Appendix A

Map of Indonesia Sedimentary Basins

DAFTAR CEKUNGAN SEDIMEN DAN LUASANNYA
LIST OF SEDIMENTARY BASINS AND AREA OF BASINS

1. SUMATERA UTARA [134.196 km²] *(NORTH SUMATERA)*
2. WOYLA [7.070 km²]
3. SIBOLGA [86.626 km²]
4. SIMEULEU [2.898 km²]
5. SIMELUCUT [5.429 km²]
6. NIAS [11.798 km²]
7. TELO [2.147 km²]
8. WUNGA [11.749 km²]
9. BATANG NATAL [2.066 km²]
10. OMBILIN [26.333 km²]
11. SUMATERA TENGAH [115.416 km²] *(CENTRAL SUMATERA)*
12. BENGKULU [48.571 km²]
13. MENGKARANG [1.368 km²]
14. RAWAS [2.934 km²]
15. SUMATERA SELATAN [144.619 km²] *(SOUTH SUMATERA)*
16. MENTAWAI [61.534 km²]
17. ENGGANO [25.972 km²]
18. BANGKA [44.482 km²]
19. NATUNA SELATAN [44.245 km²] *(SOUTH NATUNA)*
20. NATUNA BARAT [105.456 km²] *(WEST NATUNA)*
21. NATUNA TIMUR [85.063 km²] *(EAST NATUNA)*
22. SELAT SUNDA [4.032 km²]
23. SUNDA ASRI [19.260 km²]
24. VERA [17.493 km²]
25. JAWA BARAT [31.326 km²] *(WEST JAVA)*
26. BOGOR [9.192 km²]
27 UJUNG KULON [5.260 km²]
28. JAWA SELATAN [60.609 km²] *(SOUTH JAVA)*
29. JAWA BARAT SELATAN [7.206 km²] *(SOUTH-WEST JAVA)*
30. JAWA TENGAH UTARA [10.906 km²] *(NORTH-CENTRAL JAVA)*
31. SERAYU UTARA [7.119 km²] *(NORTH SERAYU)*
32. BANYUMAS [13.208 km²]
33. JAWA TENGAH SELATAN [6.993 km²] *(SOUTH-CENTRAL JAVA)*
34. PATI [8.400 km²]
35. BAWEAN [35.245 km²]
36. JAWA TIMUR UTARA [118.249 km²] *(NORTH-EAST JAVA)*
37. KENDENG [30.278 km²]
38. WONOSARI [2.026 km²]
39. JAWA TIMUR SELATAN [23.377 km²] *(SOUTH-EAST JAVA)*
40. BLAMBANGAN [1.211 km²]
41. BALI-LOMBOK UTARA [16.209 km²] *(NORTH BALI -LOMBOK)*
42. BALI-LOMBOK SELATAN [33.046 km²] *(SOUTH BALI-LOMBOK)*
43. SINGKAWANG [5.613 km²]
44. KETUNGAU [18.873 km²]
45. MELAWI [28.025 km²]
46. NANGAPINOH [17.063 km²]
47. PANGKALANBUUN UTARA [8.556 km²] *(NORTH PANGKALANBUUN)*
48. PANGKALANBUUN SELATAN [15.534 km²] *(SOUTH PANGKALANBUUN)*
49. BILLITON [24.540 km²]
50. PEMBUANG [16.982 km²]
51. EMBALUH SELATAN [12.056 km²] *(SOUTH EMBALUH)*
52. EMBALUH UTARA [41.059 km²] *(NORTH EMBALUH)*
53. TARAKAN [81.468 km²]
54. KUTAI [130.970 km²]
55. BARITO [59.033 km²]
56. ASEM-ASEM [9.691 km²]
57. PASIR [20.148 km²]
58. CELEBES [23.835 km²]
59. MINAHASA [63.266 km²]
60. GORONTALO [54.732 km²]
61. LARIANG [27.196 km²]
62. POSO [6.182 km²]
63. AMPANA [1.990 km²]
64. TOMORI [10.365 km²]
65. BANGGAI [43.391 km²]
66. SELAT MAKASSAR [60.118 km²] *(MAKASSAR STRAIT)*
67. SENGKANG [16.945 km²]
68. BONE [30.890 km²]
69. KENDARI [12.460 km²]
70. MANUI [10.436 km²]
71. SELABANGKA [35.126 km²]
72. SPERMONDE [15.223 km²]
73. SELAYAR [7.839 km²]
74. FLORES [39.347 km²]
75. MUNA-BUTON [25.104 km²]
76. BONERATE [12.722 km²]
77. BUTON TIMUR [14.197 km²] *(EAST BUTON)*
78. TUKANG BESI [20.166 km²]
79. ALOR [15.301 km²]
80. WETAR UTARA [4.602 km²] *(NORTH WETAR)*
81. WETAR SELATAN [5.258 km²] *(SOUTH WETAR)*
82. MOA [3.886 km²]
83. SUMBA [35.206 km²]
84. SAWU [53.578 km²]
85. TIMOR [21.694 km²]
86. LAUT TIMOR [73.865 km²] *(TIMOR SEA)*
87. TALAUD [62.532 km²]
88. MOROTAI BARAT [17.519 km²] *(WEST MOROTAI)*
89. MOROTAI [3.501 km²]
90. TELUK KAU [23.686 km²] *(KAU BAY)*
91. WAIGEO UTARA [24.954 km²] *(NORTH WAIGEO)*
92. HALMAHERA BARAT [56.424 km²] *(WEST HALMAHERA)*
93. WEDA [24.317 km²]
94. WAIGEO [5.179 km²]
95. TALIABU [15.037 km²]
96. OBI [5.788 km²]
97. BATANTA SELATAN [11.718 km²] *(SOUTH BATANTA)*
98. MISOOL [2.854 km²]
99. BURU BARAT [5.862 km²] *(WEST BURU)*
100. BURU [9.923 km²]
101. SERAM UTARA [5.986 km²] *(NORTH SERAM)*
102. BURU SELATAN [4.884 km²] *(SOUTH BURU)*
103. SERAM SELATAN [14.628 km²] *(SOUTH SERAM)*
104. SERAM [59.288 km²]
105. BANDA BARAT [11.449 km²] *(WEST BANDA)*
106. BANDA [44.778 km²]
107. WEBER [56.965 km²]
108. ARU-TANIMBAR [102.336 km²]
109. WOKAM [30.181 km²]
110. TAMRAU [16.772 km²]
111. BIAK [71.383 km²]
112. BIAK-YAPEN [9.754 km²]
113. MAMBERAMO [23.780 km²]
114. JAYAPURA [7.948 km²]
115. SALAWATI [15.329 km²]
116. BERAU [10.777 km²]
117. BINTUNI [39.727 km²]
118. ONIN-KUMAWA [6.860 km²]
119. LENGGURU [18.212 km²]
120. CENDRAWASIH [36.039 km²]
121. WAIPOGA [23.544 km²]
122. JAYAPURA SELATAN [8.148 km²] *(SOUTH JAYAPURA)*
123. BATOM [1.650 km²]
124. AKIMEUGAH [88.582 km²]
125. SAHUL [79.490 km²]
126. IWUR [11.695 km²]
127. ARAFURA [67.081 km²]
128. ARAFURA BARAT [35.877 km²] *(WEST ARAFURA)*

KLASIFIKASI CEKUNGAN BERDASARKAN TATAAN TEKTONIK
BASIN CLASSIFICATION BASED ON TECTONIC SETTING

A = Busur Belakang *(Back-Arc)*
B = Cekungan Antar Gunung *(Intermontane Basin)*
C = Busur Depan *(Fore-Arc)*
D = Palung *(Trench)*
E = Daratan Muka *(Foreland)*
F = Pinggiran Pasif *(Passive Margin)*
G = Cekungan Samudera *(Oceanic Basin)*
H = Cekungan Delta *(Deltaic Basin)*
I = Lembah Merekah *(Rifting Valley)*
J = Sesar Mendatar *(Transtensional)*
K = Cekungan Pinggiran Samudera *(Transtensional Marginal Oceanic Basin)*

N
W E
S

0 500 1.000 Km

SKALA / *SCALE* 1 : 5.000.000
Proyeksi Peta Geografis / *Geographic Map Projection*
Datum Horisontal / *Horizontal Datum* : WGS 84 (Spheroid Nasional Indonesia)

PETA CEKUNGAN SEDIMEN INDONESIA
SEDIMENTARY BASIN MAP OF INDONESIA

Diterbitkan oleh / *Published by* :

KEMENTERIAN ENERGI DAN SUMBER DAYA MINERAL
MINISTRY OF ENERGY AND MINERAL RESOURCES

2022

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Updated based upon Sedimentary Basin Map of Indonesia, Geological Agency 2020

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LEGENDA / *LEGEND*

STATUS DAN DEFINISI CEKUNGAN / *BASIN STATUS AND DEFINITION*

Cekungan berproduksi
Producing basin
Cekungan dengan sumur produksi
Basin with production well

Cekungan dengan penemuan
Discovery basin
Cekungan dengan sumur penemuan hidrokarbon
Basin with discovery well

Cekungan prospek
Prospective basin
Cekungan dengan komponen sistem perminyakan yang potensial, data seismik dan sumur tersedia
Basin with potential petroleum system components, seismic and well data available
Cekungan dengan keterdapatan rembesan hidrokarbon, data seismik tersedia
Basin with hydrocarbon seepage occurrence, seismic data available

Cekungan yang belum dieksplorasi
Unexplored basin
Cekungan yang belum dieksplorasi dengan data geologi, seismik, dan non-seismik tersedia
Unexplored basin with geology, seismic, and non-seismic data available
Cekungan yang belum dieksplorasi dengan ketersediaan data terbatas
Unexplored basin with limited data available

Ibukota provinsi
Province capital city
Batas Provinsi
Province boundary
Batas zona ekonomi eksklusif
Boundary of exclusive economic zone
Batas negara (daratan)
On shore country boundary
Batas landas kontinen
Continental slope boundary
Batas laut territorial
Territorial sea boundary

KEDALAMAN LAUT / *DEPTH OF SEA*

0 m
-200 m
-400 m
-600 m
-800 m
-1.000 m
-1.200 m
-1.400 m
-1.600 m
-1.800 m
-2.000 m
-3.000 m
-4.000 m
-5.000 m
-6.000 m
-7.000 m
-8.000 m
-9.000 m
-10.000 m

SUMBER DATA
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2. Data sekunder dari berbagai sumber, seperti buku laporan dan makalah ilmiah, baik yang telah terbit maupun belum diterbitkan (Secondary data from various sources : e.g. published and/or unpublished reports and scientific papers).
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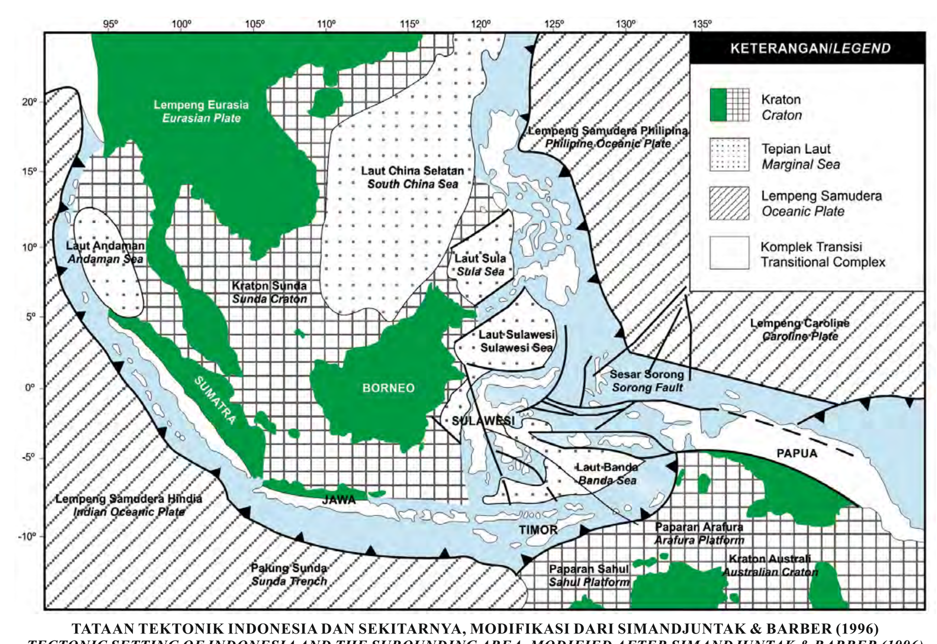


