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越南承天顺化地区的人－水共生 历史、现状与未来

SETTLING ALONG, WITH, AND ON WATER IN THUA THIEN HUE, VIETNAM: PAST, PRESENT, AND FUTURE

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摘要

本文系统介绍了越南中部高地承天顺化省的水系空间格局与建设，以批判性的视角解读了当地所面临的错综复杂的挑战：人口不断增长，对农业、渔业及水产养殖业的需求不断增加，旅游业快速发展，年降雨量发生较大变化，海平面持续上升等。本文系统性地分析了当地典型的地貌与独特的生态、多样的人居类型、水环境危机，以及整个承天顺化省所面临的当代挑战。作者通过田野调查，进行了历史资料搜集及对当代水利项目的梳理，试图阐释当地的开发建设脉络，作为后文的讨论基础。在承天顺化省人民委员会和来自河内的投资人万夫的资助下，本研究包括一系列由都市化和建筑研究小组提出的规划设计策略，旨在通过潟湖生态修复和提出新的城市开发及人居（与墓园）类型，应对迫在眉睫的气候变化（尤其是重大洪涝灾害），从而实现生态－经济协调发展。该项目需要政策导向的支持：除了从硬质工程向尽可能地运用自然措施转变，还需要为推动新型可持续经济创造机遇——毫无疑问，水环境的城市化对实现当地的可持续发展愿景至关重要。

关键词
谭江－曹海潟湖；洪涝；流域；海平面上升；设计研究

ABSTRACT

This paper develops a water-based spatial biography of the Thua Thien Hue Province in Vietnam's Central Highlands and critically interprets the territory's intertwined contemporary challenges — a growing population, greater demands on agriculture, fisheries, and aquaculture, tourism and changes in annual rainwater, and sea level regimes. It is structured by four sections (typical geography and exceptional ecology, diverse settlement typologies, curse and perils of water, contemporary challenges) which interpretatively read the context. Historical analysis and mapping of present-day projects in the pipeline are complemented by extensive fieldwork in an attempt to reveal (and later build upon) the logics of the territory. It concludes with a series of projective design strategies developed by Research Urbanism and Architecture for the Thua Thien Hue Province Peoples' Committee and the Hanoi-based investor Van Phu, which attempt to balance ecology with economy with a focus on lagoon restoration and new city and settlement types (for the living and the dead) which respond to the predicted consequences of climate change (particularly severe flooding). The project is premised on policy shifts from hard-engineering to approaches that work as much as possible with natural means to simultaneously restore ecologies and generates opportunities to embed new sustainable economies. Not surprisingly, water urbanism strategies are key to this envisioned future development of the province.

KEYWORDS
Tam Giang-Cau Hai Lagoon; Flooding; Watershed; Sea Level Rise; Design Research

翻译 田乐 肖杰
TRANSLATED BY Tina TIAN XIAO Jie

1 典型的地貌与独特的生态

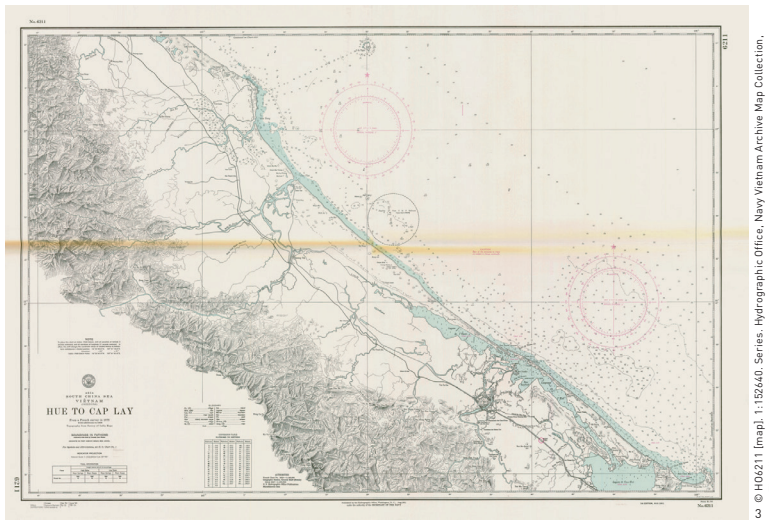
承天顺化省拥有越南中部高地极具代表性的地貌，其西部与老挝接壤处是陡峭且森林密布的长山山脉（阿拉曼科迪勒拉山脉），许多河流发源于此，流经山麓和肥沃的冲积平原，最终汇于东海（图1~3）。这里高峰重重，包括钟乃峰（1 774m）和钟发峰（1 346m），然而从高耸的山脉到沿海平原，直线距离却不足50km，坡度超过30%的陡坡既使该

1. 越南中部承天顺化省的景观极度丰富，层峦叠嶂，山麓遍布，这里除了拥有大型冲积平原外，还拥有东南亚最大的潟湖群。
2. 法国殖民时期的承天顺化省地图（绘于1876~1877年），图中描绘了顺化的山水系统及中国的“海上丝绸之路”。
3. 由法国人绘制的勘测图，图中明确描绘了西部群山以及与之垂直的数条河流，这些河流均汇于东海。

1. Thua Thien Hue Province in Central Vietnam is an incredibly rich landscape, with, over a very short distance, high mountains, foothills, a large alluvial plain, and Southeast Asia's largest lagoon complex.
2. A 1876 and 1877 French colonial map of Thua Thien Hue Province accentuating water, mountains, and the so-called "Mandarin Route" parallel to the sea.
3. A 1878 French survey map (Hue to Cap Lay) with clear delineation of the western mountains and series of perpendicular rivers leading to the East Sea.

1 © Google Earth, 2019

2 © detail from Carte de la Province de Hué (Dutreuil de Rhins 1879, insert) from Biggs 2018:11



3 © H06211 (map), 1:152640, Series. Hydrographic Office, Navy Vietnam Archive Map Collection, The Vietnam Archive, Texas Tech University

1 Typical Geography and Exceptional Ecology

The Thua Thien Hue Province is representative for the whole of the Vietnamese Central Highlands: the steep and forested Truong Son Mountains (Annamite Cordillera) on the western border with Laos are the source of numerous rivers that traverse foothills and a rich alluvial plain before reaching the East Sea (Fig. 1 ~ 3). The mountains have a number of high peaks, including Dong Ngai (1,774 meters) and Dong Pho (1,346 meters) and, since the distance from the high mountainous area down to the coastal plain is not more than 50 km, there are steep slopes (more than 30%) leading to the river catchment basins, causing soil erosion and sediment transport by runoff. The tropical mountains host a number of important national parks (amongst others, the 22,300-hectare Bach Ma National Park and 41,500-hectare Phong Dien Nature Reserve). Most of the mountains are systematically forested with merely one species — *Acacia* which grows quickly, is harvested in 3 ~ 4 years and sold internationally as a lucrative wood product. Such an evolution of the forests reminds of Ho Chi Minh's famous statement that "forests are gold"[1]. This advanced utilitarian practice of turning the territory into a productive landscape is an integral part-and-parcel of the Vietnamese development agenda. Meanwhile, the 50,000-hectare plain of the Huong (Perfume) River (with a catchment basin of 2,830 km^2 which accounts for 55% of the territory) has gentle slopes with elevations ranging from 0.4 to 10 meters. The floodplain is not easy to delineate due to its relatively flat topography and tidal effects. The Huong River originates from the confluence of the Ta Trach and Huu Trach rivers (15 km upstream from Hue). In its lower reaches, the Huong River receives the Bo River, the basin of which covers 93,800 hectares and the other primary rivers are the O Lau River (to the north west) and the Sap River (to the south)[2] (Fig. 4).

The province is as well an exceptional ecosystem. Between the plain and the sea is Southeast Asia's largest lagoon system, the Tam Giang — Cau Hai Lagoon complex (22,000-hectare water body) that comprises a series of connected lagoons: the Tam Giang Lagoon which receives the O Lau and Huong Rivers, Thanh Lam Lagoon which consists of the Sam and An Tuyen Swamps (and is not open to the sea), Thuy Tu Lagoon, a narrow piece of water at the southeast and not connected to the sea, and the Cau Hai Lagoon, the largest one receiving many coastal rivers. The 68-kilometer-long lagoon complex has varying widths, ranging from 0.5 to 9 km. It is connected to the sea by the Thuan An (in the north) and Tu Hien (in the south) Inlets (and estuaries) and its water depth ranges between 1.5 ~ 2 m and 3 ~ 5 m in the flood season. The exchange between freshwater and saltwater in

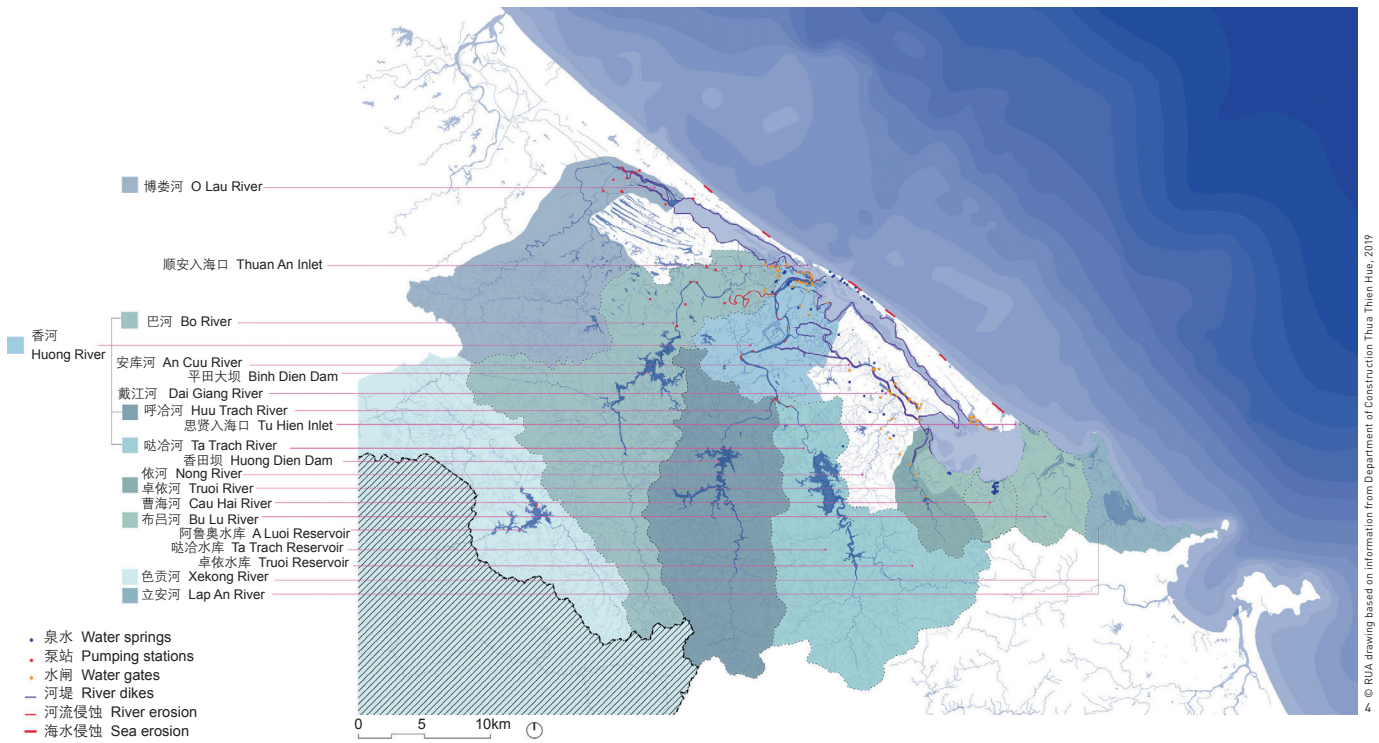
地区形成了河流集水区，也使得径流加剧了土壤侵蚀，导致河流裹挟了大量泥沙。这些具有热带气候特征的山区内有很多重要的国家公园，包括巴赫马国家公园（22 300hm^2）和封坚自然保护区（41 500hm^2），但其中大多数山地上却统一种植着金合欢（*Acacia* spp.），这种树木生长速度快，种植三四年便成材，广销国内外市场，利润可观。这种对山地森林的统一种植正应了胡志明的名言："林就是金"[1]。这种高度实用主义的土地利用方式改变了顺化的景观，也是越南发展历程中不得不提的一笔。此外，香河（流域面积2 830km^2，占全省面积的55%）拥有5万公顷的冲积平原，地势较为平缓，海拔在0.4~10m之间。由于地形相对平坦且潮汐不断，因此很难界定洪泛平原的边界。香河发源于哒冷河和呼冷河交汇处（顺化上游15km处）；香河下游与巴河（河流面积93 800hm^2）、（位于西北方向的）博娄河和（位于南部的）塞河交汇[2]（图4）。

the lagoon, dependent upon seasons, waves and tides, precipitation and floods, creates geographical and seasonal salinity fluctuations from 0 to 33%, resulting in a variable and rich biodiversity[3][4]. The coastal sand dunes, which provide protection for the lagoon, are not only threatened by flooding from river, surges and waves from the East Sea, but also by rampant formal and informal development. The province is the most severely affected territory in the country in relation to coastal flooding and strong winds; tropical storms occur regularly in the rainy season from September to January and generally lead to flash floods in the upper river reaches and inundations in the floodplain.

