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Application of Story Maps Techniques in Visualizing the Tourism Potential of Lake Toba in North Sumatera Province

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Abstract

Lake Toba is a lake located in the caldera of Mount Supervolcano. Lake Toba is also the largest lake in Southeast Asia. Lake Toba is included in the National Tourism Strategic Area (KSPN). This study aims to present information that is more interactive and communicative so that it is moreinteresting and easy to understand. This study aims to (1) visualize the potential of tourism objects in Lake Toba (2) Increase tourism promotion in North Sumatra, especially Lake Toba through the Story Maps technique. The research method used is descriptive. The results of this study are interactive maps of web-based tourist objects using Story Maps.

Keywords:
Interactive Maps, Lake Toba, Story Maps.

Introduction

Tourism is one of the largest foreign exchange contributor sectors in Indonesia, where it can be said that tourism in Indonesia is an integral part of national development and contributes to the spinning of the economy in Indonesia (Prasetya, 2018). Based on Law No. 10 of 2009, the Tourism Strategic Area is an area that has the main function and/or potential for tourism development that has influence in several aspects such as social and cultural, economic, natural resource empowerment, environmental carrying capacity, defense and security. Digital marketing in tourism activities is one of the efforts made in achieving 20 million foreign tourist visits in 2019 and encouraging promotion in Indonesian tourism (Sihombing & Hariyanto,

2019). In addition to digital marketing, aspects of brand image can also be used to support the realization of competitive marketing, brand image is considered capable of helping companies to develop in the product and service market and demonstrate the value proposition of business strategies (Evelina et al, 2012). In building a strong destination image, it is the hope that tourism managers in Indonesia want to achieve because it will increase profits for tourism managers because more tourists will visit these tourist attractions (Ayu, 2021).

Lake Toba is a National Tourism Strategic Area (KSPN) where the areas included in the administration of Lake Toba have a positive effect in increasing their PAD (Regional Original Income). This can be proven by the number of tourists who come to visit the Lake Toba and Samosir Island areas. Regarding the development of tourism in Lake Toba, there is Presidential Regulation Number 81 of 2014 concerning Spatial Planning for the Lake Toba Region and its surroundings. The regulation contains aspects of the development and development of the Lake Toba tourism area. Actually, development in the tourism sector is a developing concept, the concept of the tourism life cycle and the concept of interrelated carrying capacity is a good and dynamic way to see the conditions and developments in the tourism sector. Currently, tourism can be perceived as an engine that drives the economy or a foreign exchange earner for regional economic development. After Lake Toba became a UNESCO Caldera Geopark, the scope of the caldera area which became a water catchment area (DTA) was able to become an attraction and increase local revenue (PAD) in seven regencies, namely Dairi Regency, Humbang Hasundutan Regency, Toba Samosir Regency, Karo Regency, North Tapanuli Regency, Simalungun Regency and Samosir Regency. There are many ways that can be done to promote Lake Toba tourism, one of which is by utilizing web-based geospatial data. Geospatial data can be produced from several sources such as satellite images, aerial photos and digitized

results on screen. Geospatial data can present objects on the earth's surface. One method that can be used to present the location of the study is to visualize it with a story map technique.

Literature Review

Story maps are interactive maps combined with text and other content to tell a story about the world. Typically story maps are designed for non-technical audi- ences; thus, story maps include all the elements required to tell a story: web maps or map services, text, and multimedia content. Story maps are at the focal point of the rapid evolution of ArcGIS from a technology available only to highly trained specialists to an array of services and resources that can benefit everyone. Story maps bring the power of geography and spatial analysis to large audiences. They can be built not only by graphic designers and journalists, but by GIS users, web developers, and anyone with a basic familiarity with web and mobile platforms. They can serve not only the general public, but also within communities and organizations (ESRI, 2012)

Story maps are web applications that enable scientists, educators, and others to enhance interactive maps with text, figures, and multimedia content. Recent trends and research have highlighted the potential utility of story maps in science communication for non-expert audiences (Patterson and Bickel, 2016), adapting new technologies in the classroom (Hong, 2014), and engaging citizens with community issues (Santo et al., 2010). A story map is a widely accessible "vehicle" where learners benefit by having access to interactive, real-world models and data, which is a key component of online learning (Ally, 2008). The compactness of story maps is particularly appealing, as they are effective for communicating and visualizing complicated ideas and large amounts of information in an organized, user-friendly interface targeted to the specific audience or lesson. Teaching with story maps could enhance geo-literacy, or spatial thinking,

which is expected to be a pathway to success in many science, technology, engineering, and math careers in the 21st century workforce (Kerski, 2015; National Research Council, 2005).