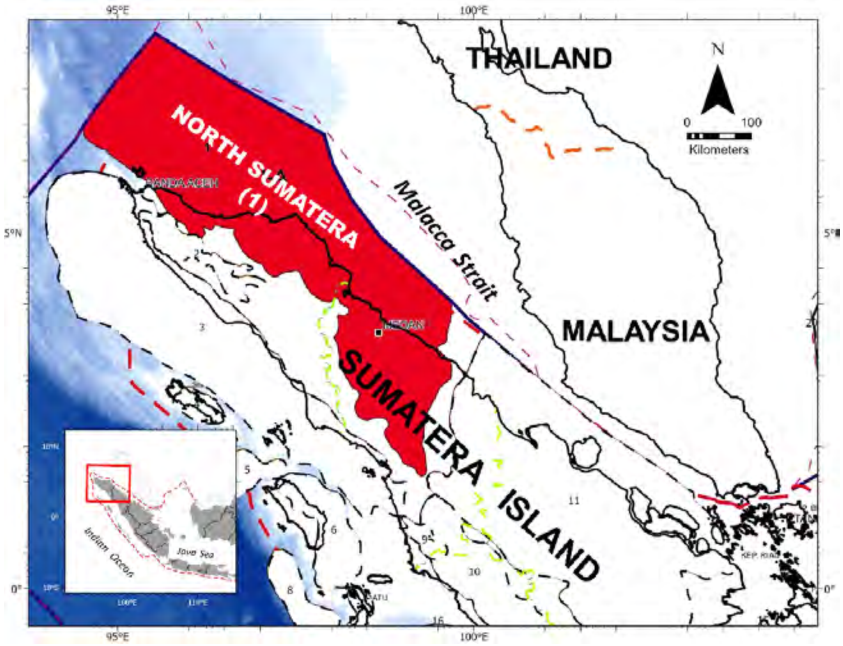
TATAAN TEKTONIK INDONESIA DAN SEKITARNYA, MODIFIKASI DARI SIMANDJUNTAK & BARBER (1996)
TECTONIC SETTING OF INDONESIA AND THE SUROUNDING AREA, MODIFIED AFTER SIMANDJUNTAK & BARBER (1996)

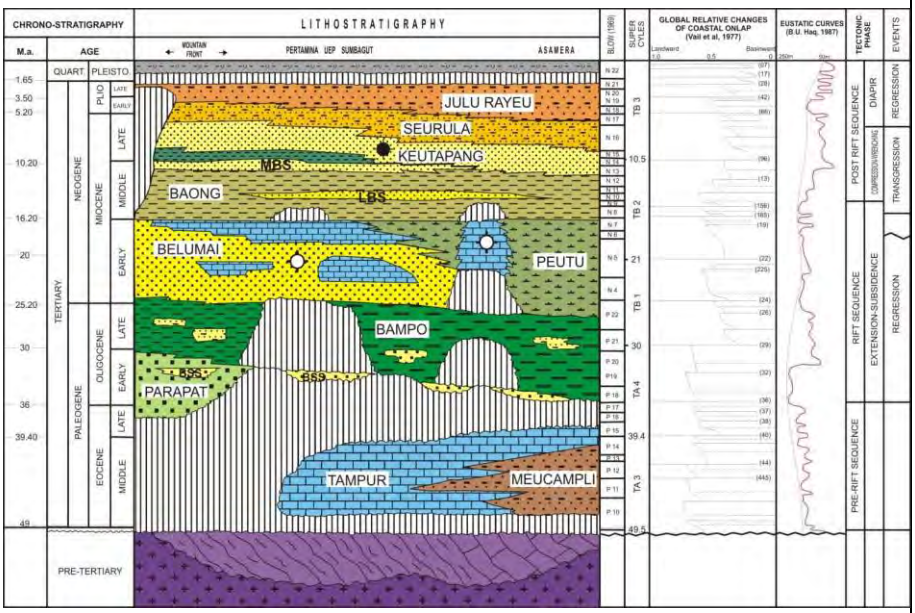
Appendix B

Summary of Selected Sedimentary Basins

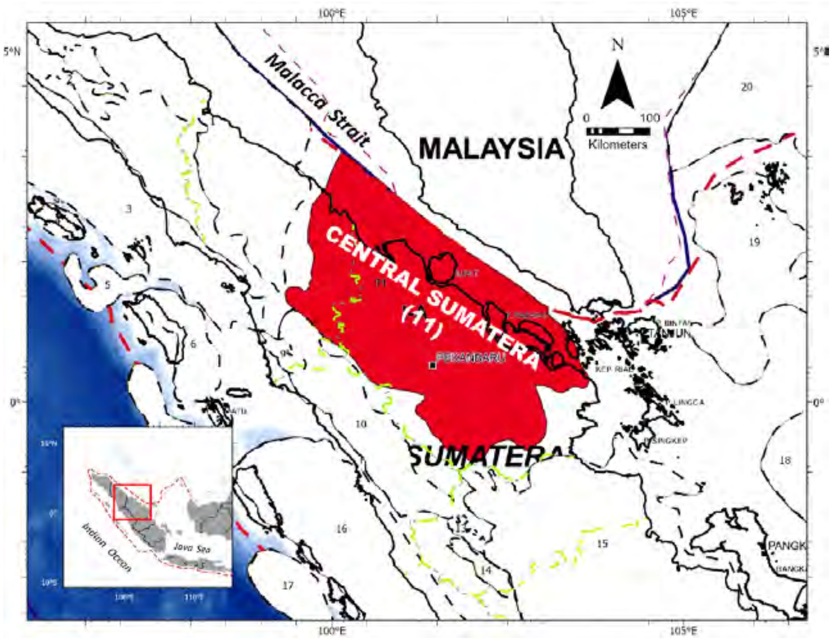
01. North Sumatra, 02. Central Sumatra, 03. South Sumatra, 04. West Natuna, 05. Sunda Asri, 06. West Java, 07. North Serayu, 08. Bawean, 09. North East Java, 10. Kendeng. 11. Tarakan, 12. Kutai, 13. Barito, 14. Makassar Strait, 15. Banggai, 16. Sengkang, 17. Seram, 18. Salawati, 19. Bintuni, 20. Bengkulu, 21 Ujung Kulon

01. North Sumatera Basin

Basin ID	01
Basin Name	North Sumatera
Basin Status	Producing Basin
Area (km²)	134.196
Geographic Location	Onshore and Offshore area of the northern part Sumatera Island, Western Indonesia
Coordinates	94.80–99.40 °E and 2.70–7.50 °N
Location Map	 (Geological Agency, 2022)
Geology	The North Sumatera Basin is a Tertiary sedimentary back-arc basin, which is known as an oil and gas producing basin. The basin was formed since early Tertiary during extensional tectonic, which is characterised by a series of horst and graben and followed by compressional tectonic which formed structural traps as folding and faulting. In general, from west to east, the structural pattern of the North Sumatera Basin can be differentiated into three major units (Kamili and Naim, 1973; Mulhadiono, 1976); Cameron et al. (1980)): 1. The Northeast–Southwest (NE-SW), represents Aceh sub-Basin, southern part of Arun High, and Yang Besar High.

	2. The Northnorthwest–South Southeast (NNW-SSE), represented by Arun High, northern part of Tamiang Deep, and some part of high and low in southern Yang Besar High 3. The Northeast–Southwest (NE-SW) found in the south of Yang Besar High The North Sumatera Basin stratigraphy comprises Pre-Tertiary basement rocks overlying by a series of Tertiary sediments ((Kamili and Naim, 1973; Mulhadiono, 1976); Cameron et al. (1980)). The Pre-Tertiary basement is composed of metamorphic rock, meta-sediment, and volcanic rocks. Unconformable above the basement, there is a series of sedimentary rocks from the Eocene Age (Meucampli and Tampur Formations) to the quaternary deposit consisting of volcanic eruption product and alluvial deposits. 
Reservoir Rocks for Saline Formation Candidate	Parapat sandstone (Oligocene fluvial to deltaic sandstone) Belumai sandstone (Oligo-Miocene marine sandstone) Arun Limestone (Ealy Miocene Limestone of Peutu Formation) Baong sandstone (Middle Miocene marine sandstone) Keutapang sandstone (Mio-Pliocene Age deltaic sandstone)
Seal	Shale of Bampo Formation Shale of Lower Baong Formation Keutapang shale

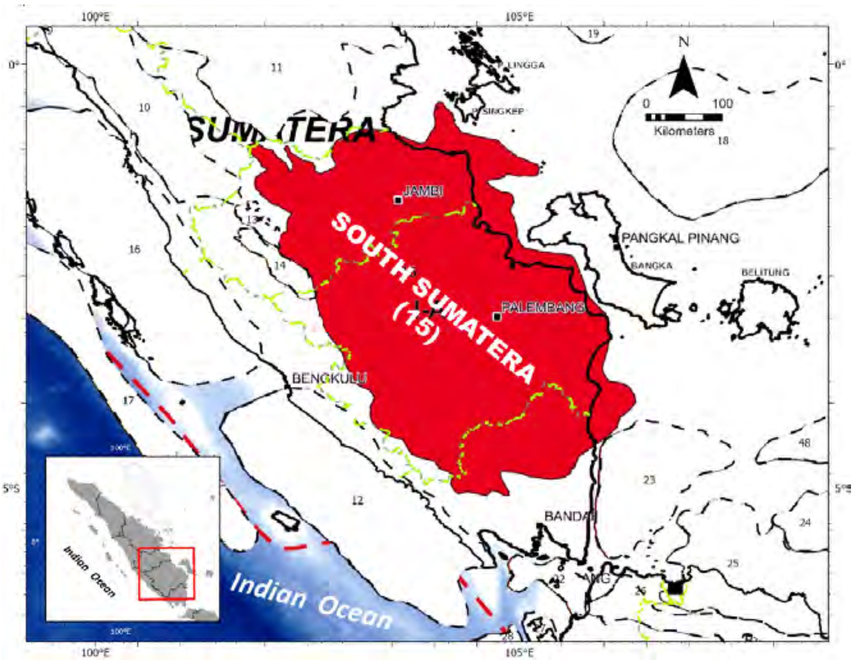
02. CENTRAL SUMATERA BASIN

Basin ID	11
Basin Name	Central Sumatera
Basin Status	Producing Basin
Area (km2)	115.416
Geographic Location	Central part of Sumatera Island, Western Indonesia
Coordinates	99° 21.733'E-103° 39.973' E and 0° 51.712' S – 3° 34.747' N
Location Map	 (ESDM, 2022)
Geology	The Central Sumatra Basin is the largest oil producer in Indonesia. The basin was formed behind the magmatic arc during the Early Tertiary as a series of half-graben structures separated by a horst block, as a result of the subduction process of the Indian Ocean plate infiltrating under the Asian continental plate. This subduction activity allows the formation of active faults that develop into grabens. According to Heidrick and Aulia (1993), the Central Sumatra Basin is dominated by two structural patterns trending north to south (N-S) and northwest to southeast (NW-SE) (Heidrick and Aulia,193). The N-S structure formed in the Paleocene is relatively older than the NW-SE structure. Stratigraphy of the Central Sumatra Basin was initiated by non-marine deposits of the Pematang Group, unconformably above the Pre-Tertiary rocks in a north–south trending basin formed as a result of Eocene–Oligocene rifting (Yarmanto and Aulia, 1988) or during the F1

	Deformation period (Heidrick and Aulia, 1993). The Pematang Group is composed of three successive formations from old to young: The Lower Red Beds Formation, the Brown Shale Formation, and the Upper Red Beds Formation. The Lower Red Beds Formation is composed of fanglomerates, conglomerates, sandstones, siltstones, mudstones, and shales formed in alluvial fan, fluvio-deltaic, to lake environments. Above the Lower Red Beds Formation is deposited the Brown Shale Formation, composed of lacustrine shales rich in organic matter interspersed with fine sandstones. Furthermore, above the Brown Shale Formation, the Upper Red Beds Formation is deposited, which is composed of shale, mudstone, sandstone, conglomerate, and coal. Deposited above the Pematang Group is a series of transgressive deposits belonging to the Sihapas Group that developed in the Early Miocene (Heidrick and Aulia, 1993). The Sihapas Group comprises the Menggala Formation, Bangko Formation, Bekasap Formation, Duri Formation, and Telisa Formation. Furthermore, the Petani Formation was deposited in the Middle Miocene–Late Miocene in regressive conditions. Above the Petani Formation, the Minas Formation was deposited in the Pleistocene.
Reservoir Rocks for Saline Formation Candidate	Oligocene Pematang Sandstone Early Miocene Menggala Sandstone Early Miocene Bekasap Sandstone Late Miocene Petani Sandstone
Seal	Shale of Telisa Formation Shale of Petani Formation