2 Diverse Settlement Typologies

In short, over a distance of approximately 50 kilometers — from the western mountainous waterheads, across the foothills, plain and lagoon, until the dunes, beach, and the East Sea — there is a rich gradient of variegated settlement forms that intertwine with a cascade of water conditions offered by the environment (Fig. 5). Hue and its rural settlements are either intimately embedded into these conditions or are part-and-parcel of a system of controlled nature and water through various degrees of engineering (in the case of imperial, colonial and later state interventions).

The ancient multi-ethnic Champa kingdom developed a system



4. © RUA drawing based on information from Department of Construction Thua Thien Hue, 2019

4. 承天顺化省的水系由众多高度硬质化、错综复杂的流域和子流域组成，这些硬化工程始于阮氏王朝，直到今日，仍有大型水坝群大兴土木。
5. 承天顺化省是越南多样的景观形态和各种土地利用类型的缩影。

4. The water system of the province has a number of watersheds and sub-watersheds which have been highly manipulated by hard-engineering stemming back to the Nguyen Dynasty and continuing until today with large dam complexes.
5. The territory is a magnificent transect of compressed landscape morphologies and occupation typologies.

顺化的生态系统也非常独特。东南亚最大的潟湖系统谭江—曹海潟湖（水体面积22 000hm^2）就坐落在这片平原与大海之间。这一系统由一系列相互连通的潟湖组成，包括（由博娄河和香河汇成的）谭江潟湖、（由萨姆沼泽和安图恩沼泽组成且不入海的）特兰潟湖、（位于承天顺化省东南部的、狭窄且不入海的）提都潟湖，以及（当地面积最大且有众多沿海河流汇入的）曹海潟湖。谭江—曹海潟湖群长68km、宽0.5~9km不等，在南北部分别有思贤和顺安两个入海口，汛期水深分别为3~5m和1.5~2m。受季节、浪潮、降水和洪水等因素的影响，潟湖中局地淡水和盐水的交换导致水体盐度从0到33%不等，生物多样性极为丰富[3][4]。作为潟湖的天然屏障，沿海沙丘不仅受到河水泛滥及东海海浪的冲击，还面临着各类开发活动带来的影响。承天顺化省是越南受海岸洪灾和强风影响最大的地区，在每年9月至次年1月的雨季，热带风暴频发，导致河流上游地区和洪泛平原洪水泛滥。

2 多样的人居类型

总体而言，短短50km的距离西连高山水源，东接大海，中间山麓、平原、潟湖、沙丘、海滩交织，不同的水环境特色孕育出了各色依水而建的人居环境（图5）。顺化及当地村落已经与这样的自然水文环境融为一体，而这一水文环境中留有封建时期、殖民时期和当代各个时期的人工化程度不一的工程印迹。

古老的多民族占婆王国建立了跨越沿海平原和高山地区、具有不同生态系统的村庄—村落体系（高地和低地的村落形态不同[5]），赋予了当地社区丰富多样的资源。占婆王国以水稻种植、渔业和海上贸易为支柱产业，并与邻近的孟高棉语族建立了贸易关系——孟高棉语族的后代发展为现在的布鲁云侨族、卡图族、傣奥族和帕高族，他们如今依然居住在承天顺化省的阿鲁奥山区和南藏山区相对分散的村庄中，这些聚落多位于山麓，椭圆形的房屋沿河流或溪流而建[5][6]。

of villages and secondary hamlets — of upper (thượng) and lower (hạ) hamlets[5] — which spanned different ecological “floors” — from the coastal plains to the highlands and giving communities access to a wide variety of resources offered by the different floors. The Champa economy was based on wet-rice agriculture, fishing, and sea-borne trade. The Champa formed alliances and traded with neighboring Mon-Khmer speaking groups whose modern-day descendants are known as Bru-Van Kieu, Co-tu, Ta Oi, and Pa Koh, who still reside in the A Luoi and Nam Dong mountain districts of the province. They live in relatively dispersed villages in the foothills of mountains with oval-shaped stilt-housing constructed along rivers or streams[5][6].

此外，京族人（越南的主体民族，也称越族）和法国殖民者在迁入当地的同时，也深刻地改变了自然环境。当时河流串联起了各种具有截然不同生态条件的区域（包括山地、山麓、平原和潟湖），同时沙丘起着大型水库的作用，通过水源涵养和溪流等形式成为整体景观的重要组成部分。在西山朝时期（1770–1802）、阮朝定都顺化时期（1802–1945），以及安南法国殖民时期（19世纪末至20世纪中期），香河都是国家发展中极为重要的水脉。无论是封建王朝都城，还是其对岸由法国殖民者建立起的“金三角”地区，都充分利用了自然地貌的优势，开展了观念树立（阮朝时期的统治者依照风水对河道进行了改造）、经济开发（越南统治者和法国殖民者修建了大规模的灌溉和运河工程，并大力开辟平原地带）、技术推广（治理都城的洪灾）和军事部署等活动[7]。

阮氏王朝的开国帝王嘉隆皇帝下令修建符合风水原则的新都城：都城毗邻香河上游河道，便于通过交通设施获取洁净用水、矿产资源和海产品，及兴建土木工程；通过山脉、山丘或树木等屏障，保护都城免受来自北方的寒风和“邪气”，同时通过两座山丘以及南向的平台或高地来保证充足的光照和空气流通，并免遭洪水侵袭。承天顺化省的城市区域即诞生于这样的山水之中，从地势上来说，此地易守难攻。1805年，嘉隆皇帝加强了顺化的自然防御，下令新建顺化皇城，整座皇城四周总长11km，近乎方形（2.7km×2.5km），并修建了护城河。整个皇宫建筑群的设计以中国明代（1368–1644）都城北京为参照，面向东南方，面朝香河河湾，背靠“皇家屏山”。

香河中有两座小岛，东部为“青龙”（龙是水下世界的霸主，象征着水与植被、春天的萌发和冉冉升起的旭日），西部为“白虎”（虎为百兽之王，既象征着尊贵和勇气、金秋与收获，也象征着战争及在变化多端的局面中镇静自若），两座小岛犹如卫兵般守护着整座都城。新都城中还修建了用于水上交通的河道系统，这些河道也与（位于都城以东13km的）顺安海港相连，便于在战时迅速撤离。河道系统上不断发展出许多小河流，部分小河流的河道被拓宽或开挖成运河，使整个都城形成了一个相互连通的水网。金龙河位于香河之北且与香河平行，后被修建成皇家运河。其他河流也串联起了当地的池塘和湖泊系统。整个都城自成一体，既处于重重保护之中，也与周遭环境和谐相处。皇家运河将都城划分为两部分：北部为稻田，南部为“皇城”。皇城内，宫殿与游园交相辉映，水在其中不仅发挥着关键作用，也具有象征意义[7][8]。与此同时，皇家陵园巧妙地分布在都城南部和香河上游地区的山麓地带，并依水修建了大量以运河和池塘为特色的游园。自1993年以来，顺化的都城、皇家陵园和多处阮朝遗迹已被列为联合国教科文组织世界遗产（图6）。

京族人和法国殖民者统治时期的人居形式与占婆国时期截然不

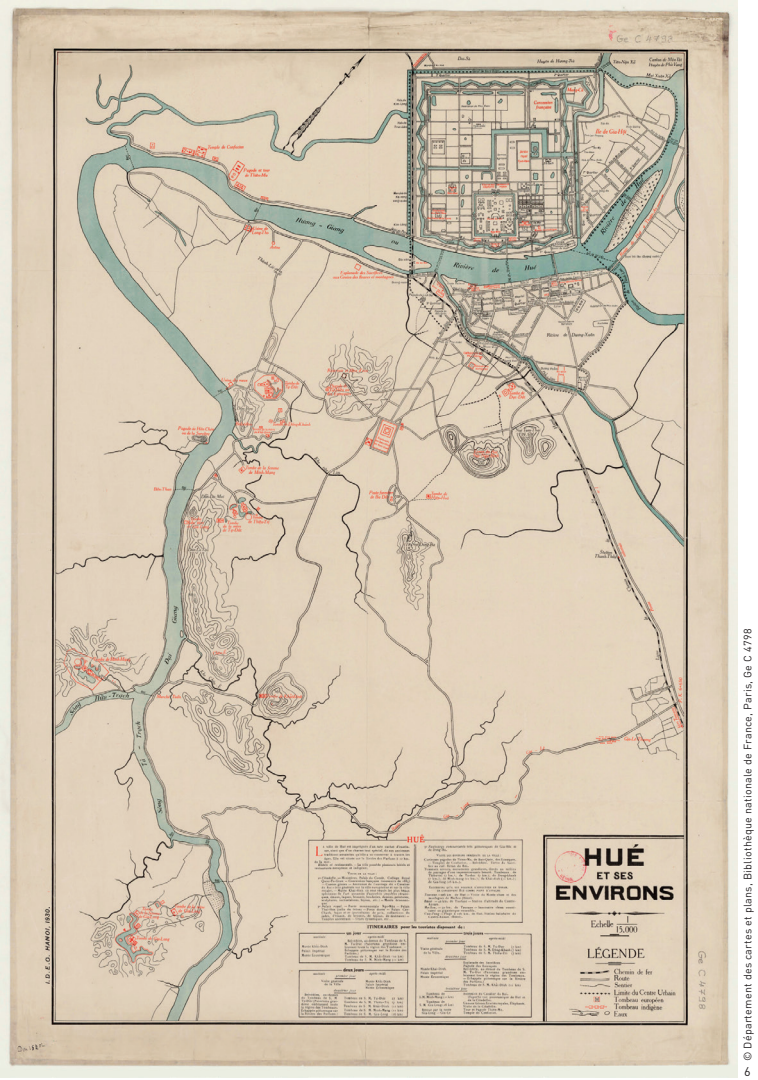
Meanwhile, the Kinh (the dominant ethnic group in Vietnam, also referred to as Viet) and the inhabitants who settled in the era of French colonization also inscribed themselves within the general geographic structures, but simultaneously radically transformed nature. The rivers connected very different ecological conditions — mountain, foothill, plain, lagoon — while the dunes also function as massive water reservoirs that seep into the landscape through sources and small creeks. It is no wonder that the large Huong River became the water vein for both the development of the Tay Son (1770-1802) and Imperial Nguyen Dynasty capital (1802-1945) and later an important seat of French colonial rule of Annam (from the late 19th century through the mid 20th century). Both the imperial citadel and French “golden triangle” — settled on the opposite side of the Huong River — simultaneously took advantage of the natural setting and manipulated it for ideological [including changing river courses by the Nguyen Dynasty to fit to phong thuy (feng shui)], economic (development of extensive irrigation and canal works by the Vietnamese and French to exploit the plain), technical (preventing the flooding of the citadel), and evidently military ends[7].

Emperor Gia Long, the first of the Nguyen Dynasty, commissioned the building of a new capital city in congruence with feng shui’s criteria for auspicious siting: proximity to an upstream flowing river course (supplying clean water, minerals, seafood, and prosperity through transportation and communication links); protection from cold northerly winds and malignant spirits (by way of mountains, hills, or trees), and protection by two hills and a south-facing platform or high ground (to have ample access light and air and protection from flooding). The selected site for Hue was inherently protected by its natural surroundings. The mountains and winding river made the site difficult to approach and easy to defend. In 1805, Gia Long reinforced Hue’s natural defenses and ordered the construction of Kinh Thanh (11 km perimeter), Hue’s new, nearly square (2.7 km × 2.5 km) moated citadel. The entire complex, modeled on Peking under the Ming Dynasty (1368-1644), was oriented southeast, in the elbow-bend of the river towards the “royal screen mountain” (Nui Ngu Binh).

