据污染控制部的数据，溶解在废弃养殖区水中的氮、磷和氨估计分别高达4 190吨、81吨和117吨。此外，20世纪末期，密集化养虾场的副产品还包括46.8万吨的固体富营养废料。部分土地在弃置后被出售用于住宅及工业开发，有的则转变为盐场或小规模水产养殖场。作为城市和海湾之间的衔接地带，这种废弃景观面临着诸如城市建成区的分隔破碎化、污染物排放的增加、土壤污染以及海岸线的严重蚀退等多重挑战。

从根本上说，水是一种能够对整个沿海生态系统产生影响的活跃机体。微地形和潮汐洪泛的共同作用是造成半咸水生态环境多样化以及创建潮间带生境渐变区的生态手段。对微地形和潮汐过程的研究旨在使多种场景下洪泛对空间的影响形象化。该地区地势非常平坦，坡度小于0.04%，平均海拔为0.5m。按200%竖向比例放大的地形模型展现出了微地形和潮汐洪泛的情景。潮水沿着泰国湾上游不断混合，半日潮高1.5m。自然情况下的最小浪高为0.9m，可淹没大约163km²的土地（合该地区总面积的70%）。过去，能够淹没该区域的涨潮时长各异，每天从4小时到18小时不等。根据地形条件、潮泛时长和含盐度的不同，上游河道的淡水与咸水的自由混合过程形成了一系列条件多样的河口湿地。然而，由于虾塘堤坝需要控制水流量和含盐度，动态的潮汐过程被僵化的虾塘网络所阻断。这些堤坝的平均高度介于1.00~1.50MSL之间，可防止涨潮淹没孵化池和生长池。水产养殖业没落后，大量的废弃池塘扰乱了潮汐流动，并阻碍了红树林湿地环境的复原。

竖向分级作为设计方法

该项目提议利用潮汐过程来发掘该区域多样的土地利用可能性，其中包括水文分流、交通网络、保护性红树林、湿地治理、替代食物来源、能源开发和栖居平台。竖向分级是一种能够决定景观操作、



3

形态以及服务的设计方法。物理干预措施包括移除堤坝并创造多样化的地形条件。通过重新引入沿南北向支流分布的潮汐过程，可使潮水的自然淹没、盐度环境的调节及一系列多样化的湿地系统的恢复成为可能。沿海岸线打通堤坝和运河路堤，以此形成红树林走廊并进一步保护海岸线和水生生境。用于绿贻贝养殖的水下池塘不仅能够减缓表土流失，还能为当地社区提供食物。在位于高潮平均高度（0.87MSL）以下的区域，将通过移除内河堤坝以形成新的水道，并使内陆潮汐流动和养分交换实现最大化。这些进程能够促进低地（+0.10MSL）的水下地块和高地（+0.70MSL）的永久性泻湖自然生成。在沉降区，淹没的堤坝网络演变成能够多种半咸水栖息地的水下走廊；同时，位于较高海拔的线性泄湖能够捕捉上游来水、净化污染径流，并为综合性的水

产养殖和半咸水农业提供淡水水源。污染物含量较高的水将通过沉淀池和地表径流湿地（+0.70MSL）得到收集和预处理。有机废料和诸如水葫芦等超富集植物物种可产生肥料和沼气以用作社区的替代能源。预处理的水被导入潮汐湿地和红树林（+0.50MSL）中，以进一步过滤吸收多余的养分。通过形成一系列拥有不同“水—红树林”比例的景观，将创造不同的使用功能和产品。经过处理的水被存储至微型水库（+0.30MSL）以备旱季使用。最后，通过利用挖掘而来的物料填升农业用地（+1.50MSL），这些抬升的农田可以在未来转化为居住用地以适应城市发展需求。

