

**LEMBAR
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU PEER REVIEW
KARYA ILMIAH : PROSIDING**

Judul Karya Ilmiah : Modeling changes in land use using the integration of MLP-NN, CA-Markov models and GIS for settlement development in Tembalang District

Jumlah Penulis : 3 Orang (S. Subiyanto, **Fauzi Janu Amarrohman** and Azizah Nur Rahmah)

Status Pengusul : Penulis ke-2

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Arief Laila Nugraha, S.T., M.Eng.
 NIP. 198105302006041001
 Unit Kerja : Teknik Geodesi FT UNDIP

Reviewer 1



Moehammad Awaluddin, S.T., M.T.
 NIP. 197408212005011001
 Unit Kerja : Teknik Geodesi FT UNDIP

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Hasil karya ilmiah ini dituliskan dengan kaidah ilmiah yang tersusun sesuai dengan tata urutan penulisan dari penerbit prosiding internasional. Unsur isi paper dimulai dari abstrak, introduction, material, methode, result, discusion, conclusion, dan references disampaikan dengan lengkap.

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Reviewer 1



Moehammad Awaluddin, S.T., M.T.

NIP. 197408212005011001

Unit Kerja : Teknik Geodesi FT UNDIS

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d. Kelengkapan unsur dan kualitas terbitan/prosiding(30%)	9,00		9,00
Total = (100%)	30,00		26,00
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Semarang,

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Arief Laila Nugraha, S.T., M.Eng.

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Modeling changes in land use using the integration of MLP-NN, CA-Markov models and GIS for settlement development in Tembalang District

Subiyanto S.^a , [Amarrohman F.J.^a](#), Rahmah A.N.^a

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^a Geodesy Department, Faculty of Engineering, Diponegoro University, Indonesia

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The effects of dynamic land use change can be modeled by Artificial Neural Network (ANN) models with Multi-layer Perceptron (MLP) network architecture and backpropagation algorithms. The setting process and predictive capabilities testing will be generated by the models with a combination of MLP-NN, CA-Markov methods and Geographic Information System (GIS) from several previous studies so the results is accurate. This study aims to analisys land use change in Tembalang District in 2010 as first period models, 2014 as period models, and land use in 2018 as validation data, make a model of land

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012037

Modeling changes in land use using the integration of MLP-NN, CA-Markov models and GIS for settlement development in Tembalang District

S. Subiyanto^{1*}, Fauzi Janu Amarrohman¹, Azizah Nur Rahmah¹

¹Geodesy Department, Faculty of Engineering, Diponegoro University, Indonesia

*sawitrisubiyanto@lecturer.undip.ac.id

Abstract. The effects of dynamic land use change can be modeled by Artificial Neural Network (ANN) models with Multi-layer Perceptron (MLP) network architecture and backpropagation algorithms. The setting process and predictive capabilities testing will be generated by the models with a combination of MLP-NN, CA-Markov methods and Geographic Information System (GIS) from several previous studies so the results is accurate. This study aims to analisys land use change in Tembalang District in 2010 as first period models, 2014 as period models, and land use in 2018 as validation data, make a model of land use change with ANN methods and projection land use in Tembalang District in 2026. CA-Markov models are used for future projections. In modeling land use change, several driving force variables are used, namely distance to roads, rivers, settlements, and population density. This research are using maps for 2010, 2014 and 2018 from digitization process of hight resolution satellite imagery and validation land use in the field. In this research, data on land use change from 2010 to 2018 is dominated by land use changes from vacant land to settlements and housing. Settlement increased by 2,13%, housing increased by 102,69%, and vacant land already allocate increased by 47,32% and vacant land decreased by -61,18%. The results of modeling validation have a Kappa index of 0.959, an the root mean square value is 2.579 m that means this value is accepted, and 85% of the area between the prediction map and the digitization map are said to be appropriate, so this model is classified as having very good similarities with existing land use conditions in 2018. Overall prediction results show that land suitability is 70.52% and 29.48% of land is not in accordance with Semarang City RTRW map for 2011-2031.

