CHAPTER I
INTRODUCTION

1.1. Background

Buleleng is the largest regency in Bali with a total area of 1365.88 km^2 or 24.25% of the Bali Province. The capital of Buleleng regency is Singaraja city which is consist of 3 districts, namely district of Buleleng, Banjar and Sukasada. Singaraja is the second largest city in the Bali province after Denpasar. Based on the spatial structure of Bali Province (Bali Provincial Regulation No. 16 of 2009), the urban areas of Singaraja is included as PKW (Center of Regional Activity). Spatial structure mandated by the Bali Provincial Spatial Plan sets the urban areas of Sarbagita as PKN (Center of National Activity) and urban areas of Singaraja as PKW. Thus, the governments of both central and regional level will focus on the development of infrastructure in the urban areas. Enactment of Singaraja urban areas as PKW gives positive and negative impacts of the development because the economic activity will be focused on urban areas. Increased economic activity is one of the positive impacts on the provision of supporting infrastructure. However, land use change is also a threat to the growth and development of the region.

Land use is a physical manifestation of objects covering the land and associated with human activity on a plot of land (Lilesand and Kiefer, 1987). Land use can be classified into two major groups, namely (1) the use of agricultural land and (2) the use of non-agricultural land. According to Barlowe (1986) factors that affect land use are the physical and biological factors, economic

considerations factor and institutional factors. Physical and biological factors include the appropriateness of physical properties such as geological conditions, soil, water, climate, vegetation, animal and population. Economic factors characterized by profit considerations, market conditions and transportation. The institutional factors are characterized by the land law, the political situation, social situation and the administration can be carried out.

Land use changes are all forms of human intervention on land in order to meet the needs of both material and spiritual life (Vink, 1975). These changes will continue to take place in line with the increasing number of population and their activity in carrying out of economic life, social and cultural, which in turn positive or negative impact. According to Munibah et al (2009) the increasing number of population will affect the development of economic that strive for the space for settlement, industry, infrastructure, and service as the consequence. In line with the development of Singaraja City, centralization of infrastructure generates more urbanization, create more economic activity and need more land for built up area. Changes in land use are not only reducing the amount of agricultural land and increase the number of built up are, but also the impact on the environment. According to Chapin et al. (1995) land use patterns in various forms and ways will have an impact on the environment. Indication of the decline in the carrying capacity of the environment in an area can be viewed from a variety of disasters such as floods, droughts, sedimentation, causing abrasion damage to the pond and so on. It is also supported by research conducted by Nurrizqi et al. (2013) who

found that changes in land use caused changes to the condition of the flood discharge.

Spatial planning aims to allocate space to meet the needs of future development. The result of the development is expected to be the welfare of society. Measure of success of development obtained by the people is the Human Development Index (HDI) (UNDP, 2004). This measure of success only oriented to humans (antropocentris). The approach to see the results of the development is not only seen on the human aspect but also the aspects of the environment (ecosystem). Therefore, it is necessary the appropriate approach which is able to describe the situation as a whole.

Most studies conducted to analyze changes in land use are based on the use of a model (Lambin et al., 2000). Land use change modeling is a technique that can be used to understand the causes and impact of the dynamic changes (Veldkamp and Lambin, 2001). Wijaya (2011) simulate of land use change in Siak Regency to understand the processes and patterns of changes that occur and also the factors that drive those changes. Veldkamp and Fresco (1995) were modeling in order to determine the impact of demographic and biophysical changes in use or land cover in Costa Rica, including reciprocal of disturbance or land cover themselves against the above factors. In addition, land-use change models are often used as an input in environment impact study, for example used as input to calculate air pollution, emission, erosion, etc. (King et al., 1989). The results of the final analysis of land use change modeling can be used to support the planning and land use policies in the future.

Various methods for modeling land use change have been applied by several researchers. Wijaya (2011) was modeling using Multinomial Logistic Regression (MLR) method. Wu et al. (2006) used regression analysis to model the land use changes in the city of Beijing China and predicting land use 20 years into the future with Markov Chain models. CLUE (Conversion of Land Use and its Effects) model was used by Veldkamp and Fresco (1995) to analyze land use changes in Costa Rica on a local, regional and national level. Using a different size scale, this model shows that at local, regional and national levels can produce an opposite effect. Cellular Automata (Markov Chain) in this study is used to determine the location or any area of green land that could potentially turn into a built up region. Geographic Information System (GIS) used to develop a spatial aspect and constructed the spatial changes. Some of the variables that led to change in land use are the distance to roads, distance to rivers, distance to settlements, slope, climate, population density and revenue. In this study driving factors of land use changes such as slope, roads and others are ignored. Land use change are seen by the initial land use condition and probability matrix (transition matrix). Therefore, by combine Cellular Automata method with GIS is expected to give a better answer in modeling the land use change.

1.2. Problem Formulation

Urban areas of Singaraja have a great potential to grow and develop. Centralization of infrastructure development, economic activity and urbanization occurs as a result of the growth. This research was conduct to answer several questions:

1. How much change of green land into urban land in Singaraja City and its surrounding area occur during the period of 2001 - 2015?

2. How is the prediction of land use changes from green land into urban land in Singaraja City and its surrounding areas in 2020 and 2025?

3. How are the accuracy of Landsat image classification and land use projection?

1.3. Research Objective

This research aims to:

1. To know change of green land into urban land in Singaraja City and its surrounding areas occurred during the periode of 2001 - 2015.

2. To know the projection of land use change of green land into urban land in Singaraja City and its surrounding areas in 2020 and 2025.

3. To know the accuracy of Landsat image classification and land use projection.

1.4. Research Benefits

The benefits of this research are:

1. Theoretical benefits

   The theoretical benefit of this research is to provide input to the study of science in land use modeling.

2. Practical Benefits

   a) Provide feedback to the Local Government of Buleleng for valuation of urban spatial planning.

   b) Provide a new method to city planners in analyzing the space requirements.

   c) As a tool for spatial evaluation.