03. SOUTH SUMATERA BASIN

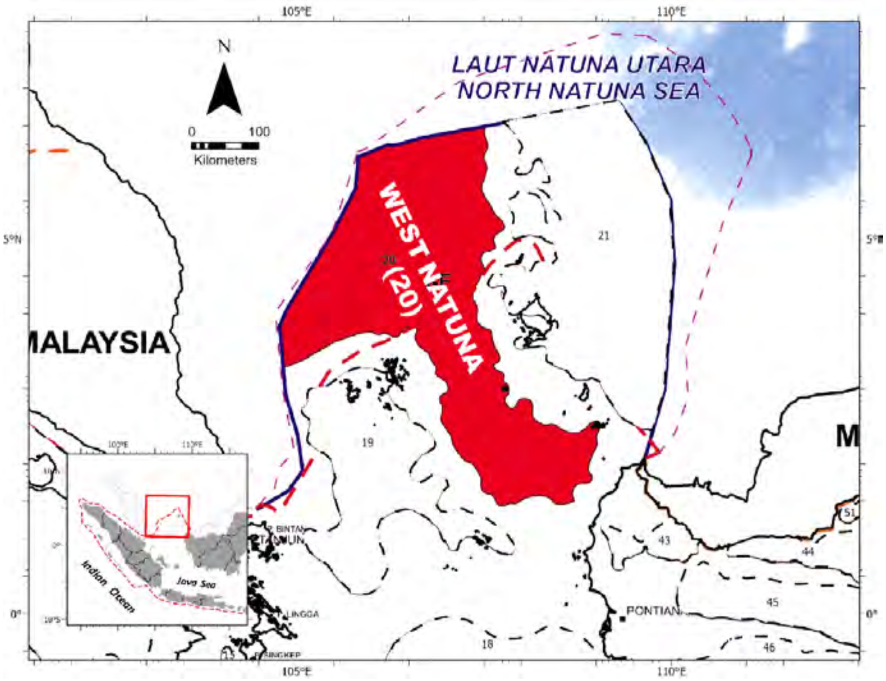
Basin ID	15
Basin Name	South Sumatera
Basin Status	Producing Basin
Area (km2)	144,619
Geographic Location	South eastern part of Sumatera Island, Western Indonesia
Coordinates	102° 45.722' E-106° 23.119' E and 0° 26.654' S - 5° 5.337' S

Location Map	 (ESDM, 2022)
Geology	The South Sumatra Basin is one of the tertiary sedimentary basins that produce oil and gas in Indonesia. The South Sumatra Basin was formed during the east–west extension at the end of the pre-Tertiary to the beginning of Tertiary times (Daly et al., 1987). Orogenic activity during the Late Cretaceous to Eocene cut the basin into four sub-basins. The following details are after van Gorsel (1988). The main structural patterns in the South Sumatra Basin can be divided into three periods: northeast to southwest and north to south trending horst blocks and half grabens were formed during an initial extensional period from the latest Cretaceous to Early Oligocene resulted from complex plate readjustment as a consequence of the collision of India with Asia. Graben subsidence continued through a tectonically quiescent period from Late Oligocene through Early Miocene time when the basin became fully marine. During Late Early to Middle Miocene time, wrench tectonics produced compressional folds due to the oblique subduction of the oceanic plate southwest of Sumatra. Plio-Pleistocene tectonics are associated with the uplift of the volcanic arc and created northwest-southeast trending reverse faults and basement uplift (De Coster, 1974) The oldest sediments found in the Central Sumatra Basin are onshore sediments from the Lahat and Lemat Formations, which consist of volcanic rocks, breccias, and 'granite wash' resulting from the erosion of bedrock blocks. The upper part of the Lahat Formation is covered by the Talang Akar Formation, composed of channel sandstone with

	siltstone inserts and carbonated shale sometimes containing mollusk shells and coal inserts and tuff units deposited in fluvial, lacustrine, lagoon and shallow marine environments. After the formation of the Talang Akar Formation, sedimentation was followed by a phase of thermal subsidence that deposited fine sedimentary rocks in almost all areas of the basin as well as the formation of limestone of the Baturaja Formation in high blocks. This phase continues until the deposition of the Gumai Formation, characterised by a thick series of dark gray clays, usually with common planktonic foraminifera that may form thin white laminae. The regressive phase after deposition of the Gumai Formation is characterised by the deposition of the Air Benakat, Muara Enim, and Kasai Formations.
Reservoir Rocks for Saline Formation Candidate	Early Miocene Talang Akar Sandstone Middle Miocene Baturaja Limestone Late Miocene Air Benakat Sandstone
Seal	Shale of Talang Akar Formation Shale of Gumai Formation Shale of Muara Enim Formation

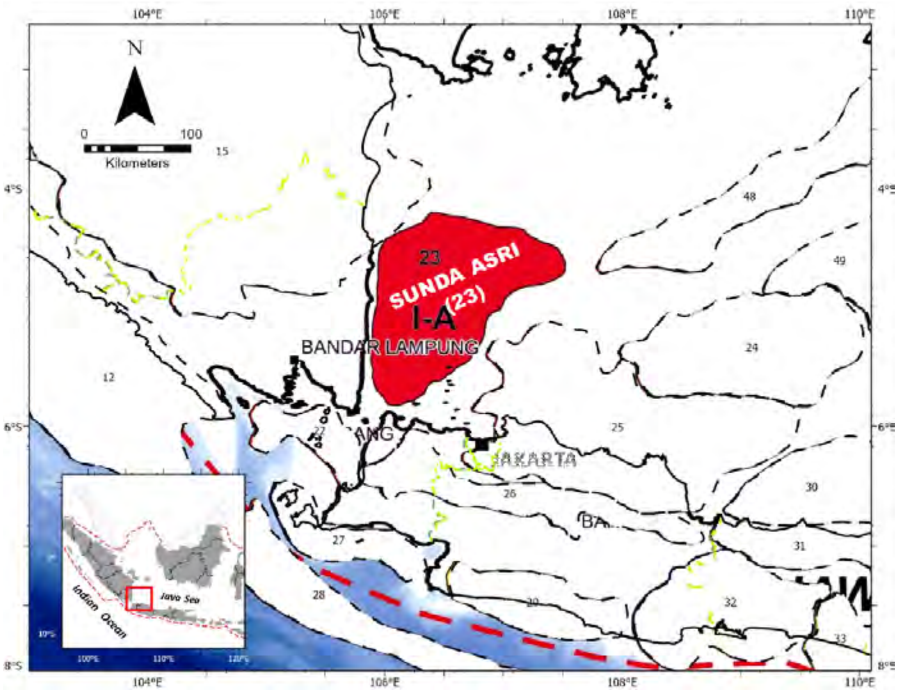
04. WEST NATUNA BASIN

Basin ID	20
Basin Name	West Natuna
Basin Status	Producing Basin
Area (km2)	105,456
Geographic Location	Natuna Sea, Western Indonesia
Coordinates	104° 49.525' E–109° 2.297' E and 1° 26.626' N–6° 30.584' N

Location Map	 (Geological Agency, 2022)
Geology	The West Natuna Basin is a Tertiary Indonesia rift basin, which lies on Sunda shelf. The basin formation was initially formed by subduction (slab rollback) to the east and divergent strike-slip extrusion faults associated with the India–Asia plate collision and it caused the rifting event that occurred probably in the late Eocene to Oligocene (Hakim, Naiola, SImangunsong, Laya, and Muda, 2008; Burton & Wood, 2010). The regional stratigraphic of the West Natuna Basin is controlled by four main tectonic episodes: (i) the active filling of rifts during the Eocene–Oligocene characterised by the Belut Formation sequence, (ii) after the formation of rifts in the Late Oligocene is characterised by the Gabus Formation sequence, (iii) inversion at the Early Middle Miocene characterised by the Arang Formation sequence, and (iv) after the inversion in the Late Miocene–Pliocene which is characterised by the Younger Formation sequence (Doust and Noble, 2008; Burton and Wood, 2010)).
Reservoir Rocks for Saline Formation Candidate	Late Oligocene Gabus Sandstone Middle Miocene Arang sandstone
Seal	Shale of Barat Formation Shale oh Muda Formation

05. SUNDA ASRI BASIN

<table>
<tr><td>Basin ID</td><td>23</td></tr>
<tr><td>Basin Name</td><td>Sunda Asri</td></tr>
<tr><td>Basin Status</td><td>Producing Basin</td></tr>
<tr><td>Area (km2)</td><td>19,260</td></tr>
<tr><td>Geographic Location</td><td>Western part of Java Sea, Western Indonesia</td></tr>
<tr><td>Coordinates</td><td>105° 56.353' E–107° 31.866' E and 4° 11.917' S–5° 49.570'S</td></tr>
<tr><td>Location Map</td><td>

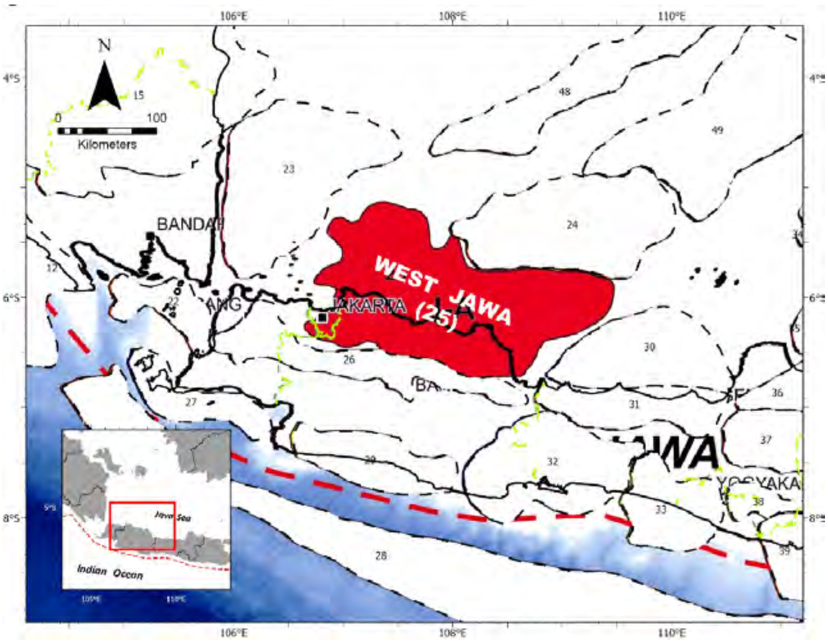


(Geological Agency, 2022)</td></tr>
<tr><td>Geology</td><td>The Sunda Basin, occupying approximately 19,260 km^2 southeast of South Sumatra Basin and northwest of the Sundaland margin, displays a triangular shape with its apex directed south–southwest towards a volcanic cone east of Merak (Wight, Sudarmono, and Imron, 1986). Characterised by north–south rifts, it features domal paleohighs, asymmetric horsts and grabens, minor troughs, and numerous normal faults with predominantly north, north–northeast, and northeast orientations. The basin is surrounded by Lower to Upper Cretaceous igneous and metamorphic rocks that rifted during the Eocene to early Oligocene. The continental sequence includes alluvial fan, lacustrine, fluviatile, and paludal deposits of the Banuwati and Talang Akar Formations, ranging from early Oligocene to early Miocene (Wight et al, 1986). The Sunda-Asri Basin and others in the Northwest Java Basin form Paleogene rift-basins during the early Tertiary period, sharing a</td></tr>
</table>

	north–south trend indicating a regional east–west directed extension. The origins of these basins are debated. One explanation posits simultaneous extension controlled by pre-existing basement structures and a possible dextral strike-slip system (Sukanto, Nunuk, Aldrich, Finehalt, and Mitchell, 1998). Vertical movement within the Sunda Basin results from N-S or NW-SE faults affecting both the basement and the sediment, with the Banuwati Formation being the oldest layer and present in limited areas (Ambaria et al., 2009).
Reservoir Rocks for Saline Formation Candidate	Eocene Banuwati Alluvial Fan System (part of Banuwati Formation) Early Oligocene Talang Akar Fluviatile Channels Systems (part of Talang Akar Formation) Early Miocene Baturaja Transgressive Carbonate System (part of Baturaja Formation)
Seal	Early Miocene Batu Raja shales Early Miocene Gumai shales

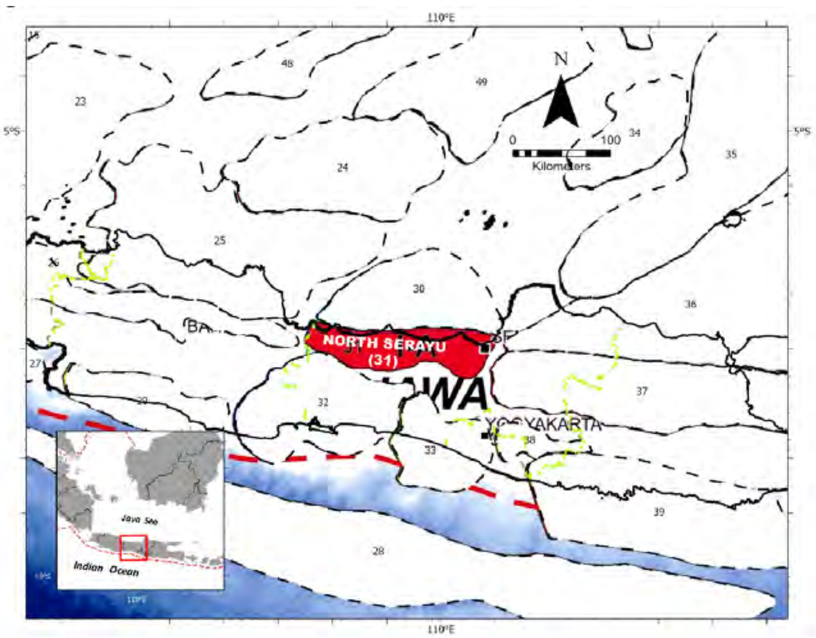
06. WEST JAVA BASIN

Basin ID	25
Basin Name	West Java
Basin Status	Producing Basin
Area (km2)	31,326
Geographic Location	Offshore and Coastal Area of West Jawa, Western Indonesia
Coordinates	106° 40.111' E–109° 28.281' E and 5° 7.454' S–6° 42.858' S