Keywords : Land Use Change, HRSI, MLP, ANN, GIS

1. Introduction

The city of Semarang is the center of government in Central Java Province. As the capital of a fast-growing and dynamic province, the city of Semarang over bounded which indicates the development of the city towards the periphery or the countryside [1]. Tembalang District is one of the sub-districts located on the outskirts of Semarang with very rapid development. One of the implications is the many changes in land use that occur, including the construction of settlements and other physical buildings. The development of cities with land changes from one use to another land use is needed information and spatial analysis of these changes. [2]. Competition in meeting the increasing needs of land can cause land damage and decreased environmental quality of the city. These changes will continue along with the increasing number and activity of the population in carrying out economic, social and cultural life, which in turn will have both positive and negative impacts [3]. During the five year periods from



The Determination of Tidal Constituents using Wavelet Base Harmonic at The Strait of Malacca

A G Abubakar^{1,2*}, M R Mahmud¹, K K W Tang¹ and A Husaini^{1,3}

¹Geo-Coastal Research Unit, Faculty of Built Environment and Surveying, Universiti Teknologi Malaysia, 81310 Johor Bahru, Malaysia

²Department of Surveying and Geo-Informatics, college of Environmental Studies, Waziri Umaru Federal Polytechnic Birnin Kebbi, Kebbi State, Nigeria.

³Department of Geography, Aminu Saleh College of Education Azare, Bauchi Nigeria.

*Corresponding Author: gaauwal2@live.utm.my

Abstract. Activity at the coastal areas required accurate tidal analysis and prediction. Tides are a result of the response of the water body to the attracting forces exerted by the moon and sun. In this paper, a new novel wavelet base harmonic model (WBH) for tidal analysis and prediction is presented. Discrete wavelet transformation is being employed to present the relationship between multiresolution analysis and wavelet to show the harmonic amplitude and phase angle as a sum of shifting and scaling functions. The coefficients of the shifting and dilating function are resolved to obtain the harmonic constituent (amplitude and phase angle) of a seawater level. It is found that the predicted tide result obtained at four tide gauge stations using the wavelet-based harmonic model agreed with the observed water tide. To test the efficiency of the model root mean square error the correlation coefficient was used.

1. Introduction

Accurate tidal analysis has become a deterministic factor for future tidal forecasting at the coastal areas, moreover, the need for accurate tidal analysis and prediction has become very paramount at the coastal areas especially the need for safe navigation, coastal engineering construction as well as in the field of science and technology such as geodesy, astronomy, oceanography, marine safety, and navigation, etc. however, fluctuation of the tide is an intricate process due to the dynamic nature of the coastal areas, weather and environmental factors which present challenges for tidal prediction.

Tides come into existence as a result of the reaction of the ocean body to the periodic fluctuation of the gravitational attraction of the moon and sun. Notwithstanding the impacting factors introduced earlier, the tide is additionally affected by the non-periodic factors, such as water temperature, wind, and air pressure (Elsobeiey, 2017; Li et al., 2018). Newton's theory of gravitation has made it a base for today's understanding of tide, great researchers such as Thomson, Ferrel, Doodson, and others improved the work of Newton which gives rise to the classical harmonic analysis model for tidal prediction. Harmonic analysis is based on the fact that tides are as a result of periodic phenomena that is expressed as the sum of several finite numbers of sinusoidal function with known frequency to determine amplitude and phase of each sinusoid (Elsobeiey, 2017). Tidal frequencies have been developed by different researchers based on the tidal theory (Cartwright D E & Edden, 1973; Amiri-Simkooei *et al.*, 2018). The accuracy of the predicted tide depends on the mathematical model and analysis employed to estimate the tidal constituent that is tidal amplitude and phase angle which depends on the length or period of the



Rapid mapping of temporary surface water using Sentinel-1 imagery, case study: Zorn River flooding, Grand-Est, France

F Bioresita^{1*}, A Puissant²

¹Department of Geomatics Engineering, Institut Teknologi Sepuluh Nopember, Sukolilo-60111, Surabaya, Indonesia

²Laboratoire Image, Ville, Environnement—LIVE/CNRS UMR 7362, Department of Geography, University of Strasbourg, 3 rue de l'Argonne, 67000 Strasbourg, France

*correspondence email : filsa_b@geodesy.its.ac.id

Abstract. Temporary Surface Water (TSW) is defined as waterbody experiencing frequent drying phases (small ponds, puddles, and wetlands) or correspond to surfaces frequently affected by flooding, thus causing hazards to human, settlements, and infrastructures. The Zorn is one of main river in Grand-Est, France which overwhelmed by strong precipitations from the Storm Eleanor (Cyclone Burglind). It caused inundation in Zorn surrounding areas. On 23 January 2018, data reported that floods occurred in Zorn watershed near to the municipalities of Brumath, Hoerdt and Hochfelden. Zorn River lies in the Moselle and Bas-Rhin departments with 580 km of linear streams. Historically, floods are frequently occurred in the Zorn watershed area. The municipalities of Eschbourg, Brumath and Dossenheim-sur-Zinsel are the most affected floods areas. Synthetic Aperture Radar (SAR) is an effective way to detect surface water over large areas. Sentinel-1 is a new available SAR, and its spatial resolution and short temporal baselines have the potential for surface water rapid mapping. Thus, the objective is to perform rapid mapping to produce flood map around the catchment of the Zorn River (next to Brumath).

