Agricultural land use change into tourism area in Lembang Sub-district, West Bandung Regency, West Java Province, Indonesia

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Abstract. The research objective is to identify agricultural land use change and its impact on the community in Lembang Sub-district, West Bandung Regency. The research methods used were overlay technique and questionnaire distribution. Overlay technique was used to determine the location distribution of land use change. Land use maps of the year 2008 and 2015 were used for overlay analysis with geographic information system (GIS). Questionnaires were distributed to the residents of Lembang Sub District to gather information regarding changes in occupation and income of the community. The result of the overlay technique is agricultural land about 116.1 hectares converted into other functions. Modifications of these land into buildings by 2%, housing as much as 77%, a commercial zone covering an area of 8% and tourism area 13%. There was evidence that the majority of farmers have monthly income decrease more than 25% as an impact of land use change in this area. There was no evidence that the resident’s occupation changes due to land use change in this area.

1. Introduction
Tourism development not only has a positive impact on the regional economy but also harm the environment, especially changes in land use. The tourism industry affects land use change in Lombok and Bali [1-2]. Tourism facilities construction has resulted in a decrease in a forest area in the Czech Republic [3]. The development of tourism through the addition of municipal utilities also has an impact on changes in land use in the City of Iasi [4]. Tourism activities affect land use change so that it is essential to research land use change into a tourist area.

The research result of land use change effect on the environment has been carried out, that affecting land quality, erosion, access to water [5]. While coastal land use change can reduce environmental quality [6], land use change studies also examine the driver factors such as population density, distance to settlements, and distance to the highway [7]. Studies of agricultural land use change and its impact on the communities in the economic aspect were also carried out [8-10]. While this research examines agrarian land change into tourist areas and the impact on farmers. Lembang sub-district is the most populous area in West Bandung Regency. The total population of Lembang sub-district is 11% of the total population of West Bandung Regency, which consists of 16 sub-districts. Lembang sub-district is well-known as an agricultural area but nowadays turned into a tourist area. There is 72% tourist facilities in West Bandung Regency such as hotels and restaurants are located in Lembang sub-district [11-12].
In Bandung Regency, which is adjacent to West Bandung Regency, it was identified the conversion of the agricultural land area due to a decrease in land ownership. In the long run, it will decline the farmer’s welfare level [13]. Land use change always occurs naturally because of population growth. Changes in land use in the future with factors of population and economic development can be predicted and simulated. Tourism activities can be as a factor of land use change [14-16]. The method used in this study were overlay technique, interview, and questionnaire. The questionnaires were distributed to farmers who owned the land. Therefore the purpose of this study is to identify agricultural land use change and its impact on the community in Lembang Sub-district, West Bandung Regency.

2. Method
The location of the research project was in Lembang Sub-district, West Bandung Regency. The research project was conducted from March to July 2016. Stages of research were processing land use maps and direct surveys to the community.

Overlay technique was used to determine land-use change location distribution. Land use maps of the year 2008 and 2015 were used for overlay analysis with geographic information system (GIS). Land use maps of 2008 and 2015 were obtained from Office of Spatial Planning and Human Settlement of West Bandung Regency.

The direct survey was obtained by interviewing and distributing questionnaires to the respondents. The respondents were 99 people consist of 45 farmers and 54 farm workers (Table 1). Only ten of 45 farmers were landowners, and the rest were land renters. Questions were asked to respondents includes their characteristics, land ownership status, occupation, and monthly income (before and after land use change).

| Characteristics          | Categories   | Number (persons) |
|-------------------------|--------------|------------------|
| Occupations             | Farmer       | 45               |
|                         | Farmworker   | 54               |
| Total                   |              | 99               |
| Land ownership of farmer| Landowner    | 10               |
|                         | Land renter  | 35               |
| Total                   |              | 45               |

3. Results and Discussion
3.1. Agricultural Land Use Change in Urban Area of Lembang Sub-district in the Year of 2008 and 2015

In 2008, land use in Lembang Sub-district was dominated by agricultural land with an area about 1,377.8 hectares or 65% of the total area while the least area was forest land with an area about two hectares. Figure 1 and Table 2 show agricultural land use change in the year of 2008 to 2015.

In 2015, Lembang Sub-district was still dominated by agricultural land about 1,261.7 hectares or 59% of the total area, while the least was forest area around 1.9 Ha or 0.1% of the whole space. There are two types of new land uses, i.e., commercials and tourism area. Commercials zones were about 9 hectares or 0.4%, and tourism areas were about 15.2 hectares or 0.7% of the total area (Figures 1, 2 and Table 2).
Figure 1. Land Use Map of Urban Areas in Lembang Sub-district in 2008.

Figure 2. Land Use Map of Urban Areas in Lembang Sub-district in 2015.
Table 2. Urban Land Use in Lembang Sub-district (2008) and (2015).

| Land Use Types | Lembang Sub-district (2008) | Lembang Sub-district (2015) |
|----------------|-----------------------------|-----------------------------|
|                | Areas (ha) | Percentage (%) | Areas (ha) | Percentage (%) |
| Water Body     | 9.0        | 0.4            | 9.0        | 0.4            |
| Buildings      | 11.7       | 0.5            | 14.3       | 0.7            |
| Forest         | 1.9        | 0.1            | 1.9        | 0.1            |
| Housings       | 532.1      | 25             | 621.4      | 29             |
| Commercial     | 0          | 0              | 9.0        | 0.4            |
| Tourism        | 0          | 0              | 15.2       | 0.7            |
| Agriculture    | 1377.8     | 65             | 1261.7     | 59             |
| Grasses        | 116.6      | 5              | 116.6      | 5              |
| Shrubs         | 76.7       | 4              | 76.7       | 4              |
| Total          | 2125.9     | 100            | 2125.9     | 100            |

