



## Review

# Collating science-based evidence to inform public opinion on the environmental effects of marine drilling platforms in the Mediterranean Sea

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## ABSTRACT

The use of rigorous methodologies to assess environmental, social and health impacts of specific interventions is crucial to disentangle the various components of environmental questions and to inform public opinion. The power of systematic maps relies on the capacity to summarise and organise the areas or relationships most studied, and to highlight key gaps in the evidence base. The recent Italian technical referendum (2016) – a public consultation inviting people to express their opinion by voting to change the rules on the length of licence duration and the decommissioning of offshore oil and gas platform drilling licences – inspired the creation of a systematic map of evidence to scope and quantify the effects of off-shore extraction platforms on Mediterranean marine ecosystems. The map was aimed as a useful model to standardise a “minimal informational threshold”, which can inform public opinion at the beginning of any public consultation. Produced by synthesising scientific information, the map represents a reliable layer for any future sustainable strategy in the Mediterranean basin by: (i) providing a summary of the effects of marine gas and oil platforms on the Mediterranean marine ecosystem, (ii) describing the best known affected components on which the biggest monitoring efforts have been focused, and (iii) strengthening the science-policy nexus by offering a credible, salient and legitimate knowledge baseline to both public opinion and decision-makers. The map exercise highlights the knowledge gaps that need filling and taking into due consideration before future transnational and cross-border monitoring and management plans and activities can be addressed.

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## 1. Introduction

At the beginning of this century, [Herrick and Sarewitz \(2000\)](#) proposed that the role of science is not to solve political

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**Table 1**  
PICO elements of the research question used to both compose the search strings and drive the selection of studies.

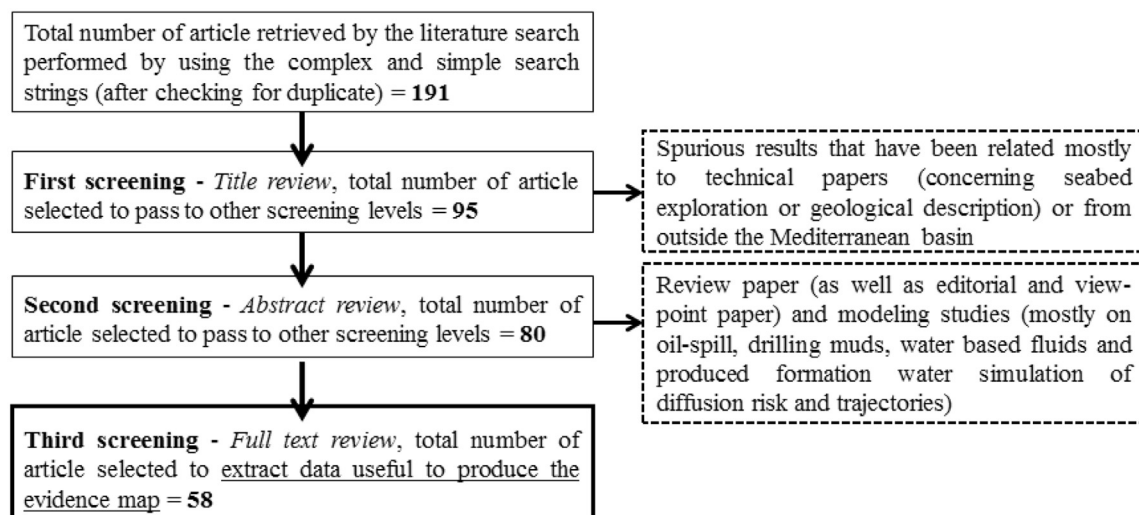
Populations	Intervention	Outcomes	Comparators
Mediterranean marine ecosystem components: abiotic (sediments, drilling muds, water column, water based fluids, produced formation water) and biotic (marine mammals, fish vertebrate, benthic invertebrate, algae, plancton, bacteria)	Oil platform, gas platform, drilling activities, seabed exploration	Measured biological responses on the four main organisation levels: Population (abundance, biomass, non-indigenous species); Community (biodiversity, species richness, Shannon's diversity, community structure, community shift); Individual (size, weight, larval mortality, larval immobilization); Sub-organismal (physiological trauma, bioaccumulation, lysosomal membrane stability, Lipid alteration and accumulation - lipofuscin alteration, survival in air, micronucleus test, benzo(a)pyrene monooxygenase activity, acetylcholinesterase activity, metallothionein content, superoxide dismutase, total oxyradical scavenging capacity, catalase activity, content of malondialdehyde, glutathione reductase, genotoxic alterations, toxicity, genetic diversity, sperm cell test, embryo toxicity test)	Reference sites (control areas), predevelopment baseline (i.e. areas where no oil and gas platforms or drilling activities or seabed exploration occurs)

**Table 2**  
Complex and simple search strings arranged using keywords arranged from PICO elements in Table 1. Notes: the wildcard asterisk (\*) following a search word has been used allowing the search engine to consider and accept the word variations in the search; quotation marks around word indicate the exact word allowed in the search results; as from Fig. 1 the number of records in the library after checking for duplicate, and before performing the screening steps was 191.

Complex search string (search at 25/04/2016)	Scopus "TITLE-ABS-KEY"	ISI WoS "TOPIC"
("petrol" OR "oil" OR "gas") AND ("drill*" OR "exploration" OR "platform") AND ("sea" OR "marine") AND ("biodiversity" OR "diversity" OR "social*" OR "economic*" OR "effect*" OR "impact*" OR "monitor*") AND "Mediterranean"	139	52
Simple search strings (search at 25/04/2016) on Google Scholar and Google		
Gas platform AND biodiversity AND Mediterranean		
Gas platform AND effects AND Mediterranean		
Oil platform AND biodiversity AND Mediterranean		
Oil platform AND effects AND Mediterranean		

controversy, but to provide a reliable and objective support tool to aid the process of informing public opinion and policy decision-making. In many cases, however, this contradicts the traditional and most widely used approach, where decisions on technical issues are made by technical expert groups and scientists only, excluding the public from scientific and technical assessments. The distance between experts, scientists and the general public, and the consequent disruption to knowledge flows, often stems from the

usage of different languages and communication channels. Most scientific documents (e.g. peer-reviewed papers, Annual Agency reports, Technical Assistance reports, etc.) routinely produced to assess the impacts of human actions on the environment and biodiversity (viz. Fishery, aquaculture, drilling platforms or wind farms) as well as sustainability policy protocols and programme reports often remain never read (Fisher et al., 2014). Nor are they downloaded from the official databases (e.g. the World Bank case



**Fig. 1.** Schematic diagram of article selection through the three screening steps – Title, Abstract and Full text.

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