Abstract

Paleogene syn-rift lacustrine deposits in western Indonesia basins have been recognized as one of the potential reservoirs. Central Sumatra Basin for instance, lacustrine reservoirs have been explored and produced sporadically even though the understanding of its reservoirs both geometry and quality are still inadequate. Similarly, this lack of understanding occurs in Ombilin Basin that has promising exploration target in syn-rift deposit. It is believed that the syn-rift lacustrine reservoirs in both basins will play as important role in further opportunities.

Lake Singkarak, which is situated in West Sumatra, is known as a pull-apart basin in Indonesia that is filled by syn-rift deposits. This basin setting will provide significant information and facts in understanding lacustrine syn-rift reservoirs that will be improved in subsurface analysis in Central Sumatra, Ombilin, and/or other petroleum basins. In addition, Lake Singkarak deposit has been considered holding possible hydrocarbon potential for exploration target. Numerous regional study of Lake Singkarak has been conducted since 1961. The most recent study provided sedimentology facies model, which are alluvial fan, braided river, meandering river, fan delta, shoreline, lacustrine delta, shallow lacustrine, and shelf-slope lacustrine facies. These facies have constructed a fundamental regional understanding of Lake Singkarak syn-rift system. However, detailed analysis on reservoir geometry and quality are unexplored. In order to obtain deep understanding how each reservoir facies distribute in such lacustrine delta or more commonly known as axial fluvial delta environment, detail analysis on modern system in this particular environment have been performed.

Axial fluvial delta will be represented by Sumpur Delta, which is located in the northern part of Lake Singkarak. Sumpur Axial Fluvial Delta (SAFD) is created in the fault-tip area and parallel to the fault. The fault activities led distinctively of accommodation space or basin geometry and sediment filling in Sumpur Axial Fluvial Delta system.
References Cited


Syn-Rift Lacustrine Axial Delta Reservoir Quality and Its Distribution: New Insight from Sumpur Delta in Singkarak Lake, West Sumatra, Indonesia

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ABSTRACT

Palambar synrift lacustrine delta in Lake Indrayanti has been proven as a viable and prolific petroleum system thanks to active tectonics and confined conditions, reservoir characterization, and geometry of the Palambar rock sequence. Further complexity results where the lacustrine delta orientation is small. Finding suitable candidate analogs is essential to understand reservoir architecture in the lake system. In this study, both a subsurface and surface data sets from the Sumpur lacustrine delta in Singkarak Lake has been performed to mapping and outlining the two fault mapping (near-surface) using, offshore lacustrine sediments grid sampling, and aerial photo datasets. This study identifies how grain size, reservoir distribution, and geometry parameters affect the complexity of potential reservoir geometry and quality. The presented work provides new insights into the deltaic framework which would be valuable for future modeling efforts in the lacustrine sedimentary basins. Understanding the distribution of these factors is critical for yielding improved reservoir models, reservoir quality, and outcrop geometries. The results allow for a better understanding of the lacustrine deltaic system and improve reservoir characterization and simulation.

INTRODUCTION

Regional Geology

Lake Singkarak is located in the Sumatra Island, Indonesia. It is known as an area of significant geology due to the presence of the Sumpur Delta. The Sumpur Delta is one of the major deltas in the region, with a thickness of about 475 m and an area of 13,100 km². The Sumpur Delta is known to have a high level of oil and gas potential.

SUMMARY, DISCUSSION, AND FORWARD PLAN

Summary

• Sumpur Axial Fluvial Delta in a fluvial dominated delta with irregularly shaped geometry that is projected slightly to parallel to N020°E.
• Sumpur Axial Fluvial Delta in divided into seven depositional facies: (1) Fluvial Channel; (2) Upper distributary channel; (3) Lower distributary channel; (4) Filling channel; (5) Filling fluvial channel; (6) Filling upper distributary channel; (7) Filling lower distributary channel.
• There are three possible favorable reservoirs in a Sumpur Axial Fluvial Delta: 1) Lower distributary channel facies are deposited above a barrier channel, and below this facies, 2) Filling channel is associated with channelized fluvial facies, (3) Filling fluvial channel is associated with channelized fluvial facies.

Discussion

We recognize the size of potential reservoirs in the Sumpur Delta are economically attractive. To illustrate, that the largest potential reservoir area is about 1,400 square meters of 15 x 20 m. However, understanding the scale of deposition and reservoir characteristics will lead us to know how the potential reservoir size properly. The geometric shape of the Lake Singkarak had led the predominance of the Sumpur Delta. Consequently, the Lake Singkarak has a high potential reservoir size properly because of a high potential size distribution, and being targeted to the potential reservoir size properly within an optimal depositional axis. Although it will increase the opportunity in the Sumpur Delta, the challenge will still be to combine techniques to properly combine the complexity between the depositional axes.

For the Future

The Sumpur Axial Fluvial Delta is considered a good sub-deltaic facies environment. Therefore, we would like to enhance our knowledge by observing the lacustrine environment in the near future to understand the reservoir geometry in the particular area.

LITERATURE CITED

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