

## SARI

### GEOLOGI KUARTER, STUDI ENDAPAN PANTAI DAN KARAKTERISTIK ENDAPAN PALEOTSUNAMI DAERAH WIDARAPAYUNG DAN SEKITARNYA KABUPATEN CILACAP PROVINSI JAWA TENGAH

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Dinamika geologi di Indonesia sangat intens. Hal ini karena tatanan geografis Indonesia didominasi oleh lautan dan berada di pertemuan tiga lempeng aktif yang mengakibatkan Indonesia menjadi rawan terkena dampak dari dinamika geologi tersebut. Untuk mengetahui dinamika dan proses-proses geologi pada Zaman Kuartar, dilakukan pemetaan geologi Kuartar, penelitian paleotsunami dan endapan pantai. Penelitian paleotsunami bertujuan mengetahui kejadian tsunami di masa lalu dan karakter endapannya. Studi endapan pantai bertujuan mengetahui endapan pantai sebagai salah satu sumber endapan paleotsunami. Penelitian dilakukan di daerah Widarapayung, karena memiliki karakter geologi dan geomorfologi yang sesuai dan penelitian sejenis belum secara detail dilakukan. Metode penelitian yang dilakukan dalam penelitian ini adalah pemboran tangan, deskripsi megaskopis, pengambilan sampel serta analisis laboratorium yaitu granulometri, *LOI (Loss of Ignition)*, *XRF (X-Ray Fluorescence)* dan diatom.

Pemetaan geologi Kuartar menghasilkan delapan satuan geologi Kuartar yang dipengaruhi oleh aktifitas tektonik, vulkanisme, proses asal laut dan fluvial. Morfologi daerah penelitian terdiri dari gumpuk pantai (*dune*), laut (*sea*), punggung pantai (*beach ridge*) dan cekungan antar punggung pantai (*swale*).

Endapan paleotsunami terdapat pada *core* WDP 16 dengan karakteristik megaskopis berupa endapan pasir di antara endapan lempung pada kedalaman 320 – 350 cm dengan umur absolut  $5920 \pm 30$  tahun yang lalu. Analisis granulometri menunjukkan ukuran butir lanau kasar – pasir sedang (5,58 – 1,31 phi), rerata sortasi sangat buruk (2,27 phi), rerata *skewness* simetris (0,18 phi), rerata *kurtosis* sangat platykurtik (1,02 phi), persentase pasir 56,86%, lanau 40,93% dan lempung 2,21% dan distribusi multimodal. Analisis *LOI* menunjukkan persentase material organik 14,25% dan karbonat 2,92% dan pada analisis *XRF*, unsur asal darat dengan nilai tertinggi adalah Fe 61.947 ppm dan unsur asal laut adalah Ca 4.239 ppm. Analisis diatom menunjukkan 57% spesies *freshwater*, 8% spesies *brackish* (transisi) dan 35% spesies *marine*, sedangkan pada selain endapan kandidat paleotsunami sangat miskin diatom asal laut.

Karakteristik endapan Pantai Widarapayung berdasarkan analisis granulometri rerata berukuran butir pasir halus (2,13 phi), sortasi *moderately well sorted* (0,65 phi), *skewness symmetrical* (0,14 phi), *kurtosis very platykurtic* (1,195 phi) dan distribusi unimodal. Berdasarkan analisis *LOI* menunjukkan persentase material organik 1,97% dan karbonat 0,61%, dari analisis *XRF*, unsur dengan nilai tertinggi adalah Fe 82.072 ppm dan Ca 29.376 ppm. Terdapat kesamaan karakteristik pada sebagian endapan paleotsunami dengan pantai modern yaitu berukuran butir pasir halus namun dengan sortasi berbeda, hal ini menunjukkan bahwa endapan pantai adalah salah satu sumber endapan tsunami.

Kata kunci: geologi Kuartar, paleotsunami, endapan pantai, sedimentologi, geokimia, diatom

## **ABSTRACT**

### **QUATERNARY GEOLOGY, STUDY OF BEACH DEPOSIT AND CHARACTERISTIC OF PALEOTSUNAMI DEPOSIT IN WIDARAPAYUNG CILACAP REGENCY CENTRAL JAVA PROVINCE**

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The dynamics of Geology of Indonesia are intense. It is caused by geographic setting of Indonesia which is dominated by ocean located in the subduction zone of three active crust, thus make Indonesia highly risked to its dynamics. To understand geological dynamics and processes on Quaternary time are done by mapping of Quaternary geology, paleotsunami and beach deposit research. Research of paleotsunami is aimed to understand tsunami event on the past and its deposit characteristic. Research of beach deposit is aimed to determine beach deposit as one of tsunami deposit source. This research is done in Widarapayung because it has appropriate both geological and geomorphological characteristic, and the same research hasn't been done in this location.

The research methodologies are done by hand boring, field description and sampling for further laboratory analyses, consist of granulometry, loss of ignition (LOI), X-Ray Fluorescence (XRF) and diatom identification.

Results of quaternary geology mapping are eight Quaternary geology unit influenced by the activity of tectonic, vulcanism, sea processes and fluvial. Morphologies consist of dune, sea, beach ridge and swale.

Paleotsunami deposit is sand deposit between clay deposit in core WDP 16 depth 320 – 350 cm with absolute age  $5920 \pm 30$  years ago. Granulometry analysis shows grain size coarse silt – medium sand (5,58 – 1,31 phi), very poorly sorted (2,27 phi), symmetrical skewness (0,18 phi), very platycurtic kurtosis (1,02 phi) and multimodal distribution. Geochemical data from LOI analysis shows percentage of organic matter 14,25% and carbonate 2,92%, from XRF analysis shows terrestrial element with highest value Fe 61.947 ppm and marine element Ca 4.239 ppm. Paleontological data from diatom analysis shows 57% freshwater species, 8% brackish species and 35% marine species, in addition to others non paleotsunami unit shows poor marine diatom.

Characteristics of Widarapayung Beach deposit based on sedimentological data are granulometry analysis shows fine sand (2,13 phi), moderately well sorted (0,65 phi), symmetrical skewness (0,14 phi), very platycurtic kurtosis (1,195 phi) and unimodal distribution. Geochemical data from LOI analysis shows percentage of organic matter 1,97% and carbonate 0,61%, from XRF analysis shows element with highest values are Fe 82.072 ppm and Ca 29.376 ppm. Characteristic of some paleotsunami and modern beach deposit is same in fine sand grain size but with different sorting, it indicates that beach deposit is as one of tsunami source deposit.

Keyword: Quaternary geology, paleotsunami, beach deposit, sedimentology, geochemistry, diatom