Two islets in the Huong River, the eastern “blue / green dragon” (Ta Thanh Long, chief of all aquatic creatures, representing the blue-green earth, the vegetation of spring, and the rising sun) and western “white tiger” (Huu Bach Ho, the king of wild beasts and metaphor for dignity and courage, representing the metallic autumn and harvest, symbolic of war and the calmness of twilight) assumed the role of sentinels for the citadel. The plan included a system of waterways to provide efficient navigation in and out of the capital and to reach the Thuan An seaport (13 kilometers east) for an expedited escape in times of war. The navigation system was grafted onto existing smaller rivers, some of which were enlarged or canalized to create an interconnected system throughout the capital. The Kim Long River, parallel to the

6. 顺化市及周边区域地图（绘于1930年），图中描绘了顺化皇城、法国殖民时期冲积平原上的“金三角”地区，以及分布在山麓中的一系列皇家陵园。

6. A 1930 map of Hue and environs with the royal citadel, French "golden triangle" in the alluvial plain, and a constellation of royal tombs on the foothills.



同。大致而言，占婆国时期的人居形式与环境相互融合：嵌入自然，而非大规模地改变自然。当人居建设活动存在过度开发的倾向时，人们便会迁向未开发的地区，形成新的小村落，这样既保护了环境的自我修复能力，也维持了人们赖以生存的资源来源和种类（包括铁矿开采）。顺化地区分散的乡村聚落不仅包括那些以贩卖木材、草药和野生动物等林产品为生的传统村落，也包括那些随着潟湖沙丘演变而不断迁徙的渔村。因此，在这种分散的人居结构中，等级划分并不明显，（在村落自给自足的前提下）资源交换比掌握权力更加重要。越战后的土地开发活动多是逐利性的，大量土地变成了生产资本，被开发为林地、种植园、牲畜养殖场、稻田、果园、渔场、水产养殖场等。未经开发的自然资源几乎仅剩河流和为数不多的国家自然公园（建立国家自然公园的理念始自殖民时代）。另一方面，都城的庄严奠定了其周边开发工程的基调，即所有工程都需要体现中央（国家）对权力的掌控。实际上，都城本身就是一项历史性的巨型水利工程，

Huong River in the north was deepened to become the Imperial Canal (Ngu Ha). Other rivers were incorporated into the system of ponds and lakes. The citadel operated as a world unto itself as a protected universe and in a balanced relation to its literal and cosmological surroundings. The Imperial Canal divided the citadel into a northern part for rice paddy and the southern part for the "imperial city." Within the imperial city, palaces were complemented by pleasure gardens, where water bodies had a central and symbolic role[7][8]. At the same time, a constellation of royal tombs located in south of the citadel and in the upstream area of the Huong River cleverly choreograph occupation of the foothills, manipulating water conditions in order to create pleasure gardens with canals and pools as the center pieces. They are also included in Hue's UNESCO status (since 1993) including the citadel, seven royal tombs, and a number of other Nguyen Dynasty monuments (Fig. 6).

It is clear that the Kinh and French colonization were quite distinct from the Champa mode of settling. Schematically, the Champa territorial occupation was a form of settling within the natural environment. The settlement was embedded within nature, without a radical transformation of the environment. From the moment that human occupation threatened to overexploit nature, a new hamlet was created in a virgin territory, safeguarding the self-renewing capacity of the environment, while expanding the volume and nature of resources that the settlement could rely on (which included iron mining). Their dispersed rural settlement pattern within the region not only found its historical origins in the mountainous hamlets that traded forest products including wood, herbs, and wild animals, but also in the fishermen communities that nestle in the dynamic dune landscape of the lagoon. It is not accidental that a heterarchical societal organization, where exchange of (in itself abundantly available) resources is key (rather than exercise of power), complements the dispersed spatial organization of settlements. Vietnamese postwar territorial development is predominantly utilitarian and systematically turns land into assets for production: forestry, plantations, cattle cultivation, rice culture, orchards, fisheries, shrimp farming, etc. Nature is almost reduced to the rivers and the few pieces that are explicitly safeguarded as national nature park (a notion that actually originates from the colonial era). On the other hand, the imperial citadel majestically set the tone of exogenous engineering approaches that more generally goes hand-in-hand with centralized (state) control. In fact, the royal city can be read as a monumental water engineering work, distributing water pressure around it as in a land-based water-wheel. At the height of Hue's imperial development, canals anchored onto the Huong River, simultaneously taking pressure

仿佛一台建在陆地上的水车，调配着都城内外的水资源。在顺化帝国盛世时期，运河接入香河，减轻了主要支流（及城市/皇都）的压力，为平原输送了含大量泥沙的水源。在过去两个世纪中先后兴起的运河、灌溉和圩田工程建设热潮下，顺化地区出现了复杂而密集的稻田（和蔬菜种植）景观，过量的灌溉用水排放至潟湖南部。除接入大型运河外，各类小型运河也被纷纷接入香河，这些小型运河的水源主要来自于沙丘在雨季储存下来的优质水体。整个都城宏大的景观结构横跨广阔的平原，如旋转轮般将距离都城较远的河流水源引至当地的灌溉网络中。

如果说占婆国时期的人居形式以顺应生态环境为主，那么此后的人居形式则以改造自然为主：山脚开始兴建宏伟的游园和陵园（至少有7处），肥沃的平原上是壮观的都城和拥有发达灌溉系统的农田，而香河下游则是被潟湖环绕的海港。当地大大小小的人居工程在这一水网中星罗棋布，都城内的游园（及陵园景观）也多沿小支流而建，这些支流不仅全年为游园和陵园供应淡水，还孕育着游园内的多处水景。阮朝时期修建的广阔的运河体系遍布整个冲积平原，形成了一个史无前例的庞大的灌溉系统。不管是在河流的发源地还是在入海口，人们一直习惯于临水而栖，人居建设也始终取决于河流的格局和流向。随处可见的水网影响着各地的景观结构，通过港口连通潟湖与东海的水道以及中国的“海上之路”都与香河呈纵横之势，这一格局也决定了整个地区的基本形态。不同于占婆国时期等级划分不明显的聚落形态，京族（以及后来的法国殖民者）统治时期的人居建设活动形成了社会等级体系，并发展出了一种与以往截然不同的自然—文化关系。自那时起（特别是在越南建国后），越南的人居建设活动无论是从象征意义上还是空间建设上，无不强调南北/东西的朝向、河流与海上航道的关联，以及在千差万别的地理环境上突显统一的国家特色。总体而言，土著聚落分布在各种水景观中，而外来的定居者则强调集中化的人居形式和硬质化的水系。近年兴起的虾塘养殖活动彻底改变了潟湖的河滨区域，土著聚落形式和高度人工化的水利工程在此相互交织，其中，渔民协会在调和国家与渔民之间的关系方面发挥着重要作用。

2017年，承天顺化省人口为1 154 310人，其中城市人口563 404人，农村人口590 906人[①]。谭江—曹海潟湖群为30万人提供了就业机会，其中10万人完全仰赖潟湖资源[9]。

3 水环境的灾难

阮氏王朝以来，人居建设过程往往伴随着大量复杂水利工程的兴建。都城为了追求更佳的风水格局，对香河稍加改道，通过从香河下游的两个支流引水的方式建造了皇家运河；同时，为了蓄积雨水，还设计了排水沟、水渠和水库系统。尽管如此，都城依然在1820年、1822年、1844年、1904年及1945年分别遭遇了重大洪灾。

away from the main river branch (and hence the city / citadel) and providing the plain with sediment-rich water. Subsequent waves of canal-, irrigation-, and polder works during the last two centuries generated a sophisticated and intensively exploited agricultural mosaic of paddy fields (and vegetable production), that finally discharges excess water into the southern part of the majestic lagoon. Larger canal structures that are anchored to the river are complemented with smaller canals that make use of the high quality of water that the dunes store across seasons. The monumental landscape structure of the citadel spans a wide swath of the plain and operates as a spin-wheel — diverting water from the river (away from the citadel) and directing it to a web of irrigation canals.

If the Champa settled within ecological floors, the Viet re-engineered nature: majestic pleasure gardens and tombs in the foothills — a constellation of not less than seven — a monumental citadel and richly irrigated fields on the fertile plain, a sea harbor downstream of the river, within the lagoon. All this settling — from the small scale to large and majestic operations — is systematically anchored to territorial water structures. The pleasure gardens within the citadel (and in the tomb landscapes) are choreographed around small tributaries that provide year in and out fresh water and feed many water features of the garden. The extensive canal systems of the Nguyen Dynasty opened up the whole fluvial plain for a monumental irrigation scheme. Settlement logics follow the main lines and orientation of the water from the headwaters until the sea. Water dominates the territorial structure, infiltrates everywhere, and defines morphologies. External links through the East Sea (through the harbor) and the Mandrin Route are both perpendicular to the Huong River that structures the regional setting. The Viet (and later French) colonization indeed superimposed a hierarchical system on top of the heterarchical Champa settlement constellation, and radically induced a culture / nature dichotomy upon the territory. It seems that ever since (and surely strongly rearticulated after the national unification), the Viet colonization has continued to symbolically and physically juxtapose north-south (Mandrin Route) / east-west (rivers) orientations and create national unity in the diverse geography. In a caricature, indigenous and dispersed settlements are embedded within the various water landscapes and exogenous forms of occupation such as centralized settlement and hard-engineered water systems. Some forms, such as the recent wave of shrimp-farm ponds radically restructure the riparian area of the lagoon and iterate between indigenous practices and engineered solutions. Fisherman associations that mediate between state and fisherman are key to this hybrid approach.

① 请访问“Thua Thien Hue Portal”官方网站了解更多信息。

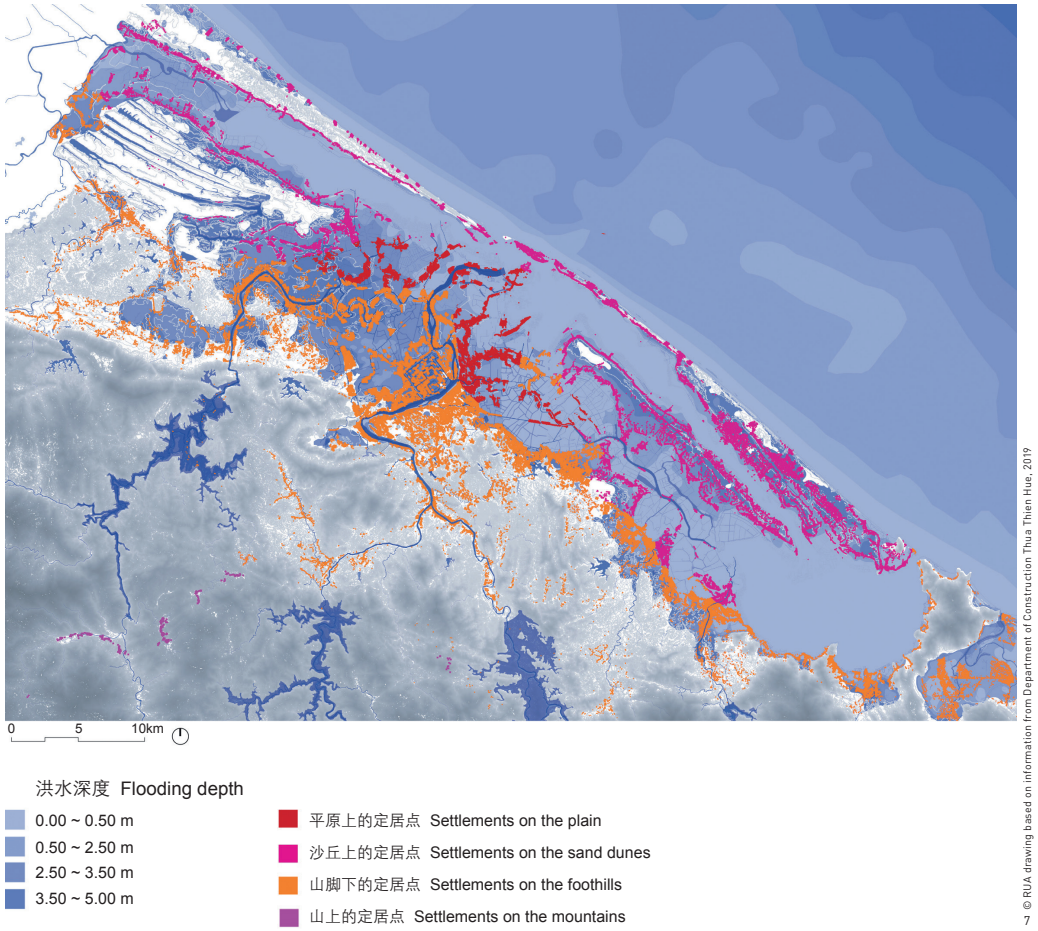
① Please visit the official website of Thua Thien Hue Portal for more information.

