

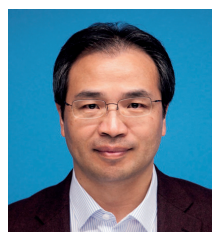
# 创新体制机制，共抓长江大保护

## COMPREHENSIVE CONSERVATION OF THE YANGTZE RIVER WITH INNOVATIVE SYSTEMS AND MECHANISMS

### 1 长江的“病因”

自党的“十八大”以来，党和国家领导人审时度势，逐步明确了“一带一路”建设、京津冀协同发展，以及长江经济带发展三大国家战略，其覆盖的地区不仅经济发展迅猛，而且汇集了丰富的资源。截至2016年，长江经济带的人口和GDP均占全国40%以上。随着2019年“两会”将“长三角区域一体化发展”上升为国家战略，长江三角洲经济文化的重要性再一次得到印证。

随着三峡工程以及长江上游干支流梯级水库的陆续兴建，长江防



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### 摘要

长江流域承载着重要的经济及文化价值，但也面临着严峻的水环境污染与生态破坏问题。2018年12月13日，作为三峡集团以企业化、市场化方式推动“长江大保护”的核心实施主体，长江生态环保集团有限公司在湖北武汉注册成立。其在探索生态环境保护路径的过程中，采取“先试点，再总结，再提炼，后推广”的方法，提出“厂网一体”策略以确保排水系统运行的安全性和高效性，以及“厂网河（湖）岸一体”策略来进一步解决水环境综合治理问题，兼顾水生态系统修复。“一城一策、因城施策”理念的提出则旨在运用不同的治理方法来适应不同的城市需求。只有加强水体治理，改善城市环境，才能使城市更具吸引力，进而带动招商引资和产业导入等。当形成了合理的回报机制，企业的生态价值链才能建立起来。此外，在“长江大保护”工作中，各级管理人员都要扮演好资源提供者和协调者的角色，既要掌握专业知识，了解服务对象，也要具备极强的协调和组织沟通能力。

### 关键词

长江大保护；三峡集团；长江流域；水环境综合治理规划；生态修复；体制与机制

### ABSTRACT

With huge economic and cultural significance, the Yangtze River Basin in China has long suffered from severe water pollution and ecological damage problems. On December 13, 2018, the Yangtze Ecology and Environment Co., Ltd. was established in Wuhan City, Hubei Province as the key implementer under the China Three Gorges Corporation to promote the Comprehensive Conservation of the Yangtze River in a market-oriented way. In the exploration of environmental protection path, “from pilot programs to experience summary, refinement, and promotion” method is adopted. Besides, two strategies are proposed: to integrate the sewage plants and the pipeline network to ensure the operation of the sewerage system safe and efficient; to integrate sewage plants, pipeline networks, river (or lake), and banks to reduce water pollution and restore the water ecosystem systematically. Furthermore, targeted strategies are put forward in different cities. After the environment is recovered and residents' living quality is improved, the city can attract more investments and industries and a sustainable value chain of enterprises would be formed. Finally, all administrative bodies should serve the roles of resource suppliers and coordinators, acquiring expertise knowledge, learning the requirements of the service objects, and facilitating coordination and communication positively.

### KEYWORDS

Comprehensive Conservation of the Yangtze River; China Three Gorges Corporation; Yangtze River Basin; Water Environment Comprehensive Treatment Planning; Ecological Restoration; Systems and Mechanisms

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洪工作已经取得一定进展。工业化和城镇化的快速发展在提升人民物质生活水平的时候，也带来了日益严峻的环境问题。从西方现代工业文明的发展以及中国自改革开放以来的发展进程来看，“先污染、后治理”的做法需要付出高昂的时间和空间代价。2016年1月5日，习近平总书记在推动长江经济带发展座谈会上提出“长江病了，而且病得不轻……要把修复长江生态环境摆在压倒性位置……共抓大保护、不搞大开发”。

既然长江病了，就需要诊断病因。长江流域的污染治理目前多聚焦于水质上。在国家层面，推动长江经济带发展领导小组办公室已组织各相关部委和科研院所进行科学诊断，基本明确了长江流域的五大污染源：

