Land Use: One of Essential Geography Concept Based on Remote Sensing Technology

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Abstract. Geography is a science that continues to grow following the times development. At first geography was only a description of exploration results somewhere. One of characteristics of geography is having a distinctive concept that can be distinguished from other sciences. Along with the development of geography that supported by remote sensing technology, it is necessary to consider the addition of new concepts, one of them is land use concept. Land use is data and information that essential in geography analysis to solve problems that occur on the surface of the earth. Fast and accurate land-use data were obtained by using remote sensing technology. This paper attempts to provide a conceptual study on the concept of land use in geography. Contribution of this paper is to add the concept of geography in analyzing the phenomena on the surface of the earth.

1. Introduction
Geography is a science that studying a geosphere phenomenon on earth’s surface. Geosphere phenomenon includes the atmosphere, hydrosphere, biosphere, lithosphere, and antroposphere. Atmospheric phenomenon includes weather and climate, hydrosphere includes water in the land and in the oceans, biosphere includes plants and animals, lithosphere includes rocks and soil, and anthroposphere includes humans and culture.

Humans play an important role in the phenomenon of geosphere, all of geosphere phenomenon that related with human is the study of geography. Therefore, study of geography is the study of the real phenomena that exist around human life, especially those that concern with the mutual relationship between humans and their environment.

In general, people would assume that geography is the science of distance, place, capital city and river. They rarely question the issue of globalization, sustainability, equality and regional differences. Most people assume that the phenomenon of geography is factual rather than conceptual. Geography allows one to think unique in looking at the world, to understand the problem on earth’s surface in complex, and being able to think connecting various geography phenomena from a local to a global scale [1].

2. Methods
The method used in this research is descriptive method, with emphasis on literature study. This method describes the conditions in the thematic studies in detail so as to produce accurate and valid data interpretation. Different kind of literature used such as a geography study approachment and also about
land use and remote sensing technology. This review is thematic. Where, in this structure, the study is grouped according to the sources corresponding to the theme. This method is stronger by organizing literary sources. In this study, land use as a geographical concept can be derived from the interpretation of remote sensing applications.

3. Results and Discussion
The results of study of geography study will formed an abstract pattern or abstraction of the studied phenomenon. Abstract patterns in the form of abstract definition or abstractions are called concepts. Since the abstract pattern is related to real phenomena about geography, then it is called as the concept of geography [2]. Concept of geography is a term that commonly used in the discipline of geography [3]. Through the concept of geography can be revealed some symptoms, phenomena, facts, factors, or problems in the study of geography so that each word contained its own meaning that distinguishes with the other words. Each geography concept will be related to space, both in the study of physical geography and human geography or between the two. Even every symptom and phenomena that exist on the surface of the earth related to human life has its own meaning and geography meaning. Therefore, the concept of geography is very numerous and the number is infinite. Geography concept can be seen by definition (denotative) or based on a broader meaning (connotative).

There are some expert opinions on the concept of geography, among others [3] [4]. According to Warman [4] Geography concept were includes (1) Regional concept, is the main concept in the study of geography. Through the regional concept that phenomena that exist on the surface of the earth were contained in a container called region. Region is a place on earth that has its own characteristics that can differentiate with other places. That characteristics can be physical or society. Regional concepts will be clearer if using map media, such as maps of differences in physical, social and economic conditions. Regional concept consists of nodal region and formal region; (2) Life layer concept, a concept which seen that the surface of the earth is a living place of humans, animals, and plants. Within this concept, it is assumed that water can be used for drinking, ground for footing, plants for food materials, and air for breathing; (3) Man-Ecological Dominant Concept, a concept that describes human relationship with nature. With their intelligences and technologies, human can utilize the natural environment to fulfil the needs of their lives, such as turning the desert environment into agricultural land, transforming agricultural land into settlements, or turning sloping land into terrain for industrial areas; (4) Globalism concept, a concept that describes the shape of the round earth and its impact on human life. As for the impact, among others, the occurrence of difference in time (hour, minute, second), the difference between night and day, and the difference in the season (northern hemisphere and southern hemisphere).

In addition, this concept explains that the earth is one of the planets in the solar system, the earth can rotate on its axis and evolve around the sun along with other planets; (4) Spatial interaction, is a concept that describes the relationship between the symptoms or phenomena on earth's surface. This is because if there is a symptom or phenomenon somewhere will be associated with symptoms or phenomena elsewhere. This relationship can occur either directly or indirectly; (5) Areal relationship concept, a concept that describes the relationship between regions or countries. Relations between regions were in the form of the spread of symptom or phenomenon either physical or human that is causally related with other areas; (6) Areal likenesses concept, a concept that explains the similarities and resemblances of places on the earth's surface both physical and human conditions; (7) Areal differences concept, a concept that explains the region differences of places on the earth's surface both physical and human conditions; (8) Areal uniqueness concept, a concept that explains that every region of the earth's surface has uniqueness or characteristics that cannot be found in other regions; and (9) Areal distribution concept, a concept which explains that any symptoms or phenomena on Earth's surface is not always sequential.