承天顺化省属热带季风气候，每年2月至8月为旱季，9月至次年1月为雨季。一般来说，10月和11月的降雨量占全年总降雨量的一半以上。每年4月和5月也会出现小规模集中降雨，特别是在高地地区。

过去5年间，顺化地区的年均降雨量约为3 400mm，但主要集中在西部和南部，南藏和阿鲁奥的年均降雨量分别为4 450mm和4 050mm。据亚洲开发银行数据显示，同许多热带国家一样，近年来当地的年均降雨量呈逐年上升趋势[10]。承天顺化省的地理环境使其经常遭受热带风暴和飓风袭击。历史数据显示，在1999年11月伊芙飓风登陆期间，承天顺化省连续4天的降雨量累计达2 000mm。此次飓风造成352人溺亡，25 056间房屋被洪水冲毁。据越南气象、水文和环境研究所的模拟结果显示，顺化范围内发生的1 999次洪水的平均深度为5.18m，受灾面积达388.4km^2，占全省总面积的7.69%。按照越南政府的B2（中级）减排计划，预计2050年洪水平均深度将达6.08m，受灾面积将达419.2km^2，占全省总面积的8.29%；2100年洪水平均深度将达6.44m，受灾面积将达453.7km^2，占全省总面积的8.98%（图7）。而在旱季，由于降水量减少、蒸发量增加，河流流量呈下降趋势。海平面上升也将使旱季河道网络中的海水倒灌现象更加严重[11]。

7. 由于海平面上升和内涝问题，未来几年研究区域内预计将发生严重的洪灾。

7. Severe inundation is expected in the coming years due to both sea level rise and inland flooding.



7

In 2017, Thua Thien Hue Province had a population of 1,154,310 with 563,404 people living in urban areas and 590,906 in rural areas①. The Tam Giang-Cau Hai Lagoon complex provides employment for approximately 300,000 people, of whom 100,000 depend totally on the lagoon resources[9].

3 Curse and Perils of Water

It is evident that, since imperial times, sophisticated water works were developed hand-in-hand with settlement. The course of the Huong River was slightly altered to auspiciously situate the citadel and an Imperial Canal was created by channeling two downstream branches of the river. In addition, a system of gutters, channels, and reservoirs were designed to capture rainwater. However, the system was not able to protect the citadel from heavy, historic flooding of 1820, 1822, 1844, 1904, and 1945.

Thua Thien Hue Province has a monsoon tropical climate with a dry season from February to August and rainy season from September to January. Most often, October and November together account for more than 50% of the total annual rainfall. A small rainy season always occurs in April and May, especially in the highlands.

The average annual rainfall in Hue has been around 3,400 mm over the last five years but the western and southern parts of the province experience an even rainier climate: 4,450 mm/year in Nam Dong and 4,050 mm/year in A Luoi. According to the Asian Development Bank, annual rainfall has increased in the recent years, as observed in many tropical countries[10]. Due to its geographical location, Thua Thien Hue Province is often hit by tropical storms and cyclones. During the last serious cyclone (Eve) in November 1999, 2,000 mm of rainfall was recorded in four consecutive days. 352 people were drowned and 25,056 houses were washed away. Modelling by the Vietnam Institute of Meteorology, Hydrology and Environment reveals that the 1,999 floods had an average depth of 5.18 meters, covered an area of 388.4 km^2 and covered 7.69% of the entire area of the province. Following the government's B2 (medium) emission scenario, the corresponding numbers for 2050 are 6.08 meters, 419.2 km^2, and 8.29% and for 2100 are 6.44 meters, 453.7 km^2, and 8.98% (Fig. 7). In addition to the increase in flooding and inundation, there is a decreasing trend of river flow in dry seasons (as a result from a decrease in rainfall and increase in evapotranspiration). There are also increasing levels of salinity intrusion in the river network during the dry season due to sea level rise[11].

自21世纪初以来，为治理洪涝灾害、提高顺化市的淡水供应量、发展水力发电建设，越南政府斥巨资沿各条河流修建大型水坝、水库。寇比大坝是承天顺化省的四大水坝之一，主要用于巴河水力发电、供给灌溉用水，以及治理洪涝灾害。这座大坝地势较高，毗邻河流发源地，位于香河入海口上游35km处。其他三座大坝分别是：1）位于呼冷河上的平田大坝，主要用于水力发电和灌溉供水，距离与哒冷河交汇处上游约10km处，集水区面积为583km^2，水库总容量为7亿立方米；2）位于哒冷河上东哈地区、入海口上游约17km处的多功能大坝，主要用于灌溉供水、治理洪涝灾害，及生产生活供水，集水区面积为730km^2，水库总容量为435km^3；3）香河上的陶龙拦河坝，其能够在不影响汛期泄洪的前提下防止来自潟湖的盐水进入河流下游。这三项水利工程都位于坡度适中的山麓与陡峭的山脉之间，在某种程度上可以视为城市化的一种扩张——因为配套道路基础设施依人居条件而建，虽然这些大坝的周围都设置了旨在保障水质的限制性措施和保护区。

值得一提的是，越南的水坝网络和基础设施建设规模居世界第三，仅次于中国和美国[②]。承天顺化省共有239座水坝，能够保证90%以上的耕地灌溉用水和8 000hm^{2}的稻田用水[②]。受季节性降雨量极端差异影响，过去当地河流全年水量常常出现大幅变化。数年前，很多热带山区（特别是一些原始山区）的河流往往一路自由奔流至潟湖区域。现如今，无论是源头还是潟湖，都受到了高度的人工化干预，季节性径流量变化和极端天气已经得到了有效控制。不过，水力发电与水产养殖、农业种植和洪涝治理活动之间依然存在难以调和的矛盾。多种密集型生产活动之间的用水协调问题依然是当地面临的一大挑战。此外，大型水库还面临着山体滑坡和漏水问题。

与此同时，上游居民被迫适应新的生产生活方式，这极大地削弱了他们对水源地的管理和保护能力。长期的系统性造林伐林活动损害了生态系统，加剧了水土流失、山体滑坡和其他水文灾害。

4 当代挑战

今天，在越南积极融入全球经济环境的同时，承天顺化省也面临着新的挑战：政府希望持续吸引工业和旅游投资者，大力发展交通运输业并进一步扩大金合欢经济林的种植规模（图8）。这些方案往往缺乏战略布局，通常都采用非常初级的粗放形式大兴基础设施建设。高速的开发建设活动给生态环境带来了前所未有的压力。从水源地到潟湖再到海洋，整个水环境都遭受到了极大的冲击。

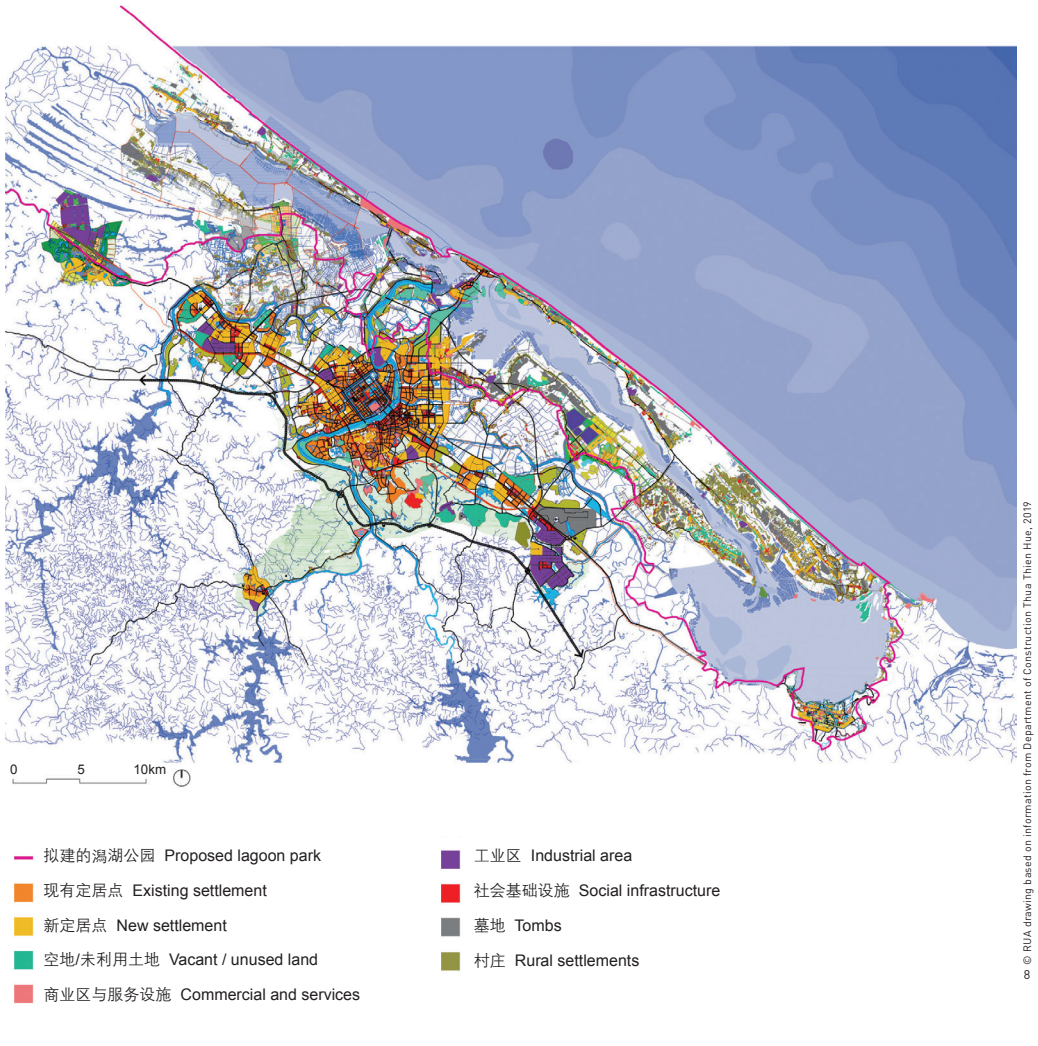
Since the 2000s, the Vietnamese government has made substantial investments into large dams / reservoirs along various rivers to control floods, as well as improve the supply of fresh water to Hue city and capture hydropower. One of the four large dams in Thua Thien Hue Province, the Co Bi dam, is dedicated to hydropower, irrigation, and flood protection on the Bo River; it is high up, almost in the headwaters and more or less 35 km upstream of the confluence with the Huong River. The three other main waterworks are 1) a dam dedicated to hydropower and irrigation on the Huu Trach River in Binh Dien, approximately 10 km upstream of the Ta Trach junction, with a catchment area of 583 km^2, and the reservoir has a total capacity of 700 million cubic meters; 2) a large, multipurpose dam (irrigation power, flooding control and water supply) on the Ta Trach River in Dong Hoa about 17 km upstream of the confluence, a catchment area of 730 km^2 and a gross capacity of 435 km^3; and 3) the Thao Long overflow barrage across the Huong River in order to prevent the ingress of saline lagoon water into the lower reaches of the river without preventing the river discharge during the flood periods. These three last civil engineering ventures are at the edge between the moderate foothills and the steep mountains and mark new urbanization frontiers — since the accompanying road infrastructure is appropriated for settlement (despite restrictions and the protection zones around the water reservoirs that aim to safeguard water quality).