Location Map	 (Geological Agency, 2022)
Geology	The Northwest Java Basin is a back-arc system on a regional scale. During the Tertiary period, it was between the Sunda microplate and the India–Australia subduction zone (Hadipandoyo et al., 2007)). Tectonic activity in the back-arc area caused the formation of several major normal faults with a mainly north–south direction. These major faults generated several sub-basins with a horst-and-graben pattern in the basin area. Generally, the basement rocks of the West Java Basin are pre-Tertiary to Paleocene in age. The basement rocks show various igneous and/or metamorphic rocks, i.e. diorite (microdiorite to granodiorite), monzonite, and argillite. Unconformities over the basement, some Tertiary age rock were deposited (Hadipandoyo et al., 2007)). The Jatibarang Formation (Paleocene to Early Oligocene) overlies unconformably the Pre-Tertiary basement, consisting mostly of tuffs intercalated with extrusive stratigraphic units, and attaining a thickness of more than 1200 m in the Jatibarang field. The Talang Akar Formation (Late Oligocene to Early Miocene) consists mostly of carbonaceous shale and sandstone in the lower part, covered by the upper unit, comprising alternating shale and limestone. The thickness varies from 100 m to 300 m. The Baturaja Formation (Early Miocene) is composed mainly of limestone with a few shale and marl intercalations. The maximum thickness is approximately 50 m. The Upper Cibulakan Formation (Early Middle Miocene) consists mainly of shales with a few sandstone and limestone intercalations, which were deposited within an inner-outer shelf environment. The Parigi Formation (Late Miocene) developed as a carbonate buildup with a maximum thickness of 150 m. The Cisubuh Formation (late Miocene to Quarternary) is made up of shales with sandstones, conglomerates, and calcareous shale streaks intercalated.

Reservoir Rocks for Saline Formation Candidate	Late Oligocene Lower Cibulakan Sandstone Early Miocene Middle Cibulakan Limestone Late Miocene Parigi Limestone
Seal Rocks	Shale of Upper Cibulakan Formation Shale of Cisubuh Formation

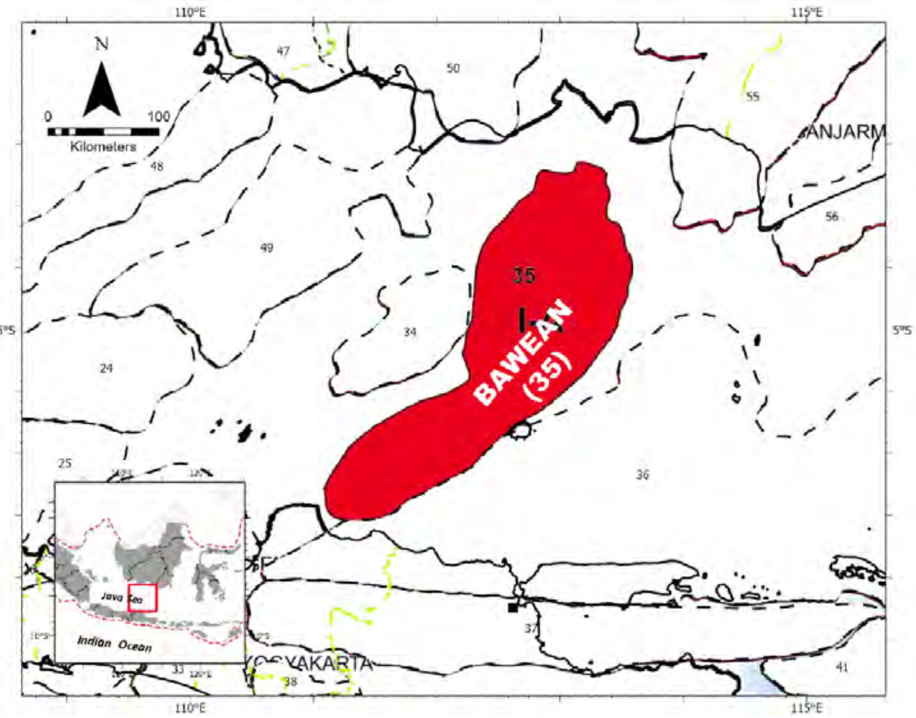
07. NORTH SERAYU BASIN

Basin ID	31
Basin Name	North Serayu
Basin Status	Producing Basin
Area (km2)	7,119
Geographic Location	Coastal Area of Central Jawa, Western Indonesia
Coordinates	108° 45.605' E–110° 31.509' E and 6° 48.077' S–7° 16.209' S
Location Map	 (ESDM, 2022)

Geology	The North Serayu Basin, located in the northern part of Central Java, has undergone uplift to form the North Serayu Range. It spans approximately 7119.1 km^2 and is bounded by the Randublatung zone and Kendeng ridge in the east, while integrating with the Bogor anticlinorium in the west (van Bemmelen, 1949). This basin has been associated with deepwater sedimentation and subsequent uplift, evident in the Bogor-North Serayu-Kendeng Anticlinorium physiographic zones stretching over 1000 km in length and 60 km in width from West Java to the east of the Madura Strait (Satyana and Armandita, 2004). The geological landscape features a single east-west mountain range, including Mount Sumbing, Sindoro, and Slamet, covered by Quaternary volcanic rocks (Nursecha et al., 2014). The basin's history involves volcanic arc growth, back-arc basin rifting, and formations like the Rambatan, Halang, Kumbang, and Tapak Formations (Qosim, Jyalita, and Husein, 2014). Pleistocene reactivation of the North Serayu volcanic arc led to land volcanic activity, contributing to the dynamic tectonic processes in the region (Nursecha et al., 2014). Structural trends in the basin are influenced by volcanic activity directions, encompassing east–west, north–south, and northwest–southeast orientations (Satyana and Armandita, 2004). This comprehensive study sheds light on the intricate geological evolution and tectonic significance of the North Serayu Basin.
Reservoir Rocks for Saline Formation Candidate	Middle Miocene Rambatan sandstones Late Miocene Halang sandstones
Seal	Intraformational mudstones of Halang and Rambatan Formations

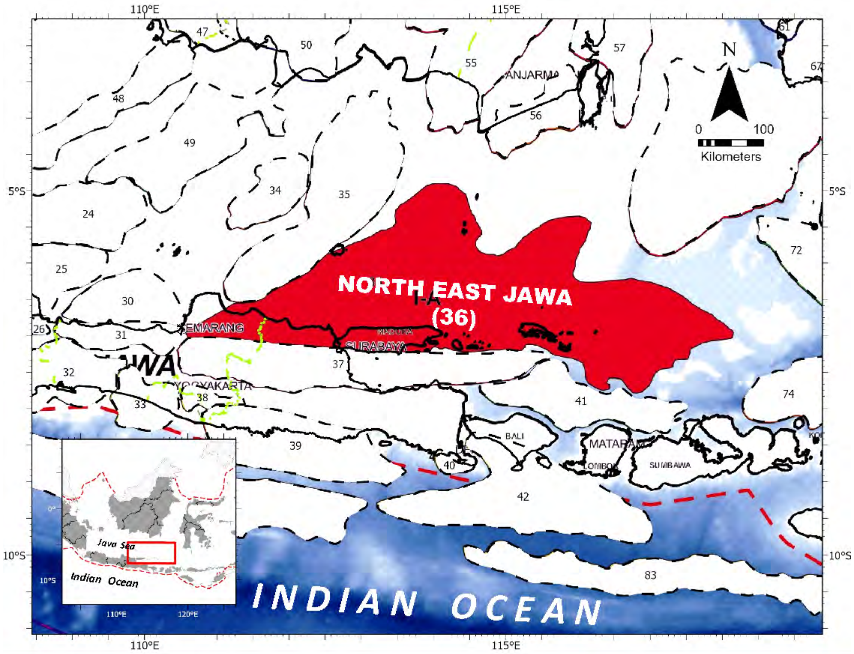
08. BAWEAN BASIN

Basin ID	35
Basin Name	Bawean
Basin Status	Producing Basin
Area (km2)	35,245
Geographic Location	Offshore East Jawa, Western Indonesia
Coordinates	111° 6.385' E–113° 35.462' E and 3° 38.853' S–6° 30.491' S

Location Map	 (Geological Agency, 2022)
Geology	The Bawean Basin consists of several high and low structures with a northeast–southwest direction or Meratus direction as seen in the bedrock configurations, such as the Karimun Jawa Arc, Muria Trough, Bawean Arc, Tuban–Gull Trough, JS-1 Hill, Depression Masalembo Doang and Exposure of North Madura (Pertamina and Beicip-Franlab, ,1992b). Bawean Basin's stratigraphy is similar to stratigraphy of NE Java area. It comprises the Pre-Tertiary Basement that are unconformably overlaid by Eocene to Pliocene sediments (BP Migas, 2008)).
Reservoir Rocks for Saline Formation Candidate	Late Miocene Sandstone of Ngrayong/Cepu Formation Miocene Rancak Formation Upper Prupuh/Kujung Formation
Seal	Mundu and lidah shale

09. NORTH EAST JAVA BASIN

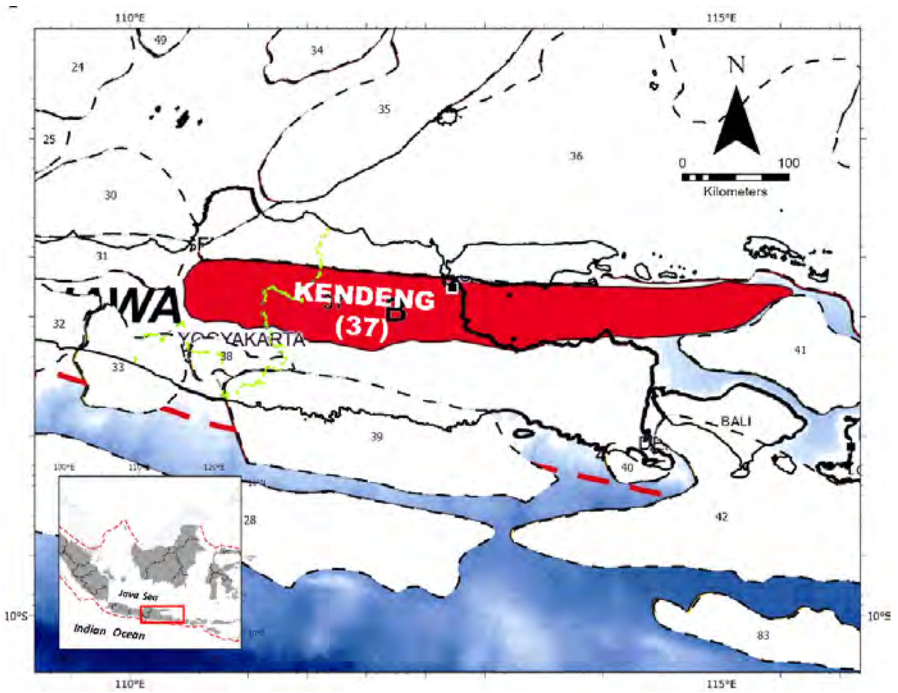
Basin ID	36
Basin Name	North East Java
Basin Status	Producing Basin

Area (km2)	118,249
Geographic Location	Offshore and coastal area of East Jawa, Western Indonesia
Coordinates	110° 35.502' E–118° 9.233' E and 4° 52.727' S–7° 46.192' S
Location Map	 (Geological Agency, 2022)
Geology	The Northeast Java Basin is a Tertiary back-arc basin located in the northeastern part of Java Island and covers the onshore and offshore areas of the central and northeastern part of East Java. The Northeast Java Basin is one of the earliest petroleum provinces discovered and developed in Indonesia. Oil exploration and production commenced in this basin more than a century ago. The present-day structural configuration of the Northeast Java Basin and adjacent areas is dominated by a major E-W left lateral wrench faults system (the Sakala Fault System) running from the Kangean area in the east to Madura and Java islands in the west (LEMIGAS, 2003). Along with this E-W trend of strike-slip fault are several structures of inversion, showing local strong erosion. The oldest tertiary sediment found in the Northeast Java Basin is the Late Eocene Ngimbang Formation. This formation consists of alluvial non-marine-valley-filled deposits and transgression of fluvio-deltaic facies. Shallow marine-shelf carbonate might develop very well at the uppermost part of this formation. During the Late Oligocene, limestone was deposited in many parts of the Northeast Java Basin, including the Kangean Block. The limestone is called Prupuh Member, and is an important objective in the Northeast Java

