

# 社区催化剂： 加纳温尼巴市以社会包容为导向的可持续水卫生设施系统建设

## Community Catalyst: Building a Water Sanitation System for Social Inclusion in Winneba, Ghana

### 陈心慧

香港大学建筑学院园境建筑学部博士研究生、弗吉尼亚大学建筑学院景观建筑学硕士

### 黄国平

弗吉尼亚大学建筑学院城市与环境规划系助理教授、里士满大学空间分析实验室主任

### CHEN Xinhui

Doctoral Student in Division of Landscape Architecture, Faculty of Architecture at the University of Hong Kong; Master of Landscape Architecture, School of Architecture at the University of Virginia

### HUANG Guoping\*

Assistant Professor in Department of Urban and Environmental Planning, School of Architecture at the University of Virginia; Director of the Spatial Analysis Lab at the University of Richmond

\*Corresponding Author

Address: 300 Carole Weinstein International Center, 211 Richmond Way, Richmond, VA 23226, USA  
Email: ghuang@richmond.edu

编辑 | 周佳怡

翻译 | 陈心慧、冉玲于

EDITED BY | ZHOU Jiayi

TRANSLATED BY | CHEN Xinhui, RAN Lingyu

### 摘要

温尼巴市位于西非国家加纳的几内亚湾沿岸地区，拥有被列入《湿地公约》的重要生态湿地，却面临严重的环境、经济和社会问题，比如水卫生危机、公共设施缺乏、环境退化、不平等经济条件下的性别差异、社会冲突等。长期以来，这些问题互相作用，形成了难以解决的恶性循环。本项目通过举办合作研讨会、“群众外包”决策活动、实地调研、交互式网页地图制作等方法对温尼巴市社会背景和传统风俗进行了深入研究，提出了一个集排水沟系统、雨水花园、取水站、果园、公共沼气卫生间、有机垃圾收集站于一体的，能促进生态环境与社会良性变革的水卫生设施系统。项目划分为“建立公共空间概念 - 通过协作劳动营造场地 - 连接社区”三个实施阶段，引入自下而上、鼓励社区参与的奖励制度，通过激发集体的合作和劳动热情，鼓励居民以社区为单位主动参与到社区公共绿地的建造与维护过程中，从而改善社区内部乃至整个城市的生态、经济和社会环境。项目所提供的不仅是一类公共空间节点的设计，抑或是一项城市绿色系统的规划，更是一条发展中国家通过居民和社区参与实现可持续的水卫生设施系统管理的治理途径。

### 关键词

水卫生设施；社会包容性；社区参与；公共空间；加纳

### ABSTRACT

Located on the coast of the Gulf of Guinea in Ghana, West Africa, the city of Winneba boasts one of the important ecological wetlands inscribed on the list of Ramsar Sites. However, Winneba faces daunting environmental, economic and social challenges—e.g. water sanitation crisis, infrastructure deficiency, environmental degradation, gender inequality, and social conflicts—interacting with each other to create a vicious cycle. Based on a collaborative workshop, a “crowd-sourcing” decision-making process, on-site fieldworks, and an Interactive Web Map, the project team develops in-depth study of the social context and traditional customs of Winneba. A water sanitation system, also as a network of public spaces that facilitates ecological and social improvement, is proposed. It includes drainage systems, rain gardens, water kiosks, orchards, public biogas toilets, and organic waste collection stations. Combining a three-phase implementation, i.e. establish the concept of public space, create a site through collaborative work, and connect communities, the project team introduces a bottom-up incentive system that encourages local community residents to collaborate and participate in constructing and maintaining the public space system for their communities, so as to improve the wellbeing of the communities and the city. Not just proving a design strategy for a kind of public space or a plan for a network of urban green space system, this project sets an exemplar to long-term sustainable management of water sanitation system through self-government of residents and communities in developing countries.

### KEYWORDS

Water Sanitation; Social Inclusion; Community Participation; Public Spaces; Ghana

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## 1 引言

坐落于几内亚湾海岸的温尼巴市（图1），是非国家加纳伊夫图地区内最大的城市，总计56 356人居住于此<sup>[1]</sup>。城市西面的穆尼泻湖为众多本地生物提供了栖息地，也为大量迁徙鸟类提供了落脚点；1992年，泻湖所在的穆尼-波马泽湿地被正式列入《湿地公约》，成为全球最需要保护的生态湿地之一。

2014年起，弗吉尼亚大学建筑学院景观系南希·高桥教授受邀多次访问温尼巴市。在当地湿地管理部门的帮助下，教授对周围环境景观进行了初步考察，了解到当地所面临的生态与环境危机。2017年，她邀请城市与环境规划系黄国平教授共同组建了“重塑城市与泻湖关系”项目组，旨在通过规划设计研究与实践，帮助温尼巴市和穆尼泻湖实现可持续共存。

此后，弗吉尼亚大学建筑学院师生与当地代表进行了互相访问，建立了长期合作关系。自此，学院先后开设了集景观设计学、建筑学和城市规划学于一体的跨学科研讨与设计课程。本文即为2019年春季研讨课程和秋季设计课程的成果总结<sup>①</sup>。

## 2 水卫生设施系统及其管理的压力与潜力

温尼巴市是一个正在快速发展的滨海城市（图2），然而各项水卫生设施的建设却远远落后于城市发展（图3），引发了居住环境恶化等问题，并且在高密度的老城区尤为突出。由于卫生设施缺乏，温尼巴市所在的伊夫图地区中有近15%的居民不得不将露天场所（如海边和泻湖边）作为“卫生间”<sup>[1]</sup>。排泄物连同未经处理的城市生活污水沿着地表径流或明渠直接排入穆尼泻湖，或排入其他自然水体并最终汇入大海。更糟糕的是，自西向东的沿岸洋流又将这些污染物与病菌再次带回渔港（图2），被污染的鱼类等水产品由此流入市场和餐桌。同时，洋流还带回大量垃圾，堆积于海岸上（图4）。这些现象对温尼巴市的水卫生系统管理带来了巨大挑战，也对公共环境和健康构成了巨大威胁。

目前，温尼巴市的水卫生设施系统由饮用水供应和生活污水排放两部分组成，与社区生活息息相关——居民主要从公共取水站获取生活用水（图5），在公共卫生间解决个人卫生需求。因此，水卫生设施所在的场所也是当地重要的公共活动空

1. 场地鸟瞰，前景是温尼巴市老城区，中景是穆尼泻湖和周围湿地，背景是当地的圣山曼库山。

1. An aerial view of the site, with the Old Town of Winneba in the foreground, Muni Lagoon and surrounding wetlands in the middle, and the sacred mountain Manku in the background.