1) 城镇生活污水与垃圾污染。长江经济带沿线城镇化程度高，人口稠密，产生了大量的生活污水和垃圾废物，但与之相匹配的城镇基础设施尚不健全，尤其是管网基础设施，难以做到污水全收集、收集全处理、处理全达标，以及综合利用；

2) 化工污染。在工业化进程中，不可避免地会产生大量带有化工污染物（如重金属）的废水。尽管通过科学方法进行治理并非难事，但由于立法不到位、执法不严格、监督管理及相关技术未完全配套等原因，化工污染治理工作推进缓慢；

## 1 Diagnoses of the Yangtze River

Since the 18th National Congress of the Communist Party of China in 2012, the Belt and Road, Coordinated Development of Beijing-Tianjin-Hebei Region, and Yangtze River Economic Belt Development have been identified as the three national strategies by the central government. Regions involved in these strategies have experienced rapid economic growth with the concentration of resources. By 2016, the Yangtze River Economic Belt has become one of the most important national hubs, the population and GDP of which have accounted for over 40% of China. In 2019 NPC & CPPCC, the integrated development of the Yangtze River Delta was elevated to the status of national strategy, further validating the economic and cultural significance of the Yangtze River Delta.

With the construction of the Three Gorges Project and the cascade reservoirs along upper reaches of the Yangtze River, the flooding risks have been controlled to some extent. Although the rapid industrialization and urbanization improve residents' living standards, they cause increasingly severe environmental problems. It is not wise to follow the footprints western developed countries have left, and “pollution first, treatment later” is costly and time-consuming. On January 5, 2016, at the Seminar on the Promotion of the Development of the Yangtze River Economic Belt, President Xi Jinping pointed out that “the Yangtze River has been ill severely... We must put the ecological restoration of the Yangtze River at a dominant position..., making all-out efforts to protect the river, and avoiding large-scale development of it.”

Diagnosis goes first before the restoration. Currently, the Yangtze River Basin remediation focuses on the water quality. According to the scientific research and diagnoses of related ministries and commissions and institutes led by the Office of Leading Group on the Promotion of the Development of the Yangtze River Economic Belt, there are five pollution sources of the Yangtze River Basin:

1) Urban domestic sewage and waste. The intensive urbanization and population settlement along the Yangtze River Economic Belt generates huge amounts of domestic sewage and waste, while the infrastructures, especially the pipeline networks are not yet capable of a complete collection, treatment, and recycling of them;

2) Chemical pollution. The industrialization process inevitably generates a massive amount of sewage with chemical pollutants (e.g., the heavy metal) that could have been easily treated by proper technological approaches. However, the conditions have gotten little alleviated at present due to the poor legislation, enforcement, and supervision mechanisms as well as the under-developed technologies;

3) 农业面源污染。作为中国的粮仓、棉仓, 长江经济带大量农业活动中使用的农药和化肥, 以及畜禽养殖产生的废弃物也会在降水和径流冲刷作用下直接进入水体, 造成棘手的水环境污染问题;

4) 船舶污染。长江自古以来就是中国的黄金水道, 航运密集。当前, 过往船只大多以柴油为动力, 含有油污的洗舱水和从船上直接丢入江中的生活垃圾对江水造成了严重污染;

5) 尾矿库污染。这一问题主要集中在长江中上游地区。例如, 位于长江中上游交界处的湖北省宜昌市拥有亚洲规模数一数二的磷矿基地, 未经充分处理的尾矿大量沉积, 残留的重金属及化学药剂等加剧了流域的污染问题。

水资源短缺是治理过程中的另一大阻碍。单纯的水资源短缺并不可怕, 可以通过污水资源化利用予以解决。例如, 在严重缺水的以色列, 约90%的污水可被回收利用, 约占全国总供水量的25%; 淡化后的海水也是重要的水资源之一<sup>[1]</sup>。相比之下, 长江年径流总量超过9 000亿立方米<sup>[2]</sup>, 若将整个水系作为一个庞大的淡水资源库加以战略性保护与利用(如对雨洪进行资源化利用), 那么水资源短缺问题便会迎刃而解。然而, 目前长江流域生态的恶化加剧了水体污染, 造成了水质性缺水, 使得水资源短缺问题愈加严重。因此, 通过科学的水资源配置修复长江刻不容缓。

