Beyond the Macondo Oil Disaster

The significance and consequences of the Macondo well spill must be analyzed in light of the geological moment of conventional oil resources in non-OPEC countries, whose production has stopped growing. This is leading to the acceleration of non-conventional production, including deepwater oil development. Moving into waters over seven kilometers deep not only creates all the possibilities for causing spills, with their adverse environmental consequences, but also implies high production and other costs, derived from a series of non-quantifiable externalities that it will take decades for the environment to heal, if those habitats are recoverable at all.

The competition for the world's remaining oil reserves not only instigates military strategies to ensure future supply for the powerful nations. Diplomatic differences are daily occurrences, and the Macondo spill produced several in bilateral U.S.-Great Britain relations, which had to be overcome so the historic "special relationship" between these two powers could prevail. This difference revealed that the implications of an oil spill can touch, among others, the most important actors on the international stage, like nation-states. Oil corporations, with their characteristic productive de-territorialization, have economic power, since their financial circumstances can have an impact not only on the nation of origin, but also on the economy of the countries where they operate.

Finally, the possibility of oil spills touches Mexico because of its incursion into offshore areas and its expectations of developing Gulf of Mexico deepwater resources. Given a scenario of oil spills, this could leave the country up in the air because of the costs and legal suits it would have to face. This shows the need for preventive regulation using different approaches and measures by the bodies involved; but it also brings up central issues for the nation's future, like the country's continuing to force its productive capacity to maintain the rhythm of exports; the very strategy of moving into deep waters, given that there is no evidence of proven reserves; and the insistence on maintaining the fossil-fuel-based energy paradigm in order to guarantee capitalist accumulation.

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Hidden Costs for the Oil Industry The Macondo Spill

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According to 2008 International Energy Agency (IEA) data, fossil fuels make up 81.3 percent of the world's total primary fuel.[1] Most of the oil is used in internal combustion engines for transport; the rest is used to generate electricity and for petrochemicals. Half the coal goes into generating electricity and the rest, to different industrial and domestic uses. Gas is increasing utilized to generate electricity, rising from 12.1 percent of electricity generation in 1973 to 21.3 percent in 2008. Practically equal amounts are used in industry, commerce, and homes. This implies that, generally speaking, fossil fuels are used three major ways: to generate caloric energy, electrical energy, and in internal combustion engines.

It is important to remember that the rate of extracting and burning oil has led us to what is called "peak oil," the highest point of production. Marion King Hubbert estimated that the world peak would come between 1990 and 2000. However, much of the data about oil wells that he used in his analysis was not completely precise and, in addition, since that time, extraction technology has made it possible to slightly increase proven crude reserves.[2] Colin J. Cambell, another oil geologist, updated the estimates and fixed a world peak between 2008 and 2010.[3] Kenneth Deffeyes also talks of a peak between 2003 and 2009, while L. F. Ivanhoe, the founder of the Hubbert Center for Petroleum Supply Studies, agrees that the peak was reached between 2000 and 2010.[4] Others, like geologist Thomas Magoon of the US Geology Survey (USGS) and the *Oil & Gas Journal*, are relatively more optimistic and speak of a range from 2003 to 2020.[5]

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To this must be added the IEA estimates predicting a 57-percent hike in energy consumption from 2004 to 2030. This will complicate the future even more by the fact that consumption is already unequal: calculations put per capita consumption in high-income countries at 21 times the levels of low-income countries. In addition, some world figures indicate that 2.4 billion people use traditional biomass, like, for example, wood, for cooking, while 1.6 billion have no access to electricity.[6] That is, half the world's population is practically excluded from the supposed "benefits of modernity." Therefore, when we talk about intensive energy consumption patterns, to a great extent, we are referring to the practices of a fraction of the world's population: the middle and upper classes.

Prevailing Energy Patterns And Their Social-environmental Impacts The Case of Oil

One of the weightiest arguments in favor of the fossil fuel model versus the development of "sustainable" energy is that oil, coal, and gas continue to be the cheapest sources of energy.[7] Nevertheless, this argument is rooted in a very peculiar system of accounting.