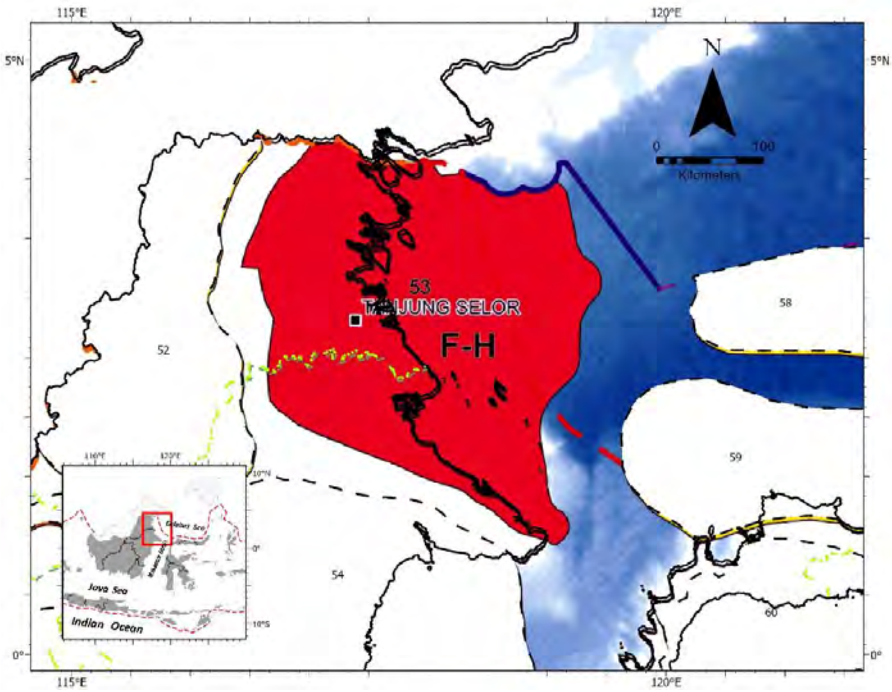
	Basin. At the age of Early–Middle Miocene the Lower Cepu Formation was deposited. At the upper part of this cycle, Lower Rancak Carbonate was deposited widespread through the entire area. The formation is reported to contain biogenic shallow gas. On top of it was deposited the Upper Cepu Formation in the Middle-Late Miocene, consisting of carbonate sequences, followed by deposition of the Mundu Formation at the Pliocene Age (Mudjiono and Pireno, 2001)).
Reservoir Rocks for Saline Formation Candidate	Late Eocene Ngimbang Clastics Middle Miocene Kujung Carbonate Middle Miocene Ngrayong Sandstones
Seal	Late Eocene Ngimbang Shale Middle Miocene Tuban Shales Pleistocene Lidah Shale

10. KENDENG BASIN

Basin ID	37
Basin Name	Kendeng
Basin Status	Producing Basin
Area (km2)	30,278
Geographic Location	Central area of East Jawa and Madura Strait, Western Indonesia
Coordinates	110° 28.900' E–115° 36.696' E and 7° 4.794' S–7° 47.033' S

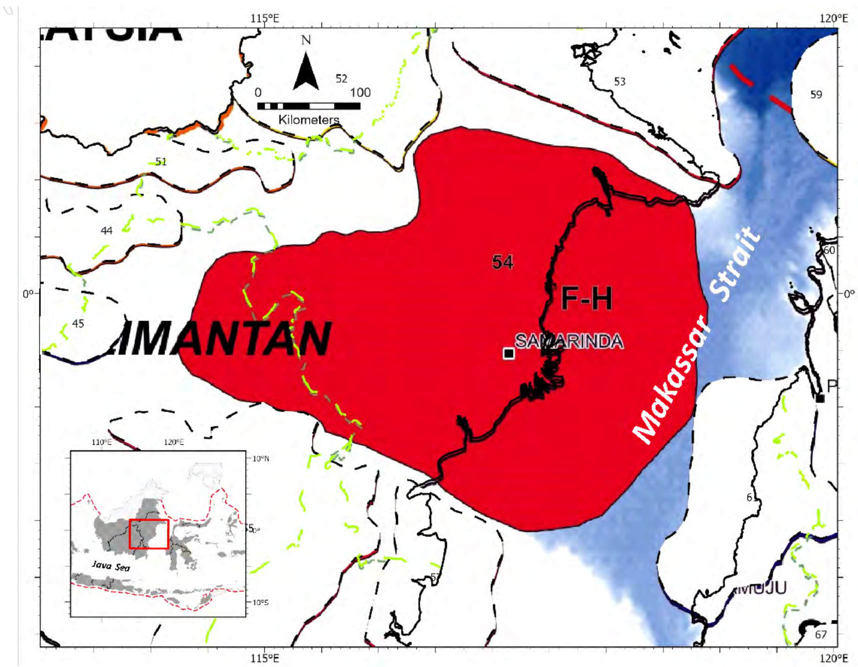
Location Map	 (Geological Agency, 2022)
Geology	The Kendeng Basin (Kendeng zone) is a west–east trending anticlinorium, extending from the volcanic Gmung Ungaran in the west to the Brantas River in the east where it plunges beneath the alluvial plain bounding the Madura Strait (Genevraye and Samuel, 1972). It is 250 km long and 20 km wide in average, covers a surface of about 4,800 km^2, and corresponds in the physiography to the Kendeng Hills. The stratigraphy of Kendeng Basin is almost similar to the southern part of the onshore area of NE Java Basin Stratigraphy. However, the Kendeng Basin is dominated by volkaniclastic sediment in the upper part although the oldest Pelang Formation is not influenced by volcanism. Middle Miocene Kerek Formation (equivalent Ngrayong in the Northeast Java Basin) until Notopuro-Kabuh-Pucangan mostly influenced by volkaniclastic sediment (Mujiono and Pireno, 2001).
Reservoir Rocks for Saline Formation Candidate	Pliocene Pucangan Formation Oligo-Miocene Kujung Formation Late Eocene Ngimbang Formation
Seal	Mio-Pliocene Kalibeng Formation Marl. Pliocene Mundu Formation shale.

11. TARAKAN BASIN

Basin ID	53
Basin Name	Tarakan
Basin Status	Producing Basin
Area (km2)	81,468
Geographic Location	Northeast coastal area and offshore Kalimantan Island, Western Indonesia
Coordinates	116° 25.144' E–119° 26.383' E and 0° 57.506' N–4° 21.632' N
Location Map	 (Geological Agency, 2022)
Geology	The Tarakan Basin in northeast Kalimantan is a passive margin deltaic basin. Bounded by Melange in the west, the Sampoerna Peninsula in the north, and the Mangkalihat Peninsula in the south, it extends eastwards to the Sulawesi Sea and Makassar Trough. Covering about 81,468 km^2, it exhibits a varying geothermal gradient from 5°C/100 m in the north to 4.5°C/100 m in the south. Influenced by major fault zones, the Samporna Fault Zone lies to the north, while the Mangkalihat Fault Zone is to the south. Divided into sub-basins, the Tarakan Basin is separated from the Kutei Basin by the Mangkalihat High. It formed due to a tectonic activity during the Eocene, influenced by the collision of Indian and Eurasian Plates. Structural trends from NW to SE and NNE to SSW, initiated in the Eocene, were periodically reactivated during compressive phases. Compression tectonics in the Plio-Pleistocene led to fault reactivations, forming NW-SE–

	oriented anticlines and synclines. Sedimentation patterns in the basin were influenced by subsidence and tectonic events, contributing to its complex geological history.
Reservoir Rocks for Saline Formation Candidate	Middle Miocene Tabul Sandstone Lower Miocene Meliat Sandstone Lower Miocene Naintupo Shaly Sandstone
Seal	Lower Miocene shale-based intraformational Naintupo and Meliat

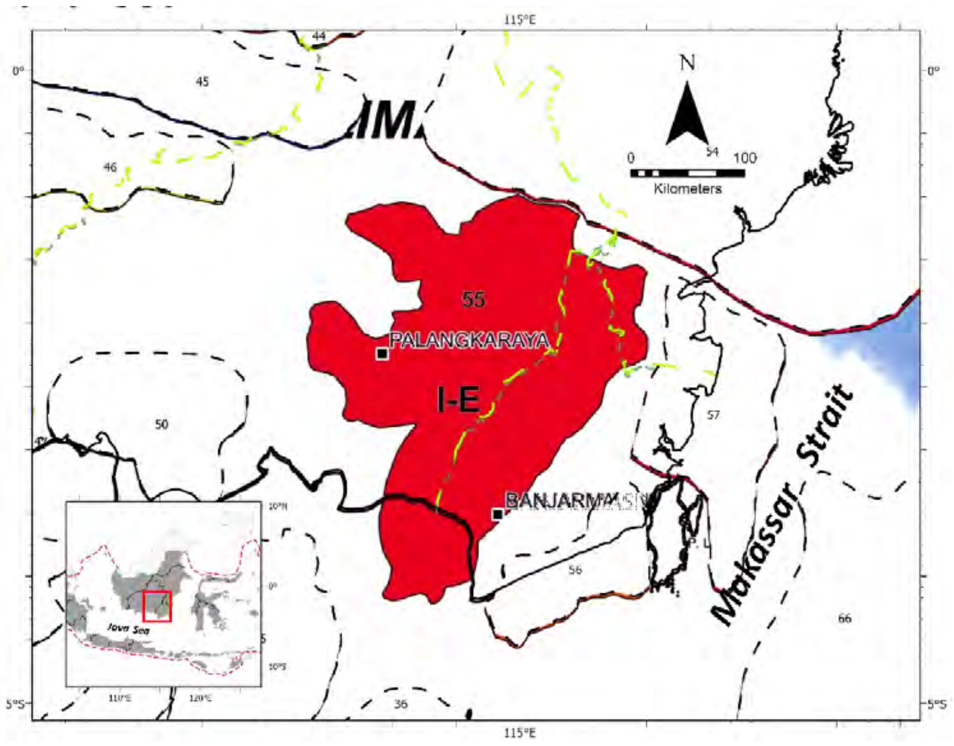
12. KUTAI BASIN

Basin ID	54
Basin Name	Kutai
Basin Status	Producing Basin
Area (km^2)	130,970
Geographic Location	Central and offshore area of east Kalimantan, Western Indonesia
Coordinates	114° 13.915' E–118° 46.470' E and 1° 29.880' N–2° 3.833' S
Location Map	 (Geological Agency, 2022)

Geology	The Kutai Basin is formed as part of the southeastern part of the Sunda Kraton, which is influenced by three main plates: the Eurasian, Indian-Australian, and Pacific plates. The bedrock structure of the Kutai Basin is a late Mesozoic to Early Tertiary tectonic product (Figure B.12-1). From the Paleocene to the Early Eocene, there was uplift and erosion from the Sunda Shelf in this area. This tectonic activity continues with the extensional and thinning of the crust on the continental margins and the spreading of the ocean floor in the Celebes Sea. This tectonic element separates the western part of Sulawesi from the eastern part of Kalimantan. Meanwhile, the spreading of the ocean floor in the Sulawesi Sea extended to the Makassar Strait during the Middle Oligocene. At the beginning of the Middle Miocene, compressive tectonics worked on the Sundaland resulting in carbonate and deltaic deposits on the Makassar Strait being folded strongly and uplifted with high topography to form the Samarinda Anticlinorium. Meanwhile in the Mahakam area, the southern shelf has been changed by progradative clastic sedimentation. The Samarinda Anticlinorium then becomes a source area of quartz sand for the next regression stage. Likewise, Central Kalimantan is a source of coarse clasts filling the offshore Kutai Basin and the Makassar Strait (Van de Weerd and Armin, 1992). Following the Palaeogene rift phase, the Kutai Basin developed as a sag basin on the continental margin prograding progressively eastward throughout the Neogene in a series of deltaic sedimentary piles (Courtney et al., 1991). Sedimentation began in the Early Oligocene with the deposition of marine shelf sediments in the depocenter and carbonates in the shallower parts. At the top it is continued with the deposition of the Pamaluan Formation at the age of the Early Miocene. This formation consists of carbonaceous shale with intercalated sandstones. The Lower Miocene Bebulu Group overlays the Pamaluan Formation and consists of a shelf edge bioclastic limestones in the onshore area (Maruat Formation) and a slope to bathyal sandstones, siltstones, and shales sequence offshore (Pulau Balang Formation). The Middle Miocene was marked by an eastward initial-out-building of the delta systems over shelf to slope sediment, with carbonates developed locally on the shallow marine shelf. The Middle Miocene deltaic sequences that developed in the onshore Kutai Basin laterally changed to the distal outer shelf, slope, and basin floor fan. The development of the Middle Miocene lowstand sediments the offshore part of the Kutai Basin/North Makassar Basin were closely related to the major sea level drop in the base of Middle Miocene. During the Late Miocene-Pliocene times, the eastern part of Kutai Basin contained deltaic to shallow marine facies laterally changing to the distal outer shelf, slope, and basin floor sediments of Late Miocene-Pliocene lowstand deposits.