Story maps are built on intelligent maps (also called web maps). Some typical components of intelligent maps that are commonly found in story maps are… (ESRI, 2012)

a) Authoritative and well-organized data
b) Clear, useful pop-ups
c) Simple, purposeful cartography
d) Time-enabled data
e) Dynamic legends

In addition to the basic elements of intelligent maps, story maps also have:

a) Descriptive text providing context, summarizing the purpose of the map, and explaining its components
b) Sliders, clickable icons, or other simple interactive elements that control or enhance aspects of the map
c) Multi-media content (photos, videos, etc.)
d) Credit and source information

The Environmental Systems Research Institute (ESRI), through their cloud-based platform ArcGIS Online, have made it possible for users of geographic information systems (GIS) to easily create and publish story maps for many environmental purposes and audiences. For example, the Global Forest Watch (2017) organization documents the trend and global distribution of forest loss, the causes of forest loss, and the potential impact forest loss has on wildlife and climate. The US Forest Service (2017) published a story map detailing the purpose, scope, and results of the 2015 forest inventory in Utah. In the example most relevant to the current research,

Fraczek (2017) published an ESRI Story Map that provides a captivating geology lesson titled "Motion of Tectonic Plates." As one example of the novelty of this and other story map applications, the map illustrates the process of tectonic subduction using an interactive map of the San Andreas Fault. It is unclear the extent to which ESRI Story Maps are being used for teaching in educational institutions, and their effectiveness for delivering course material has not been evaluated by students.

As with any new technology, there are advantages and disadvantages. The biggest advantages of ESRI Story Maps are that they are interactive, collaborative and cloud-based, making them available over an internet connection without the need to download software. Story maps can also be accessed on desktop, laptop, tablet, or smart phone devices. This allows story maps to reach a large audience or be utilized by many educators and institutions. The creation process is user-friendly and requires no coding. Story maps are most often freely accessible for the user. The disadvantages of story maps are that they rely on the availability of internet access, and the scientific peer review process is not yet fully developed to ensure the educational quality of story map content. An internet search of authors or authoring institutions will show that published story maps are likely associated with reputable organizations or agencies that may require at least an internal review before publishing. However, there is no requirement of external peer review to publish a story map that may end up being used for educational purposes.

The tourism cycle generally refers to the TLC (Butler's. 2007) concept as follows:

Stage 1. Discovery

The tourism potential is at the identification stage and shows destinations that have the potential to be developed into natural tourist attractions.

Stage 2. Engagement

At the engagement stage, the local community took the initiative by providing various services for tourists which began to show signs of improvement in several periods. Here there is the role of the government and the community in promoting the tourism potential of the region.

ESRI (2017) describes five principles for effective use of story maps (Table 1). The first principle concerns matching content of the story map with the intended audience. The second principle suggests informing the user of the rationale of location(s) in the story map at the beginning of the presentation, and saving any links that would lead the user to navigate away from the story map until the end of the presentation. The third principle requires considering the best format (e.g., scrolling or tabbed webpage) for the story being told. The fourth principle suggests tips for making interactive maps clear, concise, and visually intuitive. Finally, the fifth principle advises story map authors to strive for simplicity by reducing text and making maps more intelligible through an iterative review process before publishing.

Stage 3. Development

At this stage, there have been visits by both domestic and international tourists on a large scale. Tourism organizations began to form and carry out their functions, especially promotive functions carried out together with the government so that foreign investors became interested and chose existing destinations as their investment destinations.

Stage 4. Consolidation

At this stage the tourism sector shows dominance in the economic structure of an area and there is a tendency to cooperate with other countries in developing the existing tourism potential.

