

**ANALISIS HUBUNGAN KANDUNGAN NITROGEN DAN FOSFAT  
PADA SEDIMEN DI BERBAGAI LINGKUNGAN ALAMI  
DAN BUATAN TERHADAP PERSEBARAN  
*COMPLETE AMMONIA OXIDATION (COMAMMOX)***

**TUGAS AKHIR**

Sebagai salah satu syarat untuk menyelesaikan  
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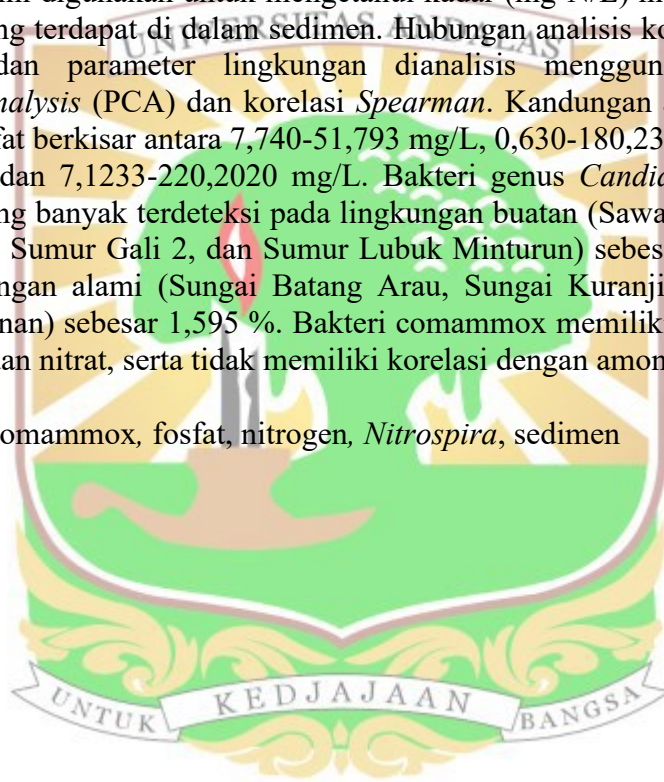
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## ABSTRAK

Pengoksidasian amonia lengkap (comammox) merupakan proses oksidasi amonia secara individual menjadi nitrat dan dianggap memainkan peran penting dalam siklus nitrogen konvensional. Namun, distribusi comammox *Nitrospora* di lingkungan berbeda seperti Sumatra Barat masih belum diketahui. Dalam penelitian ini, telah diuji 14 sedimen dari lingkungan alami yang terdiri atas sungai, danau, hutan, pantai, dan muara, serta 16 sedimen dari lingkungan buatan yang terdiri atas akuakultur air tawar, sawah, area pembuangan, dan sumur untuk diidentifikasi distribusi comammox *Nitrospora*. Dalam penelitian ini dilihat hubungan kandungan senyawa nitrogen dan fosfat terhadap distribusi comammox *Nitrospira* pada berbagai lingkungan yang berbeda. Sedimen diekstrak untuk dianalisis kandungan nitrogen dan fosfatnya menggunakan metode spektrofotometri UV-Vis. Hasil analisis ini digunakan untuk mengetahui kadar (mg-N/L) nitrogen dan (mg-P/L) fosfat yang terdapat di dalam sedimen. Hubungan analisis komunitas bakteri comammox dan parameter lingkungan dianalisis menggunakan *Principal Component Analysis* (PCA) dan korelasi *Spearman*. Kandungan amonium, nitrit, nitrat, dan fosfat berkisar antara 7,740-51,793 mg/L, 0,630-180,239 mg/L, 19,283-62,432 mg/L dan 7,1233-220,2020 mg/L. Bakteri genus *Candidatus Nitrospira inopinata* paling banyak terdeteksi pada lingkungan buatan (Sawah Limau Manis, Sumur Gali 1, Sumur Gali 2, dan Sumur Lubuk Minturun) sebesar 1,836 %, dan diikuti lingkungan alami (Sungai Batang Arau, Sungai Kuranji, Muaro Lasak, Muaro Panjalinan) sebesar 1,595 %. Bakteri comammox memiliki korelasi positif dengan nitrit dan nitrat, serta tidak memiliki korelasi dengan amonium dan fosfat.

**Kata kunci:** comammox, fosfat, nitrogen, *Nitrospira*, sedimen



## **ABSTRACT**

*Complete ammonia oxidizers (comammox) was a process of individually oxidize ammonia to nitrate. This process was considered to play a significant role in the conventional nitrogen cycle. However, the distribution of comammox Nitrospira in different environments like West Sumatra remains unidentified. In this study, 14 sediments from natural environments consisted of rivers, lakes, forests, and estuary, and 16 sediments from artificial environments consisted of aquaculture, paddy forests, and dug wells were investigated to identify the distribution of comammox Nitrospira. This study expects to identified the correlations of nitrogen and phosphate compounds on the distribution of comammox Nitrospira in a variety of different environments was observed. Sediment were extracted to analyse the content of nitrogen and phosphate compounds using UV-Vis spectrophotometry. The results of these analyses were used to determine the concentrations of nitrogen (mg-N/L) and phosphate (mg-P/L) present in sediment. The correlation between comammox bacteria community and environmental parameters was analyzed by Principal Component Analysis (PCA) and Spearman correlation test. The content of ammonium, nitrite, nitrate, and phosphate range from 7.740-51.793 mg/L, 0.630-180.239 mg/L, 19.283-62.432 mg/L dan 7.1233-220.2020 mg/L. The bacteria genus Candidatus Nitrospira inopinata was most commonly detected in artificial environments (Limau Manis Rice field, Dug Well 1, Dug Well 2, and Lubuk Minturun Dug Well) at a rate of 1.836%, followed by natural environments (Batang Arau River, Kuranji River, Lasak Estuary, and Panjalinan Estuary) at a rate of 1.595%. Comammox bacteria had a significantly positive correlation with nitrite and nitrate, and hadn't a significantly correlation correlation with ammonium and phosphate.*

**Keywords:** comammox, nitrogen, Nitrospira, phosphate, sediment