1. Introduction

Surface waters are important in human's everyday life. They can be used for irrigation, drinking water, production of energy, and many more [3, 7, 12, 13]. In the global system, surface waters are essential as the resources for the biosphere and the anthroposphere. They can control nutrient cycles and global carbon; thus, they play a role to provide ecosystem service. Surface waters can also preserve diverse habitat and support biodiversity. Temporary Surface Water (TSW), such as small ponds or wetlands, is defined as waterbody experiencing frequent drying phases. It also corresponds to surfaces frequently affected by flooding which can cause hazards to human, settlements, and infrastructures [9].

Floods become a representation of the most common type in natural disaster which have led to losses of lives and property [15]. Floods can affect buildings, residential or farm areas, also contaminate waters and lead to diseases. From 1980 to 2015, Duggar et al. [6] highlights that 25.3% of global damage caused by natural hazards are due to flooding. For example, flood events which are occurred the winter 2018 in the Grand-Est Region. The passage of the Storm Eleanor (Cyclone Burglind) had already brought significant amounts of rain in 2-3 January 2018 and affected Ireland, the United Kingdom, France, the Benelux, Germany, Austria, and Switzerland. After the storm, heavy rainfall occurred and caused several overflowing floods in France including the Grand-Est region [4]. One of the main rivers in Grand-Est, the Zorn, was overwhelmed by those strong precipitations and caused inundation in its surrounding areas.

Since it is difficult to avoid flood risks or prevent their occurrence, flood disaster management is important to reduce their effects. Flood mapping to identify sites in high hazard zones is one of the powerful tools for this purpose [18]. Mapping floods will be beneficial to urban and infrastructure planners, also for risk managers and disaster response.



Application of Machine Learning on Google Earth Engine to Produce Landslide Susceptibility Mapping (Case Study: Pacitan)

Hafsah Fatihul Ilmy¹, Mohammad Rohmaneo Darminto^{2*}, Amien Widodo³

¹Geomatics Department, National Cheng Kung University, No.1 University Road, Tainan City 701, Taiwan

²Department of Geomatics Engineering, Sepuluh Nopember Institute of Technology, Indonesia, Kampus ITS, Keputih, Sukolilo, Surabaya, Indonesia 60111

³Department of Geophysics Engineering, Sepuluh Nopember Institute of Technology, Indonesia, Kampus ITS, Keputih, Sukolilo, Surabaya, Indonesia 60111

*²rohmaneo@its.ac.id

Abstract. According to the Indonesian Disaster Management Agency (BNPB), Indonesia's losses due to landslides were estimated around hundreds of billion rupiah in 2017. Making landslide as one of the catastrophes with the greatest risk of loss and leaving a couple regions prone to landslides in Indonesia, Pacitan region is one of them. Landslide delineation therefore represents a particularly beneficial application of evolving research trend in disaster reduction, especially for the vulnerable region. In the present times of open-access satellite data, cloud computing and machine-learning algorithms is frequently used for disaster prevention monitoring. By employing Google Earth Engine, this study focuses on the susceptibility of landslide occurrence using a random forest machine-learning framework applied to digital topographic data such as elevation, slope and aspect as the independent variables and landslide inventory data obtained from Ministry of Energy and Mineral Resources Republic of Indonesia as the dependent variable. This study data sets composed from 1000 random points in Pacitan region with 70:30 ratio for training and testing sample points. The model produced good result, with overall accuracy values of 0.94, kappa values of 0.79 and 0.80 for AUC value. This model also showed that elevation is the most important variable in the landslide susceptible area. The results of this study can be used to evaluate the potential future impacts of landslide and help to optimize the management of disaster reduction in the region of Pacitan.

Keywords: Google Earth Engine, Landslide Susceptibility Map, Random Forest, Pacitan

1. Introduction

Landslides are a phenomenon of natural disasters that cause significant losses of human life and constructed environment around the world. [1], [2]. A total of 4,862 landslides were reported worldwide between 2004 and 2016, causing a total of 55,999 reported fatalities and global economic losses of tens of billions of USD. [3], [4]. These maps provide specific policies and reference for governments to make effective decisions to proactively mitigate the effects of future landslides. [5], [6]. However, it is difficult to prepare accurate map with large data sets and using the regular desktop specification would consuming a lot of time [7]. Recently, these large data sets are supported in cloud computing technologies, such as Google Earth Engine [8], Sentinel Hub EO Browser [9] or the NASA Earth Exchange [10], and with

