Tourism vulnerability management to support local wisdom conservation in the current agriculture practices (Case: Agricultural tourism area in Ngawi Regency, East Java, Indonesia)

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Abstract. Climate change can cause an increase in the earth's surface temperature and atmospheric CO2. This has an impact on the tourism area based on local agricultural wisdom. The research aims to analyze the level of tourism vulnerability management and formulate tourism vulnerability management strategies to support local wisdom preservation in current farming practices. The method used is mapping, field observations, and interviews with two approaches, namely quantitative content analysis and qualitative content analysis. The results showed that the farming community was only profit-oriented without paying attention to balancing and preserving the natural environment. Most farmers want all agricultural processes to be done instantly or quickly, with higher yields. However, they leave local wisdom values and socio-cultural contexts in managing the rice field environment. One of the components of local wisdom that can still be maintained is the cropping pattern primarily found in the highlands that can still be found. To manage the vulnerability of tourism to support the preservation of local wisdom in current agricultural practices.

1. Introduction
Climate change can cause an increase in the earth's surface temperature and atmospheric CO2. This has an impact on the tourism area based on local agricultural wisdom. Some claim that tourism is now the largest industry in the world and some areas are untouched by tourism. The tourism industry is very sensitive to variability and natural conditions [1]. Tourist attractions will be increasingly affected both directly in the form of travel behavior, capacity to travel, perceived destination, destination attractiveness, and indirectly in the form of mitigation policies, changes in the physical, economic and socio-political environment [2]. The development of tourism has also influenced society in many ways [3]. A sustainable tourism industry is based on a number of factors; in particular, consideration should be given to the impact of tourism on host communities [4]. The attitude of local residents towards...
tourism is an important factor in that a happy community is more likely to support tourism development and welcome tourists [5]. Local wisdom that develops in society is the result of community habits as a form of adaptation to nature and the environment [6]. Whereas local shows the interaction space where events or situations occur [7]. According to [8] there are 5 functions of local wisdom, namely; marker of identity community, adhesive element, across religions, community togetherness spirit, changing the mindset and reciprocal relationship between individuals and groups by placing them on the common ground.

The development of various types of tourism, the obstacle that is often faced is information related to the vulnerability of changes in natural conditions that have an impact on social and cultural conditions in the regional and local scope [9]. Meanwhile, research conducted by [10] in Vava'u, the Kingdom of Tonga, shows that several factors can increase vulnerability, namely; strong seasonality, dependence on air access, remoteness, limited connectivity of Vava'u from national decision makers, and limited human and financial resources. From the results of this study, a series of adaptation strategies are recommended to further increase the level of resilience to vulnerability, namely improving education on changes in all conditions, increasing diversification of products and markets, strengthening institutional capacity and mainstreaming adaptation in national policies. In facing various natural, social and cultural changes, it is necessary to study the proper management to maintain the sustainability of the tourism sector. This study aims to analyze the level of tourism vulnerability management to support local wisdom conservation in the current agriculture practices, and formulate a strategy for managing tourism vulnerability to support local wisdom conservation in the current agriculture practices.

2. Materials and methods
The tourism sector is a new mainstay for the Ngawi Government, East Java, to attract investors (Figure 1). A case study approach was employed, with the consideration that local agricultural wisdom is a specific component and has a different character from one region to another at certain times, especially in the current agriculture practices. Data input was carried out through mapping, field observation and interview. Thematic spatial analysis techniques were used to determine the distribution of agricultural areas which are tourist attractions based on local wisdom, and the relationship between agricultural tourist attractions. The thematic spatial analysis method uses physical parameters (location and distance) and then composites with various information attribute data to describe the themes of local wisdom that exist in the agricultural area. The output generated from this method is able to help determine a planning and decision makers more specifically. The processing of area vulnerability data is carried out using the scoring method [11]. Content analysis in this study was employed to determine the tendency of the content of communication from interviews with tourists, communities, farmers, and the government. There are two approaches used, namely quantitative content analysis and qualitative content analysis [12].

Figure 1. Position of Ngawi in East Java Province [13].
3. Results and discussion
The development of tourism in Ngawi has increased quite significantly, seen from the 2017 data, the total number of domestic tourist visits was 618,793 tourists and 76 foreign tourists, while in 2018 there was an increase in the number of domestic tourists by 778,177 tourists, while foreign tourists were 145 tourists. The total number of domestic tourists kept increasing in 2019 by 794,008 tourists.

3.1. Clustering of tourist attractions in Ngawi
The government has implemented various tourism development concepts, one of which is the formation of tourist attractions clusters in Ngawi, as a form of optimizing tourism development. According to these institutional data, it can be seen that tourism based on agricultural local wisdom has not become part of the various formally developed attractions (Table 1). The community and tourists have made efforts and innovations by exploiting the potential of agricultural tourism and are strongly supported by geographic location and favorable climate. Combining agriculture with tourism is one very interesting innovation, and it is a special attraction for tourists to get to know the world of agriculture.