Stage 5. Stagnation Stage

At this stage the highest number of visits has been reached and several periods show a number that tends to remain constant. Here there is a deterrent effect on the tourists to the tourism they visit.

Stage 6. Decreasing or Rejuvenating

After stagnation occurs, there are two possibilities that can occur in a tourism. If it remains at the stage of stagnation, it is likely that the tourist destination will be left behind by the tourists, but if you want to be more developed and advanced, a serious approach is needed in managing tourist destinations to be even better in the future.

Methods

In this study, advanced methods are used to visualize geospatial-based direct messages that contain stories of various tourism potentials in Lake Toba. Maps can be used as a medium for delivering various tourist objects in the Lake Toba area. It has been created using the ArcGIS platform, although other software (free or commercial) is available. After shifting from using old or non-web-based software now to storytelling maps, namely by presenting factual data into applications without the need for programming languages.

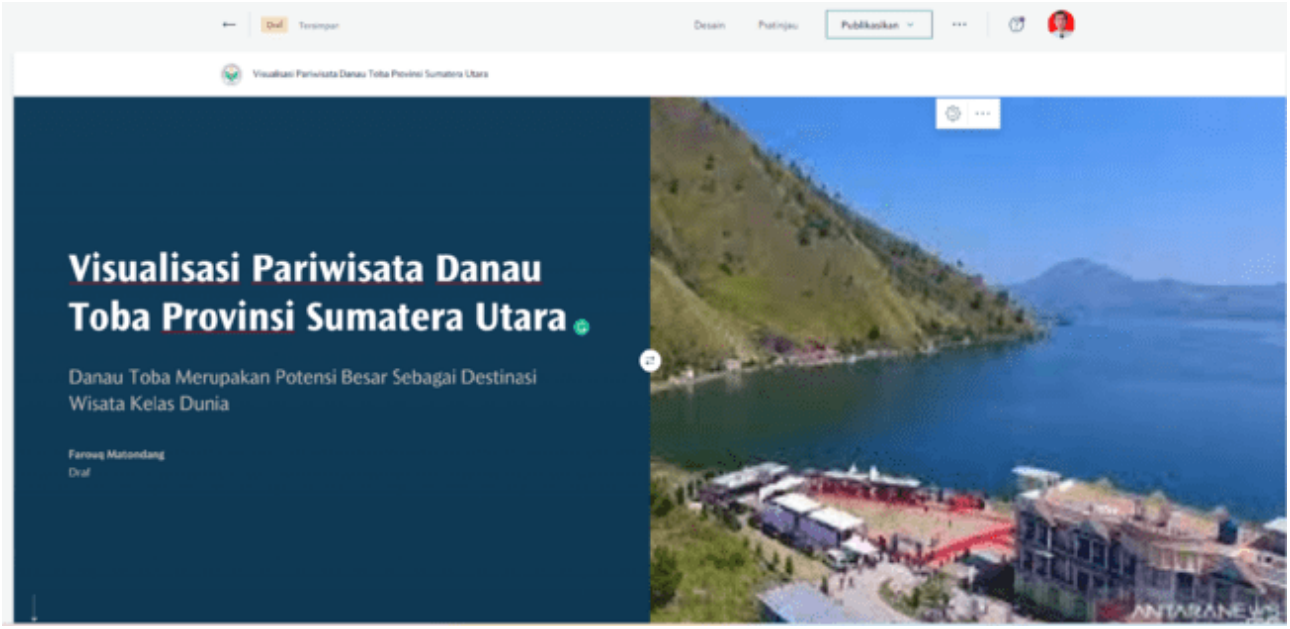
Results

The result of this research is a story map entitled "Visualization of Lake Toba Tourism in North Sumatra Province. The templates used in building the storytelling map in this study are various kinds of potential tourist objects found in Lake Toba. In addition to displaying photos, it will display a description containing an explanation regarding the