曼谷的潮间带基础设施

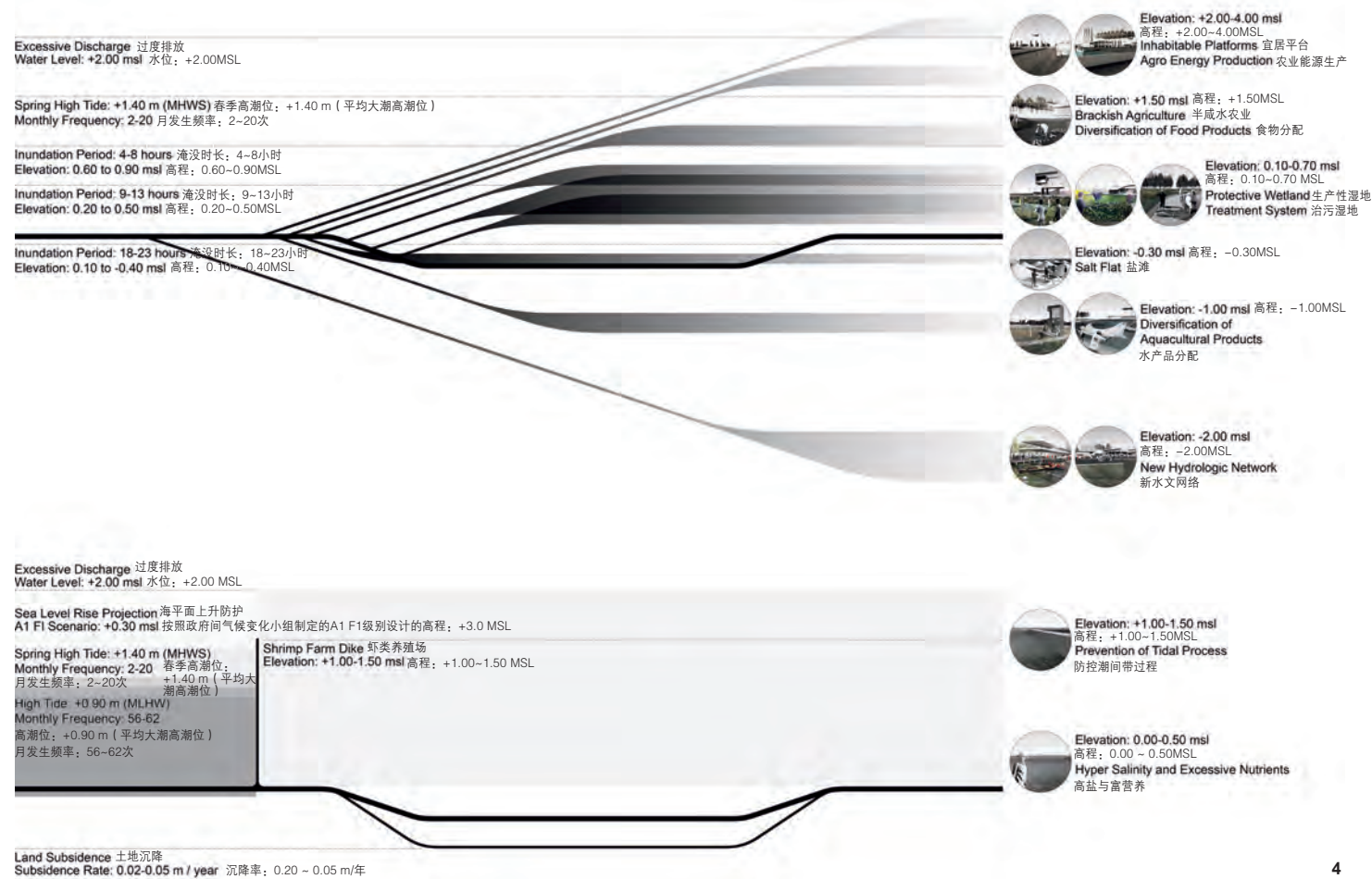
在泰国，惯有的景观设计实践已不足以应对剧烈的景观转型和退化现状。变化时有，世无恒常。景观设计学的新风潮

强调在构建物质环境和顺应时间变迁中，生态、基础设施和景观的水乳交融。重新界定设计框架，在理解事物如何在空间和时间中运作的基础上产生出新的可能性。对于曼谷城市环带而言，景观是一种促进水文与生态相互作用的媒介。在这里，景观不是秀美的风景，而是基础设施。不同于以地面基础设施为主导的正在进行的城市化进程，“曼谷水文和农业网络的重新构想”引入潮汐过程作为城市转型的方式。新的水文分流和基于地形的土地利用规划形成了一种可为城市提供多重服务的潮间带基础设施。作为一座位于季风河口地带的城市，曼谷必须是柔软的、吸纳力强且具有适应性的。该项目的操作策略可以应用于其他现存的水系统和生产网络，以建立一种能够体现综合性的水文生态功能，并能够应对多种时间跨度和空间维度上的环境变化的新的景观基础设施。LAF

1. 废弃的养虾场：随着水产养殖业的崩溃，大部分养殖塘都面临着潮水断流和高度污染等问题。
2. 交通作为核心的空间特性：第二次世界大战后，快速城市化和工业化将曼谷以水路为特色的地貌转变为固化的基础设施性景观。
3. Abandoned shrimp pond: The collapse left most of ponds abandoned with tidal disconnection and high level of contaminations.
4. Transportation as a core spatial attribute: After the Second World War, rapid urbanization and industrialization transformed Bangkok's fluid terrain to solid infrastructural landscapes the city.



