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Modeling and dynamic assessment on sustainable development of drainage enterprise: Application of a coupled system dynamics-comprehensive assessment model

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Modeling and Dynamic Assessment on Sustainable 1 **Development of Drainage Enterprise: Application of a Coupled** 2 System Dynamics- Comprehensive Assessment Model 3 Yong Zhang^{a,b} Tingsheng Zhao^a Zhengzhu Zhang^c Jun Wan^d Xiaonan Feng^d XiangminLiang^e 4 AijiaoZhou^{d,*} 5 6 ^a School of Civil Engineering & Mechanics, Huazhong University of Science and Technology, 7 Wuhan 430074, China 8 ^bWuhan Urban Drainage Development Co., LTD., Wuhan 430074, China 9 ^cWuhan Municipal Engineering Design & Research Institute Co.,Ltd., Wuhan 430023, China ^dSchool of Environmental Science & Engineering, Huazhong University of Science and 10 11 Technology, Wuhan 430074, China 12 ^e College of Engineering, University of Delaware, Newark, DE 19716, USA 13 Abstract: The operating efficiency, operating performance and service quality of a 14 drainage enterprise are determined by its sustainable development level. Sustainable 15 development is a dynamic process affected by many factors and their complicated 16 interaction. Compared with regular assessment methods, which are usually static and 17 discontinuous, this research applies the system dynamics (SD) method to study the 18 dynamic process that controls the sustainable development of a drainage enterprise. 19 This assessment can be achieved through building a dynamic feedback mechanism 20 among operable factors, simulating the dynamic evolution process of each effect 21 factor within a continuous time and combining a comprehensive assessment model. A 22 case study is presented that can help drainage enterprise stakeholders to strategically 23 understand the possible effects of policy implementation. In addition, three different 24 sustainable development scenarios are presented, which were designed and simulated 25 through the setting the key variables. These three variables are investment in 26 environmental protection, wastewater treatment fees (yuan/m³) and the growth rate of 27 wastewater treatment capacity. The assessment results show that long-term 28 sustainable development of a drainage enterprise is best served by improving the

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