

ABSTRACT

Sinkhole is a depression or hole in the ground caused by some form of collapse of the surface layer. It is one of the terrifying hazards that can badly threaten people's lives and properties and lead to the effect on the development of many regions in the world. Sinkholes and subsidence are found in Tanjungsari Sub-district which is dominated by limestone of Wonosari Formation that is located on Gunung Sewu karst, Gunung Kidul Regency, Yogyakarta, Indonesia. However, there is no study that carried out the characteristic and the specific number of sinkholes presence in this area yet. The association between the sinkhole and its controlled factors as well as the hazard assessment have not been studied and carried out either. According to these problems, this study aims to study the physical properties of the sinkhole in Tanjungsari based on the field observation with the combination of the karst characteristic from the previous studies. Furthermore, the association between sinkhole occurrence and its controlled factors, such as slope, drainage density, lineament density and types of cover was also studied by applying the binary logistic regression. Moreover, the susceptibility map of Tanjungsari was also carried out by applying GIS-based binary logistic regression. The study was based on the primary data from the field observation and the secondary data from the DEMNAS as well as the previous study. As the results, 32 sinkholes were found and mostly formed as vertical with varying size from approximate 1 m to 80 m in diameter and up to approximate 30 m depth. In addition to this, the sinkhole occurrences in the study area relate to several types of sinkhole process such as solution, collapse sinkhole, buried sinkholes, dropout sinkholes, and suffocation sinkholes. From the binary logistic regression analysis, all of the predictor variables show the significant effect on the sinkhole occurrence. With these results, sinkholes are found likely to be associated with gentle slope, high drainage density and lineament density, and soil cover area which is parallel to the same association based on the field observation and the process map from DEMNAS. Finally, the susceptibility map was carried out consisting of three susceptibility classes, such as very low-low, moderate and high-very high class that spread 50%, 12% and 38%, respectively over the study area. The results from this study can be useful information for urban planning and the development for a safe land use.

Keywords: Sinkhole, Sinkhole Susceptibility Map, Binary Logistic Regression

SARI

Lubang adalah depresi atau lubang di tanah yang disebabkan oleh beberapa bentuk runtuhnya lapisan permukaan. Ini adalah salah satu bahaya mengerikan yang dapat sangat mengancam kehidupan dan harta benda manusia dan berdampak pada perkembangan banyak wilayah di dunia. Lubang dan penurunan terdapat di Kecamatan Tanjungsari yang didominasi oleh batugamping Formasi Wonosari yang terletak di karst Gunung Sewu, Kabupaten Gunung Kidul, Yogyakarta, Indonesia. Namun, belum ada penelitian yang dilakukan untuk mengetahui karakteristik dan jumlah pasti keberadaan sinkhole di kawasan ini. Hubungan antara lubang dan faktor-faktor yang dikendalikan serta penilaian bahaya belum dipelajari dan dilakukan. Berdasarkan permasalahan tersebut, penelitian ini bertujuan untuk mempelajari sifat fisik lubang di Tanjungsari berdasarkan observasi lapangan dengan kombinasi karakteristik karst dari penelitian sebelumnya. Selain itu, hubungan antara kejadian lubang dan faktor-faktor yang dikontrolnya, seperti kemiringan, kerapatan drainase, kerapatan kelurusan dan jenis tutupan juga dipelajari dengan menggunakan regresi logistik biner. Selain itu, peta kerentanan Tanjungsari juga dilakukan dengan menerapkan regresi logistik biner berbasis GIS. Kajian ini didasarkan pada data primer dari observasi lapangan dan data sekunder dari DEMNAS serta studi sebelumnya. Hasilnya, 32 lubang ditemukan dan sebagian besar berbentuk vertikal dengan ukuran bervariasi mulai dari diameter sekitar 1 m hingga 80 m dan hingga kedalaman sekitar 30 m. Selain itu, kejadian sinkhole di wilayah studi terkait dengan beberapa jenis proses lubang seperti solution, lubang collapse, lubang terkubur, lubang dropout, dan lubang suffossion. Berdasarkan analisis regresi logistik biner, semua variabel prediktor menunjukkan pengaruh yang signifikan terhadap kehadiran lubang. Dengan hasil tersebut, lubang yang ditemukan cenderung berasosiasi dengan kemiringan landai, kerapatan drainase dan kerapatan kelurusan yang tinggi, serta luas tutupan tanah yang sejajar dengan asosiasi yang sama berdasarkan pengamatan lapangan dan peta proses dari DEMNAS. Terakhir, dilakukan peta kerentanan yang terdiri dari tiga kelas kerentanan, yaitu kelas sangat rendah-rendah, sedang dan tinggi-sangat tinggi yang tersebar masing-masing 50%, 12% dan 38% di wilayah studi. Hasil dari penelitian ini dapat menjadi informasi yang berguna untuk perencanaan kota dan pengembangan penggunaan lahan yang aman.

Kata Kunci: *Lubang, Peta Kerentanan Sinkhole, Regresi Logistik Biner*