## 2 长江流域可持续发展策略

在查清“病因”后, 就可以针对特定问题开展相应工作。可持续发展既指环境的可持续, 也指经济、社会、人文等方面的可持续; “不搞大开发”不等于不开发, 开发建设要坚持生态优先、绿色发展, 同时将环境影响纳入具体的决策考量中。江河治理是流域性的, 流域包含上下游、左右岸、干支流, 在这个系统中, 如果仅实施片段化、末端式的工程项目, 则远远达不到系统治理的效果。此外, 过去许多城市为了处理污水和垃圾, 建设了不少污水处理厂、垃圾焚烧厂, 这些处理设施功能健全, 部分设施的设计处理负荷甚至远远大于实际需求, 但利益驱使加之监管机制不完善, 导致偷排偷放等违法行为依旧存在。

因此, 就长江流域的治理与生态修复而言, 中央制定的“中央统筹、省负总责、市县抓落实”的管理体制非常必要, 这也是当前推动“长江大保护”工作的核心工作机制。过去的统筹不足一方面是由于系统协调不足, 另一方面是因为推动力度不足, 包括投资不足、政策支持不足, 以及技术研发不足等。单独来看, 每个部门制定和实施的

3) Agricultural non-point source pollution. As the production base of grain and cotton in China, the Yangtze River Economic Belt suffers from water pollution caused by massive use of pesticides and fertilizers in the agricultural activities and waste from livestock and poultry breeding. They are washed into the water bodies by rainfall and runoff directly;

4) Pollution from ships. As a “golden waterway,” the Yangtze River has also been polluted by the diesel in tank washings and garbage directly discharged from ships;

5) Tailing pond pollution mainly in the upper and middle reaches. For example, one of the largest phosphorite mine fields in Asia sits in Yichang, a city of Hubei Province at the boundary of the upper and middle reaches of the Yangtze River, and its massive undertreated tailings with residual heavy metals and chemicals aggravate the watershed pollution.

Water shortage is another challenge to water environment management. Generally, it could be solved by recycling sewage as resources. For instance, in Israel, a country suffering from acute water scarcity, around 90% of sewage can be reused, which accounts for 25% of the nation's total water supply, and the desalination of sea water also plays an important role in providing water resources<sup>[1]</sup>. In comparison, the Yangtze River with an annual runoff of over 900 billion cubic meters<sup>[2]</sup> should have been wisely protected and utilized (e.g., the collection and reuse of stormwater) as a huge freshwater resource pool. However, the degrading ecosystems in the Yangtze River Basin aggravate the pollution-induced water scarcity. Thus, the restoration of the Yangtze River with scientific water resource allocation is urgently necessary.

## 2 Sustainable Development Strategies of the Yangtze River Basin

With the problems identified, specific solutions could be put forward accordingly. Sustainability should be taken into consideration not only in the environment development, but also in economy, society, and culture. Avoiding large-scale development of the river does not mean stopping all new developments, and it calls for adherence to the path of green development that puts ecology first and efforts to consider environmental impact in the decision-making process. River management requires a holistic approach that covers all reaches, banks, trunk streams, and tributaries. Any segmented project would fail to restore the watershed systematically. Besides, many functional sewage treatment plants and waste burning plants have been set up in cities, and the treatment loads of some plants even exceed actual demand largely. However, driven by economic interests, illegal discharge still takes place frequently under the insufficient supervision.

措施都是科学有效的，但实际却没有真正发挥系统治理的作用，原因在于各自为政、多头管理、缺乏统筹协调。

水安全问题实质上是社会综合问题，首先需在理念和行动层面进行全方位、系统性筹划，通过公众教育等途径，引导企业和群众改变生产生活方式，同时完善营商环境，增强企业的环保意愿；而后借助景观规划设计手段实现水环境治理与生态修复；当水体生态恢复到良好的自然状态，就可以进一步开展水资源的科学保护、开发与利用。