Regardless of the fact that we are talking about a limited form of energy —fossil fuel is presented as a stock, not a flow, in contrast to solar energy— the fact is that included in the cost not only of fossil energy, but of maintaining the fossil energy model *in toto*, is a broad spectrum of "hidden externalities" that are not taken into account and that, if they were, would make it expensive not only financially, but also socially and ecologically. To this, we must add the negative argument that the subsidies granted (about US$200 billion a year)[8] and the security costs involved in guaranteeing and maintaining the constant flow of fossil fuels to the biggest consumers come to an estimated cost of at least 25 percent of the world's total defense expenditures.[9]

These hidden costs can be identified throughout the production-circulation-consumption process (in the case of oil, from exploration, drilling, and extraction to transportation, refining, and burning). Just to show some important aspects, it should be pointed out that exploration does not take into account changes in the ecosystems immediately surrounding drilling sites due both to equipment and machinery movement and the explosions themselves. The impact is considerable, given that once potential oil areas have been identified, their existence has to be proven by drilling test wells. Once the fuel is found, drilling increases from between 10 and 30 wells per platform, with a 40-percent chance of failure.[10]

Large amounts of explosives are used in drilling, plus the subsequent construction of oil platforms. The process pollutes, changes, and fragments ecosystems, which can be even worse because it is common to find underground deposits of radioactive materials in their natural state. The frequency with which these materials are brought to the surface and the scant monitoring of those operations have clearly shown that the risks can be very high, since even low levels of radiation can have mutagenic impacts on biodiversity.[11]

Among other kinds of environmental impacts, the extraction of oil uses massive amounts of water and generates large amounts of waste with diverse ecological impacts because of the heavy metals and toxic compounds it includes, like mercury and volatile aromatic hydrocarbons, among others. On an average, estimates put the volume of mud waste for onshore oil production at from 270 000 to slightly under a million and a half liters a day. For maritime platforms, the volume of waste water is almost 2 million liters a day.[12] So, while the mud is usually poured back onto the land and the waste waters are partially treated, the maritime waste water is almost all dumped directly into the ocean. Thus, reserves of underground and surface water, as well as biodiversity, are affected by dumping on land, at the same time that waste water dumped into the ocean can be swept hundreds of kilometers away by marine currents, harming ecosystems in their path. To this must be added the risk of explosions, spills, and fires caused as part of day-to-day oil well operations, the transfer of crude from one facility to another, human error, etc.

Also, greenhouse gases and other atmospheric contaminants generated by extraction, transport, and refining crude

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oil should be included in the calculation. It is estimated that the burning of natural gas associated with the extraction process alone, a cheap and very common practice, releases about 35 million tons of carbon dioxide and 12 million tons of methane into the atmosphere. In addition, extraction and transportation bring with them the permanent risk of spills of differing degrees of seriousness and socio-environmental impact; this risk is not just a possibility, but a constant occurrence in this industry.

Big-scale spills (more than 10 million gallons) have occurred almost every year since the 1960s; however, analysts think that although smaller spills get less public attention, when added up, they may represent a much higher amount of oil released into the environment than the big ones.[13] As we will see further along, the impacts are enormous, and even greater in aquatic ecosystems given the lower density of oil to water, which means that a ton of crude spilled typically covers about 12 square kilometers of water.

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Burning oil generates a series of contaminants that, as is well known, have been the main contributing factor for global warming. Six main elements contaminate the air: volatile organic compounds (generated by the combustion of fossil fuels); sulfur dioxide, produced by burning coal; carbon dioxide; 10-micron or smaller particles (smoke, dust, steam, etc., the product, above all, of burning diesel); 2.5 micron or small particles, or PM2.5, similar to the 10-micron particles, but more damaging for human health, above all lung tissue; and tetraethyl lead additives usually used to improve gasoline efficiency.

