

## THE ASSESSMENT OF SOCIAL-ECOLOGICAL LANDSCAPE AND TSUNAMI DISASTER RESILIENCE ON BUSTANUS SALATIN CITY PARK IN BANDA ACEH

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### ABSTRACT

Bustanus Salatin or Taman Sari Aceh was one of the largest public open space more than twenty years ago. However, after more than one decade tsunami hit Banda Aceh, the park changed and got more amenities to support public activities inside. This research aims to assess function, quality of space, and activities whether it is related to social-ecological and resilience of tsunami disaster. The methodology in this research were field survey, zone mapping and digital measurement. The findings of field survey were permanent buildings with different heights almost covered seventy five percent of park area. Overall physical conditions were not well maintained so the existing facilities become redundant and not well functioned. Furthermore, playground area was diminished because of new adding stage in the middle of park which influence social-ecology landscape and public activities. Moreover, the highest building should be evacuation space for resilience of tsunami disaster.

**KEY WORDS:** Social-ecological landscape; tsunami disaster resilience; Bustanus Salatin City Park.

### INTRODUCTION

Social-ecological landscapes link cultural and biological diversity and also represent productive landscapes that people have developed, shaped and maintained sustainably over a longtime (Gallopín, 2006). A social-ecological landscape system consists of ecological and social systems (Binder et al., 2013) that provide essential ecosystem services to society (e.g. supply of food, fiber, energy and drinking water) (Berkes and Folke, 1998; Unnasch et al., 2008). Social-ecological landscapes develop continually depending on particularly their exposure to disturbances, their resilience, adaptive cycle and adaptive capacity in the long-term (Charette-Castonguay, 2014). The landscape forms a link between a geographical area and the social aspects of the population (Bruni, 2016).

Disasters are a part of unpreventable events in human history and affect human life greatly (Rauzi, 2013). Apart from the earthquake studies, the literature reveals that public open space (POS) have the potential to be used for emergency evacuation in a Tsunami event and also to mitigate the disaster effect (Jayakody, et al., 2017). Further, the studies of tsunami prone coastal urban communities demonstrate that public open space in coastal cities can be used as a tool for 'rapid resilience'. They further suggest that Tsunami rescue open spaces need to be identified with an objective of providing safe assembly spaces, basic emergency services and utilities, such as first aids, fresh water, electricity, and communication (16). Moreover, different open spaces can be used for different functions in emergency response and recovery, providing simple to complex services (13).

Resilience thinking views social and ecological systems as intertwined, and argues that these interactions continually produce surprises (Berkes et al., 2003). We believe that planning, and particularly, long-term planning, can reasonably be expected to increase resiliency as it can increase predictability and mitigate ups and downs within development (Van Assche et al., 2016). Resilient systems have the capacity to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks (Walker and Meyers, 2004; UNU-IAS, 2013; Unnasch et al., 2008).



Figure 1 Gate of Bustanus Salatin Park

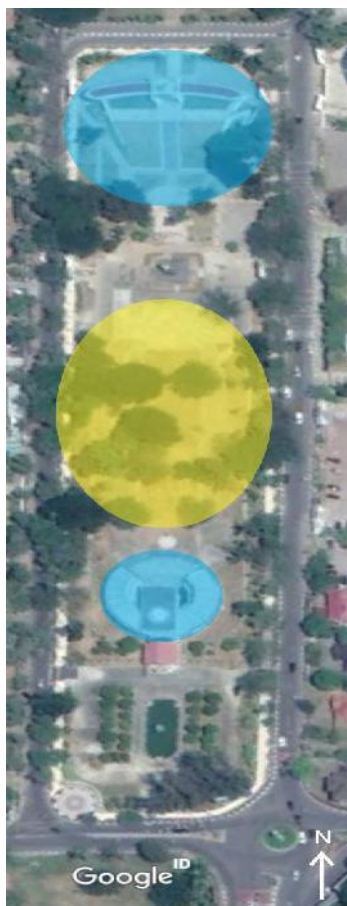
In this study, we examine how Bustanus Salatin Park has been changed in the last fourteen years. We intended to find out if social-ecological landscape and tsunami disaster resilience thinking influence the current Bustanus Salatin Park along activities inside.

## CASE STUDY

Bustanus Salatin is central park of Banda Aceh city. It is one of the most important open space for people. POS are often used as a mode to improve the quality of life, aesthetic beauty, environmental health, economic growth and to increase the walkability, live ability and vitality of cities. However, sustainable development should comprise the improvements of disaster resilience (Jayakody, et al., 2017).