It is interesting to note that Vietnam has the third largest dam network and infrastructure in the world, after China and the United States[②]. Thua Thien Hue Province has 239 dams which ensure irrigation water for more than 90% of the cultivated area and water logging for 8,000 hectares of paddy field. The river flows used to experience large variations throughout the year due to extreme seasonal differences. Not long ago, the tropical (and quite wild) mountain rivers ended in the calm expanse of the lagoons. They are nowadays highly re-engineered, almost from the headwaters until and including the lagoon. Seasonal contrasts and weather incidents are replaced by management cycles. However, until today it seems difficult to align cycles of hydropower management with aquaculture and agricultural cycles, and flood protection. Aligning water and various intensive production cycles is a major issue. The monumental water reservoirs face major problems of landslides and water leakage.

In the meantime, upstream ethic groups have been forcefully introduced to new livelihoods which has drastically altered their stewardship capacity of headwaters. A long, rather abrupt, history of systematic afforestation and deforestation, unleashed

② 详细信息请参见世界银行2019年越南承天顺化省大坝修复与安全提升（WB8）计划。

② Please see the Dam Rehabilitation and Safety Improvement (WB8) in Thue Thien Hue Province Project, World Bank (2019) for more information.



8. 在过去几十年中，人们已提出了一系列基于整个承天顺化省尺度的总体规划方案。这些方案都实行隔离的、无视土地条件差异的用地区划。

8. Over the past decades, a number of masterplans have been proposed throughout the province. They all impose segregated land use zoning and indiscriminately blanket the territory.

目前，广阔的潟湖生态系统极其脆弱，但却仍要维系海洋和潟湖的水产养殖活动、低地和沙丘中的农业活动，以及庞大的陵园景观。在过度捕捞、水体污染和水环境的剧烈变化等挑战面前，人们必须立即采取应对措施。潟湖利益相关方之间冲突不断，特别是与鱼栅（图9）和小孔渔网（2007年开始用于潟湖捕捞）使用的相关问题。随着渔业协会的发展和渔业空间使用权的分配，20世纪90年代中期，当地首次提出了潟湖集中管理方案。渔业协会指出，养殖场是私有的，水域是公共的[12]。潟湖是公共的共享空间，自封建时代以来便存在所有权问题。如今，承天顺化省已成立了64个渔业协会，他们与区级政府对部分指定区域进行共同管理[9]。虽然鱼类多样性减少问题没有得到实质性改善（实际上鱼类多样性依然在持续减少），但潟湖资源保护工作取得了一定成效：渔民减少了对破坏性渔具的使用，严格遵守保护区的捕鱼禁令，积极解决资源分配方面的冲突[9]。同时，为了解决自然资源枯竭问题、提高潟湖周边居民收入，政府鼓励开展水产养殖活动。如今，潟湖主要面临着水质恶化及海藻、虾蟹、鱼类疾病高发等问

a distortion of the ecological system while speeding up erosion, landslides and other water-related phenomena.

4 Contemporary Challenges

Today, as Vietnam continues its integration into the global economy, the province faces numerous new pressures — government believes that investors are eager to develop large industrial zones and tourism enclaves and has ambitious transportation plans as well as further reforestation with productive *Acacia* visions (Fig. 8). Government schemes do not excel in strategic selectivity, hence infrastructure construction is abundant and omnipresent, leading to a dispersed, often only embryonic development. The current, quite drastic development wave is nevertheless pushing the ecological stress level to new heights, not the least the water system that now is distorted from the headwaters all the way down to the lagoon and sea.

The most fragile ecology to date is the vast lagoon, which hosts sea-farming, as well as aquaculture fishermen, farmers in low lands and dune troughs, and vast, extraordinary tomb landscapes. Over fishing, water pollution, and a changing water regime reached levels that require urgent adaptation measures. There has also been an increase in conflicts between various lagoon users — particularly with regards to use of fish corrals (Fig. 9) and small mesh-sized Chinese Lu (first used in the lagoon in 2007). Centralized management of the lagoon was initially complemented in the mid 1990s with the development of fishery associations and the allocation of Territorial Use Rights for Fishing. The fishery associations develop the notion điền tư ngư chung — “farm land is private and water area is open”[12]. Lagoon commons are shared spaces, and issues of property rights have arisen since the feudal times. Today, there are 64 fishery associations, which allow defined areas to be co-managed with district-level government[9]. Although there has not been any measurable recovery from the degradation of fish diversity (and in fact a continuing decline), there have been improvements in lagoon resource protection with fewer fishermen using destructive fishing gear, compliance with fishing bans on protected areas / sanctuaries and resolution of conflicts between resource users[9]. Meanwhile, the government has encouraged aquaculture in order to overcome the depletion of natural resources and as a means to improve lagoon-dwellers’ income. The lagoon now faces major issues regarding water quality and frequent disease evidenced in four major cultured species (seaweed, shrimp, crab and fish)[3]. Environmental programs, amongst others guided by UNDP, work on environmental renewal of the lagoon through mangrove afforestation on the western shore of the lagoon, safeguarding

题[3]。当地在联合国开发计划署的指导下积极制定环保方案，在潟湖西岸种植了红树林，保护鱼类繁衍区（潟湖是近海和远海鱼类的重要保育区），并在其他具有重要生态价值的区域进行自然复育。

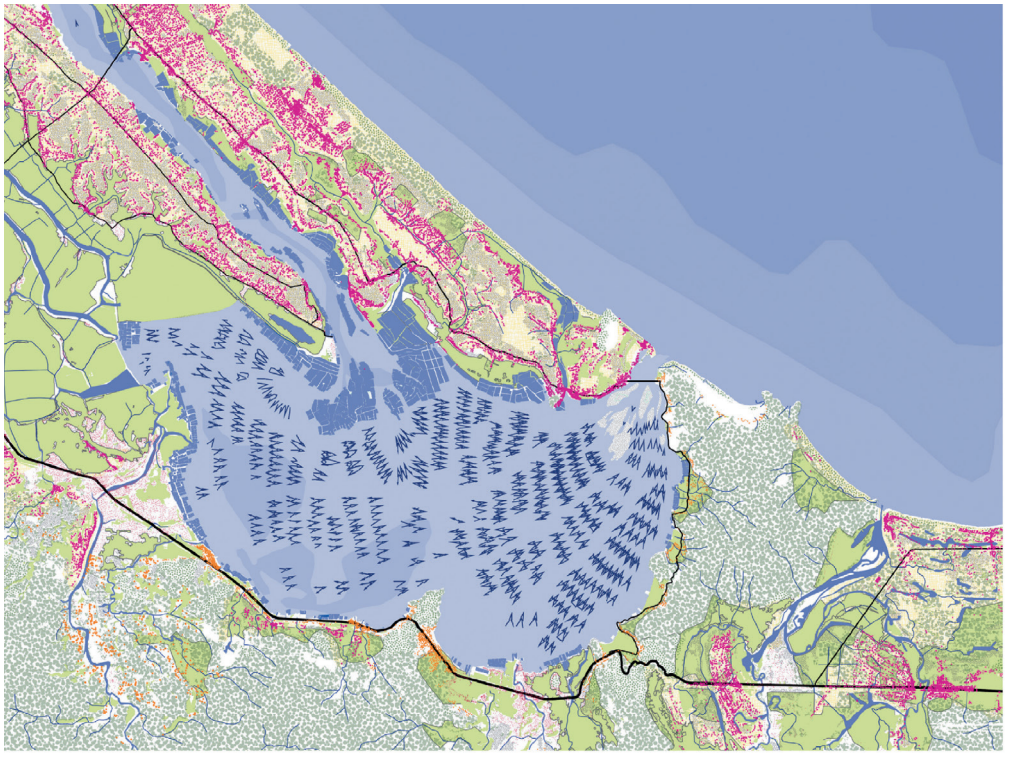
在农业领域，稻田（大部分位于潟湖西侧）可能会在雨季遭受重大洪灾，其他季节也可能出现盐水倒灌问题，这将导致粮食产量下降，并威胁粮食安全。随着重大风暴愈加频发，林场也将变得更加脆弱。

5 承天顺化省的未来：依水而建、绕水而栖

在越南，特别是承天顺化省，邻水而居的传统由来已久。占婆王国初期的人类聚落（包括沿高山溪流而建的村落，以及沿东海海岸分布的渔村）和阮氏王朝都秉承依水而建的原则；法国殖民统治时期也兴建了大量水利工程设施（特别是与资源开发配套的灌溉设施和港口基础设施），同时积极推进以道路建设为导向的城市化进程。这种做法看似满足了人们对现代化发展的需求，实则造成了灾难性的后果。以道路建设为导向的城市化进程导致沙子、水泥和矿产被大肆开采，工业出口区域和城市建设无序扩张。

生态环境与经济协调发展已经成为一种越来越广泛的共识。都市化和建筑研究小组（RUA）近期与越南城市规划研究所合作开展了设计研究，探索承天顺化省的新型空间发展战略。过去20年间对城市和工业的大规模建设并没有收到成效（即没有吸引到预期的投资），甚至在开发理念上也是失败的（极大地增加了生态成本，破坏了大量独具特色的景观）。直至今日，这里的工业优势仍仅局限于廉价劳动力，无法实现良性的全面发展。因此，必须对承天顺化省的发展战略进行重新定位，需要依靠当地优势资源，而非引入诸如工业区和住房等常规建设。

简单来说，RUA提出了一种双轨发展战略。除了山地自然公园、森林复育区和森林保护区外，还计划设立谭江—曹海潟湖公园（图10）。这些既有和拟建的区域，连同联合国教科文组织遗址，将使承天顺化省的关键性区域变成一个人与自然和谐相处的公园，在这一脆弱又珍贵的环境中，既可实现历史和自然遗产保护，又有助于地区的健康发展。该战略采用了“自然化”的解决方式：将水视为资源，同时确保开发水平与生态环境的自我修复能力相匹配。公园中的人居建设要以品质而非数量为先，对原始森林、沙丘、潟湖、海滩、河流及其流域的管理与满足生活需求并重。总之，这一发展战略也体现了周边乡村地区21世纪的发展方向，强调经济发展要适应生态承载力，兼顾经济效益和生态效益。这种新型的公园景观本身也是一种新的人居形态。由于农村人居建设战略注重对当地资源的利用，因而不可避免地会依赖当地的水资源，这一点在潟湖公园中得到了特别强调——对于从水源地到潟湖的整个水系生态系统以及这个生态系统中的所有组成部分来说，水资源都是重要的塑造力量。公园本身的生态环境虽然敏感，但依然具有一定的旅游价值。在旅游开发层面，可以开辟一些



of breeding grounds (the lagoon is an important nursery area for inshore and offshore fish species) and re-naturalization of other areas that are equally fundamental for ecology, etc.

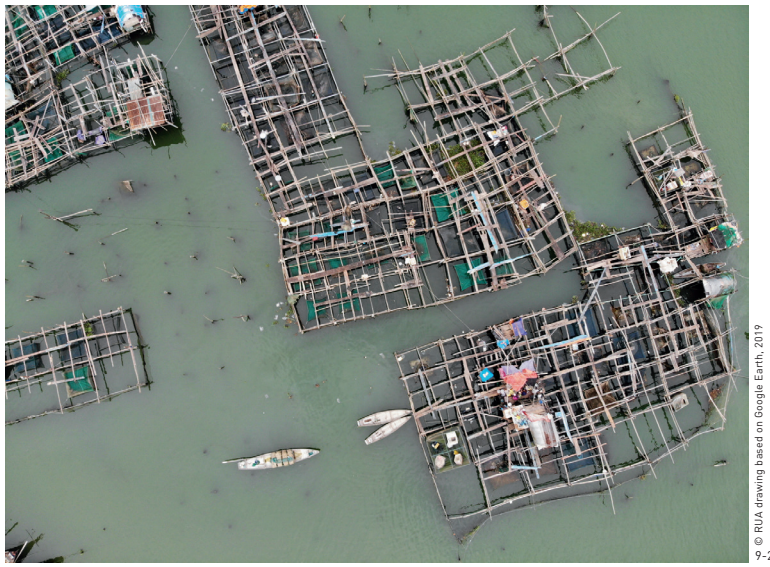
In the agricultural sector, rice paddies (with most on the western side of the lagoon) risk extraordinary flooding in the wet season and saline intrusion in other periods; there is an expected drop in yields, which in turn will threaten food security. Tree plantations will also be vulnerable, due to the increased frequency and severity of storms.