The short- and medium-term impacts of these contaminants (or smog) include contamination of vegetation; filtration to water tables, and from there to the rest of the food chain; acid rain; and different diseases such as asthma, cardiovascular problems, cancer, irritation; allergies, etc. The long-term, or "indirect" impacts are essentially linked to the implications of global warming.[14]

The Macondo Spill in the Gulf of Mexico

As already mentioned, far from being occasional, oil spills are systematic. The Macondo well case is only one of the most recent large-scale socio-environmental disasters produced by the oil industry. The volume of oil spilled went from about 800 barrels a day at the time of the accident to 25,000 barrels daily in just a few days. The US Flow Rate Technical Group (FRTG) estimated that, from April 20 to August 5, 2010, the entire spill totaled about 4.9 million barrels, that is, one and a half times the amount spilled after the Mexican Ixtoc I well accident in 1979.[15]

Deepwater oil operations —of the kind the Mexican government is betting on today— were clearly high risk. This is due not only to the depth and the pressures they entail, but also because they were in an area with a high incidence of hurricanes and tropical meteorological phenomena and, once again, they were being carried out relatively near an important coastal area with biologically diverse marine life.

The location of the oil project *vis-à-vis* the U.S. Continental Shelf, about 66 kilometers from the coast of Louisiana, was a factor that increased the spill's socio-environmental impact and visibility, given that it spread rapidly along the coast of Louisiana, Mississippi, Alabama, and part of Florida, at least to Panama City.[16] It also expanded to inland waters.

To "handle" the spill, 17 percent was pumped, 8 percent was burned, and 8 percent was chemically dispersed. For the last procedure, clearly designed to partially hide the impact, BP used the dispersal agent Corexit 9500 and 9527.[17] While there was no longer a discernable oil slick on the surface after August 2010, the oil is still there: it is estimated that it remains for a while suspended in small globules (a form that if ingested, can bio-accumulate in animal tissues, causing different kinds of damage). The substances would then be deposited on the ocean floor with largely still-unforeseen results derived not only from the presence of the crude oil itself, but also because the chemical used creates a toxic environment with deadly effects for sensitive species and possible carcinogenic damage in these and others.

Naturally, the impacts will depend on the degree of exposure the species have both to the oil and the dispersal agent, their relations of interdependence, and their capacity for movement. But the ecosystems as such will take decades to recover, if they are actually able to recover completely at all.

Along these same lines, it is noteworthy that the dispersal agents used were, strictly speaking, experimental. The man-

ufacturer itself, Nalco Holdings, related to BP through interlocking boards of directors, recognizes that it has not done toxicity studies, but, despite that, assures the public that the damage to human health is moderate or low.[18] Even though it knew this, the compound was used in indiscriminate amounts despite its not being the best, but the cheapest option. Thus, between 7 and 8 million liters of Corexit were poured into the gulf, a little more than half on the water's surface and the rest injected underwater.

This action has effectively made it possible to keep the environmental impacts imperceptible to the naked eye, but that does not mean they do not exist. Particularly worrying are the effects that will be noticeable in the medium and longer terms and for that very reason, will be difficult to associate with the spill. So, it should also be taken into account that the "management" of the accident only covered one-third of the oil spilled. Estimates put the rest of it along the coasts in the form of balls of tar buried in the sand, in sediments, or floating on the surface of the ocean (26 percent); another 25 percent has already evaporated or dissolved; and 16 percent has dispersed naturally. Therefore, the real size of the damage has yet to be seen.

In any case, the immediately visible costs are diverse. One example is the negative effects on 445 species of fish, 134 species of birds, 45 species of mammals, and 32 species of reptiles and amphibians, many in danger of extinction, like the Atlantic Ridley sea turtle. That, plus the damage to more than 160 kilometers of coastline, including Louisiana wetlands and swamps and the Mississippi Delta, may be the most illustrative cases. This has also affected productive activities related to fishing and marine cultivation, which supply 40 percent of the seafood consumed in the United States. Other damage can be added, like the aforementioned burning of oil and the consequent emission of toxic smoke.

All of this means the costs are high, although for now they are not all visible and measurable. In November the Norwegian publication *Upstream* put the cost at US$32.2 billion.[19] This includes containment operations, drilling the auxiliary well, sealing the well, reparations actually paid out, among other items. Neither the value of the loss of biodiversity nor the effects on entire ecosystems in the short, medium and long terms have been taken into account. In addition, that calculation process becomes complicated since the value of biodiversity is often incommensurable, exactly the reason why, from an ecological economics point of view, the measurement cannot always solely be made in economic terms.