间，如妇女在取水站清洗衣物、互相交谈时，孩童会在一旁玩耍。这些公共活动成为制定本方案的现实基础。

维护水卫生设施系统需要大量人力资源，若能以社区为单位组织居民参与与维护工作，则有望缓解长期维护的压力。在温尼巴市，深入人心的部落传统、以社区为基础管理野生动植物的政策指导<sup>[2]</sup>，和通过社区参与的方式保护湿地景观<sup>[3]</sup>的经验，为社区参与的可持续水卫生设施系统管理提供了潜在的实践机会。

除此之外，西非水卫生设施系统的完善还与女性权益息息相关。据统计，加纳69%的家庭的用水采集由妇女（15岁以上的女性）承担，6.5%由15岁以下的女孩承担<sup>[4]</sup>。女性为家庭用水付出了大量时间和精力，这限制了她们的受教育时间，并影响了她们经济独立的可能性。改善水源设施可以大大降低取水时间成本。若从自然水体、无保护的井和泉眼等未加改善的水源取水，则单日取水时间可长达40~80分钟；若从水管或公共取水站等改善后的水源设施取水，则单日取水仅需约10~25分钟<sup>[4]</sup>。本方案提出的可持续水卫生设施系统将增加公共取水站的数量，从而降低用水采集的时间成本，增加雇佣机会，使数以万计的女性从中受益。

## 3 设计过程

2019年3月，由城市规划师、教育工作者、加纳林业委员会的湿地管理者，以及当地部落首领组成的温尼巴市利益相关者代表团和弗吉尼亚大学项目团队举办了合作研讨会，制定出项目后续的开展计划：首先，基于温尼巴市的城市发展愿景，参会者

对项目整体进行SWOT态势分析，提出了16个具备建设可行性的候选项目实施方案；随后通过“群众外包”决策活动<sup>②</sup>，对其进行重要性排序。排序靠前的7项被列为待建项目（图6），其按照得分从高到低排序依次是：建立垃圾收集系统、建造研究教育中心、保护和恢复海岸线植被、修复滨河廊道、设立多用途步道系统、建造公共沼气卫生间、营建人工湿地。

6月，项目团队和当地师范大学师生合作，与部落首领、加纳林业委员会人员、当地市政议会官员、居民沟通，在地图上标出了需要保护的建筑物与景观，以及可利用的现有城市资源，进而确定可将待建项目落地的场地位置（图6）。此外，项目团队参加了温尼巴市市政议会的会议，了解到推广、建造公共沼气卫生间的项目已得到当地居民和政府的极大关注。

10月，在田野调研过程中，项目团队与当地居民交谈，初步收集了他们的日常生活需求（图7），并了解到：1）当地居民对大海感情深厚，从大海中捕获的鱼类是温尼巴市最重要的食物来源，并且住在大海中的神祇是当地重要的文化象征；2）尽管泻湖距离城市很近且具有重要生态价值，但人们并不了解泻湖的重要性，仅将其视为吸引游客的资源；3）所有受访者都不约而同地提到，希望城市里能有

① 本项目获得2020ASLA学生奖的城市设计类荣誉奖和2020ASLA弗吉尼亚分会学生奖的规划和分析类奖项。

② “群众外包”是指发动研讨会全体参与人员对提出的所有候选项目进行排序的决策活动。参与者在项目卡片上匿名写下他们对每个候选项目的评分。评分基于以下三个标准：高影响力，即能为当地社区和环境带来重大收益；高优先级，即实施该行动的紧迫性；高可行性，即政治阻力和资源需求均较低。

更多的树阴和水卫生设施，例如公共取水站和公共卫生间。

同年5月，本文作者还开发了一个交互式网页地图，在5~12月期间持续征集温尼巴市居民对城市生活的期望与建议。当地居民可在此页面上传音频文件，讲述他们的故事，帮助项目团队进一步了解居民心声（图8）。

### 3.1 设计概念

人类学家迈克尔·谢丹认为，圣林等非洲文化景观成功获得长期维护的原因在于它们的存在可以调解社会冲突，促进社会资本之间的转化<sup>[5]</sup>。在加纳，公共活动和风俗传统（如节日）自古以来连接着城市和自然环境，在景观保护方面发挥着重要作用：人们在城市里举办仪式，庆祝丰收、感谢大自然的慷慨馈赠；当地部落制定各种禁忌保护湿地和

森林（比如每周三禁止在穆尼泻湖捕鱼）；动物祭祀传统延续至今，促使人们关注物种及其栖息地保护（图9）。以圣林为例，圣林通常是一片被保护的具有宗教意义的树林，大至森林保护区，小至耸立于城市或田野中的小树林，其树阴下的凉爽场地常被用于举行祭祀仪式，并严禁以任何形式开采和砍伐圣林中的树木，因为人们认为这种行为会打扰神灵<sup>[6]</sup>。可见，文化景观为社会公共生活提供了场所；与此同时，策划、建造、修缮公共景观的过程又作为一种公共活动发挥着塑造社会共识的作用。

