A FEW OF TURBIDITE CHARACTERISTIC FEATURE IN THE VICINITY OF BANTARUJEG

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ABSTRACT

The traversing of Cilutung River exposes the sedimentary rock which is corresponding to turbidity system sedimentation. In around Bantarujeg area, the composite lithology is characterized by monotonous of poorly sorted tuffaceous sandstone interbedded with mudstone of classical turbidite; coarse grain of pebbly sandstone; interbedded tuffaceous sandstone and mudstone of slump deposits; disorganized pebble-coble-sized components of mud supported; massive sandstone and polymix breccia. A genetic unit based on sedimentary processes is more reliable in order to grouping the lithostratigraphic units.

Keyword: system sedimentation, turbidity

ABSTRAK

Lintasi S. Cilutung menyingkapkan batuan sedimen yang sesuai dengan sistem sedimentasi turbidit. Di sekitar area Bantarujeg, batuan ditandai oleh batupasir tufaaan porositas buruk selang-seling dengan batulempung turbidite klasik; batupasir kerikilan berbutir kasar; selang-seling batupasir tufaan dan endapan slum batulempung; batupasir masive dan breksi polimiks. Satuan genetika berdasarkan proses sedimentasi lebih dapat dipercaya dalam rangka menggolongkan satuan litostratigrafi.

***Kata kunci** : sistem sedimentasi, turbidit*

INTRODUCTION

Bantarujeg is the town, lies about 15 km south of Majalengka. Department of Geology Universitas Padjadjaran have been utilizing this area for student mapping exercise since three years ago in order to accelerate the time of student graduation without reducing the tutoring stuff. The students of Geology Unpad are very familiar with Bantarujeg since they were doing the first field work of Physical Geology course.

This passage is a little part of the major scenario and emphasized on the outcrops feature observation of sedimentary rock characteristic as the basic scope for recognizing sedimentary rock in the field. The major line of the work is establishing the geological setting in that area and will be reported after the whole of geological aspects observation completely done. So, every little thing of the observation product from the field will be documented and reported periodically. Since the lithology characteristic, disperse and variation of composition vertically or laterally are rapid changing, the sedimentary rock characteristic is the focused observation in this time.

To simplify the grain size-based of lithology name, sand/sandstone is terms applied to average grain sizes coarser than 4φ (1/16 mm). If the bulk of sediment is finer than 4φ, the term mud/mudstone used with an additional word to emphasize the major component (Bouma and Rozman, 2000).

METHOD AND DATA

Geological field work is deducted especially to observe outcrops of sedimentary rock which are exposed around Bantarujeg by traversing Cilutung River and streams.

The characteristic of sedimentary rocks, particularly the texture and structure led by genetic processes is the main subject in this time. Absolutely, the deposit characteristics are not presenting all the variety of turbidites due to the limitation of observed sedimentary outcrops.

Regional Stratigraphy Setting

The geology of West Java has been studied by many research workers since the first decades of the 20th century. The results of their studies were summarized and well documented by Van Bemmelen (1949) and Martodjojo (1984). The West Java, especially Bogor Trough revealed that the basin is mostly filled with marine deposits during Neogene time. These deposits are consisting of intercalation tuffaceous sandstone; vary of polymix breccia and shally facies which corresponding to turbidity sedimentary processes. The young E-W trending anticline is formed during a recent episode of north-directed compressive structuring and authentic event related to subduction of Indian Oceanic Plate below Sundaland Continent

In Majalengka area, the successions are commonly characterized by fine to coarse of poorly sorted tuffaceous sandstone, polymix breccia intercalation with siltstone and claystone of Cimanuk Group N14-N18 (Djuhaeni and Martodjojo, 1989), while in the Rajamandala and Cianjur area, the similar type is obtainable Citarum Formation which older in age (Lower Miocene) and overlaying the limestone of Rajamandala Formation.

In the Bumiayu and Kuningan area the similar characteristic have the same age with Cimanuk Group and named from the older to younger as Halang Formation, Kumbang Formation and Tapak Formation.

The Feature of Turbidite Characteristics

Turbidites are defined as the deposit of turbidity current and generally regarded as deep water deposits. The turbidity current process can operate in any depth, but to preserve the deposits as turbidites, they must not be reworked into different-looking deposits by other currents. This effectively places turbidites below storm wave base; depending on the basin, this probably implies minimum depths of 250-300 m. (Walker, 1992).

Present day Cilutung exposure in Majalengka area, displays the segmented of Neogene turbidite succession more than 3600 m in thickness (Cimanuk Group, Djuhaeni and Martodjojo, 1989). The group is consisting of Cinambo Formation, Cantayan Formation and Bantarujeg Formation (Halang Formation, Djuri 1973). The sedimentary rocks are outcropped around Bantarujeg and reported in this paper is only included of Bantarujeg Formation.

The outcrops of sedimentary rocks obtain in the walls and base of stream discontinuously but relatively easy to touch and observe. The beddings surface are striking ESE-WNW and dipping to the south. It is characterized by intercalation of poorly sorted tuffaceous sandstone, polymix breccia and mudstone. The thickness and characteristics are various in vertical successions along perennial or intermittent streams.