2



Hydro and Agro Network

After the Second World War, rapid urbanization and industrialization transformed Bangkok's fluid terrain to solid infrastructural landscapes. Bangkok Metropolitan Region (BMR) is located on the floodplain of Chao Phraya Estuary with the Gulf of Thailand to the south. The area is a hydrodynamic conjunction, where upriver discharge meets with heavy rainfall and high tide in monsoon. During the early period, the construction of extensive waterworks was driven by global demands of agricultural products. Farming communities in this fertile floodplain had intimate associations with climatic, topographic and hydrologic conditions, which the upland rainforests release nutrient mixture through river tributaries. After the

collapse of the market, Thailand's economics had fully shifted toward industrialization, which contributed to construction of land-based infrastructures over farmlands and water networks. The conversion had significant hydrologic impacts, including elimination of absorbent capacity and deterioration of functioning floodway. The attitude that land and water was separable articulated constructions of structural control measures. Bangkok must be dry not soaked. Water was drained rather than absorbed.

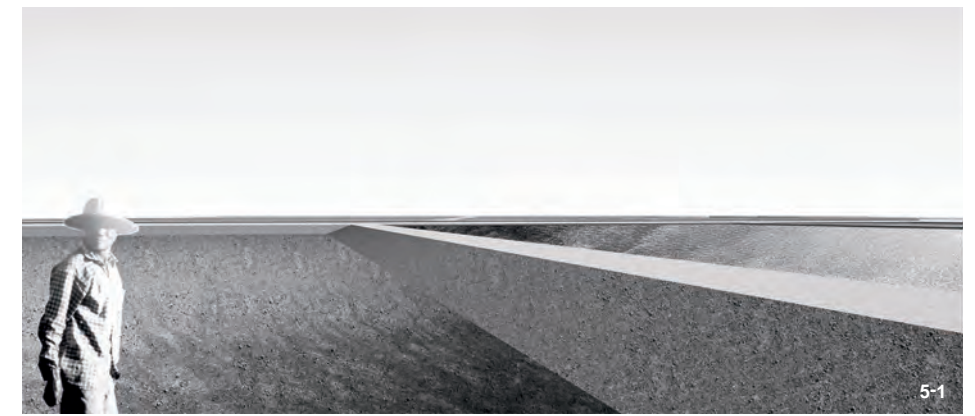
Continuing to the present, the mode of urbanization has completely transformed geographic and hydrologic structures of the city. Transportation becomes a core spatial attribute, which accommodates an outward expansion in responding to growth. Extensive

road networks provide accessibilities to cheaper farmlands, which are purchased and subdivided into small blocks for housing developments. The consequence is the fragmented land pattern over the urban-region ring. Nonetheless, the remnant productive lands still cover over 5,000 square kilometers or 66 percents of the BMR's land area. With the magnitude of scale, this hydro and agro network offers a fresh opportunity for the largest strategic and spatial intervention to reintroduce diverse hydro-ecological services, including flood mitigation, pollution control, temperature moderation, and food production to the city.

