Sustainable development of energy, water, and environment systems

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This special issue contains 10 articles selected from the 1st International Symposium on Water Resource and Environmental Management (WREM 2018), which was held in Kunming, China, from the 28th to the 29th of November 2018. WREM is an annually held conference, which covers the topics of resilient water management, aquatic restoration, habitat conservation, hydrologic modeling, the impact of climate change on water resources, non-point source pollution, the role of industry and agriculture in water management, and others.

After a meticulous peer-review process, ten (10) high scientific-level papers have been accepted for publication. They mainly concern sustainable development of energy, water, and environment systems.

The first paper is entitled “Effects of rainfall intensities on sediment loss and phosphorus enrichment ratio from typical land use type in Taihu Basin, China” (Yang et al. 2019a). In this work, field plots were established to evaluate the effects of rainfall intensities on sediment yield and phosphorus enrichment ratio (ERP) in surface runoff. The authors simulated three types of rainfall intensities for understanding the transportation from farmland via surface runoff. The findings of this study provide valuable aid to farmers on how to manage farmland effectively to prevent soil nutrient loss and reduce water eutrophication.

The second paper “Numerical simulation study of strip filling for water-preserved coal mining” (Sun et al. 2019) aims to reduce the damage to groundwater and surface water by the underground coal mine. The effects of different strip filling conditions

on the diversion fissure zone are studied by discrete element numerical experiments. The strip filling method can effectively prevent the upward and downward fissures of the water-blocking rock group from penetrating, and can ensure that the surface water system is not affected by the underground coal mining activities.

The third paper “Multi-objective optimized scheduling model for hydro-power reservoir based on improved particle swarm optimization algorithm” (Fang and Popole 2019) aims to study the performance of the high-pressure SCR system under the conditions of low-sulfur and high-sulfur exhaust gas. And the two main engine modulation schemes of the scavenging bypass and the turbine exhaust bypass of the original engine matching with the high-pressure SCR system were also studied. It is found that both modulation scheme methods can make the exhaust performance of the original engine meet the requirements of the IMO Tier III regulations, but the scavenging bypass modulation scheme had less impact on the original engine’s performance.

The fourth paper entitled “The hydropower myth” (Williams 2019) aims to contribute new directions to understanding global hydropower development, questioning commonly held assumptions that it is ubiquitously beneficial, and investigating how these assumptions are not only false, but also the circumstances which lead them to be upheld. In particular, this paper discusses how hydropower has come to be represented as a key tool for development and as a provider of clean energy while policy and development deliberately overlooks the negative social and ecological externalities associated with hydropower development.

The fifth paper entitled “Analysis of broad leaved forest carbon sinks changes and forest economics and management in China” (Zhang et al. 2019) aims to analyze changes in broad leaved forest carbon sinks and the relations between the changes and the investment in forestry fixed assets in silviculture and afforestation and management level improvement, etc. in China from 1981 to 2014. The paper establishes carbon sink estimates using the forest stock volume conversion method and analyses recent carbon sink trends of the

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dominant species of broad leaved forest which is based on 6 times inventories of China's forest resources. The results show that a significant effect has been made by the forest carbon sinks of the dominant species of broad leaved forest and investment in forestry fixed assets in silviculture and afforestation, management level improvement, etc. though with a lag of 4–7 years, and there raises a lot of discussions of various problems regarding forest carbon sinks and forest management and economic development in the paper.

The sixth paper is entitled “An empirical study on energy utilization efficiency, economic development, and sustainable management” (Pan et al. 2019). This paper analyzes the concept of the environmental Kuznets curve, taking 35 European countries as the research objects discuss the trend of energy utilization efficiency from 1990 to 2013, and then analyzes the relationship between energy efficiency and economic development. The empirical results conclude that energy efficiency and economic development showed a quadratic U-shaped relationship, indicating that the long-term energy efficiency of the country will first decline and then rise during economic activities.

The seventh paper “Combustion and emission characteristics for a marine low-speed diesel engine with high-pressure SCR system” (Zhu et al. 2019) aims to study the performance of the high-pressure SCR system under the conditions of low-sulfur and high-sulfur exhaust gas. And the two main engine modulation schemes of the scavenging bypass and the turbine exhaust bypass of the original engine matching with the high-pressure SCR system were also studied. It is found that both modulation scheme methods can make the exhaust performance of the original engine meet the requirements of the IMO Tier III regulations, but the scavenging bypass modulation scheme had less impact on the original engine's performance.

The eighth paper is entitled “The influence of extensive green roofs on rainwater runoff quality: a field-scale study in southwest China” (Liu et al. 2019). In this work, the runoff quality of two field-scale extensive green roofs with common plant-media combination in southwest China has been studied. It showed that both green roofs mainly acted as pollutant sources with greater concentrations of SS, COD, and TP when compared with rainwater quality. When compared with runoff quality from the control roof, greater TP concentrations in runoff from one green roof with commercially available substrate were observed.

The ninth paper is entitled “Cross-Strait climate change and agricultural product loss” (Lin et al. 2019). This study applies Cross-Strait ICIO table with the period 2005–2017 to estimate direct and indirect losses caused by natural disasters. The estimation indicates that the value-added losses caused by natural disasters in economic sectors account for 87.4% in Mainland China and 94.6% in Taiwan of total separately.

The final paper is entitled “Environmental policy, tax, and the target of sustainable development” (Yang et al. 2019b). The main purpose of this work considered the policy effects

of enterprise heterogeneity in an open economy and studied the relationship between environmental policies and sustainable development. The results show that the optimal environmental policies for sustainable development are negative in a closed economy and positive in an open economy. Because of the assumption of imperfect competition, the result of negative tax is consistent with other existing provisions. Imperfect competition distorts efficiency more than environmental policy compensates, even if firms' productivity is heterogeneous.

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