Figure 2 Gate name corner



Legend:

- Social Zone
- Ecological Zone (None)
- Resilient Zone

Figure 3 Zone mapping result

## METHODOLOGY

The methodology in this research consist of three stages were field survey, zone mapping and digital measurement. Assessment of Bustanus Salatin Park conducted in two ways were social-ecological landscape system which were consists of ecological and social systems; and resilient systems.

### Field Survey

Field survey collected data from visiting each facilities in Bustanus Salatin Park. Data was collected by taking photographs of buildings, circulations, street furniture, and interviewing Vendors Street.

### Zone Mapping

Zone mapping is a method that used to determine function of an area in the park based on activities. The zoning created based on analysis of social-ecological system according to ecological system and social systems; and resilient system of function, quality of space and activities.

### Digital Measurement

Digital measurement is a method to calculate area of space that is used widely in everyday life by people for leisure and relax. The area for each activities and functions showed type of the Park if it is active open space or not.

## RESULT

Table 1. Table of zone mapping area based on space allotment in Bustanus Salatin Park using digital measurement.

Function	Facilities	Form
Leisure	Playground	Open space
	Public event space	
	New stage	
Education	Name Corner (Selfie spot)	Building
	Monument	
	Library	
	Hall	
Service	Dekranas	Open space
	Wifi.id corner	
Circulation	Parking area	Open space
	Padestrian	
Green Space	Pathways	Open space
	Grass, shrubs and trees	

The result of field survey related to function of Bustanus Salatin Park showed in Tabel 1.

**Assessment of Social-ecological System.** It consists of ecological system and social system. It compared between provided facilities fourteen years ago and existing facilities.

Table 2. Table of facilities based on ecology and social system.

Function	Provided facilities	Existing facilities
<i>Ecological system</i>		
Water supply	Water tower	None
Land cover	Grass	Pavement
Vegetation	Shrubs and Trees	Trees
<i>Social system</i>		
Cultural value	King's Monument	King's Monument
Playground	Children's playground	Children's mobile cars and fishing corner
Vendors Street	None	Wide pedestrian
Internet corner	None	Permanent building

**Assessment of Resilient System.** It consists of safe assembly space for gathering that should have height and width. The evacuation route and its signs also alternatives route should be able to guide people in Park if earthquake or tsunami occur.

Table 3. Table of facilities based on resilient system.

Function	Provided facilities	Existing facilities
Evacuation route	None	Stairs
Evacuation route signs	None	None
Safe assembly spaces	None	Gate of Bustanus Salatin
Basic emergency services	No information	No information

**The result of zone mapping** presented on figure 3. Each color represented only one zone which consist of social zone, ecological zone and resilient zone. Zoning only presented existing Bustanul Salatin Park. It was not be compared condition of park in fourteen years ago.

Table 4. Table of land cover material calculated using digital measurement.

Function	Facilities	Area (M <sup>2</sup> )	Land Cover
Leisure	Playground	4.307	Concrete
	Public event space	3.282	

	New stage	2.483	
	Name Corner (Selfie spot)	255	
Education	Monument	353	Ceramic floor
	Library	1.183	
	Hall	1.502	
	Dekranas	206	
Service	Wifi.id corner	130	Paving block
	Parking area	5.520	
Circulation	Padestrian	3.321	Concrete
	Pathways	1.485	
Green Space	Grass, shrubs and trees	3.313	Grass

**The result of digital measurement,** total area of Bustanus Salatin more less 27.740 m<sup>2</sup>. The result showed in table 4. It presented only one per eight of total area was covered by green area. It proved that the function of park was no longer as park with beautiful atmosphere yet as multifunctional public space surrounding by public buildings.

## CONCLUSION

This research found that buildings with different heights covered eleven percent of park area. On one hand, its height can be one of evacuation space if tsunami occurs. On the other hand, in ecological view is not appropriate to cover eighty seven percent site of park with concrete and buildings. The open space and water absorption should be considered to prevent the park from flooding. Furthermore, buildings that has been built was lack of maintenance so it became redundant, not functional and broken. Overall, Bustanus Salatin Park is not fully function as park even less as public open space. The site had some buildings, stage and pavement. The space for vegetation only for shrubs as guiding plan on sidewalk and pedestrian.

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