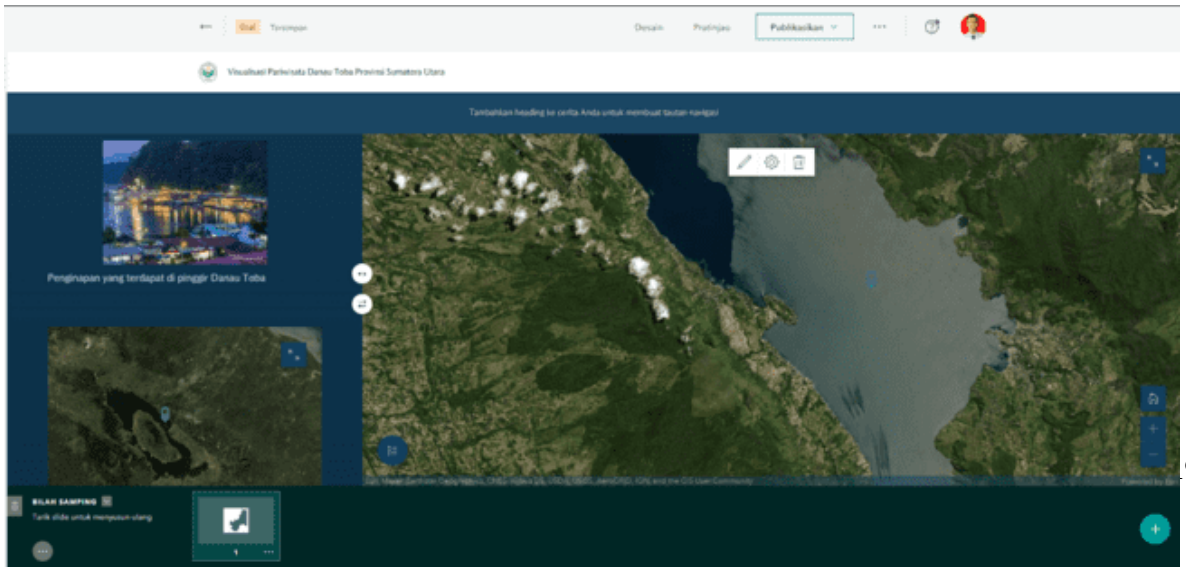
tourist objects in the Lake Toba area.

Discussion

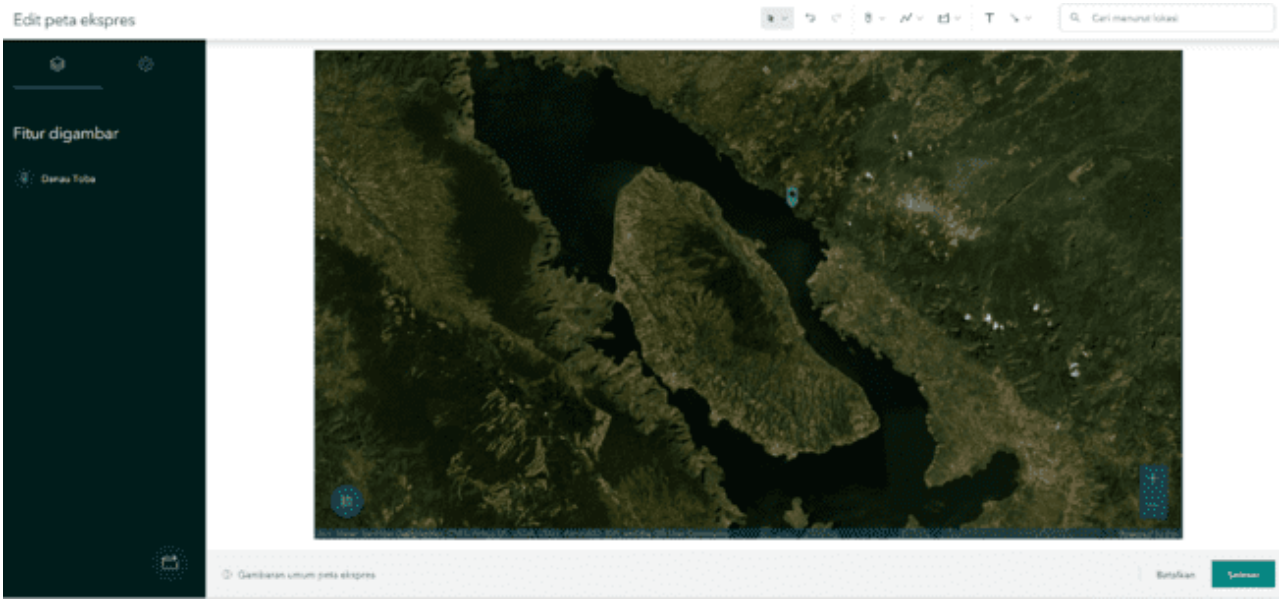
Figure 1 is the home page or home page. The home page displays information related to titles and subtitles along with pictures of the appearance of Lake Toba and the tourism potential in it.