Regarding to field-based major characteristic, the type of turbidity deposits in the Bantarujeg area can be described as follow:

- **The Interbedded Tuffaceous Sandstone and Mudstone of Classical Turbidite**

  The characteristic of classical turbidite in Bantarujeg area is monotonous alternation of sharp-based poorly sorted tuffaceous sandstone and interbedded

mudstone. The sandstone is commonly medium and coarse grain, calcareous, grey, hard, and about 10 - 40 cm in thickness and defined as thin-bedded turbidite (figure 1). These individual beds are excellent lateral continuity. The sharp bases of the beds have abundant markings, such tool marks and scour mark as indicator for local flow direction (figure 2). Within the sandstone beds, the graded bedding (decrease upward) and parallel lamination of Bouma sequence is commonly present. The climbing ripple is rarely founded (figure 3). The sandstone-mudstone beds ratio is vary from low value to high value (figure 4).

- **Pebbly Sandstone**

  The pebbly sandstone is founded rarely in around Bantarujeg and common associates with classical turbidite facies. Pebbly sandstone consists of coarse grain, well graded (normal graded bedding of pebble-size grain), poorly sorted of sandstone-size matrix and no internal imbrications. The top of bedding surfaces are sharp, and erosional as scour and channeling type at the bottom (figure 5). The usual thickness of single bed is about 30-40 cm and laterally inhomogeneous. The pebble components are sub-rounded and mostly the diameter is less than 1 cm.

- **Slump Deposits**

  Slump deposits can be recognized easily in the field while the deposit is sited in between the undisturbed turbidite. The main body of the slump mass is not totally disturbed which indicates that the slump has moved largely as an undeformed block along a basal plane of decollement (Dzulynski and Walton, 1965 in Reading, 1982).
  Slump deposits consist of interbedded poorly sorted tuffaceous sandstone and mudstone. The thickness of deposits is more than 2 meters. The fix thickness is ignored due to recent eroded and weathered at the top (figure 6). The original of typical and facies is interbedded tuffaceous sandstone and mudstone of classical turbidite.

- **Pebbly Mudstone**

  Pebbly mudstones or pebbly mudstone-sandstone breccia in Cilutung River and Cijurey River consist of pebbles-boulders of intermediate igneous rock and distorted clasts of sandstone, mudstone and rare limestone, dispersed in a silty mudstone-sandstone matrix. Basically the matrix can be divided into silty mudstone matrix and coarse grain sandstone matrix (figure 7 & 8). The composition ranges from mudstone containing only a few clasts to large number of clasts (clasts supported). The thickness of individual bed is commonly less than 10 meters. The deposits are internally structureless, poorly sorted of mixing intra and extraformational clasts, random fabric and matrix supported framework. The clast components of sedimentary rock are varying in type, size and fabric. Soft sedimentary deformation is common as the block of sedimentary rock clast and erosional base contact (figure 9 and 10).

  Pebbly mudstone breccia is deposit of mud flows/grain flow. These are mudrich flows in which the mud-water mixture has matrix strength. This strength supports the coarser clasts during their transport in a

semirigid plug of material. The resulting deposit commonly has large blocks projecting up above the top of the bed, or even resting almost entirely on top of the bed. The deposits show no internal evidence of slumping (Walker, 1992).

RESUME AND DISCUSSION

Sedimentary rock characteristics of Bantarujeg Formation in around Bantarujeg and which have been observed is consisting of classical turbidite, pebbly sandstone, pebbly mudstone and slump deposit. The other types of turbidity deposit are still opened and possible to be set up. Those facies variation are interpreted as the product of slump, mass flow (grainflow/mudflow) and low turbidity current on the base of slope – submarine fan depositional setting.

To delineate the lateral distribution of each characteristic genetically needs the parallel sections and relatively perpendicular to the bedding surface. The bedding surfaces lead the time of correlation as long as the detail of time line of stratigraphy succession is not available.

The major criteria which is controlled the variety of turbidite characteristic in Bantarujeg could be determined as a function of the composition of source material and the physical and chemical forces during sedimentation processes without refusing to consider the tectonic uptilting during that deposition period.

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Figure 1. Thin bedded classical turbidite

Figure 2. Sole marking, common found at the bottom of sandstone bed as indicator of local paleo current

Figure 3. Classical turbidite deposits, commonly characterized by intercalation of tuffaceous sandstone and mudstone with erosional base contact. Bouma sequence is common present in sandstone layers

Figure 4. Slump deposit of interbedded tuffaceous sandstone and mudstone overlaid the normal strata of classical turbidite deposits.

Figure 5. Claystone clast in the med-coarse grain sandstone, normal grading in the bottom become reverse grading in the middle overlaying classical turbidite with erosional contact. The pen is 20 cm long.

Figure 6. Tabc of Bouma's sequence within medium sandstone

Figure 7. The strata of classical turbidite within mudflow deposit which is faulted

Figure 8. Polymix component supported breccia, igneous is the major type of component with matrix is poorly sorted coarse grain sand material.

Figure 9. Limestone block, gravels of sandstone, claystone, and igneous rock igneous rock as disorganized component in mud supported breccia.

Figure 10. The soft sedimentary deformation (slump deposit) shows likely the "micro folds" as a " block" within mud/ grain flow.