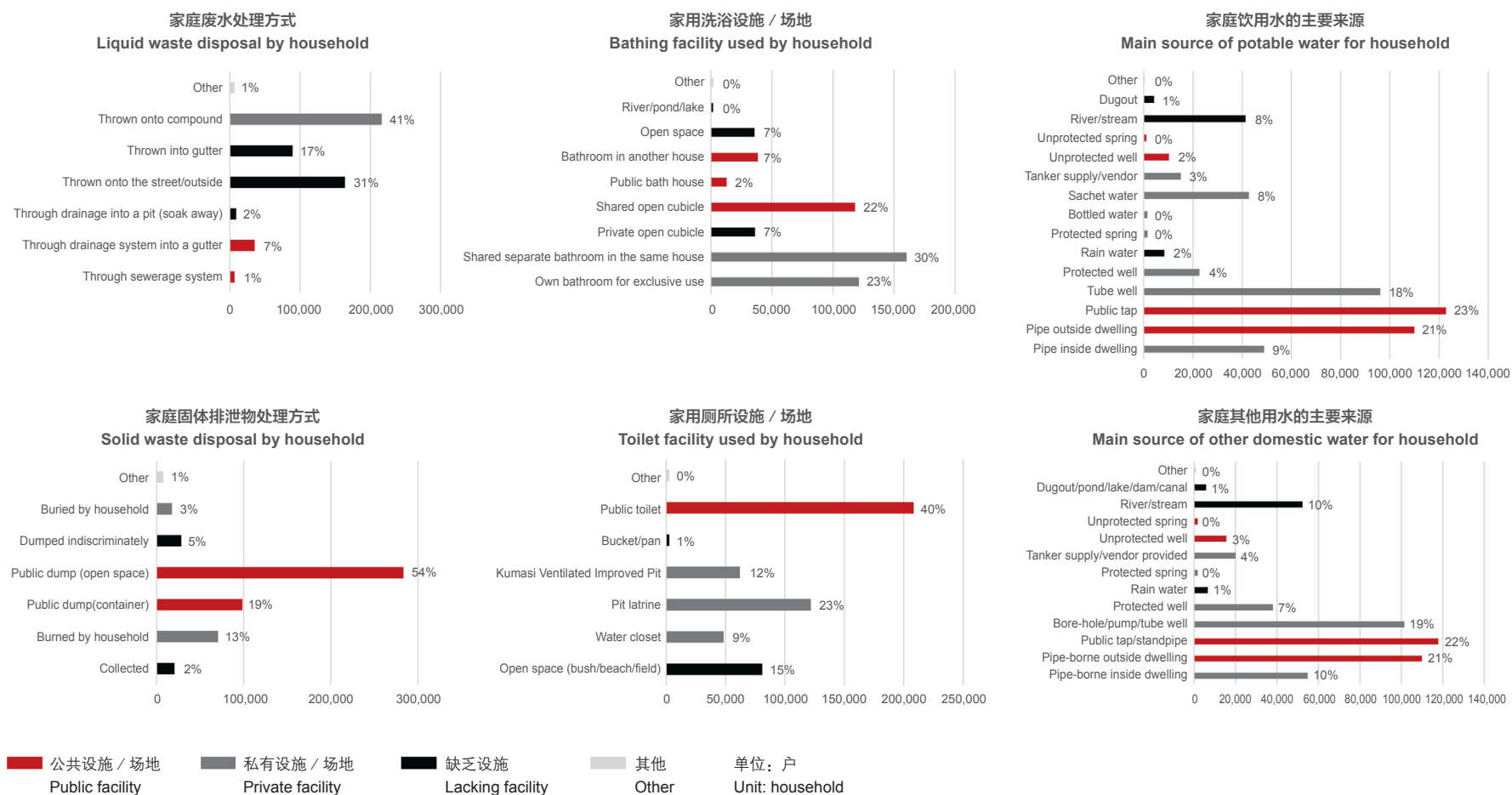
基于以上研究，本项目构建了一个以社会公平和生态效益为目标的可持续水卫生设施系统，并尝试用自下而上、以社区为单位的组织形式取代自上而下、由政府主导的传统项目推进模式。正如催化剂一样，本项目能够促使社区居民互动与合作，进而创造出一种新型公共空间模式。

项目号召社区居民接受市政议会的支持以及专家的指导，为自己的社区建设排水沟系统、雨水花园、取水站、果园、公共沼气卫生间，和有机垃圾收集站等各项水卫生设施，并将其整合到景观设计方案中（图10）：生活污水经过排水沟和雨水花园的收集、储存、过滤、净化用于公共沼气卫生间；公共沼气卫生间连接沼气池，通过微生物催化发酵将人类排泄物和来自收集站的其他有机垃圾转化为能源，并将其用于取水站的烧水、灭菌等流程；而能源转化后遗留的沼气残渣在经过处理后被用作果树肥料。

在社区内就地种植果树不仅可为人口密集的老城区提供难得的树阴和公共空间，而且本地居民可通过沿街售卖果实及其加工副产品，进一步带动经济发展、激发公共活动和街头生活，催化出新的社区参与模式。项目团队提出的积分兑换系统设想可

2. 温尼巴市的城市发展和扩张，以及生活污水排放和水污染现状。
2. Urban development and expansion of Winneba, as well as existing discharge of domestic sewage and water pollution.





以进一步鼓励社区参与——即通过使用公共卫生间（而不是在露天场所如厕）、将动物粪便等废弃物带到有机垃圾回收站再送往沼气池处理（而非像以往一样抛弃在户外）、参与公共设施和树木的维护等途径，居民可获得相应的积分或代金券以兑换奖励，如一升干净的水、果园收获的水果、公交车票或学习用品等。

### 3.2 多方参与的建造过程

本项目的核心在于自下而上的社区参与，主要参与者是当地居民。此外，2019年成立的温尼巴市“社区催化剂”委员会（后文简称委员会），负责项目的筹款集资、提供技术支持、调解潜在冲突，和监督整个建设过程。该委员会由多个参与方组成，其中包括来自市政议会、当地政府职能部门、加纳林业委员会、当地部落首领、温尼巴师范大学和弗吉尼亚大学的各位代表。委员会得名于沼气发酵过程中使用的催化剂，它的存在可以起到协调社区各参与方的作用，提高合作效率。通过这样的

组织形式，可以增加不同社会群体相遇、合作的机会，也可以培养出基于社区的文化认同。项目将分为三个阶段完成（图11）。

#### 3.2.1 第一阶段：建立公共空间概念

在加纳，由于对公共空间的管理不明确，闲置地块总是很快被非正式住宅占领。因此，在这一



- 伊夫图地区水卫生设施使用情况（参见参考文献[1]）
- 被污染的海岸和捕鱼港口
- 温尼巴市老城区中的公共取水站

- Water sanitation services in the Effutu Municipal District (Source: Ref. [1])
- Polluted shores and fishing ports
- Public water kiosks in the Old Town of Winneba



阶段，项目的首要目标是建立、强化公共空间的概念，从公共意识层面为后续建造公共水卫生设施系统打下基础。

在加纳传统文化中，树林具有发生聚集活动的空间隐喻，其阴凉舒适的氛围也从感官上为聚集活动的发生提供了可能。因此，在本项目中，树木成为标记用地的基本设计元素，以此明确禁止侵占的公共地块。项目发起后，在策划阶段，项目团队与市政议会和部落首领进行商讨，确认可用于建设的闲置地块，随后由委员会协助制作被选中地块的地图并提供《推荐树种清单》，清单中的树种大部分具有速生、耐受当地土壤与气候环境，和一定经济价值的特征，社区居民将根据清单投票选出最喜爱的树种；最后，在当地林业部门的帮助下雇佣当地居民，将获选的树木种满相应社区的闲置地块，防止其被非法侵占（图12）。随着树木生长，这些被小树林围合的场地将很快成为热带气候条件下人们喜爱的聚集场所。在未来的建设阶段中，部分树木会被移植到果园、河岸，或用作行道树，以腾出场地建造公共水卫生设施系统。

