

# Kajian Spasial Implementasi Algoritma Short-Term Ensemble Prediction System (STEPS) dalam Pembuatan Peringatan Dini Cuaca Berbasis Dampak di Kabupaten Bogor = Spatial study of the IMPLEMENTation of the Short-Term Ensemble Prediction System (STEPS) Algorithm for Impact-Based Weather Early Warnings in Bogor Regency

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## Abstrak

Transformasi metode penyampaian peringatan dini cuaca konvensional berupa informasi berbasis fenomena menjadi informasi berbasis dampak memberikan dampak yang signifikan terhadap upaya pengurangan resiko bencana. Algoritma prediksi berdasarkan data resolusi tinggi menjadi komponen yang penting dalam sistem peringatan dini cuaca. Penelitian ini bertujuan untuk melakukan kajian spasial implementasi algoritma prediksi Short Term Ensemble Prediction System (STEPS) menggunakan data radar cuaca dalam pembuatan peringatan dini cuaca berbasis dampak di Kabupaten Bogor. Teknik weighted overlay digunakan untuk menghitung indeks peringatan berdasarkan nilai variabel Quantitative Precipitation Estimation (QPE) 24 jam, Quantitative Precipitation Forecast (QPF) 3 jam dari algoritma STEPS, dan nilai indeks risiko bencana banjir. Nilai pembobotan pada setiap variabel ditentukan menggunakan teknik Analytical Hierarchy Process (AHP) dan nilai batas ambang QPE dan QPF dihitung menggunakan metode persentil. Studi kasus yang digunakan adalah kejadian banjir pada tahun 2020 di Kabupaten Bogor. Algoritma STEPS menghasilkan performa prediksi yang baik dimana 75% dari seluruh studi kasus memiliki structure, amplitude, dan location yang hampir sama dengan nilai observasi. Indeks peringatan dini cuaca berbasis dampak pada seluruh studi kasus memiliki rentang nilai 5 hingga 10 atau masuk dalam kategori siaga hingga awas dengan potensi dampak banjir dimana seluruh potensi dampak tersebut sesuai dengan kejadian di lapangan.

.....The transformation of extreme weather early warnings format from phenomenon-based information into impact-based information has a significant role on disaster risk reduction. Prediction algorithms based on high-resolution data become an important component in extreme weather early warning systems. This research aims to conduct a spatial study of the implementation of the Short Term Ensemble Prediction System (STEPS) using weather radar data in the making of impact-based extreme weather early warnings in Bogor Regency. The weighted overlay technique is used to calculate the warning index based on the value of the Quantitative Precipitation Estimation (QPE) variable 24 hours ago, the Quantitative Precipitation Forecast (QPF) 3 hours ahead from the STEPS algorithm, and the value of the flood risk index. The weighting value for each variable was determined using the Analytical Hierarchy Process (AHP) technique and the threshold values for QPE and QPF were calculated using the percentile method. The case study used is the flood incident in 2020 in Bogor Regency. The STEPS algorithm produces good predictive performance where 75% of all case studies have the same structure, amplitude, and location as the observed values. The impact-based early warning index in all case studies has a range of 5 to 10 or is in the category of alert to alert with potential flood impacts where all of these potential impacts are in accordance with events in the field.