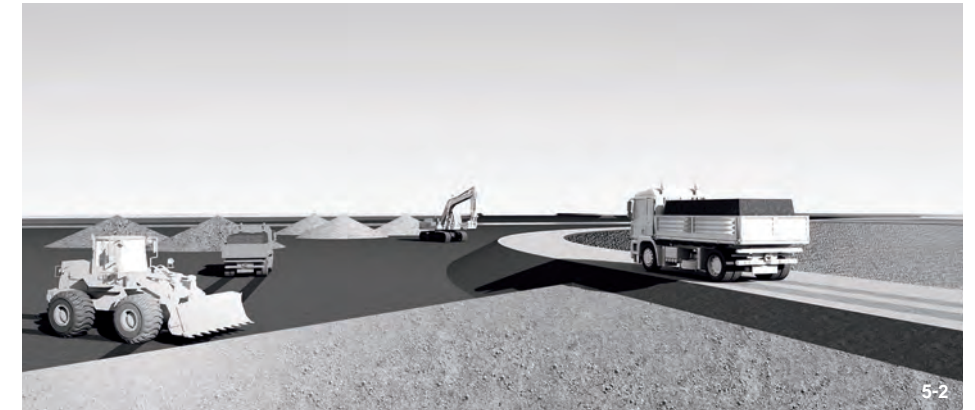
Derelict Intertidal Landscape

As a part of the extensive hydro and

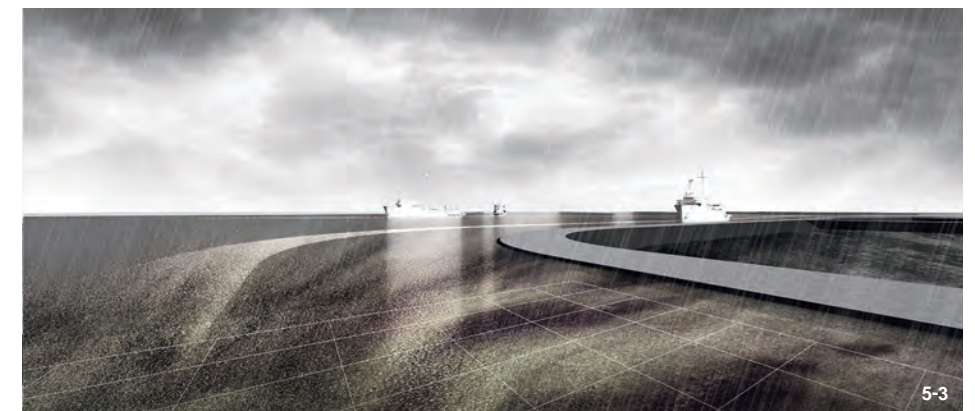
agro network, 340 square kilometers of the derelict aquacultural land between Chao Phraya River and Tha Chin River is selected as an experimental platform for re-activating hydro-ecosystem performances and re-constructing urban environments. Within 20 kilometers from the coastline, the construction of Rama II Road in the late 20th century provided a shortcut to southern provinces and accommodated flows of resources across the upper gulf. The new accessibility accelerated urbanization and massive exploitation of coastal resources. Paddies fields and mixed orchards were converted to residential and industrial estates, while remaining farmlands were suffering from increasing water pollutions. Along the shoreline, mangroves were reclaimed for short-term benefits of aquaculture. Advances in technology coupled with increasing global demands for shrimps led to the development of intensive aquaculture systems and massive expansion of shrimp farms. The shrimp boom onslaught caused extensive destruction of mangrove in the area. As a part of BMR, SamutSakhon had lost over 99% of coastal mangroves from 185 square kilometers to less than 2 square kilometers within a decade. However, more than 80 percent of shrimp farms were abandoned after short harvesting periods. In 1995, the collapse left most of ponds abandoned with tidal disconnection and high level of contaminations. According to Pollution Control Department, dissolved nitrogen, phosphorus, and ammonia in water were estimated as high as 4,190 ton, 81 ton, and 117 ton, respectively. In addition, 468,000 ton of solid nutrient-concentrated wastes are the by-product of intensive shrimp farms in the late 20th century. After the abandonment, some properties were sold for residential and industrial developments and converted to salt farms or small-scale aquaculture. As an interface between the