The results of the overlay technique showed that there was a decrease in agricultural land from 2008 to 2015, which was 116.1 hectares. This land converted into built areas, which including buildings, housings, commercial, and tourism areas. The highest portion of land use change was from agricultural land into settlements, an increase of area was 89.3 hectares or 77% of the total conversion, while the least was the change from agricultural land into buildings area about 2.6 hectares or 2%. Agricultural land converted into the commercial zone about 9.0 hectares or 8% and into tourism areas was about 15.2 hectares or 13% (Tables 3 and 4).

Table 3. Urban Land Use Change in Lembang Sub-district (2008-2015).

| Land Use Types | Areas in 2008 (hectares) | Areas in 2015 (hectares) | Land Use Change (hectares) |
|----------------|--------------------------|--------------------------|----------------------------|
| Water Body     | 9.0                      | 9.0                      | 0                          |
| Buildings      | 11.7                     | 14.3                     | +2.6                       |
| Forest         | 1.9                      | 1.9                      | 0                          |
| Housings       | 532.1                    | 621.4                    | +89.3                      |
| Commercial     | 0                        | 9.0                      | +9.0                       |
| Tourism        | 0                        | 15.2                     | +15.2                      |
| Agriculture    | 1377.8                   | 1261.7                   | -116.0                     |
| Grasses        | 116.6                    | 116.6                    | 0                          |
| Shrubs         | 76.7                     | 76.7                     | 0                          |

Table 4. The proportion of agricultural land change into other uses in Lembang Sub-district (2008-2015).

| Land use       | Area (hectares) | Percentage (%) |
|----------------|----------------|----------------|
| Buildings      | 2.6            | 2              |
| Housings       | 89.3           | 77             |
| Commercial     | 9.0            | 8              |
| Tourism        | 15.2           | 13             |
| Total          | 116.1          |                |
3.2. Impact of agricultural land use change into tourism area to the local community

3.2.1. Respondent Characteristics

Characteristics of the respondent on aspects of education and income are shown in Table 5. The education level of farmers in Lembang Sub-district is relatively low. There are 62 respondents who did not graduate from elementary school, and 36 people graduated from elementary school. There is only one person who graduated from junior high school, and no one has graduated from high school.

**Table 5. Respondent’s characteristics.**

| Characteristics | Categories                  | Number (persons) |
|-----------------|-----------------------------|------------------|
| Education       | Primary school drop out     | 62               |
|                 | Primary school graduated    | 36               |
|                 | Junior High school graduated| 1                |
|                 | Senior high school graduated| 0                |
| Total           |                             | 99               |
| Monthly income  | More than IDR 2,000,000     | 21               |
|                 | IDR 1,000,000 to IDR 2,000,000| 59             |
|                 | Less than IDR 1,000,000     | 19               |
| Total           |                             | 99               |

In term of farmer’s income, according to West Java Governor’s Regulation Number 561 (2014), regional minimum wages in West Bandung Regency in 2015 was IDR 2,045,000. Therefore, the monthly income of respondents was relatively low, because the majority of farmers’ income is less than two million rupiahs.

3.2.2. Impact of agricultural land use into tourism area to the farmers

The research result finds that the respondent’s occupations in Lembang sub-district are still as farmers or farmworkers. The conversion of agricultural land does not result in changes in farmers’ livelihoods. So that change in land use does not change their occupations. However, agricultural land use change affected to respondent’s monthly income (Table 6). This result is different from the case in Ubud, Bali that agricultural land change into tourism area also changed farmers’ occupation. The farmers became workers in the tourism sector [17].

Majority of respondents stated that their income decreased more than 25%. This result is similar to the case in North Bandung that conversion of agricultural land in 1992-2002 resulted in a decline in farmers’ income. In seven years, 17 farmers from 45 sold their property, and they became a land renter. This case is suspected due to the high land price. This case is similar to [18] that changes in land use from agriculture to tourism and settlements have an impact on decreasing the quality of the land.

**Table 6. Respondent’s characteristics after land use change (2015).**

| Occupation   | Monthly income’s condition | Total (persons) |
|--------------|----------------------------|-----------------|
|              | Remain stable              | Decrease < 25%  | Decrease > 25%  |                  |
| Farmer       | 12                         | 6               | 27              | 45              |
| Farmworker   | 1                          | 53              |                 | 54              |
| Total (persons) | 12                         | 7               | 80              | 99              |

Similar research result in the Turkish Mediterranean shows that agricultural land change into tourism area for over 30 years have an impact on agricultural livelihoods. Around 60% of local peoples were living in the agrarian area 30 years ago decrease into 22% [14]. The same circumstance happens in the UK that wage rate affected young farmers’ willingness to stay. Another factor that affected farmers were their pessimism for agriculture, society, and family [19].
4. Conclusion
Lembang sub-district was allocated for an agricultural area. Agricultural land area was declined due to tourism activities in 2008-2015. Land conversion from agricultural land to other uses was 116.1 hectares. The changes were into buildings (2%), housings (77%), commercials (8%) and tourism areas (13%). The impact of land use change to the farmer does not appear in changes in their occupation. However, there was evidence that the farmer’s income decreased due to land use change.

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