### 3.2.2 第二阶段：通过协作劳动营造场地

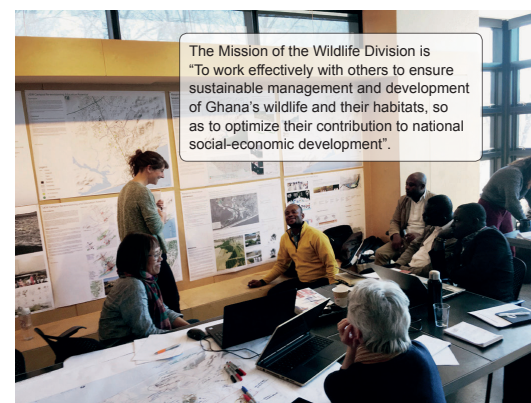
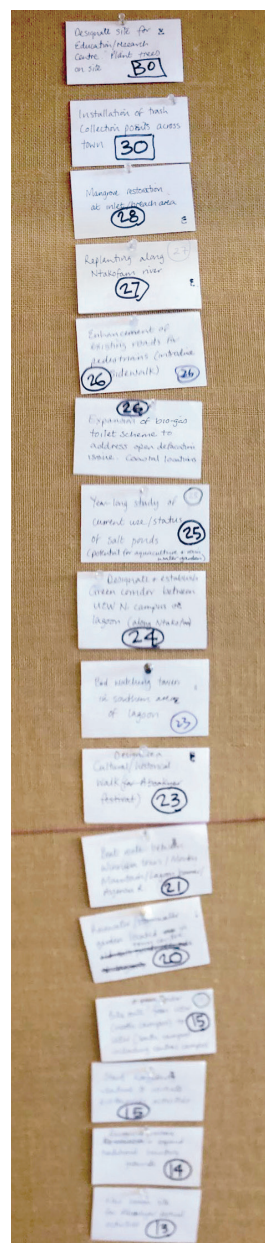
这一阶段旨在鼓励当地居民加入到公共水卫生设施系统的建造中：通过举办社区会议讨论、分配具体的营建工作，并在委员会的帮助下尽可能雇佣居民来建造他们自己的基础设施。居民可自愿报名受雇，雇佣方（当地政府职能部门和加纳林业委员会）会为他们提供必要的工作培训。这些居民将有机会在标记的场地内部建造公共沼气卫生间、污水明渠、雨水花园、有机垃圾收集点和取水站等设施。在加纳，女性是被鼓励参与园艺劳动的，因此，树木维护等工作可为当地女性提供额外的就业机会。建成后的小型公共空间既是水卫生设施系统的节点，也是居民进行聚集活动的场所（图13）。

### 3.2.3 第三阶段：连接社区

在这个阶段，项目将从局限于单一社区的孤立系统发展为由多个社区共同组成的公共水卫生设施系统。相邻的社区共同讨论并决定如何将各自的水卫生设施连接起来，比如排水沟和行道树系统。随着越来越多的社区加入，林荫街道有望连接为一个树种多样的绿廊。城市里的每片小树林都将标识出社区公共空间的存在，这些小型绿色公共空间及其连接廊道将形成一种新型的城市绿色结构。

6. 左图展示了经SWOT态势分析提出的所有候选项目清单，按“群众外包”决策活动的统计得分由高到低排序；右图从上至下分别展示了3月开展的“群众外包”活动，6月项目团队咨询当地市政议会官员、规划师的意见，10月田野调研中弗吉尼亚大学师生采集渔民、社区居民的意见的场景。

6. The list of all potential design interventions proposed by the SWOT analysis, ranked in descending order of importance scores from “crowd-sourcing” decision-making process shown as the left picture. The right ones show “crowd-sourcing” process in March, the project team consulting with local assembly members and planners in June, and the team collecting the opinions of fishermen and residents in October respectively.



相邻社区的互相合作、分享可以拉近居民间的关系，使得可持续水卫生设施系统管理的社会基础更稳固。

## 4 讨论与评述

温尼巴市的城市规划师和市政议会成员已对这种小规模、可持续发展的城市项目表现出兴趣，并表示会着手标记更多可用地块、确定试点社区。

本项目从神圣场所获得灵感，又考虑了当地的社会现状，提出了一种创新的公共空间（水卫生设

施系统）营建方法，有助于形成更加包容的社会生活方式；进而通过社区参与的方式来建设和维护当地公共空间和基础设施，由此形成能保持水卫生设施系统长期可持续发展的综合性管理策略。但是，对建造过程的构想仍需深化：进一步争取利益相关方的支持，与当地的政府职能部门、部落首领、各族居民协商讨论；明确项目发起单位（自行组织社区单元或引入NGO）；厘清闲置地块产权、项目资金与技术支持来源等工作。可持续的水卫生系统管理需要各方达成长期的合作关系。