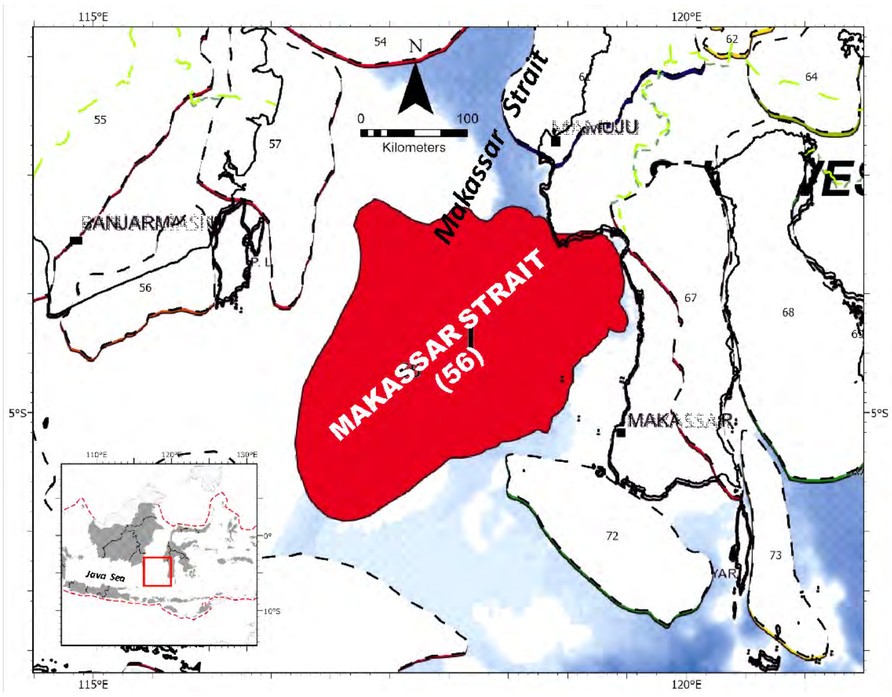
Reservoir Rocks for Saline Formation Candidate	Middle Miocene Balikpapan sandstones Pliocene Kampungbaru sandstones
Seal	Intraformational shales

13. BARITO BASIN

Basin ID	55
Basin Name	Barito
Basin Status	Producing Basin
Area (km^2)	59,033
Geographic Location	Sothern part of Kalimantan Island, Western Indonesia
Coordinates	113° 20.87'' E–116° 0.13'' E and 0° 58.09'' S–4° 11.64'' S
Location Map	

	Geological Agency, 2022)
Geology	The Barito Basin can be divided into three distinct zones: the Barito Platform just along the eastern edge of the Sunda Shield, represented by the Schwaner and Muller Mountains; the main Basin, including the Barito Foredeep; and the Meratus Welt Zone next to the western margin of the NNE-SSW Meratus Basement Uplift (Pertamina and Beicip-Franlab, 1992a). The faults characteristic in the Barito Basin varies from one area to another. Transverse and thrust faults along the Meratus edge are commonly related to the wrench movement, while intensity of thrusting decreases from east to west. To the north, in the Tanjung Raya and Kasale areas, the basin rises up, and en-échelon, asymmetrical, prominent fold trend axis becomes sharper and higher. The Barito Basin stratigraphy can be divided into two main units: the pre-Tertiary basement complex and the overlaying Tertiary sedimentary rocks (Kusuma and Darin, 1989). The oldest Tertiary sediments are the Eocene age of Tanjung Formation, while the youngest rock formations are the Dahor Formation (Late Miocene–Pleistocene) in age. Sedimentation in the Barito Basin began during the Early Tertiary, when the basin filled with transgressive clastic sediments of the Tanjung Formation, which deposited in an alluvial (land) to shallow marine environments. This transgression was even followed by uplifting, causing a decrease in global sea level in the Early Oligocene. In the Late Oligocene, a transgression resulted in a shallow marine environment followed by the deposition of limestone of the Berai Formation. Local uplift occurred within the basin in the Early Miocene and the Warukin Formation, depositing in a shallow marine to deltaic environment. In the Late Miocene, the Meratus Mountains were uplifted; there was also formation of the Adang shear fault in the north, so that some of the Warukin Formation deposits uplifted and eroded. After the Meratus uplifting, the transgression phase occurred in the basin followed by deposition of the Dahor Formation whose sediments originate from the Meratus Mountains (in the eastern part) and the Schwaner Mountains (in the western part).
Reservoir Rocks for Saline Formation Candidate	Eocene Sandstone of Tanjung Formation Oligocene Carbonate of Berai Formation Miocene sandstone of Warukin Formation
Seal	Warukin shale

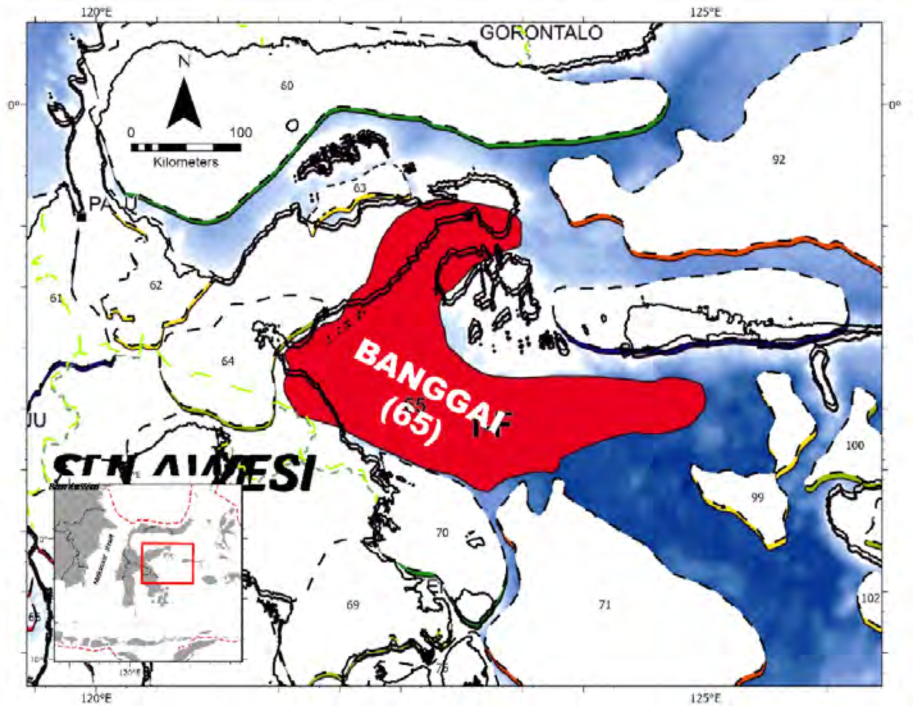
14. MAKASSAR STRAIT BASIN

Basin ID	66
Basin Name	Makassar Strait
Basin Status	Producing Basin
Area (km²)	60,118
Geographic Location	Makassar Strait, Western Indonesia
Coordinates	116° 42.35'' E–119° 30.30'' E and 3° 10.29'' S–5° 53.33'' S
Location Map	 (Geological Agency, 2022)
Geology	The Makassar Strait in Central Indonesia serve as a geological boundary between Western and Eastern Indonesia, formed by rifting along the eastern edge of Sundaland. This natural division resulted from the separation of Sulawesi's western region, marking the eastern extent of Sundaland. The straits exhibit varying depths, ranging from -200 m at the shelf's edge to -2,500 metres at its deepest point. The depression of the North Makassar Strait's western area is encompassed by a broad shelf with depths under 200 m, extending up to 50 km before sloping downward to over 2,000 m. Conversely, the eastern boundary features a narrower shelf, 10–20 km wide, adjacent to Central Sulawesi, descending steeply to depths exceeding 1,000 m before gradually reaching over 2,000 m. The South Makassar Basin, adjacent to the North Makassar Strait, is separated by the Adang-Paternoster strike-slip fault.

	The basin's tectonic evolution is associated with the subduction of the Indian Plate beneath the Eurasian Plate and the Australian Plate beneath the Sunda Craton. The basin originated as a back-arc basin in the Early to Middle Eocene, marked by grabens and horsts formation, followed by a sag phase during the Oligocene. In the Early Miocene, inversion occurred due to the subduction of the Australian Plate beneath the Sunda Plate, leading to uplift and fold-and-thrust-belt formation (Satyana, Damayanti, and Armandita, 2012; Rousseau et al., 2015).
Reservoir Rocks for Saline Formation Candidate	Lower Tanjung Lower and Upper Warukin
Seal	Berai, Lower, and Upper Warukin

15. BANGGAI BASIN

Basin ID	65
Basin Name	Banggai
Basin Status	Producing Basin
Area (km^2)	43,391
Geographic Location	Banggai Sea, Eastern Indonesia
Coordinates	121° 32.588' E–124° 59.522' E and 0° 44.846' S–3° 8.371' S

<table>
<tr>
<td>Location Map</td>
<td>


(Geological Agency, 2022)
</td>
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<tr>
<td>Geology</td>
<td>
The physiography of then Banggai Sula Basin can be divided into four main units: mountains, hills, karsts, and coastal peneplanes. The mountainous area is mostly on Taliabu Island, which has dense forest and an elevation of up to 1,735 m. The hill topography occurs on most of the island in the Banggai-Sula basin.

The Banggai-Sula Microplate, interpreted to be a fragment of the north Australia–New Guinea continent based on the similarities in the age and type of the basement (White et al., 2014), the Mesozoic stratigraphy, and the age of a Mesozoic unconformity mark the beginning of the rifting apart of northern Australia and New Guinea. During the latter part of the Mesozoic, the Banggai-Sula Microcontinent broke away and drifted west towards the Asiatic Plate. This extensional period is represented by a transgressive phase of continental to shallow marine Jurassic clastics overlain by deeper water anoxic shales. Essentially passive margin sedimentation took place through the Cretaceous and into the Tertiary during the drift westward. On the microcontinent, bathyal conditions most likely existed with little clastic sediment input.

The rocks that make up the Banggai–Sula micro-continent are similar to those exposed on islands in eastern Indonesia, which also originate from the edge of the Australian continent. Its lithology consists of rocks from the edge of the Australian continent that are Mesozoic to Middle Miocene and rocks deposited in basins formed on the micro-continent itself, which are Late Miocene to Pleistocene (Pertamina-BPPKA, 1996).
</td>
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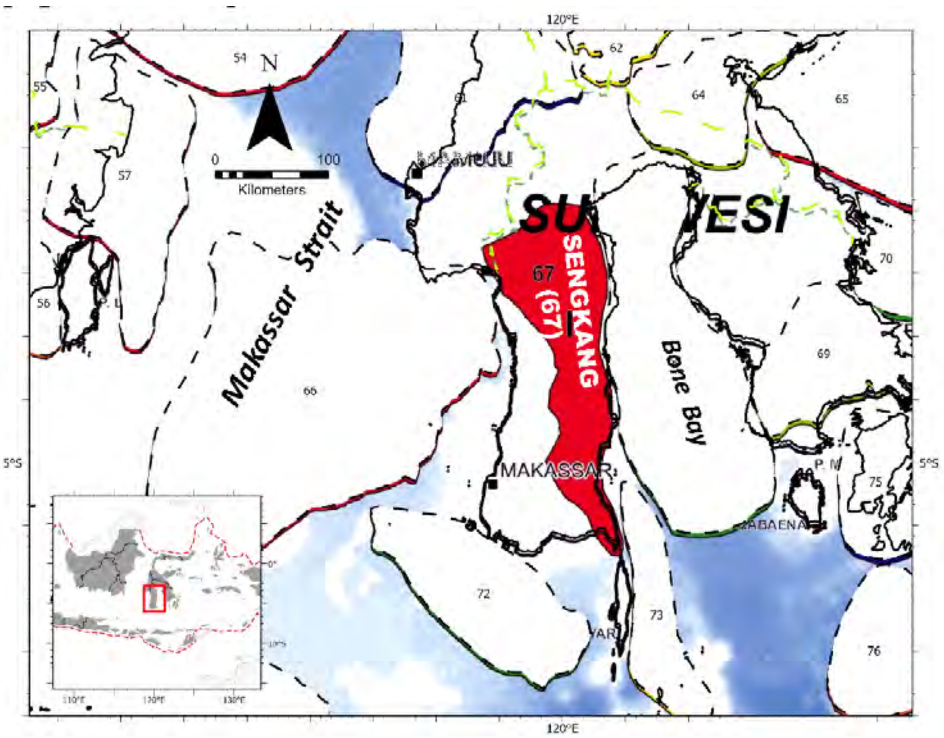
Reservoir Rocks for Saline Formation Candidate	Miocene Carbonate of Minahaki Formation Miocene Carbonate of Tomori Formation
Seal	Pliocene shale of Kintom Formation Mid Miocene Shale of Matindok Formation