Table 1. Tourist attractions cluster of Ngawi.

| No  | Tourist Attractions by Cluster | Jatipangawitan Village, Sub-district | Kenebejo Village, Sub-district |
|-----|--------------------------------|-------------------------------------|--------------------------------|
| 1.  | Trinil Museum                  | Kawu, Kedunggalar                  | Girikerto, Sine                |
| 2.  | Pondok Reservoir               | Bringin, Padas                     | Hargomulyo Stone, Sine          |
| 3.  | Sangiran Reservoir             | Bringin, Karangjati                | Hargomulyo House, Ngrambe       |
| 4.  | Kedung Bendo Reservoir         | Gunungjati, Kasreman               | Srambang Waterfall, Girimulyo, Jogorogo |
| 5.  | Tawun Baths                    | Tawun, Kasreman                    | Suwono Waterfall, Hargomulyo, Ngrambe |
| 6.  | Van Den Bosch Fort             | Palem, Ngawi                       | Teleng Waterfall, Ngrayudan, Jogorogo |
| 7.  | Banteng Statue                 | Wonorejo, Kedunggalar             | Srigati Guest House, Babadan, Paron |
| 8.  | Patih Pringgokusumo’s Tomb    | Ngawi, Ngawi                       | Mount Warak, Sine               |
| 9.  | Rest Area of Suryo Monument   | Kawu, Kedunggalar                  | Mount Liliran, Ketanggung, Sine |
| 10. | House dr KRT Rajiman           | Kauman, Widodaren                  | Pendem Temple, Pucangan, Ngrambe |
| 11. | Tirtonimolo                    | Tempuran, Paron                    | Demangan Temple, Ngrayudan, Jogorogo |
| 12. | Bonggol Jati Craft Center      | Ngawi, Brining, Widodaren, Mantingan | Jaka Tarub Hermitage, Widodaren, Gerih |
| 13. | Masjid Baiturrahman            | Ngawi, Ngawi                       | Selondo Campground, Ngrayudan, Jogorogo |
| 14. | Mati River                     | Kartoharjo, Ngawi                  | Remembrance of Keraton Wilotho, Tanjungsari, Jogorogo |
| 15. | Ngawi Square                   | Ngawi, Ngawi                       | Tomb of PH Kertonegoro, Sine, Sine |
| 16. | Taman Pintar                   | Ngawi, Ngawi                       | Tomb of patih Ronggolono, Hargo Dumilah, Hargomulyo, Ngrambe |
|     |                                 |                                     | Nono Water Springs, Soko, Sento, Jogorogo, Ngrayudan, Sine, Ngrayudan |
3.2. Variety and problems of agricultural local wisdom as tourism potential

Agricultural tourism has become part of the leading tourism in Ngawi. Both plantation tourism and cultivation agriculture can be seen in Figure 2. In addition, the tourism industry acknowledges that agriculture based on local wisdom is needed to support sustainable tourism. A good synergy of agriculture and tourism on the one hand can increase people's income, and on the other hand it is not destructive to natural sustainability. Several villages that still maintain local wisdom are in Ngrambe, Jogorogo and Sine Sub-districts which still have a large expanse of rice fields with panoramic views of terraced rice fields or beautiful terraces and still uses traditional rice irrigation systems. Traditional agricultural system is a cultivation system that has been passed down from generation to generation so that it becomes local knowledge of farmers in carrying out cultivation activities [6]. The tourism potential based on organic agriculture can be found in the highland region of Ngawi. The area for developing organic agricultural tourism can be seen in Figure 3. The local wisdom of the Ngawi farmer community in the agricultural sector can be examined from several components, namely agricultural norms and rituals, agricultural implementation processes, spatial formation of agricultural land management, agricultural cropping patterns, agricultural actors, and agricultural equipment.

![Figure 2. Position of the development area for organic agricultural tourism.](image)

![Figure 3. Organic Agricultural Tourist Attractions in Ngawi.](image)
3.3. The vulnerability level of tourism to support local wisdom conservation in the current agriculture practices

Vulnerability includes a variety of concepts including sensitivity or vulnerability to hazards and a lack of capacity to cope and adapt [15]. Local wisdom can be found in various ways, including in the agricultural system [16]. Traditional agricultural system is a cultivation system that has been passed down from generation to generation so that it becomes local knowledge of farmers in carrying out cultivation activities [14]. This local knowledge system provides us with an overview of the traditional wisdom of the community in using natural and social resources wisely which refers to balance and environmental sustainability.