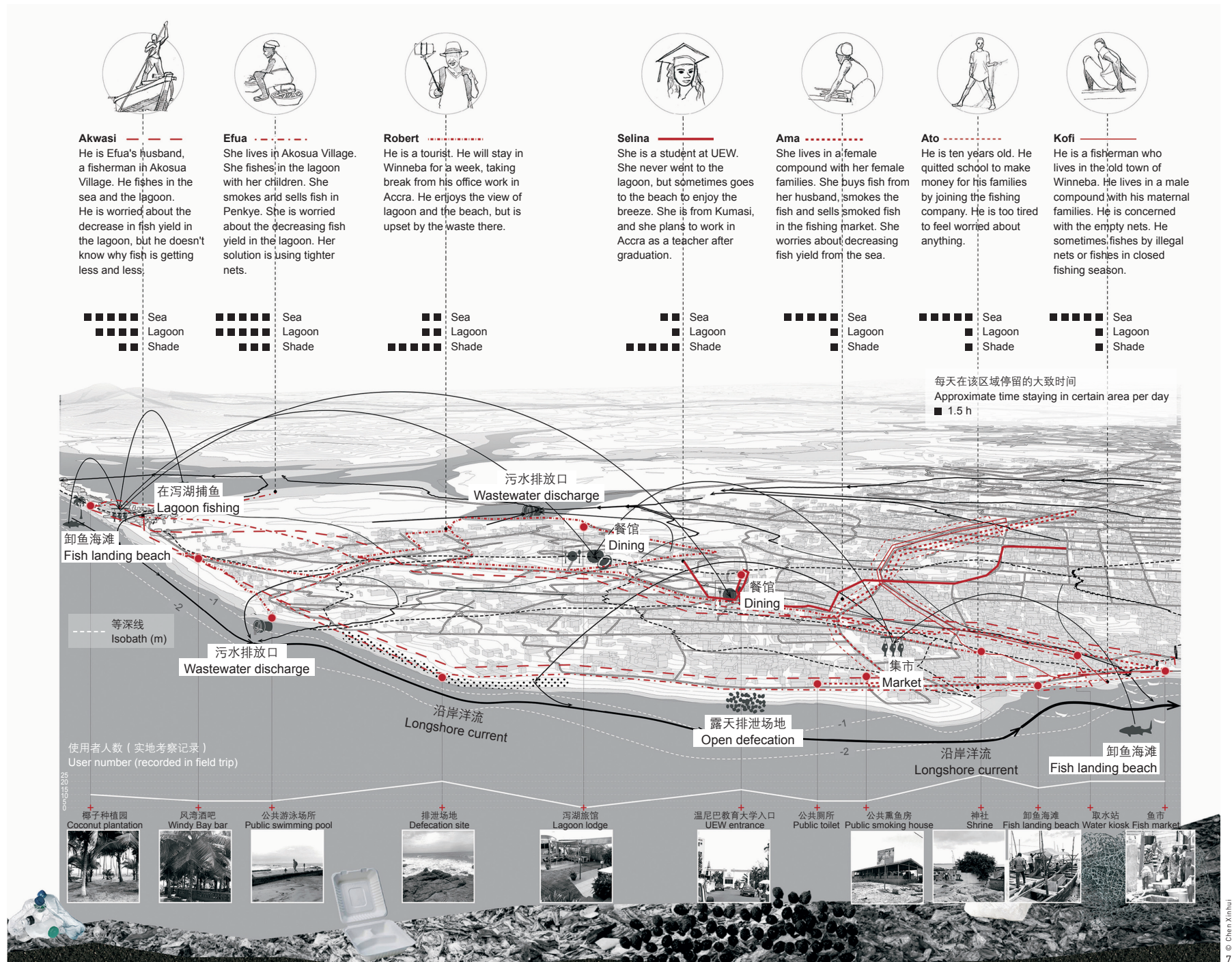
2004年的诺贝尔和平奖得主、肯尼亚社会与环

境活动家旺加里·马塔伊曾说“只有动员群众、依靠群众，才能保护好环境。你要告知人们并帮助他们理解：他们自己正主宰着环境资源的可持续使用的权利，这样人们才会去保护它。”<sup>[7]</sup>温尼巴市虽然面积小，但和其他许多西非国家的城市一样，面临着各种环境、经济和社会问题。西非城市的发展，特别是完善基础设施的建设，除了依赖本国经济发展和各种外界援助外，自下而上的社区参与和居民

的主动参与也是不可忽视的力量。本项目所提供的不仅仅是一类节点绿地空间的设计，或者一项城市绿色系统的规划，更是一条依靠居民和社区达成长期可持续的水卫生设施系统管理的治理途径。如同文艺复兴时期意大利佛罗伦萨市通过城市步道连接小广场定义出新的公共空间一样，温尼巴市自主形成的绿色空间和网络可以成为西非城市绿色复兴的典范。**LAF**

7. 温尼巴市居民城市生活体验叙事地图：污染物、排泄物、洋流和捕鱼业的循环给城市带来公共健康方面的危险；尽管受访者们对城市生活的向往和担忧各不相同，但他们都直接或间接地被这个无形的危险循环联系在一起。

7. A narrative map illustrating experiences of people in Winneba. The cycle of pollutants, defecation, currents and the fishing industry poses risks to public health of the city. Although the interviewees hold different prospections and concerns about city life, they are all vulnerable to this invisible cycle directly and indirectly.



## 1 Introduction

Situated on the coast of the Gulf of Guinea, and with a population of 56,356, Winneba is the largest city in the Effutu Municipal District of Ghana, West Africa (Fig. 1)<sup>[1]</sup>. Muni Lagoon to the west of the city provides habitats for numerous native wildlife and migratory birds. In 1992, the Muni–Pomadze Wetland, where the lagoon lies, was designated as a Ramsar Site for its international ecological value.

Since 2014, Professor Nancy Takahashi of the Department of Landscape Architecture at the University of Virginia (UVA) has been invited to visit Winneba multiple times, and conducted onsite surveys to initiate her into the problems of local ecological environments with the help of local Ramsar site managers. In 2017, she set up the design-research project “Relinking City and Lagoon” in cooperation with Professor Huang Guoping from the Department of Urban and Environmental Planning at UVA to sustain progress based on the harmony between Winneba and Muni Lagoon.

Thereafter, a long-term partnership was established through reciprocal visits of representatives from Winneba and faculty and students from UVA. In response, interdisciplinary seminars and design studios in Landscape Architecture, Architecture, and Urban Planning were offered at UVA. This article derives from two of the courses in 2019<sup>①</sup>.

## 2 Pressure and Potential of Water Sanitation System and its Management

The aggressive urbanization process in Winneba results in an imbalance between the growing needs of the population and the water sanitation services (Fig. 2, 3). The environmental degradation makes life harder particularly for the residents in the dense Old Town. Due to the lack of sanitation, 15% of the residents of Effutu have to defecate in open spaces such as beaches and lagoons<sup>[1]</sup>. The excrement, together with untreated domestic sewage, is discharged along surface runoff or gutters directly into Muni Lagoon, or into other natural water bodies connected to the sea. Worse, the west-to-east longshore currents not only bring the pollutants and germs back to the fishing ports (Fig. 2), where the fish and other aquatic products are contaminated and served as dishes, but also a large amount of marine debris that accumulates on the coast (Fig. 4). These problems challenge the management of water sanitation system in Winneba, and also threaten public environment and health conditions greatly.

Existing water sanitation system in Winneba serves the purposes of potable water supply and domestic sewage discharge. Most local community residents (“residents” hereafter) obtain domestic water from public water kiosks (Fig. 5) and defecate in public toilet facilities. Therefore, where water sanitation stands is also

where local public activities take place—e.g., at a public water kiosk, women wash clothes and chat with each other, with their children playing nearby—all the activities became the basis of the new program.

Maintaining a water sanitation system is labor-intensive. However, by motivating the public to participate in maintaining their own community, the heavy responsibility of long-term maintenance can be shared. In Winneba, the deep-rooted clan tradition, policy guidance for community-based management of wildlife<sup>[2]</sup>, and experience in preserving wetland landscape by community participation<sup>[3]</sup> show potential for a sustainable water sanitation system management plan with community participation.