Maps can be used to observe the spread of these symptoms so that the similarities, differences, and patterns of symptoms or phenomena both physically and human in a region or its relation to other areas can be seen; (9) Relative location concept, a concept which explains that every symptom or phenomenon
on the earth's surface has relative locations when seen from the area around it; (10) Comparative advantage concept, a concept that describes the ratio of the man advantages in managing the natural environment. Through their minds in managing the environment for the welfare of their lives; (11) Perpetual transformation concept, a concept which explains that any symptoms or phenomena on the surface of the earth is always changing, whether it caused by natural and human factors; (12) Culturally defined resources concept, a concept which explains that the natural resources of the earth's surface availability is limited so that the utilization should be calculated on the needs in the future; (13) Round earth on flat paper concept, a concept which explains that the round earth shape can be projected onto a flat surface in the form of a map. A map is a picture of the earth's surface in a flat surface that uses a certain projection.

The concept of geography based on Suharyono & Amien [5], as follows.
1. Location, is a concept which explains that the position or location of a region has value or price.
2. Distance, is a concept which explains that between objects on the earth's surface has distance, both relative and actual distance.
3. Affordability, is a concept that explain the condition of whether easy or not a region to reach by certain transportation infrastructure
4. Pattern, is a concept that describes the relationship between human and nature that has a distinctive shape and well regulated.
5. Morphology, is a concept that describes the formation of the earth's surface as a result of natural and man-made processes.
6. Agglomeration, is a concept that explains the grouping of human activities in a region.
7. Utility value, is the concept of a region or area that has value to certain people.
8. The interaction and interdependence, is a concept that describes the mutual relations between the regions to meet a demand.
9. Spatial structure and spatial distribution, is a concept that describes the similarities and differences of dispersed regions on earth’s surface.
10. Spatial linkages, is a concept that describes the interregional linkages in fulfil social needs and its inhabitants.

The concept of geography by Daldjoeni is as follows [4].
1. Cultural awards to the earth, is a concept which explains that every society has a different perception and adaptation to the phenomenon of the natural environment. Similarly, the perceptions and adaptations of different societies over time, including the utilization of science and technological progression.
2. Regional, is a concept which explains that a region has similarities in the landscape and community life.
3. Areal coherence, is a concept which explains that between elements in a region has links so that it gave a distinctive characteristic to the region.
4. Spatial interaction, is a concept which explains that each region has a relationship or cooperation with other areas. This cooperation is based on the regional potential differences.
5. Localization, is a concept that explains the phenomenon of centralizing activities in a region, which adds function of the region.
6. Scale, is a concept that explains the comparison of the scope of the study area, can be a narrow area (microscopic) and wide area (macroscopic).
7. Change, is a concept which explains that the phenomena that occur in a region can change depending on time.

In human life, land has a very important role, such as for settlement areas, agricultural activities and plantations, and establish industrial buildings. Geographically, the meaning of land is an area on the surface of the earth, covering all the objects that compose biosphere that is settled or migratory, on top of the area was atmosphere, under the area were soil, rocks, topography, and water, that affect human lives in the present and future [7].
Another definition, land is an area on the surface of the earth that has certain characteristics, for the climate (atmosphere), rocks and structures (lithosphere), landform and soil processes (pedosphere), vegetation and animals (biosphere) and humans (anthroposphere). Furthermore, land is a physical environment consisting of soil, relief, climate, water, flora, fauna, climate, and a formation of human cultures so that the land also has a sense of space or place [8]. Land is a place or area where people gathered and live together, where they use the environment to sustaining viability [9].

Based on some understanding of land according to the experts can be concluded that land is a part of the surface area of the earth consisting of lithosphere, biosphere, hydrosphere, and atmosphere that has an influence on human life.

Land use is a permanent human intervention in fulfilling the needs from nature, which was land, people change the land to fulfill their life needs [10]. Land use is every form of human intervention to the land in order to meet their needs, both material and spiritual needs [11]. Land use is an interaction between human and their environment, human attitudes and policies on the environment will leave marks to the land that called land use [12]. Land use is the human efforts in utilizing its natural environment to meet their certain needs of life and successes [7]. Land use is any human intervention either permanently or cycle on natural resources to meet the material and spiritual needs [13]. Land use is any type of land use by humans that includes the use for agriculture, sports fields, housing, restaurants, hospitals and cemeteries [14]. Land use is the human activity on specific areas of land (settlement, urban, rice fields) to meet human needs in life [15].

Classification of land use is the grouping of some types of land use into specific classes in a hierarchical manner based on the specific characteristics that contained in each type of land use [16]. In general, land use is classified into two major groups, namely the use of agricultural land and non-agricultural land use [17]. The use of agricultural land depends on the class of land capability that influenced by soil texture, slopes, the ability to pass water, and level of erosion. The use of agricultural land includes cultivation, mixed crops, rice fields, smallholder plantations, large plantations, production forests, grazing areas, protected forests, and conservation area [8].