### 3 长江环保集团的成立契机与使命

2018年5月，国家发展和改革委员会、国务院国有资产监督管理委员会联合发文，明确把“在共抓长江大保护中发挥骨干主力作用”作为三峡集团新的战略发展定位。

作为三峡工程的建设者和管理者，三峡集团在长江梯级水能资源开发过程中始终秉持科学的精神、科学的态度、科学的方法，不断在体制机制、生产技术、规范标准方面创新创造，将核心技术掌握在自己手中——这正是总书记将共抓大保护重任赋予三峡集团的首要原因，期望三峡集团继续在这项工作中发挥示范引领和组织协调的作用。共抓大保护工作也需要大量的资金投入，在党和国家、全国人民长久以来的支持和帮助下，三峡集团已发展成为长江经济带上最具实力的央企之一，为共抓大保护工作提供了经济保障。

2018年12月13日，作为三峡集团以企业化、市场化方式推动长江大保护的核心实施主体，长江生态环保集团有限公司（简称“长江环保集团”）在湖北省武汉市注册成立。其与长江绿色发展投资基金、长江生态环保国家级工程研究中心、长江生态环保产业联盟，以及共抓长江大保护专项资金共同构成了三峡集团共抓长江大保护的五大业

Therefore, it is necessary to implement the management mechanism where the central government makes overall plans, provincial-level governments take overall responsibility, and city and county governments ensure implementation. This is also the core mechanism of the Comprehensive Conservation of the Yangtze River. It can substantially connect and coordinate the formerly scientific but failing policies, plans, and measures made by isolated departments, in order to achieve a systematic improvement of the watershed ecological environment with better financial, policy, and technical support.

Water security, in essence, is a comprehensive social issue. Therefore, enterprises and citizens should be encouraged to change production modes and lifestyles through public education, and the business environment should be improved to enhance enterprises' willingness of undertaking the environmental responsibility. Subsequently, water treatment and ecological restoration can be carried out through landscape planning and design. With an ecologically healthy water environment, we could then protect, develop, and utilize the water resources of the Yangtze River more scientifically.

### 3 Opportunities and Missions of the Yangtze Ecology and Environment Co., Ltd.

In May 2018, China Three Gorges Corporation (CTGC) was officially positioned as the backbone to the Comprehensive Conservation of the Yangtze River by the central government.

Such a responsibility is a recognition of CTGC's scientific attitude and innovative mechanisms, production technologies, and standards which have embodied clearly in the cascade hydropower development of the Yangtze River. The possession of core advanced technologies makes CTGC continue to play a role of demonstrating and coordinating in the protection of the Yangtze River. After years of development, CTGC has grown into one of the most capable central enterprises in the Yangtze River Economic Belt, guaranteeing the protection work financially.

On December 13, 2018, the Yangtze Ecology and Environment Co., Ltd. (YEE) was established in Wuhan City, Hubei Province as the key implementer under CTGC to promote Comprehensive Conservation of the Yangtze River in a market-oriented way. Besides YEE, there are other four platforms, including the Yangtze River Green Development Investment Fund as a fund raising platform to guarantee capital, the Yangtze River Ecological and Environment Protection Engineering Research Center as a research platform to conduct researching and monitoring businesses then facilitate the application of the research results, The Yangtze River Ecology and Environment Protection Industrial Alliance as a



1. 建设中的江西省九江市芳兰污水处理厂一期工程

1. The first phase of Fanglan Sewage Treatment Plant under construction in Jiujiang City, Jiangxi Province

1 © 长江生态环保集团有限公司

务平台。其中，长江绿色发展投资基金是筹资平台，定位为国家级产业投资基金，为共抓大保护提供资金保障；长江生态环保工程研究中心是研发平台，承担生态环境的研究和监测业务，并将研究成果加快转化应用于长江经济带生态环保业务；长江生态环保产业联盟是共建平台，促进产业链上下游企业、机构的有效融合，形成项目共建、利益共享、责任共担的生态环保产业链；长江生态环保专项资金是支撑平台，负责水环境综合治理规划、技术示范工程以及前沿科研等。

成立长江环保集团的另一大目标是重构行业生态。首先，要具备系统性思维，明确责任方、组织方与参与方，科学合理地安排项目；其次，环保工作要与城市定位及区域社会经济发展水平相匹配。当前的治理工作大多聚焦在技术层面，没有引入经济学的概念，但经济账一定要算明白，以实现资金平衡。

