

## **DEVELOPMENT OF AN URBAN ENVIRONMENTAL QUALITY INDEX AND APPLICATION TO SOME CITIES IN VIET NAM**

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### **Abstract**

Rapid urbanization and development has put an increasing pressure on urban environment in Vietnam, which can break out efforts to ensure the country's sustainable development. Urban environmental issues in Vietnam are of a wide spectrum, including water, air and noise pollution as well as water supply, solid waste and sanitation system management problems. Significance of each issue also varies from city to city. In order to support urban managers and policy-makers in rapid and integrated assessment of urban environmental status, an index tool is necessary. Some specific indices such as water quality index, air quality index have been applied in Vietnam. However, an index that integrates them and more urban environmental components would be better. Urban environmental quality index (UEQI), therefore, was our study target.

UEQI was developed using a three-step procedure. Firstly, the selection of determinants of UEQI and their weightings was implemented using Delphi technique with a panel of environmental experts throughout the country. As a result, 11 determinants were chosen which belongs to 6 categories: (1) air quality, (2) water quality, (3) urban noise, (4) green space, (5) solid waste management performance, and (6) services of water supply. Secondly, various functions for converting measured values to sub-indices of unitless scale were developed. Finally, UEQIs were calculated using weighted additive formulae. A 100-point scale was applied for classifying calculated UEQI values into 5 groups: Excellent, Good, Medium, Moderate and Bad.

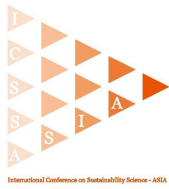
Monitoring data on environmental quality of Hue, Da Nang and Ho Chi Minh cities were collected. Based on these data, UEQI values for the three cities in 2009-2010 were calculated. Also, the annual UEQIs for Da Nang city from 2006 to 2010 were investigated. The results showed that overall urban environmental quality could be classified as "Good" for Hue, while as "Medium" for Da Nang and "Moderate" for Ho Chi Minh city.

### **Keywords**

Water quality, air quality, noise pollution, UEQI, urban environment, Vietnam

### **References**

1. Economist Intelligence Unit (2010). Final Report: Asia Green City Index, Research report of Project supported by Siemens.
2. Central Viet Nam Environmental Protection Agency (2010). Environmental monitoring data in key economics region of Central Viet Nam from 2006 to 2010, Viet Nam.



3rd International Conference on Sustainability Science in Asia  
January 11-13, 2012  
Bali, Indonesia

3. Institute for Resources, Environment and Biotechnology – Hue University (2010). Monitoring and analysis of environmental quality of the Huong River 2010, Annual report, Viet Nam.
4. Institute for Environment and Resources - Ho Chi Minh National University (2009). Environmental monitoring in South of Vietnam (2009), Viet Nam.
5. Lu Chau Yen (1979). Environmental Quality Index for developing country. Thesis submitted in part fulfillment of the requirements for the degree of Master of Engineering, Asia Institute of Technology. Thailand.
6. Pham Khac Lieu (1997). Water Quality Management: A case study of the Huong River in Hue City, Vietnam. Master Thesis, Asian Institute of Technology, Thailand
7. Yale Center for Environmental Law and Policy and Center for International Earth Science Information Network-Columbia University (2010). Report annual 2010: Environmental Sustainability Index. USA.