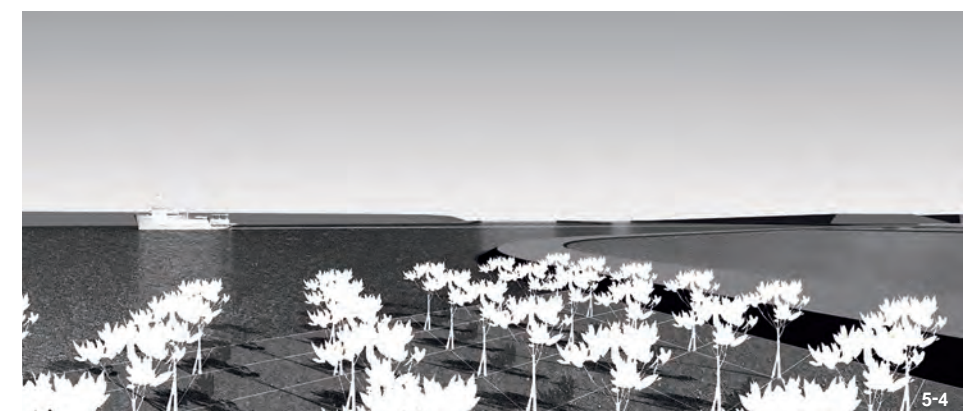
5-1



5-2



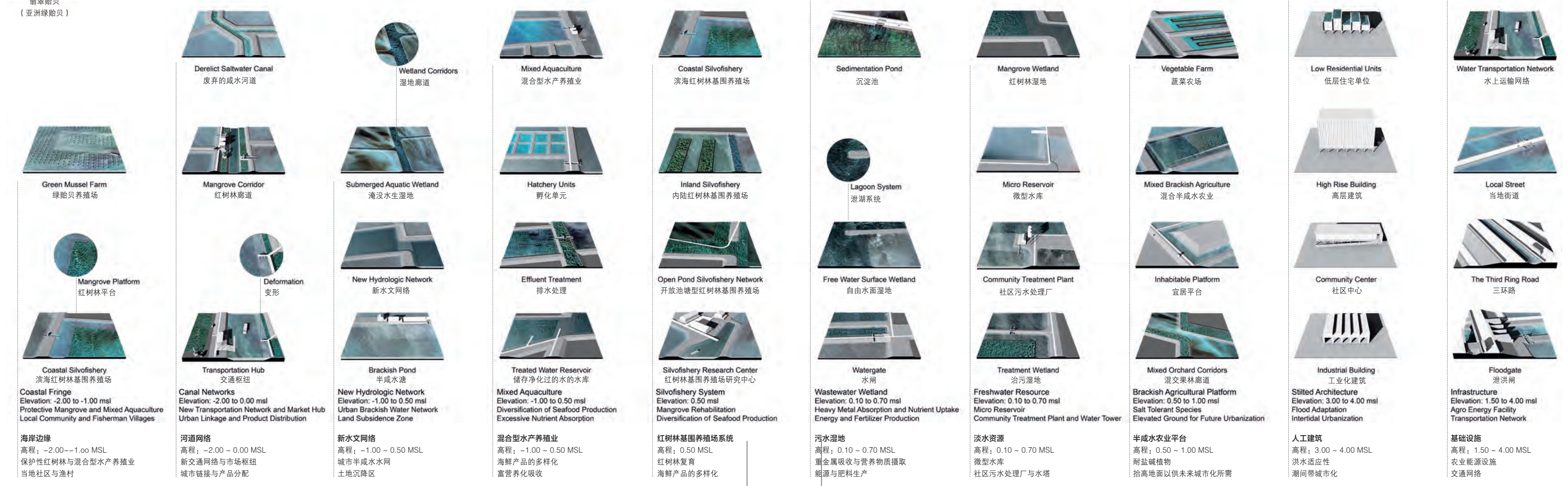
5-3



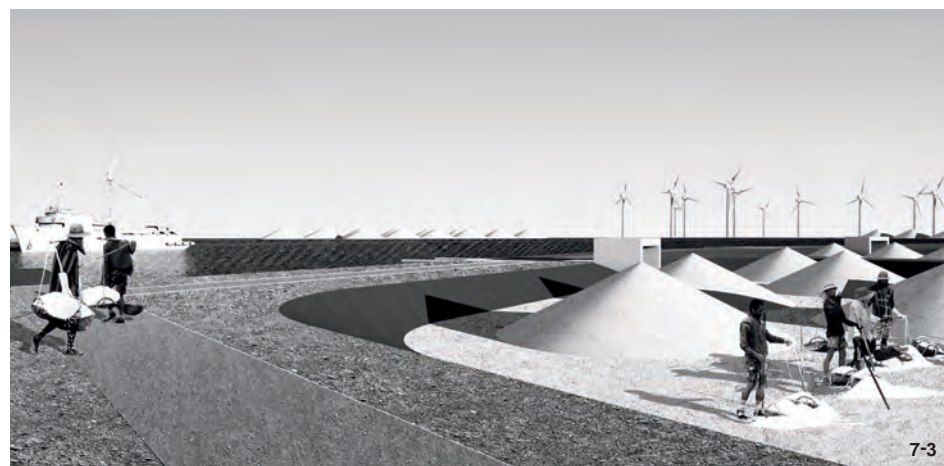
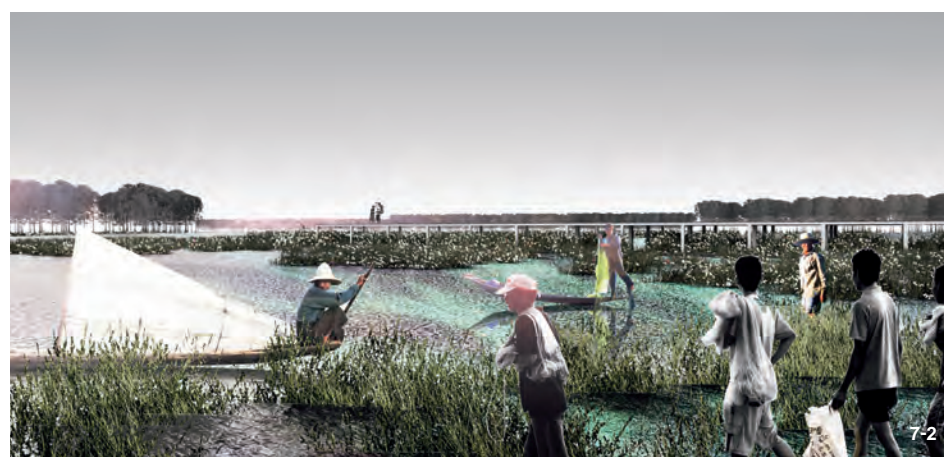
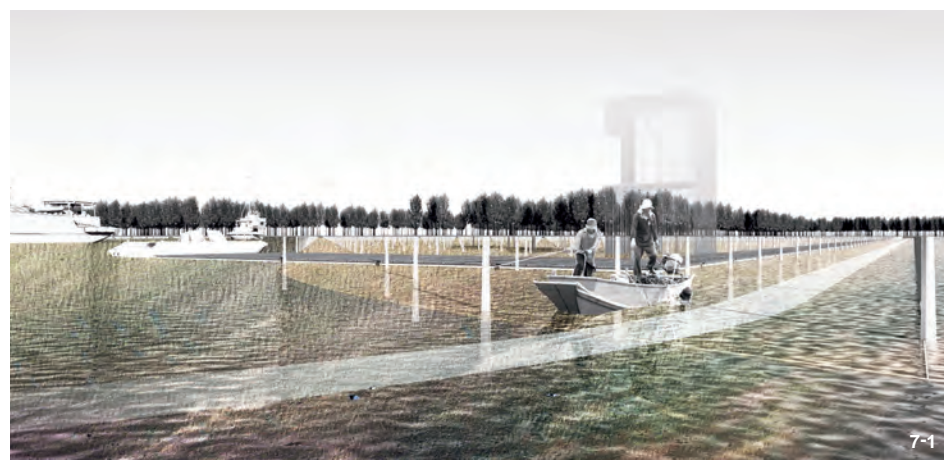
5-4

4. 竖向分级作为设计方法: 竖向分级是一种能够决定景观操作、形态以及服务的设计方法。
5. 潮汐过程的引入: 物理干预将移除养殖场的堤坝, 并创造出多样化的地形条件。
4. Level as a program device: Level is a program device

- determining operations, typologies, and services of landscape.
5. Introduction of tidal process: Physical interventions are removal of pond dikes and creation of multi-topographic conditions.



6. 以地形为基础的设计：包括水文分配、交通网络、保护性红树林、治污湿地、多样化的食物来源、能源生产以及宜居平台。
 6. Topographic-based programs: Hydrologic distributaries, transportation networks, protective mangroves, treatment wetlands, alternative food sources, energy productions, and inhabitable platforms.



city and the gulf, this derelict landscape is confronting with multiple challenges, including fragmented urban footprints, increasing pollution discharge, soil contamination, and severe coastline retreat.