#### 4 长江经济带生态环境保护路径

泰晤士河的全流域治理始于19世纪下半叶，至今已有一百余年；莱茵河流域的治理始于20世纪50年代，目前也获得了良好的整治效果。因此，长江流域的生态状况也必定不是一朝一夕能够改变的，一定要秉承科学的精神和态度，做好具有前瞻性的规划设计，在新技术的协助下制定愿景，一张蓝图绘到底，久久为功。

在探索过程中，长江环保集团采用了“先试点，再总结，再提炼，后推广”的科学路径。目前，16个长江沿岸合作市县的先行先试工作已全面启动，其中包括第一批确定的4个试点城市——九江、芜湖、岳阳、宜昌，以及第二批确定的重庆、武汉、南京、上海等城市。上述试点城市河湖水系均非常复杂，水环境问题也极具代表性。

在城镇污水治理实践中，需要明确的一点是，已建成的污水处理厂容量大多过剩。前期普查工作发现，大量城市地下管网存在管道老化、管网系统改造滞后、缺乏统一的管理和监督机构等问题，加之偷排偷放现象严重，污水未能被全部收集，使治理工作难以取得成效。因此，首要工作是实现污水管网全覆盖，并确保管网建设符合城市特性。通过研究，我们提出了“厂网一体”和“厂网河（湖）岸一体”两个策略：前者可以确保整个排水系统运行的安全性和高效性，后者则旨在解决水环境系统治理问题，并兼顾水生态系统修复。另外，处理技术与排放标准之间的差距也是治理成效不足的重要原因，因此，我们建议未来污水处理厂出水排放标准均提高至一级A标准。

以城镇污水处理为切入点就是要止住长江的“出血点”，而不是先种上美丽的花草。不可否认，中国的生态环保企业目前已进行了诸多探索，是污染治理的先行者，但相关工作仍存在不足之处。我们要有一种扬弃的担当和责任，同时让群众参与进来，使他们产生现实的获得感。

jointly-built platform to promote the integration of businesses and institutions across the industrial chain with shared benefits and obligations, and the Yangtze River Protection Special Fund as a support platform to fund the comprehensive planning of the water environment, technological demonstration projects, and cutting-edge research activities.

YEE is also expected to play a role in rebuilding the operation model of the industry. Firstly, a holistic thinking is required to arrange relevant work scientifically and reasonably with identified responsible parties, organizers, and participants. In addition, the protection work should match the city orientation and socio-economic development level and take financial feasibility into consideration, rather than just focusing on technologies and overlooking the importance of Economics.

#### 4 Approaches to Protecting the Ecological Environment of the Yangtze River Economic Belt

The holistic improvement of watershed can never be realized overnight. For example, the management of the Thames River started in the second half of 19th century and that of the Rhine River dated back to the 1950s, and both have achieved satisfactory results. Therefore, the management of the Yangtze River Basin should make a proactive planning with scientific attitude and cutting-edge technologies, as well as perseverance and sustained efforts.

YEE's exploration follows a path “from pilot programs to experience summary, refinement, and promotion.” The pilot programs have been launched in 16 cities and counties along the Yangtze River, including Jiujiang, Wuhu, Yueyang, and Yichang as the first group, and Chongqing, Wuhan, Nanjing, Shanghai, and other cities as the second group. All of them are selected for their complex water systems with representative water environmental problems.

Early-stage investigation finds that the capacities of urban sewage treatment plants are usually excessive, while numerous sewage network systems are suffering from aging pipelines, overdue improvement, and lack of synergy and coordination in management and monitoring work. The illegal discharges make it worse. Therefore, the first step is to establish a 100-percent-coverage sewage system and to ensure the network construction to meet practical demands of the cities. Two strategies are proposed: first to integrate the sewage plants and the pipeline network to ensure the operation of the sewerage system safe and efficient; and second to integrate sewage plants, pipeline networks, river (or lake), and banks to reduce water pollution and restore the water ecosystem systematically. Besides, the sewage treatment capacity should meet a