5 Ways forward: Settling along, with, and on Water in Thua Thien Hue

Vietnam, in general, and Thua Thien Hue, in particular, has a long tradition of settling with water. Early Champa settlements (with communities along high mountain streams and fishermen along the East Sea) and the Nguyen Dynasty capitalized on

9. 潟湖区域随处可见的资源开采活动。图9-1：潟湖南部的大批捕捞鱼栅；图9-2：浮动鱼笼；图9-3：大片土地被用于水产养殖。

9. The lagoon is nearly completely exploited, with extensive fishing corrals in the south lagoon (Fig. 9-1), floating fish cages (Fig. 9-2), and enormous swaths of surface converted to aquaculture (Fig. 9-3).



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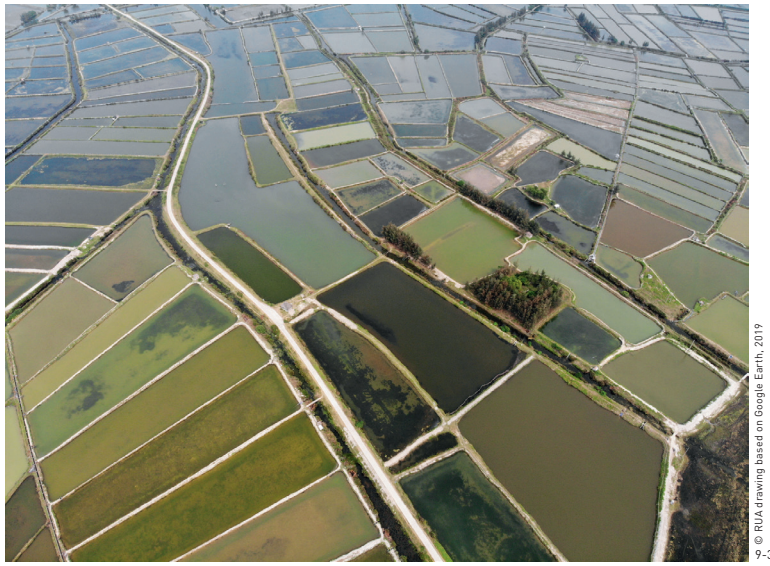
9-2



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9-3

the common-sense logics of proximity to fresh water. The French colonial era simultaneously created more heavily engineered water-based systems (specifically irrigation and port infrastructure to optimize exploitation of resources) and began the relentless pursuit of a road-based urbanism, which seemingly addresses popular expectations of modern development but is actually highly destructive. The road-based urbanism includes massive extractive industries for sand and cement industries and mining, generic industrial export zones, besides measureless urban expansion plans.

Recent design research of RUA (Research Urbanism and Architecture), in partnership with VIUP, the Vietnamese Institute of Urban Planning, therefore investigated alternative spatial development strategies for the province, since it has become more and more clear that ecology and economy urgently need to be rebalanced. The as massive as generic investments in urban and industrial development of the last two decades has neither proved efficient (in attracting expected / intended investment), nor convincing, since they dramatically externalize ecological costs and massively destroy large amounts of unique and irreplaceable landscapes. Until now, industry only comes for the cheap labor, the generic development that follows in its wake must be seriously questioned. A reorientation of development strategies is consequently explored — ones which anchor themselves much more on the locational assets of the territory, rather than on the provision of generic spatial devices (such as industrial zones and housing allotments).

In general, RUA unfolds a dual development strategy. The mountainous nature parks, forest reserves, and forest protection zones are complemented with a Tam Giang-Cau Hai Lagoon park (Fig. 10). This series of existing and new parks, together with the UNESCO protected area, turns a very substantial portion of the province into an inhabited natural and heritage park, where development is categorically embedded within the environment (simultaneously recognized as valuable and vulnerable).
The strategy evidently returns attention to a natural settling modus: relation to water as resource and keeping exploitation levels attuned with the self-renewing capacity of ecology and environment. In the inhabited park, quality is cherished above quantity and inhabitation is equated with stewardship of the pristine forests, dunes, lagoon, beach, rivers and their watersheds, etc. In short, the development strategy rearticulates a rural realm for the 21st century, while emphasizing ecologically appropriate development modes to rebalance economy and ecology. The landscape in this new park type is understood as the inherent structure that hosts settlement. Since the rural settlement strategy capitalizes on the resourcefulness of the territory, it inevitably

特色自然人文旅游线路（如红树林、洞穴、沙丘或其他基于当地独特自然资源的线路，或是传统工艺村、都城和陵园遗迹旅游线路等），在发展农业、水产养殖业、林业和渔业的同时，也注重生态旅游经济的发展。需要再次强调的是，这些产业发展也应从重数量向重质量、从低价值向高价值、从快速向慢速、从盲目开发向因地制宜转变。

山麓和肥沃的冲积平原是承天顺化省的另一大优势，这些区域可以开展大规模集约化生产活动，实现规模经济效益。坡度适中的山麓地区不仅毗邻升级改造后的1号国道（原“海上之路”旧址），还在更高的地势上新建了一条匝道，便利的交通设施可将各个城市中心的周边地区纷纷串联起来，使这些区域在保有自身特色的同时，能够适应迅猛的城市发展。所有人居区域的规模都处于可控范围内，而顺化依然是这一多元化发展的城市带的核心，其因为地处冲积平原，所以也将成为唯一一个需要通过强有力的干预手段方能适应气候变化（海平面上升、降雨模式变化导致洪涝风险的增加等）的城市中心。山麓地带位于繁茂的森林和肥沃的平原之间，这样的地理位置使其可以免受洪涝和台风影响。位于山麓地带的人居区域不仅安全，而且不占用生产性土地，还能充分利用现有基础设施。这些山麓可以被开发为高密度城市建设区，通过激发协同作用来承载住宅、商业、旅游等不同功能。这种规模的人居环境便于引入基于自然的、简单的水处理系统，且不会对巴赫马国家公园和拟建的谭江—曹海潟湖保护区带来影响。海拔在5~10m的山麓地带可用于密集城市开发，海拔在10~25m（且坡度小于5%）的地带则可开展密度相对较低的专项开发活动。

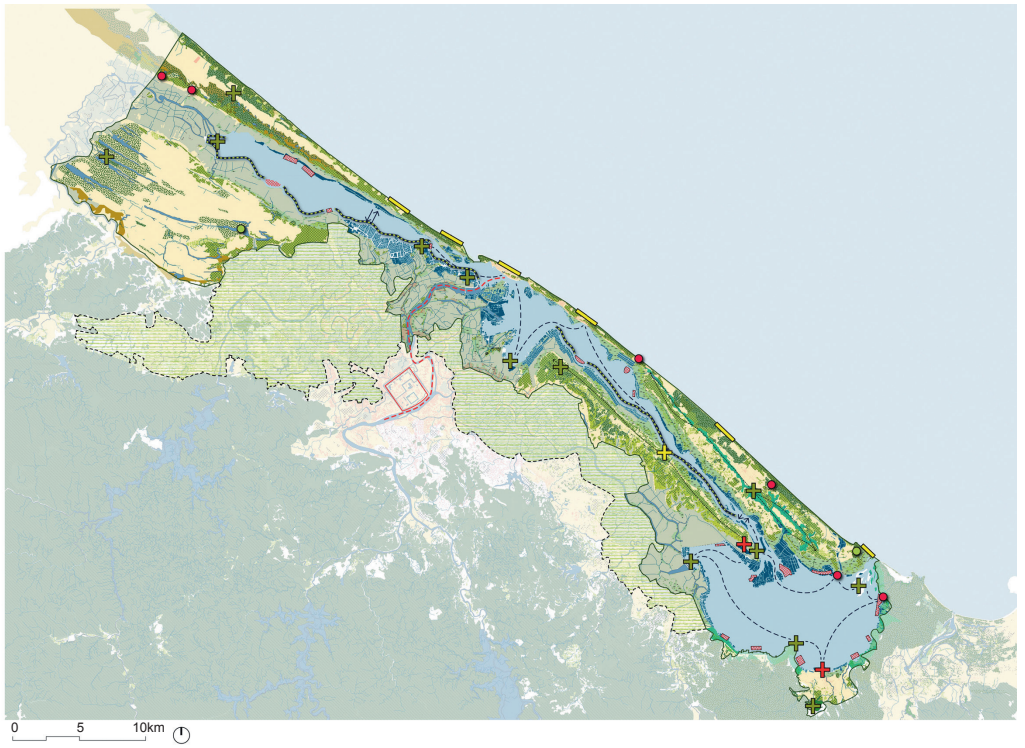
山麓地带可以开展城市建设活动，而冲积平原则可供人们开展农业和水产养殖活动，但是承天顺化省的城市建成区是个例外，因为这片区域既要保证国家粮食安全，又要保护稀缺的肥沃土地，还要引导城市向更安全的区域发展，从而更好地抵御洪涝、热带飓风和海上风暴灾害。河流和潟湖是最重要的自然基础设施，它们支撑着当地庞大的灌溉（和排水）系统。作为农业景观的主要脉络，水基础设施系统需要在修复、维护、建设和适应等方面系统规划、统筹行动，从而更好地应对气候变化（如海平面上升、盐水倒灌）带来的挑战、适应人工水利工程干预下的动态水环境。伴随着技术的变革、政策的调整、农业和水产养殖市场的不断变化，必须积极推动进一步转变，实现生态与经济的协调发展，从而充分释放农民和渔民社区的自组织能力。如前文所述，渔业协会在这方面发挥着重要作用。未来10年间，平原上高度工程化的耗水型农业生产活动将发生结构性变革，形成全新的农业生产景观，这种景观不仅可以容纳农业和水产养殖活动，还可促进生态系统的自我修复和更新。

anchors itself on water structures as natural assets. This is self-evident in the case of the large lagoon park, but not less important along the whole water trajectory from waterheads until lagoon and everything in between and where everywhere water should be reemphasized as the structuring device. It speaks for itself that the assemblage of park environments is an ideal setting for sensitive, but not less valuable forms of tourism. To that purpose, alternative tourist routes can be anchored on the particular and unique qualities (both natural and human such as mangroves, caves, dunes, and other unique natural features and traditional craft villages, built heritage such as the citadel and royal tombs) to support an eco-tourism economy that complements agri- and aquaculture, forestry, and fisheries. Also here is the key of a shift from quantity to quality, from mass low value to selective high value production, from fast to slow, from generic to authentic.

The foothills and the agriculturally productive alluvial plain are reinforced as the other complementary component of the province, as a site for intensive development where economies of scale can be exploited for mass production. Foothill areas with moderate slopes — and with good connectivity with National Highway 1 (the upgraded old Mandarin Route) and its recent bypass on a higher elevation — afford good opportunities for a necklace of complementary urban centers with each its own identity that could accommodate the anticipated strong urban growth. Evidently Hue would remain the central core of this chain of complementary and diverse settlements with each a manageable scale. Hue, positioned on the alluvial plain, would be the only urban center that would require strong interventions to adapt to climate change (sea level rise, increased flooding risk due to changing rain patterns, etc.). The foothills are “safe” from inundation and typhoon winds, accessible from in-place infrastructure and nestled between the productive forests and the agriculturally-rich plain. New settled areas on the foothills would by nature not only be safe, but also not consume productive land, and capitalize on existing infrastructure. The settlements are conceived as dense urban environments which would stimulate synergies so that the environments host different functions simultaneously (residential, commercial, touristic, etc.). Their scale allows the integration of simple and nature-based water treatment systems. The newly proposed settlements do not interfere in the boundaries of Bach Ma National Park and the proposed Tam Giang-Cau Hai Lagoon Reserve. The foothill areas between 5 and 10 meters are set as the primary topographic level for intensive urban development. A less intensive and

10-1. 拟建的谭江－曹海潟湖公园的运行有赖于环境管理措施的施行。潟湖区包括特定的热点生态修复项目，并整合了生态旅游。

10-1. The proposed Tam Giang-Cau Hai Lagoon Park depends upon enforcement of environmental management. The lagoon area includes specific hotspot ecological restoration projects and integrates eco-tourism.