In addition, the improvement of water sanitation system can potentially empower women in West Africa. In Ghana, approximately 69% of households rely on women (aged 15 and over) to collect water on a daily basis, while 6.5% rely on girls (under 15)<sup>[4]</sup>. Women devote so much time and energy to domestic water that their opportunity to get educated or achieve financial independence is greatly compromised. Water sanitation improvement can significantly reduce time expenditure for water collection. It takes 40 ~ 80 minutes per day on average to collect water from unimproved facilities such as natural water bodies, unprotected wells or springs, but only 10 ~ 25 minutes per day on



8. 交互式网页地图  
8. Interactive Web Map

- ① This project received the Honor Award in Urban Design, 2020 ASLA Student Award and Commendation for Planning and Analysis, 2020 Virginia Chapter of ASLA Student Award.
- ② A “crowd-sourcing” decision-making process refers to an activity that all participants are asked to rank every potential project presented during the workshop. Participants anonymously write down their ratings for each project on cards based on three criteria: high impact, meaning significant benefits to the local community and its environment; high priority, meaning urgency to implement the action; and high feasibility, meaning low political resistance and resource requirements.



that a great local concern was given to the promoting public biogas toilets.

In October, during a fieldwork, the project team gained a preliminary understanding of the daily needs of residents through interviews, (Fig. 7). This investigation has shown that in Winneba: 1) Residents are deeply attached to the sea because fish harvested from the sea is the major food source and the deity who lives in the sea plays an important symbolic role in local culture; 2) Despite its high accessibility and ecological importance, the lagoon is merely valued as a tourist attraction; 3) All interviewees expect for more shade and water sanitation, such as public water kiosks and public toilets.

In May, the author developed an Interactive

10. 项目设计原型：由居民们自建的社区公共空间不仅是一处基本水卫生设施的简单集合，更是一个可容纳公共活动的小型广场。
10. Prototype: The community open space built by residents is not only a simple collection of basic water sanitation but also a small plaza that can accommodate public activities.

Web Map to solicit expectations and suggestions from residents during the next 8 months. Residents could upload audio files on this page to tell their stories, helping the project team to further “hear from” them (Fig. 8).

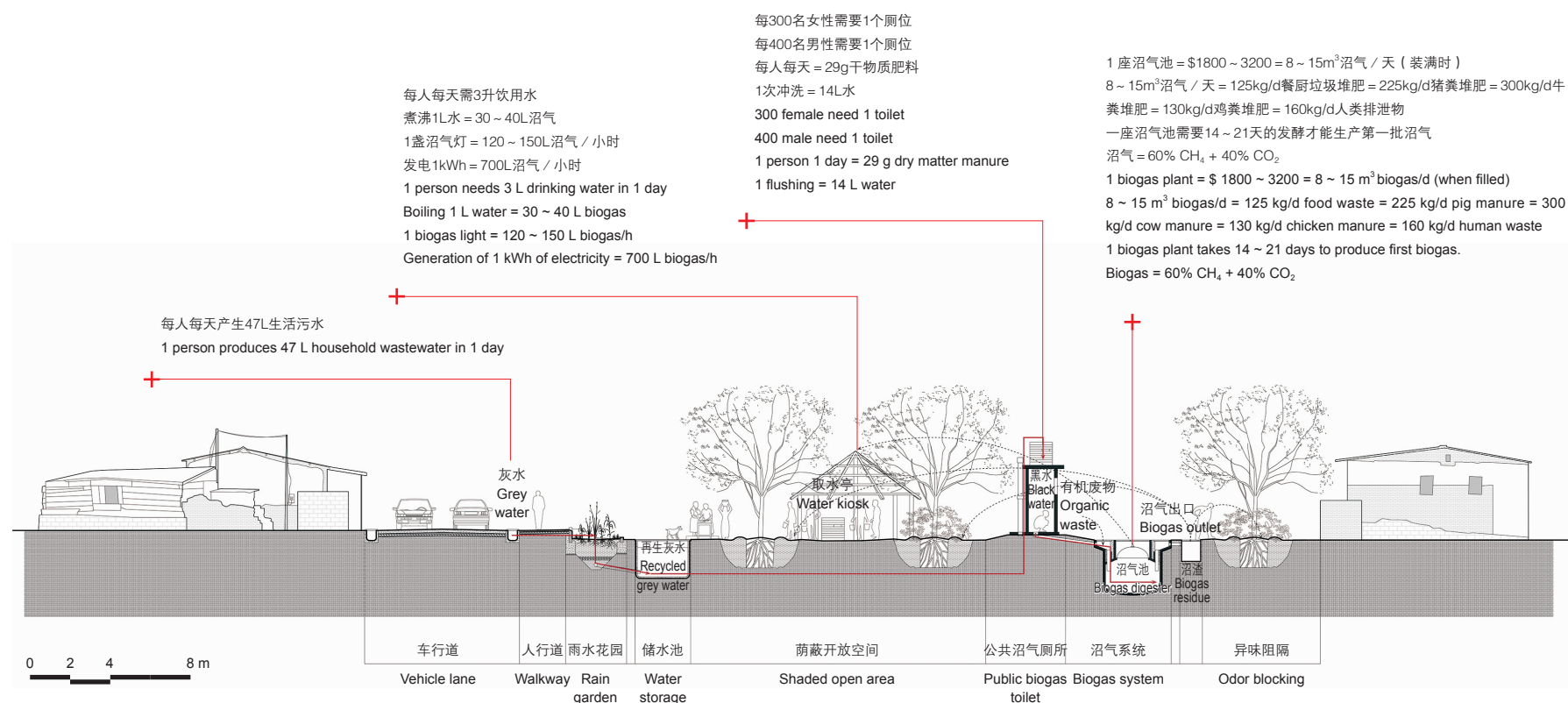
### 3.1 Design Concept

Anthropologist Michael Sheridan argues that the successful long-term maintenance of some African cultural landscapes, such as the sacred groves, is due to their role in mediating social conflicts and facilitating transformations between social capitals<sup>[5]</sup>. In Ghana, public events and customary traditions (e.g. festivals) have been the adhesive between natural and built environments and play an important role in landscape conservation. People celebrate harvests and appreciate nature for its generosity through festive ceremonies. Local tribes protect wetlands and forests by taboos such as a ban on fishing in Muni Lagoon every Wednesday. Besides, existing animal sacrifice prompts efforts for the conservation of wildlife species and their

habitats (Fig. 9). For instance, a place covered by the shade of a sacred grove—usually a protected patch of woods of religious importance, from a forest reserve to a small cluster of trees standing in an open field or urban area—is often used for rituals. Cutting down trees here, which is believed to be disturbing the spirits and gods, is strictly prohibited<sup>[6]</sup>. Evidently, cultural landscapes provide places for public social life. The process of planning, building, and repairing of them, in turn, promote social inclusion.