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2. 安徽省芜湖市试点岸线治理愿景

2. The vision of a waterfront plot project in Wuhu City, Anhui Province

## 5 长江大保护工作的实施情况

在宏观层面，长江环保集团最基本的工作是通过大数据统计和分析，摸清长江流域沿线11个省及直辖市的本底，之后再行流域系统规划。目前，我国上到生态环境部、水利部、自然资源部，下到各地流域管理局都拥有大量的数据资料，但均各成孤岛，未成体系。在今后的治理过程中，希望能够得到更多国家层面的支持，将这些数据进行整合。此外，长江环保集团也在推进构建相关断面在线监测平台、智慧水务平台等信息系统，并计划安装大量传感器或摄像设备，以为未来智慧水务的高效精准运营维护打下基础。

我们将基于对城市的水资源和水污染现状、河湖岸工程的定位和功能、人口稠密区和工业区的布局等方面的了解，为每一个地区做顶层的水环境综合治理规划，再结合各地的自然资源优化规划方案。以往的城市规划通常由侧重市政管网和基础设施建设的工程设计院牵头，但在水环境综合治理规划中，相关工作更适合由具备流域系统思维的相关设计院牵头，并由市政、水利、环保等多专业设计团队协作完成。此外，我们还将依据相关城市专项规划，整合形成统一的水环境综合治理规划，并以此确定后续的项目清单与实施顺序，因为即使是同一个项目、同样的资金投入，实施顺序的不同也会带来截然不同的效果。

针对不同的城市，我们提出不同的治理策略，即“一城一策、因城施策”。例如，绝大部分城市的污水处理厂体量已经足够，无须再进行投资建设。这时就要补齐管网短板，或征用、或改造、或新建，简而言之就是“盘活存量、带动增量”。

在理论研究与技术创新层面，长江环保集团已经与清华大学、同济大学等拥有生态环保专业的高校达成了研究合作协议，长江环保集团的国家级工程研究中心也已在水污染防治（如污染预防与处理、黑

higher discharge standard, which is suggested to reach Grade I-A.

Starting with the urban sewage treatment, the protection efforts aim at the primary pain points of pollution, rather than beautification of the Yangtze River water environment. As a pioneer of environmental protection industry in China, we should take the essence and discard the dross of the previous work done by other enterprises, keep exploring and encouraging citizens to join our practice to enhance their sense of achievement.

## 5 Implementation of the Comprehensive Conservation of the Yangtze River

On the macro-level, the fundamental task of YEE is learning about the environmental background state of the 11 provinces or municipalities through big data collection and analysis before systematic watershed planning. Such information is now owned by different-level administrations from the Ministry of Ecology and Environment, the Ministry of Water Resources, the Ministry of Natural Resources to the local watershed authorities, and needs to be integrated systematically in the future with the support on the national level. At the same time, YEE is developing online information systems with large networks of sensors or cameras to intelligently monitor watershed sections and conduct Smart Water Conversancy.

Based on the learning of the status quo of water resources and pollution, the orientation and function of the river-lake-bank projects, the layout of the congested areas and industrial areas, as well as local environment and resource conditions, we can then make and optimize the comprehensive top-down planning for each city. Thus, it is more suitable for planning and design institutes with a systematic thinking of watershed to lead and coordinate with municipal, hydraulic, and environmental protection departments and professionals. Besides, subject plans would be integrated into a comprehensive planning to identify the sub-tasks and implementation procedure to optimize the investment and gain the best outcomes.

In different cities, targeted strategies are put forward. For example, given that sewage treatment plants are sufficient in most cities, we suggest to improve the pipeline networks, taking advantage of existing facilities as much as possible and constructing new ones when necessary.

In theoretical research and technological innovation, YEE has come to agreements with universities such as Tsinghua University and Tongji University to provide intelligence support. Our national-level engineering research center is working on topics including water pollution prevention and control (such as pollution

臭水体治理)、流域水资源科学利用(如流域综合调度、环境友好型综合安全调控)、生态保护与修复(如陆域、河岸带、水体等的生态修复)、生态环境影响研究与评价、生态与环境监测等课题上进行了积极探索。