From Figure 2, the following shows the geospatial-based appearance of Lake Toba and the land surrounding the lake. Based on the storytelling map, there is some information about the tourism potential in the form of lodging and cages in the Lake Toba area.



From Figure 3 we can see geospatially the appearance of Lake Toba. Based on (*Undang-Undang-Nomor-10-Tahun-2009-Tentang-Kepariwisata*an, n.d.) Regarding tourism, it is stated that aspects in the development and development of tourism areas include tourist attractions, accessibility, infrastructure and facilities as well as the community.



From Figure 4
If viewed from a geological point of view, the formation of Lake Toba is inseparable from the history of the super powerful eruption that formed this caldera lake. This was revealed by Van Bemmelen, a geologist from the Netherlands in his book The Geology of Indonesia (1939) who revealed his hypothesis about the process of the formation of Lake Toba.

According to Bemmelen, initially this ancient volcano carried out volcanic activity and a very powerful eruption occurred. The combination of volcanic and tectonic processes in this ancient volcanic eruption caused the sinking of the center of the mountain, thus forming a basin extending from the northwest to the southeast.

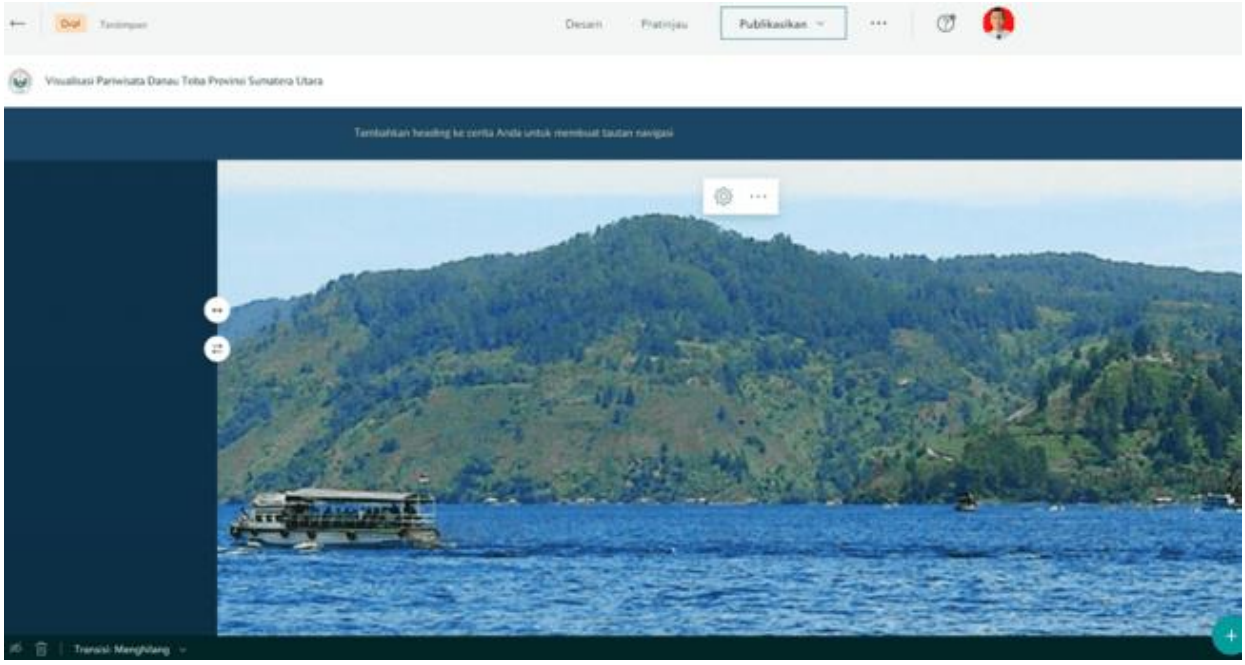
The eruption also caused a part of the land to tilt to the southwest which formed Samosir Island. After the massive eruption, the Toba Caldera was covered with igneous rocks which then melted and formed a lake.

