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Introduction to the special issue on “Economic modeling of natural resources for sustainable development”

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Introduction to the special issue on “Economic modeling of natural resources for sustainable development”

This special issue emanates from selected papers presented at the World Conference of Resource Modeling Association in Guangzhou, China, on June 9–13, 2018. The conference was held in collaboration between the College of Economics and Business, South China Agricultural University, Guangzhou, China, and the Resource Modeling Association. This is the first time the association has held its conference in Asia, so all the members were enthusiastic about attending the meeting. I must say that those attendees whom I talked to were delighted with the facilities and intellectual environment provided by the conference host. Conference attendees presented papers on different aspects of natural resources, and those individuals came from Asia, Europe, Australia, and North America.

The meeting started with a tour of two significant cultural and natural resource venues in Guangdong province, China. Attendees enjoyed the visit to Nansha Wetland Park and Nansha Mazu Temple before the formal start of the conference. Nansha Wetland Park, located on the bank of the Pearl River, provided an ideal natural venue to reflect upon the theme of biodiversity conservation and sustainable development.

Many developing countries are compromising environmental quality in the name of development (Paudel, 2014). Lack of attention to environmental quality has taken these countries to the brink of ecological and environmental crises. River bodies in many developing countries are highly polluted; there are drinking water problems; forest resources are harvested at an alarming rate; and the stock of many commercial fishery species are at an all-time low (EPI, 2018; FAO, 2018; UNEP, 2018). Policymakers in many of these countries believe that everything will be fine after they reach a certain stage of development. However, a continuous march to this stage of development is likely to bring two things. One, when these countries reach the desired level of development, stocks of many biological resources may either be extinct or below a critical depensation point. There is no way to come back to the stage of normalcy after this. Another thing is many pollutants affecting air and water quality may increase monotonically, such as stock pollutants like mercury. There is no way to decrease these stock pollutants except to find an alternative or backstop technology. Take for an example of this conference's host country, China. Between 2001 and 2015, China has increased government spending on environmental causes every year, with 880.6 billion yuan (about 127 billion U.S. dollars) spent in 2015. Yet there is a lack of substantial change in environmental quality in the country. According to the 2018 Environmental Performance Index Report, out of 180 countries considered, China ranks 120th in the comprehensive environmental performance index and 174th in the air quality index (EPI, 2018).

This issue includes six papers representing problems with water (2), fisheries (1), forestry (2), and production agriculture (1). Most of these papers are on the modeling aspects of natural resources problems. The breadth of papers includes water quality and water quantity, fishery



harvesting, timber harvesting, and agricultural production. All these papers have gone through the journal's regular referring process, so the quality of these papers is judged excellent not only by me but also by other peers.

The paper by Peterson (2019) looks at how technology generated from public investment can help to reduce the negative impacts of water pollution. He argues that there is space for both technology and policy, and technology often helps to reduce the negative impact of resource use. The argument on public investment in technology development to mitigate pollution is consistent with the benefit of public investment in agriculture. For example, Fuglie and Heisey (2007) indicate that public investment in U.S. agriculture has increased crop outputs, and this has benefitted farmers (increased revenue) and consumers (availability of food in an affordable price).

Susaeta and Gong (2019) investigate the effects of two risk components (price and wildfire) on the even-aged forest land. Using the reservation price model, they show that wildfire risk reduces the optimal reservation price, hastens the harvesting of trees, and provides lower land values. The reservation price model is also superior to the deterministic rotation age model.

Dahmouni, Vardar, and Zaccour (2019) help to understand the impact of pollution on fisheries resources using an n -player differential game framework with two state variables (pollution and fish). They highlight that a cooperative solution provides a higher payoff than a noncooperative solution. They indicate that an egalitarian sharing rule provides fair and time consistent allocation in a cooperative situation.

The paper by Poudel and Paudel (2019) looks at the role of risk in groundwater extraction. They develop a transboundary game-theoretical model where agents are extracting groundwater and natural gas, but the natural gas extraction from hydraulic fracturing impacts both groundwater quality and quantity. They indicate that the presence of contamination risk from hydraulic fracturing implies caution is needed in fracking. They propose imposing optimal linear taxation for fracking and groundwater extraction that can resolve the risk associated with fracking on groundwater extraction. Their findings should be helpful to policymakers and resource managers equally in the face of ongoing groundwater extraction for fracking activities in the United States or other countries.

Two papers in this special issue are related to separability in agriculture production and demand for forest products in China. Chen, Ma, and Huang (2019) are concerned about the separability of production and consumption in Chinese households. They first develop a model assuming separability, theoretically derive the optimal solution and then compare it against the real farm household resource allocation behavior. They indicate that farmers have been underutilizing their land but over utilizing material and machinery. Despite the availability of off-farm labor opportunities, farmers in their study use more labor in production activities, thereby indicating that Chinese farmers are operating in a nonseparable manner. The paper by Zhang, Luo, Duan, and Gao (2019) explores the effects of environmental regulations on forest products trade in China. They find that environmental regulations impact the import and export of forest products. Specifically, they find that regulations have negative effects on wood products export but increase the import of wood products, and have no effects on wood furniture products export. Depending on what sector the government wants to protect or promote, environmental regulations can be an effective tool to policymakers and managers.

Overall, I believe readers will find this issue to be interesting and useful. I want to thank NRM editor-in-chief Shandelle Henson and RMA president Luc Doyen for trusting me and giving me an opportunity to guest edit this special issue. I would also like to thank the authors, reviewers, and meeting participants who made this special issue possible.



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