在投资层面,我们主要采取TOT模式<sup>①</sup>来盘活城市基础设施存量资产,吸引、增加社会投资总量,合理配置资源;同时,促使地方政府转变观念和职能,秉持“不求所有,但求所在”的理念。若要将绿水青山与金山银山划等号,就要探索生态效益价值化的路径和方式,建立企业发展的可持续生态价值链。现阶段大部分地方政府都采用标准的政府和社会资本合作(PPP)模式实施工程项目,但这一模式并非始终可持续。因此需要改良PPP模式的回报机制,探索其与政府专项资金、以生态引领城市可持续发展等模式的结合。只有加强对水体、空气和土壤的治理,改善城市环境,才能实现愿景中的美好生活,使城市更具吸引力,进而带动招商引资、产业导入、土地增值等。只有形成了合理的回报机制,企业的生态价值链才能建立起来。

在实施层面,我们根据当地特定的污染问题运用不同的技术手段。同时,鉴于技术的效用在项目初期不易甄别,我们的解决方案是让更多真正掌握核心技术的企业参与到污染治理的技术示范项目中来,见成效后再买单。

## 6 结语

以往的流域环境治理政策、体制、机制存在较多局限,相关激励及约束措施均未能适应生态环保行业的特性。在此背景下,三峡集团应充分发挥市场化运作和可持续发展模式机制探索的作用,协助推动治水模式、价格机制、投资机制、回报机制和建设机制等的更新换代。模式决定治理效果,机制解决可持续问题。我们要以“老板思维”而非“伙计思维”开展大保护工作。各级管理人员都要扮演好资源提供者和协调者的角色,既要掌握专业知识,了解服务对象,也要具备极强的协调和组织沟通能力。LAF

precaution and treatment), scientific utilization of water resources (such as watershed integrated dispatching and environmental-friendly safety regulation), ecosystem protection and restoration (such as the restoration of land, river banks, and water bodies), study and evaluation of ecological environmental impacts, as well as ecology and environment monitoring.

Faced with financial challenges, the TOT<sup>①</sup> mode is adopted to put idle assets to better use, attract social investment and properly allocate resources. It also helps to shift the management philosophy of the local governments from aiming to own businesses operating in their localities to playing good hosts. Moreover, we need to explore how to transform ecological benefits into economic value and set up a sustainable ecological value chain for business growth. Public-Private-Partnership (PPP) projects are recently popular among local governments, but it is not always sustainable. We should improve its rewarding mechanism and attempt to integrate it with the Government Special Funds and the Ecology-Oriented Development mode. After the environment is recovered and residents' living quality is improved, the city can attract more investments and industries and a sustainable value chain of enterprises would be formed.

On the practical aspect, developing pertinent measures to targeted pollution problems is important. Meanwhile, we want to involve enterprises owning core technology in the demonstration projects, and pay the bill after the pollution treatment work takes effect.

## 6 Summary

In order to face up to the limitations of previous policies, institutions, and mechanisms on the Yangtze River Basin restoration, and the fact that incentive and constraint measures failed to work in the environment protection industry, CTGC is trying to explore a new watershed management model in a market-oriented way while promoting the upgrade of the pricing, investment, rewarding, and construction mechanisms so as to enhance the treatment effect and sustainability. We must develop the master awareness to join actively in the Comprehensive Conservation of the Yangtze River. All administrative bodies should serve the roles of resource suppliers and coordinators, acquiring expertise knowledge, learning the requirements of the service objects, and facilitating coordination and communication positively. LAF

## REFERENCES

- [1] Fluence News Team. [2017, February 15]. Israel Leads World in Water Recycling. Retrieved from <https://www.fluencecorp.com/israel-leads-world-in-water-recycling/>
- [2] Huang, Z. [2019, May 25]. Expert: China Faces More Water Challenges while the Yangtze River Runoff Reduces by 7.5% in the Past Decade. The Beijing News. Retrieved from <http://www.bjnews.com.cn/news/2019/05/25/583396.html>

① TOT模式,即移交-经营-移交,通常指政府部门或国有企业将运营项目一定期限内的产权或经营权有偿转让给投资人,由其进行运营管理,投资人在约定期限内通过经营收回全部投资并得到合理回报,在双方合约期满后,再将该项目交还政府部门或原企业的一种融资方式。

① TOT is the abbreviation of Transfer-Operate-Transfer. It is a financing mode that government or state-owned enterprises transfer the property right or management right of projects to investors with compensation for a fixed term. Investors could recover cost by the operation and get returns during that period, then transfer the rights back to the government or the enterprise on the expiration of the contract.