Urban forest and financial resources perspective in Indonesia

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Abstract Urban forests can help to improve the environmental quality of urban areas because trees mitigating of urban heat island and adapting cities to environmental changes. The increasing urban population has a direct impact on urban natural capital, which is urbanization have been replaced green spaces with impervious materials. Urban forests in Indonesia is very limited and not well-managed due to the urban forest was made without any form of consensus with the people, but an initiative of the city government. Some of facing problems that are high land costs, diversity of land ownership, social and environmental pressures, and the spread of financing sources and other resources in urban forest cultivation and maintenance. In Indonesia, financial resources to maintain and management of urban forest it is not problem if users recognize and understand that benefit and function of urban forest. Local government, company, owners building, NGO’s, local residents will participated in a partnership, but a key factor can influence of partnership is raise awareness and provide environment education; and legal aspect to supporting the partnership itself. This paper focuses on urban forests and financial resources in Indonesia. This paper concludes that urban forest management in Indonesia required a very large cost due to the high price of land, and they need participated of users and supporting legal aspect about who has responsibility of maintain and management of urban forest especially financial resources.

1. Introduction

Urban forests and trees help to improve the environmental quality of urban areas because trees mitigating of urban heat island and adapting cities to environmental changes, and provide cooling by evapotranspiration up to 7 KW \([1]\). Trees can absorb a variety of pollutants that are harmful to health. However, the increasing urban population has a direct impact on urban natural capital. One reason is that urbanization have been replaced green spaces with impervious materials. In summer, rising urban temperatures lead to increased electricity use, increased pollution, and increased discomfort among residents \([2]\). In Indonesia, urban forests is very limited and not well-managed due to the designation of urban forest was made without any form of consensus with the people, but rather an initiative of the city government \([3]\). Some of the problems that are often encountered are high land costs, diversity
of land ownership, social and environmental pressures, and the spread of financing sources and other resources in urban forest cultivation and maintenance [4].

The main aim of this paper to find out of urban forest and financial resources to management urban forest in Indonesia. The structure of paper follows as described benefit and cost of urban forest and financial resources, methodology and conclusion.

1.1 Urban Forest
Urban forests and all urban natural capital, such as urban agriculture, park and other urban greens can be considered as green infrastructure managed in one location [5]. Many studies have shown that forest-based benefits can be optimized through long-term management across the city to maximize the productivity of urban forests. Urban forests can only be fully planned and managed when urban residents and policy makers recognize and understand that all-round services that trees and green space provide. Environmental benefits of urban forest are often based on deferred costs; that is, without urban forests or trees, owners of property or governments will have to invest in additional engineering infrastructure or equipment to address environmental issues [5, 6]. For example, the canopy intercepts rainwater, which reduces the amount of water that falls to the ground and flows into the rainwater harvesting system, saving the city the cost of building larger capacity pipelines and storage facilities [7, 8]

Furthermore, urban forest can be benefit to human services, such as physical and mental conditions. Urban resident live a sedentary life, which increases the number of overweight or obese urban residents. The National Health in U.S conducts of individual activities levels and how to motivate people to participate in basic sports such as walking and cycling. Other studies have explored how to encourage urban design forms such as street layout, the presence of sidewalks and the proximity of parks activity. When the entire city or country gathers, the economic consequences of traditional light sports are enormous. The fatigue patient after a short visit to the forest environment can enhance psychological and physical recovery, and access to the forest environment can be beneficial when suffering from fatigue [9]. Similarly, deferred costs are possible because people who are engaged in daily physical activity and exercise have lower medical costs.

All benefit of urban forest like environment benefit, human services requires the cost for planting, maintenance, materials and disposal. Potential energy savings in buildings by an urban tree planting program in California, they assuming total planting and stewardship costs of $ 2.5 billion or $ 50/tree [15], while cost of the maintenance trees is $1.9 million annual [6].

1.2 Financial Resources Perspective
Economic assessment of urban forest services and functions into terms that increase public value. Urban forests are urban resource systems that can be cultivated and managed on all land in the city, including private and public property, as well as all socio-economic zones.