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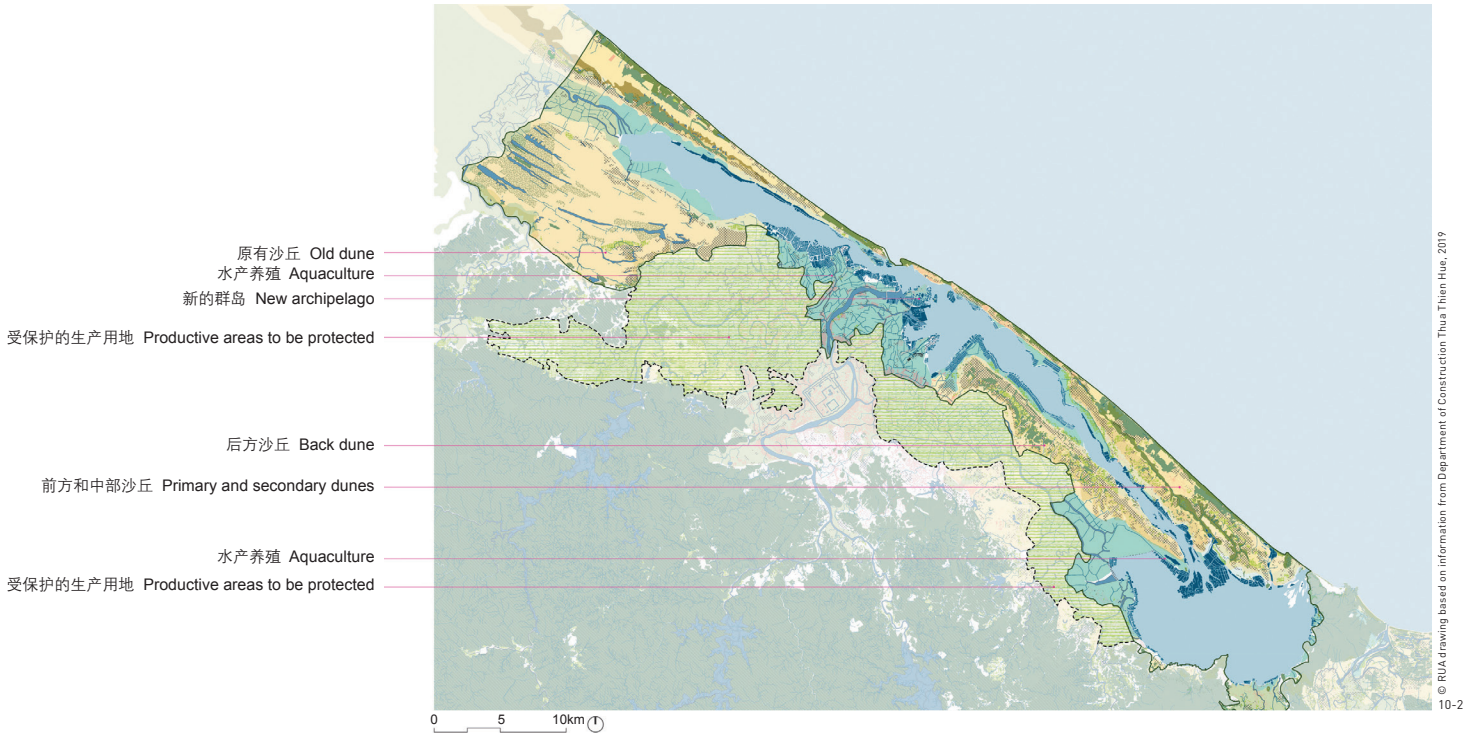
10-1

上述两大发展战略——无论是密集建设还是粗放发展，是采用工程性介入手段还是顺应自然的方式——都离不开现代化的交通设施及新型的交通方式。而新的公园区域也同样采用了这两个战略，并更具针对性：在公园区域中南北向的山麓地带和带状的冲积平原采取密集建设策略，以形成一条城市—工业链；在公园内从流域水源地至潟湖入海口周边地区采取粗放发展模式。这两种空间发展战略都以水环境为基础，相辅相成，同时又犹如经纬线纵横交织；一快一慢、一密一疏的两种战略将共同促进区域发展，避免当前常见的同质化发展问题，同时又尊重和强调地区的天然禀赋。

more specific development can be initiated on appropriate sites (with a slope less than 5%) at the level between 10 and 25 meters.

Whereas the foothills become the host for new urban development, the alluvial plain remains integrally reserved for agri- and aqua-cultural production. Only the existing urban area of Hue is an exception to this reservation that both aims to contribute to national food security and safeguard irreplaceable fertile land for what it is suited best, while orienting urban development to safer land (in terms of flood, tropical hurricanes and related sea storms). The rivers and lagoon are the most important natural infrastructures. On them is anchored a very extensive irrigation (and drainage) system. As backbone of the agricultural landscape, the water infrastructure system requires systematic attention and interventions ranging from restoration and maintenance, to extension and adaptation, to new sustainable irrigation systems that adapt to climate change (sea level rise, salination), and to the water dynamics catalyzed by the dams. Further transformations will be required because of technological shifts, policy changes, market dynamics of agri- and aquaculture and, last but not least, to better balance ecology and economy as well as to better valorize the organizational capacity of farmers and fishery communities. As previously mentioned, fishery associations already play an important role in this regard. The strongly engineered and water-fed production machinery of the plain needs to structurally mutate during the next decennia into a renewed and innovative productive landscape mosaic that accommodates improved as well as new agri- and aqua-cultural productions, while allowing the ecological systems to renew themselves.

The two development are strategies, intensive and extensive, engineered and embedded, strongly connected to contemporary transport and more oriented towards new forms of mobility can merge in the proposed new park realms, each with their own directionality. The intensive strategy unfolds along the north-south oriented foothills and the long alluvial plain where it generates a necklace of urban and industrial settlements. The extensive strategy embeds itself along the water structures beginning high up in the waterheads until the immense expanse of the lagoon near the river mouths and the sea. Both spatial development strategies, complementary by nature and geographically in a certain way perpendicular in directionality, intertwine and articulate as warp and woof, slow and fast, extensive and intensive components of regional development. They avoid the generic sameness that characterizes current development, while simultaneously respecting and accentuating the natural assets that the territory offers. They both anchor themselves on the water structure.



10-2. 拟建的谭江－曹海潟湖公园。冲积平原的西部地区为保护区域，以保障水和粮食安全。

11. 谭江－曹海潟湖的生态设想，该剖面改绘自著名景观设计师伊恩·麦克哈格的理念，为顺化未来的环境规划提供了指导原则。

12. 为了提升潟湖/沙丘景观的韧性，方案提出了新的人居建设构想：海拔5~10m的山麓地区为密集城市建设区（图中深粉色部分），包括现有聚落与拟建的顺化群岛；在海拔10~25m（且坡度小于5%）的山麓地区的适当地块可进行密度相对较低的城市建设活动（图中浅粉色部分）。

10-2. The proposed Tam Giang-Cau Hai Lagoon Park. The western area of the alluvial plain is as well to be given protective status to safeguard water and food security.

11. A section of the Tam Giang-Cau Hai Lagoon ecology adopted from a section by the renowned landscape architect Ian McHarg and as guideline for future environmental planning.

12. Proposed areas for new settlement correspond to the fragility of the lagoon / dune landscape and are primarily in the foothills: dark pink area between 5 ~ 10 meters is the primary topographic level for intensive urban development — including existing settlements and the proposed archipelago; light pink is a less intensive development on appropriate sites (with a slope less than 5%) at the level between 10 ~ 25 meters.

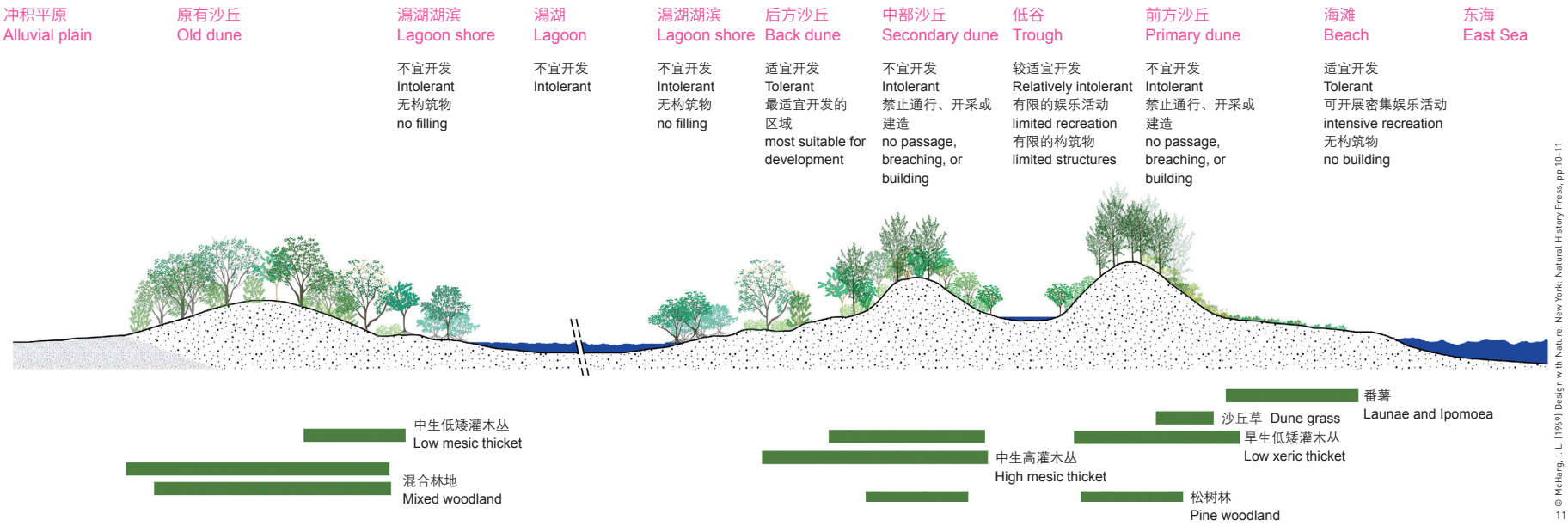
谭江—曹海潟湖水系无疑是一处宝贵的自然财富，如今却面临着城市化的巨大压力：当地先后制定了大型工业区、高端旅游区和更多同质化开发项目的规划方案。值得庆幸的是，承天顺化省人民委员会的领导近期对当前的发展方式提出质疑，并积极探索其他发展路径。多个政府部门也在积极推进发展方案的修订工作，努力避免碎片式开发活动带来的影响，实现城市扩张（包括经济发展、人口增长）与生态环境之间的平衡。RUA提出的双轨式发展战略正是这一探索的重要组成部分。

在谭江—曹海潟湖的规划方案中，RUA的首要目标是建立国家湿地公园，其不仅可以保持当地的资源特色，还可以明确描绘出潟湖区域能够承载的人居形式和经济活动。这一规划方案基于越南政府和亚洲开发银行的一项尚未实施的提议，即建立海洋保护区并入选《国际湿地公约》[10]。谭江—曹海潟湖公园将与南部的巴赫马国家公园相连，横卧于陡峭山脉和湿地之间，这里保留着未被开发的自然景观和供人类生息的平原。如前文所述，在RUA的方案中，该公园不仅仅是保护区，还是人类的定居场所，当地的农民和渔民将承担管理公园的义务，公园中的每个组成地区都会因地制宜地实施特色发展战略。根据RUA的规划方案，将在广阔的陵园内种植乡土树木，此举有助于保护当地脆弱的流动沙丘景观。此外，方案还计划将潟湖以西的低地稻田纳入保护范围，并维持目前人类聚落稀少的状态，以有效保障当地的粮食和用水安全（图11，12）。

潟湖系统的可持续发展要求重建自然资源开发与生态完整性之间的平衡关系，重新审视自然管理方式，采用新型水产养殖方法等措

One of the largest assets in that respect is without doubt the Tam Giang-Cau Hai Lagoon complex, that nowadays is under enormous pressure to urbanize — with plans for vast industrial zones, high-end tourism enclaves and more generic development. Fortunately, the leaders of the Provincial Peoples' Committee have had the recent insight to question the ongoing developments and are prospecting alternative scenarios. Different government agencies are participating in the development of a revised vision which challenges piecemeal development that threatens the delicate balance of expansion (economic and population growth) and environmental concerns. The dual development strategy of RUA described above is part of this exercise.

