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Conference Abstract

# Environmental Genomics Applications for Environmental Management Activities in the Oil and Gas Industry - State of the Art Review and Future Research Needs

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## Abstract

The International Association of Oil and Gas Producers (IOGP) Environmental Genomics Joint Industry Program (JIP) was formed in June 2019. The aim of the JIP is to facilitate the development of guidelines for the application of environmental genomics to support environmental management activities in the oil and gas industry. Towards this goal, a white paper summarizing the state-of-the-art in environmental genomics research and how it

may be used to advance technology development opportunities for the oil and gas industry was drafted.

More specifically, a series of applications and focus areas of primary interest to oil and gas companies were covered including:

- baseline assessments;
- detection of key species;
- rapid assessment of invasive species;
- population status and dynamics;
- monitoring of environmental effects of oil and gas activities;
- remediation and restoration;
- sampling design;
- data analysis and interpretation;
- community representation;
- species abundance,
- distribution and viability;
- and real-time on-site measurement and analysis.

In addition to the literature review, consultation of professionals from academic, regulatory, and industrial backgrounds with expertise on these topics was conducted. While there was a consensus that the application of environmental genomics has advanced greatly in a short period of time with demonstrable benefit potential, there was acknowledgement that key aspects of best management practices are still lacking. Furthermore, while the majority of regulators interviewed were aware to varying degrees of the methodological limitations which restrict the present use of environmental genomics in regulatory affairs, it transpired that there is considerable appetite and capacity amongst the regulatory community to engage in collaborative research initiatives with the oil and gas industry and academia.

Through these academic, regulatory, and industrial consultation, specific environmental genomics study areas and applications requiring further development and refinement were identified. These include:

- methodological standardization,
- persistence and dispersal of eDNA;
- eDNA data integration with various other data types;
- improvement of reference databases;
- and refinement of molecular indices.

Based on the above and considering the most efficient path to greater regulatory uptake for environmental genomic approaches for the oil and gas industry, the JIP's recommendation is to pursue a Common-Garden Experiment. Such experiment should seek the involvement and ultimately endorsement from the Regulators marking the path towards wider regulatory acceptance and uptake of eDNA-based approaches.

## Keywords

eDNA, metabarcoding, industry, IOGP JIP, standardization

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