The return on investment is not easy to calculate. Industrial forests are used for market commodities to determine the price and income of resource products such as wood. In contrast, many products of urban forests are public goods. Multiple owners invest in the city’s natural capital, producing products in the form of intangible features and benefits of each resident, visitor and user [10]. The trees provide $8.4 million in annual services and $1.9 million for maintenance, every $1 spent on tree management, residents receive $4.48 in benefits. Energy-saving value $6.20/tree, CO2 reduction $0.33/tree and atmospheric pollutant deposition $5.40/tree Large value associated with reduced stormwater runoff $47.80/tree and increased real estate value $144.70/tree [6].

Few private companies willing to invest in public goods, because the non-exclusive and unnatural conditions of the urban forest rarely generate profits. Government agencies have traditionally invested in public resources that are intuitively accepted by member of society as providing value, such as education or emergency response systems. Sustained political support of such investments is more likely if economic benefits can be demonstrated.
Users who live nearby may spend a small amount of money, while others may travel some distance, and their spending on meals, fuel, accommodation, and souvenirs can be proportionally based on the amount of time the park or forest visits [5].

Consumers claim that they are willing to pay about 9% to 12% for products in the downtown tree shopping district, rather than comparable areas without trees. Customer service, merchants’ helpfulness and product quality are considered better by shoppers in the tree area [5]. While, trees provided a net annual benefit at $2.2 million in Modesto and $805,732 in Santa Monica [15]. The cost-benefit ratios for Modesto and Santa Monica are 1.85:1 and 1.52:1, respectively. For every $1 invested by the management, residents receive annual benefits of $1.85 and $1.52. Aesthetics and other benefits account for 50% to 80% of total annual revenue, while pruning expenses account for approximately 50% of total annual cost.

1.3 Urban Forest and Financial Perspective in Indonesia
The developing countries including Indonesia, there is a critical challenge not only in terms of maintaining existing green areas, but urban forest management is also complicated due to lack of financial resources [11]. A few studies of urban forest related to financial and economic were conducted in Indonesia. Urban community is willing to pay for the maintain and cultivation of urban forests in Jakarta because it can bring many benefits, such as improved environment, play facilities, fishing places and strategic for sales places [12]. On the other hand, the local government cooperates with PT [13]. Pertamina to manage the urban forest Subang in Indonesia has been successful in growing crops of high economic value. Since 2012 land use of urban forest change was leisure activities, rice fields, residential areas and crop plantations. As one of the stakeholders, PT. Pertamina clearly prove the seriousness to do conservation program that have positive impacts on the quality of the environment. However, this conservation program faced a lot of obstacles and interference from outside parties who damage the vegetation.

This study showed the function of urban forests in Tangerang, Indonesia has not been fully benefited by the community because of the lack of trees that can be a shelter [14]. Only 5% user of urban forest as strategic of sales place. In addition, this study suggests to to improving the function of urban forests such as the addition of vegetation to make urban forests more shady with lush trees, more intensive supervision and management in maintaining the condition of public green space so that they are always in good condition, and the awareness and responsibility of community in utilized urban forests by not damage or carrying out vandalism, maintain the cleanliness of the urban forest environment. There is no specific authority responsible for urban forest management due to the urban forest is not seen as an object to be managed intensively, thus some urban forests are almost without management [1]. This study found that only Hasanuddin University urban forest managed by itself.

2. Methodology
The data were collected from secondary sources of journal publications and books and thus, analysed through understanding and synthesizing the literature.

3. Conclusion
In Indonesia, urban forests is very limited and not well-managed due to the designation of urban forest was made without participated of people, high land costs, diversity of land ownership, social and environmental pressures, and the spread of financing sources and other resources in urban forest cultivation and maintenance. Urban resident willing to pay for maintain and cultivation of urban forest in Jakarta. While, the local government cooperates with PT. Pertamina to manage the Subang urban forests in Tangerang has not been fully benefited due to the lack of trees and suggests to improving the function of urban forests (addition of vegetation, more intensive supervision and management in maintaining urban forest).
Financial resources to maintain and management of urban forest in Indonesia, it is not problem if users recognize and understand that benefit and function of urban forest such as environment benefit and human services, then they (local government, company, owners building, NGO’s, local residents) will participated in a partnership. Lastly, a key factor can influence of partnership were raise awareness and provide environment education; and legal aspect to supporting the partnership itself.

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