| No | Classification | Variety of Local Wisdom | Local Wisdom Values | Vulnerability | Vulnerability Rating |
|----|----------------|-------------------------|---------------------|---------------|---------------------|
| 1  | Agricultural norms and rituals | wiwiti (starting) or wiwitan (opening /commencing) | Social value as a lesson about the importance of community solidarity | Wiwiti ritual before planting or harvesting rice in paddy fields | First |
|    |                | bring all ubaranpe (ritual equipment) | Cultural values contain the philosophy of the very noble ancestors |                           | Norms and Rituals are no longer practiced |
| 2  | Agricultural implementation process | pre-mechanization using traditional agricultural tools | Social values as empowerment of farming communities | Currently, part of it has begun with mechanization in the form of a tractor | Fourth |
|    |                | making pinihan | Cultural values as a form of patience with natural processes | There is a process without seeding, rice seeds are directly sown in the rice fields | Part of the agricultural process is carried out by mechanization of modern machines |
| 3  | The spatial formation of agricultural land management | The highlands apply land management with local wisdom with the concept of mountain belts or terraces | Ecological value as an effort to conserve the environment, | The concept of terracing wastes land | Sixth |
|    |                | recognizing pranata mangsa (season rules) as a reference time for planting crops | | | The spatial formation in the highlands still uses terraces. |
| 4  | Agricultural cropping patterns | Implementing multiple cropping | Cultural values have the belief that nature is suitable for farming in certain seasons. | prices of grain at this time tend to fall due to the high moisture content of grain. | Second |
|    |                | | The ecological value that this method is intended to reduce the risk of crop failure | | The cropping pattern changes significantly due to climate change |
| 5  | Agricultural actors | Agricultural actors can be grouped into several categories, | Social values instill a division of roles in all levels of society in agriculture. | Developing agricultural equipment technology that replaces agricultural actors in the form of mechanization | Third |
|    |                | | Economic value provides the opportunity to work at all levels of society. | | Agricultural actors are greatly reduced by the development of industrial area |
|    |                | | Cultural values instill togetherness in all communities according to their role. | | |
| 6  | Agricultural equipment | Traditional farming tools; Luku, Pacal, Lencek, Garba, Garuk, Angkil, Ganco, Arit, Aniani. | Socio-cultural values change the mindset that is profit-oriented without paying attention to the problem of balance | These agricultural tools are traditional agricultural tools | Fifth |
|    |                | | The economic value of all agricultural processes. | | Agricultural equipment partly uses modern equipment |
According to the results of a study of the varieties and problems faced in the organic farming system in Ngawi, in formulating the level of vulnerability of tourism based on local wisdom, an assessment of each variety of local wisdom can be carried out. The assessment is classified into several components, namely agricultural norms and rituals, agricultural implementation processes, spatial formation of agricultural land management, agricultural cropping patterns, agricultural actors, and agricultural equipment. The results of the analysis can be seen in Table 2.

According to the results of this analysis, it can be said that the most highly vulnerable position is the change in the community’s paradigm towards agricultural norms and rituals. The socio-cultural changes occurring in the farming community in Ngawi can be seen clearly, especially from the change in their mindset. However, they leave local wisdom values and socio-cultural contexts in managing the rice field environment. This is a potential tourist attraction. Local wisdom developing in society is the result of community habits as a form of adaptation to nature and the environment [6].

3.4. A strategy of tourism vulnerability management to support local wisdom conservation in the current agriculture practices

Strategies to respond to global climate change are often considered under the heading of mitigation and adaptation. In examining the development of local wisdom-based tourism areas, an understanding of the factors that cause local wisdom is needed. In Gurgur II Forest Village state that the factors that led to the local wisdom being maintained are traditional tools still exist, inherited rice fields, farmers still have strong Batak customs. Customary leaders are very influential, farmers consider maintaining local wisdom a tribute to the ancestors of the Batak tribe [6]. The results of this study, adaptation strategies are recommended to further increase the level of resilience to vulnerability, namely increasing education on changes in all conditions, increasing product and market diversification, strengthening institutional capacity and mainstreaming adaptation in national policies [11].

In the context of managing the vulnerability of tourism to support local wisdom conservation in the current agriculture practices, what can be done are: 1) Cultivating agricultural norms and rituals in future generations; 2) Preservation of the agricultural implementation process based on local wisdom; 3) Increasing efforts to maintain the sustainability of the spatial formation of agricultural land management; 4) Adaptation of agricultural cropping patterns to climate change; 5) Regeneration of agricultural actors; and 6) Engineering agricultural equipment which is environmentally friendly and labor intensive.

4. Conclusion

This study provides information to conservators and conservation scientists about the management of tourism vulnerability to support the conservation of local wisdom in current agricultural practices. The spatial pattern of agriculture is a physical formation of understanding the local wisdom of the farming community in Ngawi regarding the environment in land cultivation. To manage the vulnerability of tourism to support the preservation of local wisdom in current agricultural practices.

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