Therefore, the project team puts forward a sustainable water sanitation system for social equity and ecological benefits. Instead of taking a traditional top-down, government-led approach, it proposes a bottom-up, community-based, and cooperative one. The project stimulates interaction and collaboration among residents, thus providing an innovative paradigm of public place-making.

Residents are encouraged to build their own water sanitation—drainage systems, rain gardens, water kiosks, orchards, public biogas toilets, and



第一阶段：建立公共空间概念  
Phase I: establish the concept of public space



第二阶段：通过协作劳动营造场地  
Phase II: create a site through collaborative work



第三阶段：连接社区  
Phase III: connect communities



organic waste collection stations—with technical support from experts and financial support from the Municipal Assembly. Such effort leads to a landscape transformation in the community (Fig. 10). Domestic sewage is collected through drainage gutters, filtered and purified in rain gardens, and then stored for flushing biogas toilets. A biogas digester converts human excreta (from toilets) and organic waste (from collection stations) into biogas, an energy-rich gas mostly composed of methane, through microbial catalytic fermentation. Biogas energy will be used for water boiling and sterilization at water kiosks, while properly treated residue as fertilizer for orchards.

Planting fruit trees in the community would not only provide valuable shade and public space in the tropical Old Town, but also stimulate the economy, public activities, and street life through street sales of fruits and their processed by-products, catalyzing a new model of community participation. A credit

system could further encourage community participation. By using public toilets instead of open defecation, taking organic waste such as animal waste to a collection station with a biogas digester for disposal instead of casting it outdoors, or participating in the maintenance of public facilities and trees, residents could earn credits or in-kind incentives such as clean water, fruits, bus tickets, or school supplies.

### 3.2 A participatory construction process

The key of the project lies in the community participation. In addition, a Winneba Community Catalyst Committee (“the Committee” hereafter) was established in 2019 to raise funds, provide technical support, mediate potential conflicts, and oversee the construction process. The Committee was composed of important stakeholders, including representatives from the Winneba Municipal Assembly, local government agencies, the Forestry Commission of Ghana, local tribal

authorities, the UEW, and the UVA. Named after the agent used in the biogas production process, the Committee serves as a bridge between various participants in the community to increase the efficiency of collaboration. This form of organization maximizes opportunities for different social groups to meet and collaborate, and fosters community identity. The project will be carried out in three phases (Fig. 11).

#### 3.2.1 Phase I: Establish the Concept of Public Space

In Ghana, because of the ambiguity in local land management, public spaces are always immediately possessed for informal housing

11. 项目分期规划图展示了由试点地块逐步拓展成绿色空间网络的过程。

11. The project phasing shows a network of green spaces will evolve from isolated pilot plots.

once vacant. Therefore, the primary goal is to establish and reinforce the concept of “public space,” which serves as the foundation for subsequent construction of a public water sanitation system.

Groves in Ghanaian traditional culture are often taken as a spatial metaphor for collective activities. Their shade and aroma also add to the atmosphere. In this proposal, they are used to demarcate a site as a “public space” and ward off encroachment. Once initiated, a pilot project would start with a site selection meeting among the UVA project team, the Municipal Assembly, and tribal authorities. The Committee will assist in mapping the selected site and provide a List of Recommended Tree Species, from which the species are fast growing, tolerant of local soil and climate, and have some economic value. The residents will then vote on the species they prefer to plant in their own community. With the help of the Forestry Commission of Ghana, residents

will be hired to plant the selected trees as a way of demarcation (Fig. 12). As time passes by, these sites cooled by groves of trees will soon become popular gathering places for people against tropical climates. In future phases, some of the trees will be transplanted to orchards, riverbanks, or used as street trees to make room for public water sanitation systems.

### 3.2.2 Phase II: Create a Site Through Collaborative Work

To encourage residents to join in the construction of the public water sanitation system, the Committee would give out the following instructions. Residents will be hired in their interests and the employers (local government agencies and the Ghana Forestry Commission) will provide them with the tools and necessary technical supports. Hired residents will engage in building facilities such as public biogas toilets, drainage gutters, rain gardens, organic waste collection stations, and

water kiosks in the demarcated site. In Ghana, women are often encouraged to participate in horticultural works, so job opportunities such as tree maintenance will be available to them. The built small public space serves both as a node of the water sanitation system and as a place for collective activities (Fig. 13).

### 3.2.3 Phase III: Connect Communities

The project envisions an evolution from an isolated system serving just one community to a city-wide public water sanitation system created by multiple communities working together. Neighboring communities could decide how to connect their water sanitation, such as drainage gutters and street trees. As more communities join in, the tree-lined streets are expected to form green corridors with diverse tree species. Each grove in the city will identify the presence of a community public space. Together with the connecting corridors, they will form a new type of urban green network. Cooperation and sharing among neighboring communities can bring residents closer, which provides a stronger social foundation for sustainable water sanitation system management.