Based on Ministry of Public Works (PU) Regulation No. 41 of 2007, land use is classified into two major groups’ namely protected area and cultivation area. Protected areas are designated areas with the primary function of protecting the environment includes natural resources and artificial resources. The cultivation area is a defined area with the main function for cultivation on the basis of conditions and potential of natural resources, human resources and artificial resources.

Land use classification according to Darmoyuwono, are settlements, gardens that planted of horticulture and hard crop trees, seasonal crops, grassland, forests, water bodies (wetlands, rivers, lakes), and unproductive land [18]. According to Sandy land use are classified based on a scale mapping of 1: 250.000 and 1: 200.000, differentiated into eight categories, namely villages, rice fields, moors and gardens, shifting cultivation, forest, reeds and shrubs, swamps, and other land [19]. Based on the mapping scale of 1: 100.000, 1: 50.000 scale, and the scale of 1: 25.000, the use of land divided into 10 classes, with several sub-categories:

1) Villages include village, cemeteries, and emplacement.
2) Farmland in the form of rice fields that planted with rice twice a year, rice field once a year, rice fields cultivated alternate year, which was rice once a year, once a year instead of rice, and shifting cultivation.
3) Plantation land with types of rubber, coffee, other plantation crops.
4) The gardens can be vegetable fields and never planted with rice, dry gardens with various plants, forest divides with dense forest; bushes; one type of plant.
5) Fish pond.
6) Swampland / swamp.
7) Infertile land or land with no economic value.
8) Grazing forest.
9) Others (if there is any appropriate with the conditions of area).
Land use data collection techniques that accurate, fast, covering large areas, can save time, cost and energy, that is using remote sensing technology. Remote sensing is a science or art to obtain the information about an object, area, or phenomenon by analyzing data that obtained by using a tool without direct contact with the studied object, area, or phenomenon [20].

Collecting land use data this time in order to be easy on a large scale and fast and can save time and energy, is using remote sensing data. However, field surveys are needed to ensure the interpretation results using sampling techniques.

Land use data from remote sensing imagery cannot always be identified indirectly, but recognizable by the association of land cover. Land cover is a vegetation and artificial construction that covers the surface of land, such as buildings. Information of land cover can be recognized directly from remote sensing imagery [20].

The presentation of land use information can be spatial in the form of maps to display information on the distribution of land use in the area. In addition, land use information can be presented in tabular, to see the wide area comparison of each type of land use. Land use map is a thematic map that illustrates the distribution of types of land use information, such as vegetation, water, open fields, roads, and buildings [15].

There are several stages of interpretation of land use data from remote sensing imagery, either visually or manually. Stages of visual interpretation includes setting reference data for interpretation, establishing land use classification systems, introducing key of land use interpretations (size, shape, pattern, texture, association and spatial characteristics), understanding image characteristics in generating land use information. Interpretation digitally can be done with supervised image classification by selecting a sample class based on experience in interpreting satellite images. Sampling is based on polygon data on the use of land that is homogeneous [21].

The detail of land use information using remote sensing technology was obtained by spatial resolution which is owned by the remote sensing image. Remote sensing information from landsat image can be used visually and digitally. Visually may use the classification of digitization on screen and supervised and unsupervised classification. The advantages of using satellite imagery, vastly coverage of recorded area, such as landsat images can cover, spot images, sentinel images, compared to aircraft or unmanned aerial vehicles.

In landsat true color image, each color representing a particular land use, green is the vegetation, the more green means more dense vegetation such as forests. Blue color is the appearance of waters which can be ponds, lakes, rivers, sea. The more blue means the water body were deeper. If the green color found on the hilly slopes then it is vegetation or annual plants or plantations [22].

Land use data is indispensable in each spatial analysis to solve problems on the earth's surface, such as the phenomenon of natural disasters, poverty, regional planning, exploitation of natural resources, and policies in the field of population. Land use data is the northern data that should be analyzed as a consideration for the problem solving recommendations.

For example, to solve a flood problem somewhere, the first data that has to be collected is land use data. This is because in the data of land use there is information on the spread of locations of settlements, rice fields, commercial areas, and industries. Based on the information can automatically predict the losses due to flooding and flood mitigation efforts to reduce the loss of property. In addition of land use data, to determine potential areas of flooding it requires other supporting data, such as network streams, altitude, rainfall, types of soil, and regional spatial planning. In order for the decision of solving flood problems to be accurately done, these data should be displayed in the form of maps that analyzed through a geographic information system.

Land use as a form of human interaction in utilizing the environment. The relationship between human and the environment is the core of the study of geography that distinguishes it from other sciences, both the social sciences of humanities and the clumps of science.
4. Conclusion

Concepts are terms in geography that has its own meaning to reveals the symptoms or phenomena on the surface of the earth. One of the most important geography concepts in analyzing the interaction between human and environment is the concept of land use. Land use is a human activity in utilizing a plot of land to meet the needs of their lives. Types of land use are settlements, rice fields, plantations, and moor. Rapid and accurate land use data and information can be obtained using remote sensing technology. Land use is an essential concept in geography that based on remote sensing technology.

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