

Bacteria keep tabs on state of oil field

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The ups and downs of the bacteria in an oil field provide a useful source of information for keeping tabs on the state of the oil field itself. In theory, this process known as 'biomonitoring' can increase the yield from an oil field. This is the conclusion reached by Geert van der Kraan, who recently obtained his doctorate on this topic at TU Delft, The Netherlands.

Oil fields are highly specific ecosystems. For instance, they contain no oxygen and the temperature, pressure and salinity are often high. This means that oil fields are home to a very particular community of [bacteria](#). The exploitation of oil fields gives rise to a great many changes. In order to obtain more oil from a field, methods such as pumping [seawater](#) into the field are used in order to flush through the oil. Seawater injection has a number of effects, such as the introduction of sulphate. This changes the composition of the bacteria populations in the oil field. Bacteria that reduce sulphate thrive, prompting the release of hydrogen sulphide, which is not only toxic but also has an adverse effect on the quality of the oil and damages the pipelines.

For this reason, these bacteria have always been closely monitored by the oil industry. For his doctorate research, Geert van der Kraan investigated whether a brand new step could be taken. He wanted to know whether the microbial changes (i.e. the types and quantity of bacteria present) could be used as an information source to track what is taking place in the oil field. This concept is known as biomonitoring. It is an approach that has the potential to boost oil exploitation or to prevent the production of harmful [hydrogen sulphide](#) at an early stage. This can be

achieved by smart management of oil wells.

Geert van der Kraan has studied various Dutch oil fields, focusing on the [microbial communities](#) living there. "There are very positive indications that biomonitoring is a realistic option. The changes in the [microbial diversity](#) of the pore water from the oil well can provide a good understanding of the changing geochemical conditions in the oil field itself. This may well enable the oil field to be exploited more efficiently."

In addition to monitoring, bacteria can also be used to improve oil extraction. Geert van der Kraan explains: "Encouraging the growth of certain groups of bacteria at specific locations in the oil field is an interesting proposition. This growth partially blocks the porous structure of the rock that contains the oil, forcing the water to take another route. It can then move oil that is more difficult to reach, increasing the effectiveness of oil extraction."

More information: The thesis: 'Subsurface ecosystems - Oil triggered life: Opportunities for the petroleum industry':
[repository.tudelft.nl/view/ir/ ... 6-af36-bea4a460e1b1/](https://repository.tudelft.nl/view/ir/...6-af36-bea4a460e1b1/)

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