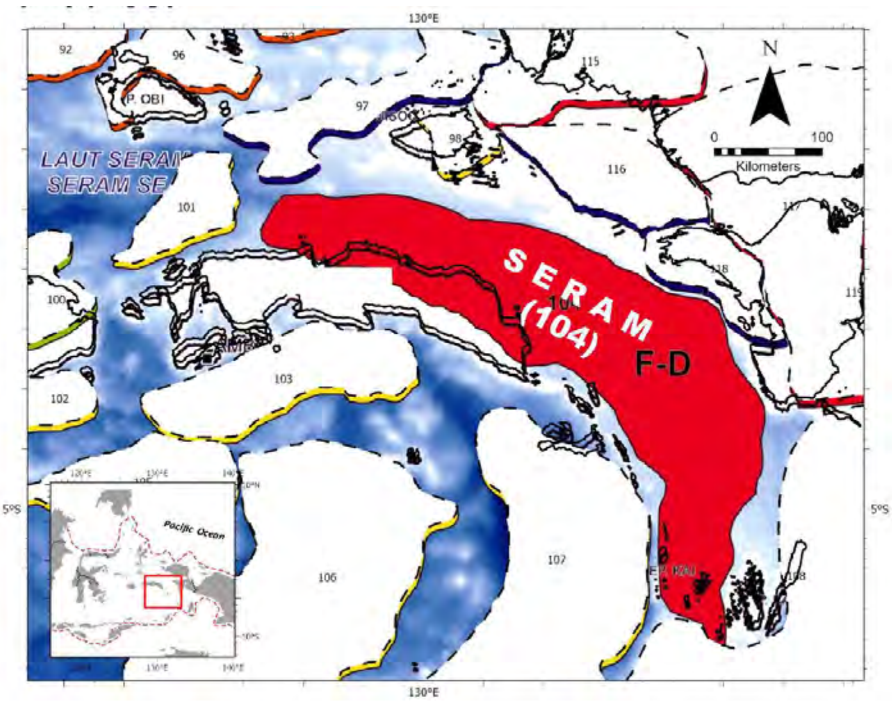
16. SENGKANG BASIN

Basin ID	67
Basin Name	Sengkang
Basin Status	Producing Basin
Area (km^2)	16,945
Geographic Location	Eastern part of South Sulawesi, Eastern Indonesia
Coordinates	119° 22.075' E–120° 21.290' E and 2° 54.504' S–5° 42.530' S
Location Map	 (Geological Agency, 2022)

Geology	The Sengkang Basin is located southwest of Sulawesi and is bounded by Cretaceous flysch sediments from the Latimojong Mountains to the north, the Pre-Tertiary Western Divide mélange to the west, the Bone Mountains to the south, and the Bone Basin to the east. Tectonic evolution in the South Sulawesi region began with collisions during the Cretaceous age. This collision is marked by a westward sloping subduction zone along western Sulawesi, where the proto-oceanic crustal rocks of the Banda Sea subduct beneath the southeastern edge of the Sunda Shelf (Grainge and Davies, 1983). In the Eocene, the increase in convergence caused the western Sulawesi Plate to sink vertically and caused a slab rollback mechanism. This vertical sinking caused a bulging of the crust behind the subduction zone and has been interpreted as causing the opening of the Makassar Strait. During the Oligocene epoch, collision and obduction occurred as indicated by the presence of Blue Schist and Ophiolitic Complexes in the East Sulawesi Arm, and Paleogene volcanic rocks in the West Sulawesi Magmatic Column (Parkinson, 1991; and Helmers, et al. 1990). The volcanic activity that occurred in the Southern Arm of Sulawesi in the Neogene is thought to be the result of a collision between the microcontinents moving west–northwest along the Sorong Fault with the Central Sulawesi Metamorphic Rock Route and the East Sulawesi Ophiolite Route in the Middle–Late Miocene (Simandjuntak, 1993; Coffield et al., 1993). The regional stratigraphy of the Sengkang Basin is characterised by the deposition of the Bantimala Formation above the basement (Grainge and Davies, 1983). This formation consists of mélange sedimentary sequences, metamorphic rocks, and ultramafic rocks exposed on the west coast of the Bone Mountains. Above it was deposited unconformably the Balangbaru Formation consisting of flysch sediments deposited in a bathyal–abyssal environment, possibly in a trough system. On top of the Balangbaru Formation, Eocene sediments were unconformably deposited in the Malawa Formation. Then proceed with the deposition of carbonates of the Tonasa Formation, consisting of coral limestone, bioclastic limestone, and calcarenite, mostly dense and layered, with intercalated marl, shale, and sandstone at the bottom. This formation is aligned above the Malawa Formation, and above it was gradually deposited in the Camba Formation. But it shows unconformity in several places. The Tacipi Limestone (Late Miocene) comprises limestone and shale that were deposited unconformably on top of the Camba Formation. The Tacipi limestone occurs throughout the East Sengkang Sub-basin and may occur at depth in the West Sengkang Sub-basin, where a seismic appearance covering the Walanae Formation is interpreted as Tacipi limestone.
Reservoir Rocks for Saline	Late Miocene Tacipi limestones Middle Miocene Camba Formation

Formation Candidate	
Seal	Pliocene Walanae shales

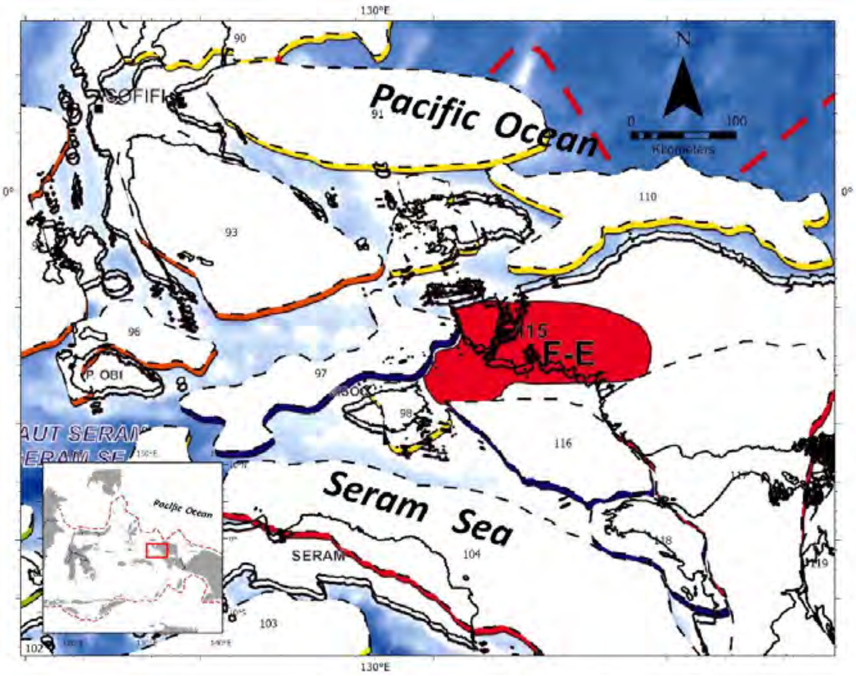
17. SERAM BASIN

Basin ID	104
Basin Name	Seram
Basin Status	Producing Basin
Area (km^2)	59,288
Geographic Location	Seram sea and eastern part of Seram Island, Eastern Indonesia
Coordinates	128° 37.947' E–132° 49.700' E and 2° 19.052' S–6° 5.607' S
Location Map	 (Geological Agency, 2022)
Geology	Seram Island is in the Banda arc, which extends from Nusa Tenggara to Buru Island. Tectonically, this island, along with Banda arc and Papua Island, is part of the northern Australian continental crust that broke up and shifted to the north or northwest in eastern Indonesia. Generally, the geological structure of the Seram area consists of major thrust faults dominated by west–northwest (WNW)–southeast–east (ESE) orientation.

	The current structural pattern is the result of rejuvenation of ancient structures influenced by compression during the subduction at Seram trough. A schematic cross-section of Seram Island indicates that the main structure pattern occurred as the fold formation followed by thrust faults, which rise relative to the north of Seram (Kemp, Mogg, and Barracclough, 1995). The tectonic features formed during late Tertiary due to subduction of Seram block to the north, which also created some Plio-Plesitocene age basins. This basin is characterised by a relatively narrow dimension filled by thick sedimentary sequence derived from erosion of older rocks. The stratigraphy of Seram can be separated into an older Australian Series, which forms an integral part of the northern Australian continental margin, and a unique Seram Series. A more detailed discussion of the stratigraphy and structural development of the Island is set out in Kemp, Mogg, and Barracclough (1995). The Australian Series consists of Triassic to Late Miocene sediments that sit unconformably on older metamorphic units and were deposited on the northern margin of the Australian continental plate. The Late Miocene marks a critical phase in the geology and tectonic evolution of Seram. It was at this time that major collision between the northward-moving Australian, eastward-moving Eurasian and westward-moving Pacific Philippine plates had its major influence in the Seram area resulting in major thrusting of the section at Seram. Associated with the initial stages of thrusting and rapid orogenic uplift, a gravity slide/slump unit, the Salas Complex, was deposited and sits unconformity on the Australian Series. During the early Pleistocene, continued uplift of the island resulted in shallower water depths in the thrust foreland basins, and the change to deposition of the neritic mudstones, clay stones, sands, silts, conglomerates, and limestones of the Fufa Formation occurred.
Reservoir Rocks for Saline Formation Candidate	Jurassic Carbonate rocks of Manusela Formation Pliocene Sandstones and limestones of Fufa Formation
Seal	Late Jurassic to Early Cretaceous shales of Kola Formation Intraformational shale of Fufa and Wahai Formations

18. SALAWATI BASIN

Basin ID	115
Basin Name	Salawati
Basin Status	Producing Basin

Area (km^2)	15,329
Geographic Location	Western part of Bird Head Papua, Eastern Indonesia
Coordinates	130° 23.818' E–132° 20.712' E and 0° 53.361' S–1° 47.343' S
Location Map	 (Geological Agency, 2022)
Geology	Physiographically, the Salawati Basin is in West Papua. Structural development of the basin is the result of the complex interplay of three major crustal plates. The left lateral strike-slip movement along the Sorong fault is primarily responsible for the present-day structural configuration of the basin. East–west folds and complex faulting dominate the local tectonic pattern. Most of the faults are northeast–southwest trending normal faults, which predominate over the basinal areas. These faults are generally down-stepping to the northwest across the basin into the depocenter on northern Salawati Island, as a result of the transtensional pull-apart regime induced by movement along the Sorong Fault initiated during Late Miocene. Although this fault has significant strike-slip movement, the major effects are down to the basin, which allowed rapid deposition of the Pliocene Klasaman Formation, best illustrated by the rapid westward increase in the thickness of the Pliocene Klasaman Formation towards the depocenter. Movement appears to be diverted to a more neutral left-lateral displacement as the fault's orientation shifts to a more east–west direction and crosses the southern part of Salawati Island, suggesting that movement began in post-Miocene, Early Pliocene times.

	The final movement of the Sorong Fault during Plio-Pleistocene created a series of NE-SW trending folds. These are located south of the Sorong fault in the northern part of Salawati Island (Hill, 2012). The Salawati Basin stratigraphy consists of pre-Tertiary to Tertiary rocks (Satyana, 2003). Pre-Tertiary rocks consist of the Kemum, Aifam, Tipuma, Kembelangan, and Aifam Formations. Above the basement, unconformably deposited Paleocene sediments from the Waripi Formation comprise Oolite calcarenite and biocalcarenite sandstone. The Faumai Formation is Eocene–Oligocene in age, the rocks include shallow exposure carbonate rocks. On top of the Faumai Formation at the age of the Oligocene–Miocene was deposited with the Sirga Formation with lithology in the form of fine clastic sediments. The Klamogun Formation was deposited on top of the Sirga Formation in the Miocene age. The Klamogun Formation has rocks in the form of open-sea and deep-sea limestone as the beginning of a new transgression sedimentation. The Kais Formation was deposited in the Miocene age. This formation consists of limestone shallow exposure which thins to the west, namely, as a depocenter deposited within the marl of the Klasafet Formation. On top of this shelf, limestone reefs grow to the east, characterising some of the transgression sediments of the Kais Formation.
Reservoir Rocks for Saline Formation Candidate	Oligocene Faumai limestone Early Miocene Kais limestone Middle-Late Miocene Klasafet sandstone
Seal	Middle-Late Miocene Klasafet shale Pliocene Klasaman shale

19. BINTUNI BASIN

Basin ID	117
Basin Name	Bintuni
Basin Status	Producing Basin
Area (km^2)	39,727
Geographic Location	Central part of Bird Head Papua, Eastern Indonesia
Coordinates	131° 55.626' E–133° 58.689' E and 1° 17.709' S–4° 5.757' S