Based on research, the Ancient Toba Volcano was formerly a supervolcano, which could spit magma at least 300 km3 when it erupted 74,000 years ago.

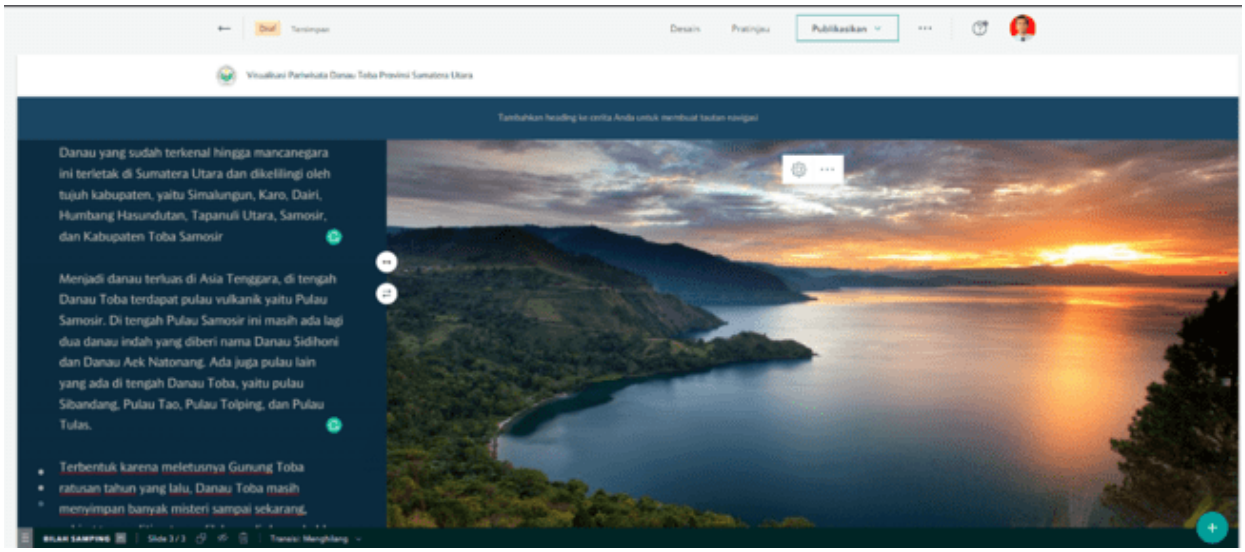
When the eruption took place, at least the Ancient Toba Volcano had spewed out no less than 2,800 km3 of volcanic material. Worse, due to the devastating eruption, the human population on earth shrank by 60% and was followed by disruption of the food chain.

Even this ancient volcanic eruption was said to have made the Homo sapiens species almost extinct. Modern human migration has also stalled, as the eruption left Homo Sapiens isolated somewhere in Africa.

Now the results of the eruption have formed a beautiful lake which is a tourist attraction in North Sumatra with a length of 100 km and a width of 30 km. The depth of Lake Toba is around 500 meters with a surface height of about 900 meters (kemenparekraf, 2021).



From Figure 5



Conclusion

Technological developments and information at this time is growing so rapidly, the higher the usage digital technology, the higher also the use of the internet and compared straight with its use in the world marketing, so it is said that online marketing is gaining popularity in line with the increasing popularity of use internet (Mukhsin, 2019).

The implementation of the promotion of marine tourism on Lake Toba should also emphasize promotions in the field of social media because in the era of 4.0 people are more familiar with the use of these social media applications. The storytelling map of Lake Toba's tourism potential was created using a template from the ESRI ArcGIS Story Map, which tells about the potential of tourism objects in Lake Toba. This is done as a form of promotion of Lake Toba tourism through the Story Map website. By looking at the positive trend of global tourism growth, optimization of tourism development as a sector is expected to be able to encourage the country's economy and the regional economy in particular.

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