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Scraping the bottom of the barrel: What are the risks?



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In my first editorial of two months ago, I highlighted the reasons why Hydrolink must increase the number of articles devoted to up-to-date news regarding different aspects of research and engineering in hydraulics, hydrology, fluid mechanics and water engineering, focusing on world news. Unfortunately the latest news which has recently appeared in newspapers and magazines and has been broadcasted on radio and television has been devoted to the disaster in the Gulf of Mexico. A oil well blow has created an environmental catastrophe. An oil slick has formed on the sea surface growing daily and drifting inexorably towards the coast of Louisiana, which had already been devastated by hurricane Katrina some years ago.

At the time of writing, the latest news was that after days of reporting failures, BP had made some progress in containing the ruptured oil well, being able to sever a damaged riser pipe. The success, however, was tempered by the grim reality that oil could continue gushing into the Gulf of Mexico at least until August, when BP hopes to have a relief well in place.

The leak will most likely cost BP billions. The USA National Oceanic and Atmospheric Administration (NOAA) has banned fishing in much of the Gulf and the oil had made its way to within miles of Louisiana shrimpers' home on the Mississippi delta. Oil is toxic to fish, shrimp and oysters and shorebirds that come into contact with the crude oil can end up smothered.

The damage will be measured in environmental and economic costs and it could even be political. Not just because President Obama's administration will surely be judged on its response to this new Louisiana disaster, but mainly because the USA President announced support for expanded offshore drilling as part of his energy policy.

The disaster in the Gulf of Mexico could rival those major incidents in the past (such as that of the Exxon Valdez in 1989, with an oil spilling of 41.3 million L, and the Santa Barbara, California, with an oil spilling of 15.9 million L). Many other disasters of this type have happened and, unfortunately, continue to happen around the world.

But the accident could at last improve the impetus to craft an energy policy that must be smart, pragmatic and green. It imposes many questions since steadily increasing oil and gas exploration and production from deepwater locations (water depths in excess of 300 m) are present in several other regions around the world, for example the North Sea, off shore West Africa, and off shore Brazil, which therefore are threatened by a disaster similar to that in the Gulf of Mexico.

The scientific community believe that soon the peak of oil production will be reached. The best scientific estimates show that

this peak will occur between 2010 and 2020. In any case, it is difficult to have accurate estimates on this point. In fact, even if oil reserves are twice or triple the value which they are estimated to be, this will not have any practical relevance since the worldwide economic crises (also due to worldwide imbalance, like global warming, the exhaustion of fossil energy resources, overexploitation of other resources) mainly depends on the grim awareness that this peak exists, not on when it will appear. In other words the strategies and ideologies of the recent past implied the hypothesis that fossil energy was endless and growth was unlimited. Now our scenario is like that of the period when humanity realized that our planet is not flat nor infinite. In any case, while hoping that new energy sources may one day completely replace fossil fuels, all oil companies are "scraping the bottom of the barrel" with deeper and more environmentally dangerous offshore drilling. In 2007 it was estimated that the production from installations deeper than 800 m was about 70% of the total production. The oil industry plans to extend the exploration and production to as deep as 3000 m allowing the potential for an oil/gas spill to increase. But, as the recent disaster in the Gulf of Mexico has shown, concerns from a deepwater oil/gas spill should be taken into account.

In other words we must consider the matter from every angle.

The pressing questions linked to the before mentioned problems surely involve our hydraulic scientific and engineering community. In fact, for example, an environmental concern is whether oil will surface and if so, where, when, and what the oil slick thickness will be. To meet these new challenges, spill response plans need to be upgraded. An important component of such a plan would be models able to simulate the behaviour of oil and gasses, if accidentally released, in deepwater. On this interesting topic this issue of Hydrolink presents an article by Prof. Poojitha D.Yapa, expert of oil spilling modelling, and advisor to NOAA on deep oil spill.

The pressing questions are of interest for all branches of environmental engineering. In fact, in order to contain the spill the oil can be corralled and ignited (but this is a smoky solution that is viable only in calm water and light wind), or floating barriers could be laid to surround and redirect surface oil, or chemicals could be applied on the surface and directly at the leak site to break up slicks (but the dispersants can be toxic for wildlife). We must remember that the topic of oil spilling is one of many in a wide branch of hydro-environmental engineering and in order to solve these problems there is still much work to do for hydraulic engineers and scientists. We asked prof. Heidi Nepf of MIT for her opinions and our article "10 questions to..." will reveal her thoughts on this intricate situation.