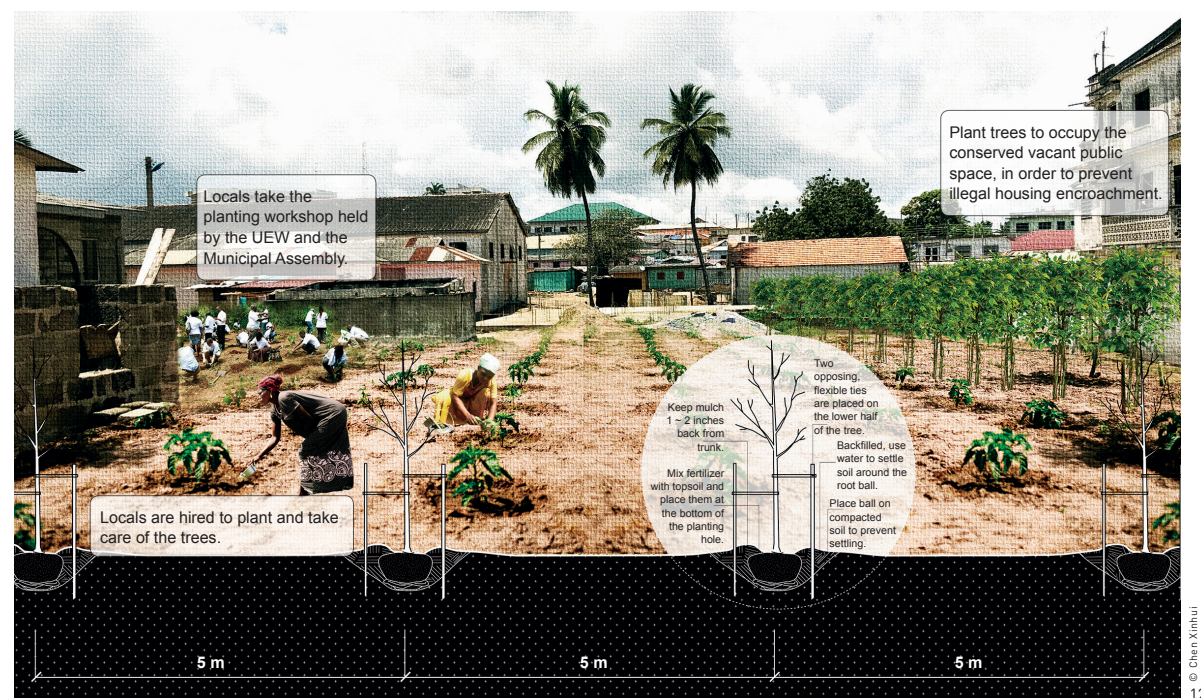
## 4 Discussion and Review

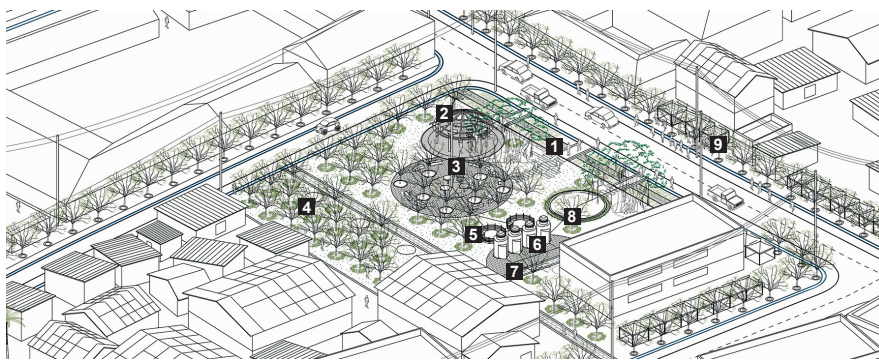
Winneba city planners and municipal assembly members have shown great interest in this small-scale, sustainable urban project and have indicated that they will proceed to mark the vacant plots for design intervention and designate pilot communities.

Drawing inspiration from sacred sites, and taking existing local social conditions into

12. 由社区组织居民在闲置地块种植芒果树，防止其被非法侵占。芒果树为本社区居民投票选举选出的最受喜爱的树种。

12. Led by the community group, the residents plant mango trees, elected as the favorite tree species by this community, on the selected sites to prevent illegal encroachment.



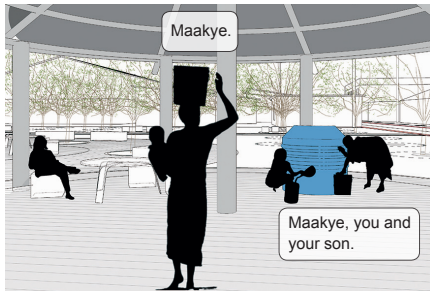


- 1 雨水花园 Rain garden
- 2 取水站 Water kiosk
- 3 公共广场 Public plaza
- 4 社区果园 Communal orchard
- 5 沼气系统 Public biogas system
- 6 公共沼气卫生间 Biogas toilet
- 7 废弃物回收站 Waste collection
- 8 雨水蓄存处 Rainwater storage
- 9 节日集市 Festival market

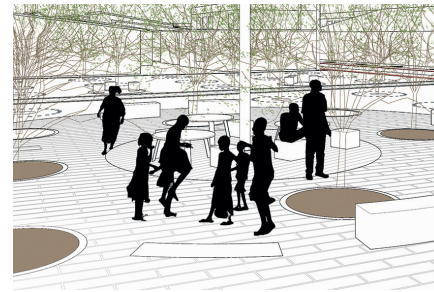
节日集市 Festival market



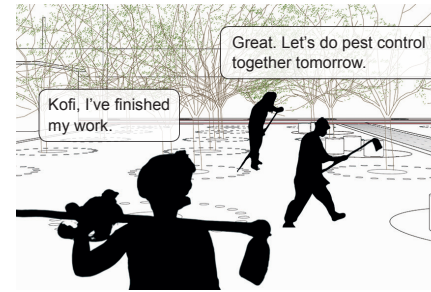
取水站 Water kiosk



公共广场 Public plaza



公共果园 Communal orchard



废弃物回收站 Waste collection



13. 不同社会群体的居民在场地中相遇  
13. People from different social groups meet each other on the site.

account, an innovative approach is proposed to construct a network of public spaces—i.e. water sanitation system—that will contribute to a more inclusive society. Moreover, an integrated management strategy is put forward to ensure the sustainable development of the proposed system through community participation. To get the project off the ground, it is crucial to achieve more support from stakeholders through consultation with local government officials, tribal authorities, and residents from various ethnic groups. It is also beneficial to identify project initiators (either self-organized community units or NGOs), clarify the ownership of vacant public spaces, and muster support for funds and construction techniques, etc. Sustainable management of water sanitation system calls for long-term collaboration among all agencies.

Wangari Maathai, the 2004 Nobel Peace Prize Laureate, Kenyan social and environmental activist once said, “You cannot

protect the environment unless you empower people, you inform them, and you help them understand that these resources are their own, that they must protect them.”<sup>[7]</sup> Despite its small size, Winneba, like many other cities in West Africa, faces a variety of environmental, economic, and social problems. In addition to government investment and external assistance, bottom-up community participation and active engagement of residents are essential to urban infrastructure. Not only proving a design strategy for a kind of green spaces or a plan for a network of urban green space system, this project also sets an exemplar to long-term sustainable maintenance of a water sanitation system through self-government of residents and communities. The self-managed network of green spaces in Winneba can serve as a prototype for urban revitalization in West Africa in the same way as the network of small piazzas did to the city of Florence during the Renaissance. **LAF**

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