Essentially, water is an active agency over a coastal ecosystem. Micro topography and tidal inundation is an ecological device that diversifies brackish conditions and creates zonation of intertidal habitats. Study of micro topography and tidal process aims to visualize spatial impacts of inundation in multiple scenarios. The area is extremely flat with slope less than 0.04 percent. An average elevation is 0.5 meter above mean sea level. A topographic model with 200 percent vertical exaggeration reveals micro terrain and tidal-based inundation regimes. Along the upper gulf of Thailand, tide is mixed, semidiurnal dominated with tidal range of 1.5 meters. Naturally, the minimum high tide reaches 0.90 meter, which can inundate approximately 163 square kilometers or 70 percent of the total land area. In the past, high tides flooded the area in different periods, from 4 hours to 18 hours a day. Freshwater from upstream canals mixed freely with saltwater creates spectrums of estuarine wetlands based on topographic conditions, inundation periods, and levels of salinity. However, tidal dynamics was interrupted by rigid networks of shrimp pond dikes to control water flows and level of salinity. An average dike elevation between 1.00 MSL to 1.50 MSL prevents high tide to inundate hatchery and growing units. After collapse, this extensive derelict landscape disrupts tidal flows and prevents recolonization of mangrove wetlands.

Level as a Program Device

The project proposed an introduction of tidal process in discovering programmatic possibilities, including hydrologic distri-

butaries, transportation networks, protective mangroves, treatment wetlands, alternative food sources, energy productions, and inhabitable platforms. Level is a program device determining operations, typologies, and services of landscape. The physical interventions are removal of dikes and creation of multi-topographic conditions. Reintroduction of tidal process over north-south distributaries allows natural inundation, moderates salinity condition, and reactivates succession of diverse wetland systems. Along the coastline, dikes and canal embankments are excavated and turned to mangrove corridors, which offer shoreline protection and aquatic habitats. Structures of green mussel farms are installed over submerged ponds to mitigate topsoil erosion and provide food sources for local communities. Under the level of the average high tide (+0.90 MSL), removal of inland dikes forms new waterways and maximizes inland tidal flows and nutrient exchanges. These processes encourage natural succession of submerged aquatic patches on the lowland (+0.10 MSL) and perennial lagoons on the upper ground (+0.70 MSL). Over the subsidence area, inundated dike networks evolve to submerged corridors providing diverse brackish habitats, meanwhile linear lagoons on the higher level capture upstream discharge, decontaminate runoff, and supply freshwater for mixed aquaculture and brackish agriculture. Polluted water is collected by sedimentation ponds and surface-flow wetlands (+0.70 MSL). Organic waste and hyperaccumulator species, such as Water Hyacinths are harvested to produce fertilizer and biogas as alternative resources for communities. Pre-treated water is diverted to tidal-flow wetlands and mangroves (+0.50 MSL) as a secondary filter to absorb excessive nutrients. These landscapes are operated with multiple water-to-mangrove ratios offering adaptability in

programs and productions. Treated water is retained by micro reservoirs (+0.30 MSL) for dry season. Finally, elevated agricultural lands (+1.50 MSL) built from excavated material can be transformed to inhabitable grounds to support urban developments in the future.

Bangkok's Intertidal Infrastructure

In Thailand, the current landscape architectural practice has been proved inadequate in responding to the magnitude of transformation and degradation. Change is norm, and constancy is impossible. The emerging design disciplinary emphasizes a synthetic hybrid of ecology, infrastructure, and landscape in constructing physical environments and reconciling temporal changes. Re-defining the design frameworks, new possibilities are derived from understanding of process that how things work in space and time. Over Bangkok's urban-region ring, landscape is a medium that facilitate hydro-ecological transactions. It is infrastructure rather than scenic significance. In contradiction to an ongoing urbanization led by land-based infrastructures, Re-envisioning Bangkok's Hydro and Agro

Network is an introduction of tidal processes as programs for urban transformation. New hydrologic distributaries and topographic-based programs form an intertidal infrastructure that offers multiple services to the city. Bangkok, the city in monsoon estuary must be soft, absorbent and adaptive. The operative strategies of the project can be applied to the remaining water systems and productive networks to build infrastructural landscapes that perform diverse ecological functions, underpin city economics and response to environmental shift in diverse range of times and spatial scales. **LAF**

7. 发掘设计的可能性：这个项目提议在发掘设计的可能性中引入潮汐过程。
8. 一种潮间带基础设施：新的水文分配和以地形为基础的设计，形成了一种将会为城市带来多重服务职能的潮间带基础设施。
7. Discovering programmatic possibilities: The project proposed an introduction of tidal process in discovering programmatic possibilities.
8. An intertidal infrastructure: New hydrologic distributaries and topographic-based programs form an intertidal infrastructure that offers multiple services to the city.