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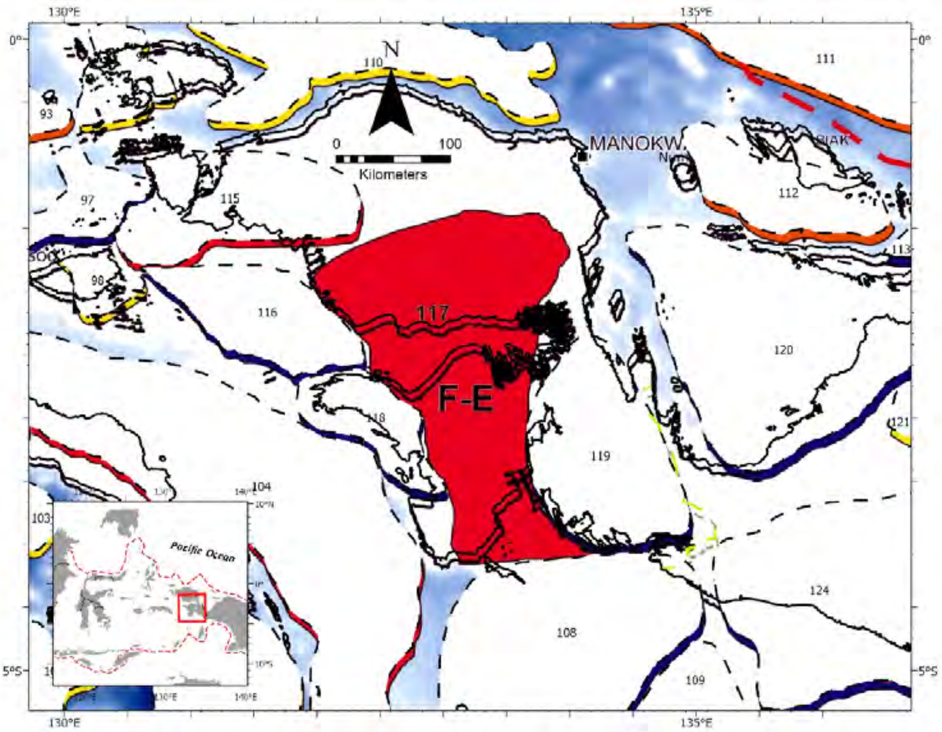

(Geological Agency, 2022)
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<td>Geology</td>
<td>
The Bintuni Basin is elongated in a north–south direction (Hadipandoyo et al., 2007). To the northwest, the Bintuni Basin is bordered by the Ayamaru Plateau, separating this basin from the Salawati Basin. The northern boundary of the basin is the Kemum Block, composed of Pretersier rocks and New Guinea limestones. The western boundary of the basin is the Sekak Hills and Onin Hills, the southern boundary is the Tarera-Aiduna Fault, and the eastern boundary is the Arguni Fault. The thickness of the sediments in this basin can reach more than 9,000 m, including more than 4,500 m of Late Miocene sediments and synorogenic clastic sediments (O'Sullivan et al., 1995).

The stratigraphic section of Bintuni Basin can be schematically split into a clastic dominated Pre-Tertiary sequences (Carboniferous to Cretaceous sediments) overlain by a Tertiary sequence (Paleocene to Pleistocene sediments) where carbonates were largely dominant (Chevalier and Bordenave, 1986). This carbonate platform prevailed over most of Bintuni Basin, although it displays a marked eastward deepening. These carbonates, ranging in age from Eocene to Upper Miocene, are referred to the New Guinea Limestone Group.

The Kemun Formation is a basement of the Bintuni Basin. It comprises Palaeozoic rock found in the outcrop to the north of the Muturi Block. The Aifam Group is cropped out in the northern part of Kepala Burung area and overlies unconformably with the Kemun Formation. The Aifam Group was deposited from the Late Carboniferous to the Late Permian, unconformities above the basement. It comprises the Aimau, Aifat, and Ainim Formations. The Tipuma Formation is usually considered as Triassic to Early Jurassic in
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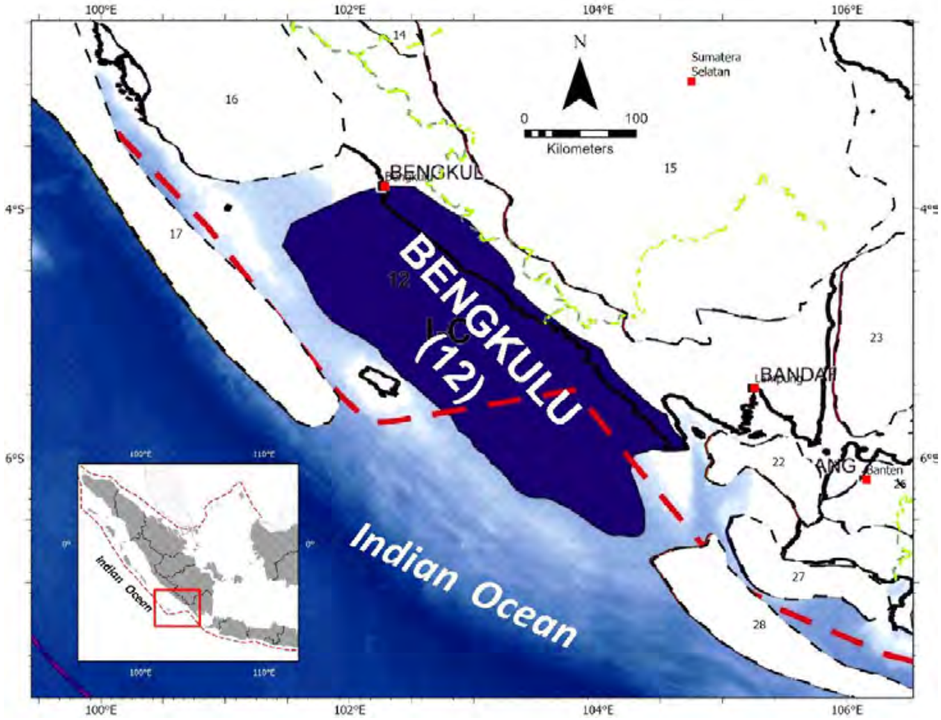
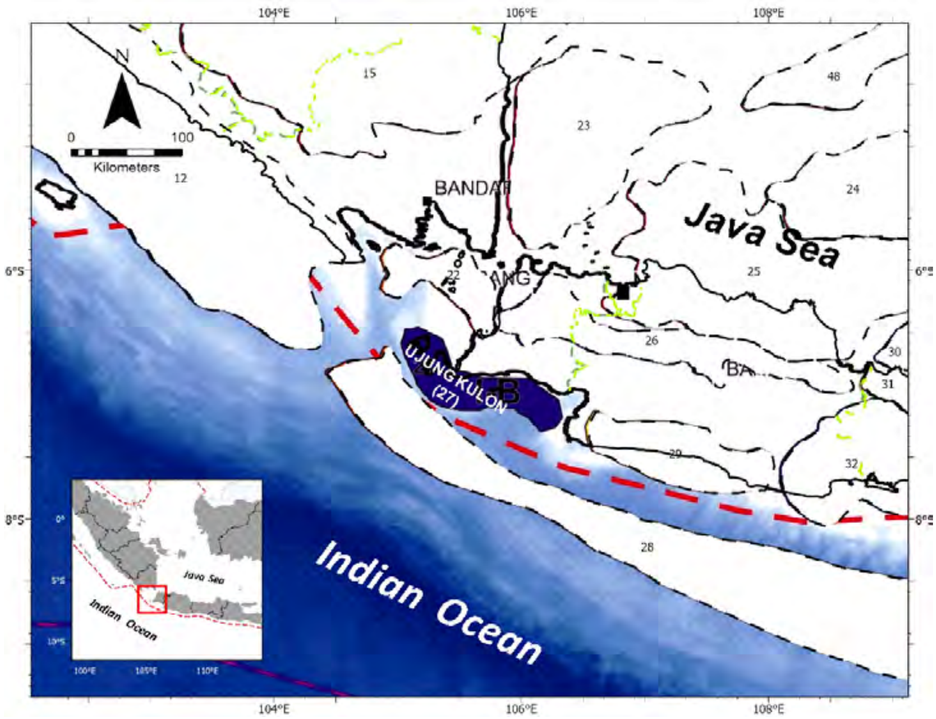
	age because its stratigraphic position in the Kembelangan–1 well is between the Permo–Carboniferous Aifam Group and the Middle Jurassic–Cretaceous sediments of the Kambelangan Group. The Kambelangan Group is divided into the Lower Kambelangan and the Upper Kambelangan (Jass) Formations. The Tertiary sequence comprises the Waripi Formation, New Guinea Limestone Group, and Steenkool Formation.
Reservoir Rocks for Saline Formation Candidate	Triassic sandstone of Ainim Formation. Jurassic sandstone of Lower Kembelangan Miocene carbonate of Formasi Kais Formation
Seal	Upper Kembelangan shale Seal of Steenkool Formation

20. BENGKULU BASIN

Basin ID	12
Basin Name	Bengkulu
Basin Status	Discovery Basin
Area (km^2)	48,571
Geographic Location	NW part of Sumatera Island, Western Indonesia
Coordinates	101° 53.402' E–104° 43.833' E and 3° 49.430' S–6° 37.899' S

Location Map	 (Geological Agency, 2022)
Geology	The Bengkulu Basin is in the southeast part of Sumatra Island, covering both onshore and offshore. The Bengkulu Basin is trending NW-SE, parallel to Sumatra Island, with about 600 km in length and 150–200 km in width. The structural setting of the onshore part of the basin can be divided into the Pagarjati Sub-basin in the north and the Kedurang sub-basin in the south. They are separated by the north–south trending Masmambang High (Yulihanto et al., 1995). The stratigraphy of the onshore Bengkulu Basin consists of a series of Oligo-Miocene up to Pliocene sediments overlaying unconformably the Pre-Tertiary Basement Complex (Yulihanto et al., 1995). The pre-tertiary basement complex is represented by metasediments of the Lingsing, Sepitiang, and Saling Formations. Surface geological studies exhibit that Tertiary sediments crop out in this onshore area and are represented by the Hulusimpang, Seblat, Lemau, Simpangaur, and Bintunan Formations.
Reservoir Rocks for Saline Formation Candidate	Talang Akar Formation Baturaja Formation
Seal Rocks	Shale of Gumai Formation Shale of Seblat Formation

21. UJUNG KULON BASIN

Basin ID	27
Basin Name	Ujung Kulon
Basin Status	Discovery Basin
Area (km^2)	5,259.8
Geographic Location	Western part of Java Island, Western Indonesia
Coordinates	105° 3.024' E–106° 21.335' E and 6° 28.439' S–7° 18.188' S
Location Map	 (Geological Agency, 2022)
Geology	The structural unit in the Ujung Kulon Basin is primarily defined by its morphology consists of reliefs and depressions, which are often well contrasted in this region, correspond to structural highs and lows, respectively. In addition, most of the boundaries between the highs and lows are confirmed by well-marked gravity gradients (Keetley et al., 1997). From the viewpoints of structure, lithofacies, and geological history, these units are thought to belong, region-wise, to different larger geological zones on Java Island:

	- The West Malingping Low is considered to be the westernmost part of the axial trough of Java. - The Bayah High, the Ciletuh High, and the central part of the Jampang segment make up the core of the axial ridge of Java. - The northern slope of the axial ridge corresponds to the Cibadak-Pelabuan ratu low, the Sukabumi high, the Cimandiri zone, and the northern part of the Jampang segment. - The southern part of the Jampang segment belongs to the southern slope of the axial ridge. The above interpretation of the structural setting obviously implies that the Bayah and Ciletuh highs were originally aligned and later shifted to their present position along an NNE-SSW trending major wrench fault system. Another deep-seated major fault, also NNE-SSW trending, may be inferred from the eastward-dipping gravity gradient marked between the Honje high and the West Malingping low. The stratigraphy of Ujung Kulon Basin comprises Pre-Tertiary that unconformably overlies by Tertiary sediments (Keetley et al., 1997). The Pre-Tertiary strata exhibit a metamorphic transformation. It is characterised by the prevalence of schists and phyllites, which have undergone intrusions of ultrabasic rocks. The basement is unconformably covered by the late Eocene Ciletuh beds, consisting of conglomerates and sandstones. The quartz sandstone of Gunung Walat is equivalent to the Ciletuh Formation. The Bayah formation comprises fluvially dominated sandstone with black clays and bituminous intervals. The Bayah Formation outcrops in the Ciletuh area consist of gravitational flow deposits or turbidites. The clastic Bayah beds grade upwards into the neritic calcareous cicarucup beds of a late Eocene age. Cijengkol Formations are composed of well-bedded andesitic conglomerates and sandstones, quartz-sandstones, marls, clays, and foraminiferal limestones. The basal breccias are alluvial fan-type deposits belonging to the Cacarucup Formation. The Cimapag Formation consists of volcanic and volcaniclastic rocks. The Badui Formation is composed of shallow to transitional marine deposits. It is overlain by marine-influenced sediments of the Bojongmanik Formation.
Reservoir Rocks for Saline Formation Candidate	Bayah formation Walat formation

Seal Rocks	Cijengkol Formation Bojongmanik Formation