The overarching goal of the RUA proposal for the Tam Giang-Cau Hai Lagoon complex is to create a national wetland park which simultaneously safeguards its distinctive quality and precisely define forms of settlement and economic activities that it can sustain. This builds on a yet unrealized proposal by the Government of Vietnam and the Asian Development Bank for the site to be a Marine Protected Area and RAMSAR



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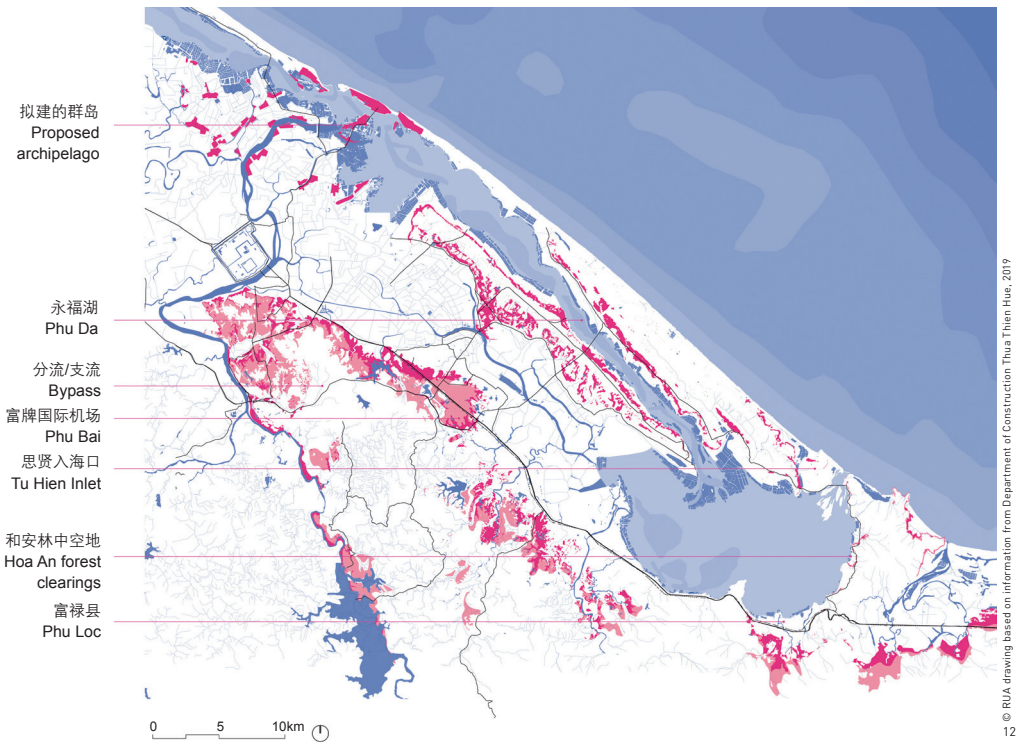

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Site[10]. The Tam Giang-Cau Hai Lagoon Park would be physically linked to the Bach Ma National Park in the south to articulate the threshold between the steep mountains and wetland — untouched nature and the domesticated plain. It imagines, as mentioned already, the new park, however, not merely as a protective area, but as an inhabited territory, where the local farmers and fishermen become more responsible for its stewardship and where each area is developed in its own terms with specific strategies adapted to their distinct identities. The vast areas of tombs would become reforested with native species, concurrently protecting the fragility of the dynamic dune landscape. As well, it is suggested that the lowland paddy to the west of the lagoon receives protected status — to remain largely unsettled in order to continue to serve for the region's food and water security (Fig. 11, 12).

Sustainable development of the lagoon system requires the re-establishment of a balance between economic exploitation of natural resources and ecological integrity. There needs to be renewed commitment to nature management, including measures for alternative aquaculture methods that rely less on polluting antibiotics and artificial feeding, dune restoration and mangrove afforestation. Exceeding the self-renewing capacity of the ecological systems can by no means be tolerated. A substitution of (low-value) monocultures that erode the environmental qualities with new (high-value) special species that can be

施减少对污染性抗生素和人工饲养的依赖，并修复沙丘，重新种植红树林。其中，任何人类开发活动都绝不能超出生态系统的自我修复及更新能力。在潟湖系统丰富的生态环境中引入新型（高价值）物种，来取代原先影响环境品质的（低价值）单一物种，不仅能够化解迫在眉睫的环境危机，还能提高潟湖生态系统的经济多元性，从而实现稳健发展。种养模式的多样化也有助于提高生态系统的修复能力，发展更具韧性的水产养殖和农耕种植行业。这种多元化还将有助于扩大经济效益：在当地开展农产品和水产养殖产品加工将推动内生性工业化进程，不仅可以形成有别于越南其他省份的独特竞争力，还可以强化本省的经济主体地位。这种理性发展要求明确承天顺化省农业生态区域（主要集中于肥沃的平原地区），以及山区（主要是森林覆盖的山区）、潟湖（水产养殖业和渔业）和沙丘等自然环境的独特优势，在平原地区开展集约化农耕活动（种植水稻等作物），在山脉、潟湖和沙丘等自然环境中因地制宜地开展生产活动。

在RUA为承天顺化省描绘的未来蓝图中，人们需要将气候变化当作机遇，并统筹考虑应对方案。这不仅需要分别制定应对洪涝、季风、干旱、盐碱化等自然挑战的策略，还需要对现有人类定居区进行策略性保护或去城市化（至少需缩减人居区域面积），并将居民安置到更适合居住的新型定居区中（图13）。此外，RUA的设计研究亦高度关注保护区（即可用于城市开发的土地）与谭江—曹海潟湖公园之间的边界划定问题。

该规划方案既实现了对顺化都城和顺化市核心区的保护，也令古代的堤防工程成为了今日的地标景观。方案中拟建的1A高速公路也对潟湖外的人居区域形成了保护。由于海平面上升定会导致附近区域被潟湖吞没，因此区域以东的人居区域或融入沙丘保护系统，或被改造成巴河和香河之间的群岛。平原地区地势最低的区域将主动与潟湖系统连通并发展现代渔业，不必再被动地抵抗洪涝灾害。通过对区域内现有人居区域进行聚类和重组，最终实现打造顺化群岛的目标。每个岛屿开发都应以促成顺化群岛的成型为目标，即在香河及其支流上塑造一系列大小不一的、不被洪水淹没的人居岛屿。这些岛屿主要用于度假屋、度假村和生态旅游等特色开发，可在原生湿地或红树林的映衬下，形成有别于周边现有聚落的风格形态。当地政府还将建立潟湖研究中心及渔场。顺化群岛设计方案实现了从单纯依靠水利工程（堤坝等）向拥抱自然路径（系统性的植树造林、沙丘修复和扩大、水土流失治理、红树林修复等）的理念转变。这必将促进生态系统的恢复，同时还将带动可持续经济模式（在潟湖和红树林区域进行可持续性鱼虾养殖、在森林中进行药草种植等）的发展。**LAF**

致谢

本文基于由布鲁诺·德·缪德尔和凯利·香农领导的都市化和建筑研究小组（RUA）的尚在进行中的设计研究项目撰写。该项目于2018年受承天顺化省人民委员会和位于河内的越南城市规划研究所（VIUP）委托，由河内的投资者万夫资助。RUA团队成员还包括安娜莉丝·德·尼斯、纳姆耶尔·休伯特、埃琳娜·卡塞路易和阮明匡。

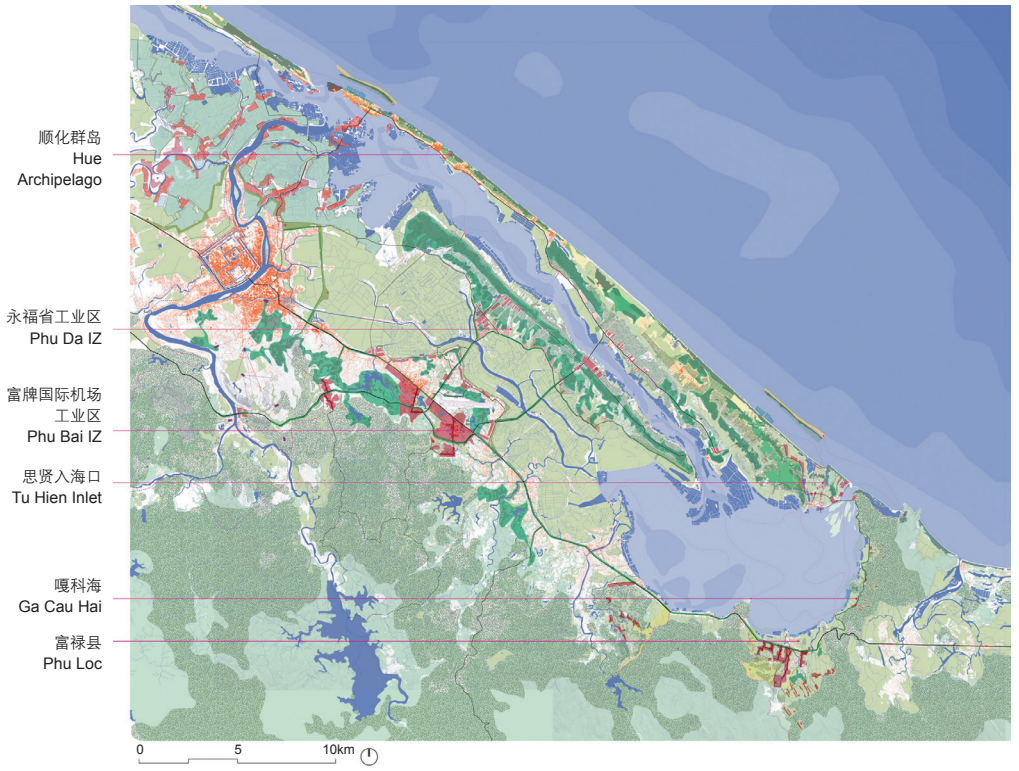
embedded in the rich ecology of the lagoon system is not only necessary to avoid an unavoidable environmental crisis, but also to diversify the economy (that will consequently gain robustness). A diversification of suitable cultures will simultaneously contribute to a more resilient ecological system and less vulnerable aqua-agricultural systems. Diversification is also proposed with regards to larger economies. Enhancing local processing of the agro- and aqua-cultural produce will generate an endogenous process of industrialization in sectors where it has competitive advantages to other regions in Vietnam. A larger part of the value chain would therefore remain in Thua Thien Hue province. Intelligent development means anchoring development on the specific environmental characteristics of the agro-ecological regions within Thua Thien Hue province (basically the fertile plain), and the largely natural environments of mountains (where forestry would be dominant), lagoon (aquaculture and fisheries) and dunes. Where the fertile plain allows for intensive cultivation (rice, etc.), the natural environments (mountains, lagoon, dunes) can nest specialized productions (in the forest, mangroves, lagoon, etc.).

In the vision for the province, RUA has sought to address climate change as an opportunity and on a systemic level. It has devised strategies to not only work with the forces of nature (inundations, monsoons, droughts, salination, etc.), but also one which strategically protects or deurbanizes (or at least shrinks) existing settled areas and guides new settlement in more appropriate locations and with new typologies (Fig. 13). A lot of attention in the design investigation of RUA went into the definition of a border between protected safe land (where urban development can be located) and the Tam Giang-Cau Hai Lagoon Park.

A landform is therefore introduced as protection for the citadel and city center of Hue, reinterpreting the ancient dike structures as a contemporary and territorial landscape figure. Highway 1A works with the new landform to protect the non-lagoon settlements. The settlements east of the landform are either part of the protective dune system or transformed into an archipelago between the Bo and Huong Rivers — sea level rise will de facto expand the lagoon. Instead of defending against the flood, the lowest lying segments of the plain are given back to the lagoon and modern fisheries installed. The Hue Archipelago could then be created through the clustering, reconfiguration and densification of existing developed settlements within these areas. Each island development should contribute to articulating the Hue Archipelago — namely a series of unique strongholds of various sizes in the ever-increasing inundation of the Huong River and its tributaries. The primary use of the islands, in line with the preference for specific and qualitative over generic and massive

13. RUA为潟湖南部地区制定的设计方案：这里将成为人与自然和谐共生的家园（包含逝者的墓园）。

13. RUA proposal for the southern end of the lagoon, with the simultaneous building of new nature and new settlement (for the living and the dead).



development, could be quite extra-ordinary, ranging from second homes, resorts, and eco-tourism, embedded in a local environment of existing settlement, native wetlands or mangroves. Public programs could include a lagoon research center and fisheries. The archipelago design is emblematic for the proposed policy shift from hard-engineering (dykes, etc.) to approaches that work as much as possible with natural means (systemic afforestation, regeneration and extension of sand dunes, erosion control, mangrove regeneration, etc.) to simultaneously restore ecologies and generate opportunities to embed new sustainable economies (sustainable fish and shrimp farming within the lagoon and mangroves, medicinal plants in forests, etc.). **LAF**

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