



306/C

## **Valuation of eco-system services of green roofs as a sustainable rooftop technology: A case study for Colombo, Sri Lanka**

P.S.A.P Fernando and V.M. Jayasooriya\*

*Department of Forestry and Environmental Science, University of Sri Jayewardenepura,  
Nugegoda, Sri Lanka*

Rapid urbanization has led to alarming repercussions on the environment and human health. Therefore, global emphasis is directed towards switching into building sustainability, especially in urban areas. However, the lack of area availability is a major drawback towards introducing urban greening concepts. Integration of green roofs is a commonly used greening concept as it utilizes the highly spacious roof surface areas in a sustainable manner. Green roofs also provide a multitude of additional benefits to the building and surroundings, which are known as ecosystem services. Some of these services include cooling energy savings, run-off reduction thereby reducing urban flash floods, urban heat island mitigation, air quality improvement, carbon sequestration, and improving the building aesthetics while providing habitat and recreational opportunities. Even though research has been conducted throughout the world regarding green roofs, no studies have been conducted to value the eco-system services provided by green roofs in terms of their environmental and economic benefits in the Sri Lankan context, considering local climatic and financial scenarios. Therefore, the major objective of this research is to perform a comprehensive analysis on the effectiveness of green roofs, considering their environmental and economic feasibility for Sri Lanka, by using Colombo as a case study. The present study investigates the ecosystem services of green roof technology by retrofitting 10 rooftops with hypothetical semi-intensive green roof scenarios. Studied green roofs achieved an energy saving potential of 22.29 KWh/yr/m<sup>2</sup> with an annual saving of LKR 481.46 per m<sup>2</sup>. Furthermore, green roofs provided a benefit of LKR 125 per m<sup>2</sup> in terms of air pollutant removal and CO<sub>2</sub> sequestration. In financial terms, green roofs exemplified 17-18 years to recover its total investment with a NPV of -8857.71 (LKR/ m<sup>2</sup>) for the selected case studies in Colombo district.

**Keywords :** Eco-system services, green roofs, Sri Lanka

**E-mail:** varuni.jayasooriya@sjp.ac.lk