It is at least a matter for controversy that, in the face of these kinds of hidden costs, the U.S. Department of the Interior Mineral Management Service adopted in 2005 a series of regulations based on the idea that it is the oil companies themselves that are best equipped to evaluate their environmental impact. It is a political measure that in concrete terms is weak since the oil industry and its lobby are so strong that their priority continues to be business above everything else, even sustaining life itself.

> Although smaller spills get less public attention, when added up, they may represent a much higher amount of oil released into the environment than the big ones.

Climate Change, a Reflection Of The Long-Term Hidden Costs Of the Current Energy Model

Worldwide, the largest source of greenhouse gas emissions is burning fossil fuels to generate electricity and heating (24.6 percent) and in transportation (13.5 percent). Changes in land use (18.2 percent), agriculture (13.5 percent), and industry (10.4 percent) are the next largest, although agriculture and some industrial processes are the ones that emit the most methane.[20]

The effects of this dynamic are multiple and anthropogenic global warming is one of the most visible symptoms. A product above all of the indiscriminate burning of fossil fuels, the amount of carbon in the atmosphere, which had remained constant for the last 10 000 years at about 28 parts per million (ppm), rose to 360 ppm in 1998 and 391 ppm by early 2011. Climate change specialists consider the last figure to be the tipping point into dangerous territory in terms of the size and irreversibility of the impacts.

The polarization of responsibility percentage-wise in the destruction of the environment is clear: historically speaking, the 20 percent of the population who mostly live in the metropolitan (or rich) countries have generated 90 percent of all GHG.[21]

The long-term impacts of solely the accumulation of atmospheric contaminants are essentially linked to the increase in temperature and sea levels, the spike in extreme climatic events, the change in rainfall patterns, and the growing loss of biodiversity.

Thus, in the face of the expected impacts of climate change, it is widely accepted that the countries that will pay the highest costs will be those whose GHG emissions are small. To a great extent, those costs will be linked to current risks (floods, storms, water scarcity, etc.) that will become greater. To this must be added problems of food production and other atypical ones. This makes it imperative not only to take measures to improve or adapt infrastructure, for which energy is key, but also to design a broad agenda of mitigating actions including revising the entire energy-material cycle of production, distribution, consumption, and also waste.

Climate change makes it necessary, then, to seriously rethink how and with what goals in mind the territorial space is constructed and, therefore, how development is conceived.

Final Thoughts
Rethinking Development as The Basis for Changing the Paradigm

Typically, people believe that development is based on economic growth, or what is even worse, that development is synonymous with economic growth. This leads, sooner or later, to socio-environmental debacle given that economic growth necessarily requires the transformation of nature. For Georgescue-Roegen, the dilemma is clear: "We need no elaborated argument to see that the maximum of life quantity requires the minimum rate of natural resources depletion….Any use of the natural resources for the satisfaction of nonvital needs means a smaller quantity of life in the future."[22]

> We have to wager on a transition from the prevailing energy paradigm toward one that would be increasingly supported by flows and not stocks of energy. We must bet on alternative sources.

In this sense, rethinking development is key for constructing alternatives for life. First off, de-linking it from economic growth is fundamental to be able to associate it to sustainable biophysical degrowth, understood as an equitable reduction of production and consumption that would increase human well-being and improve ecological conditions locally and globally in the short, medium, and long term. But sustainable degrowth and kinds of development can and should adopt different forms, with their common central purpose: to be constructed in harmony with nature and from the perspective of the lives of each and every one of the world's individuals (this, from the standpoint of the unity of human beings and nature); that takes into account the complexity of the contexts of each space or region; and that takes advantage of and preserves diversity and the wealth of existing cultures and knowledge.

To a great extent, this implies not only avoiding profligate consumption, but also changing the entire process and forms of production, circulation, and consumption that externalize environmental costs, mortgaging the future to serve the present. For the specific case of the peripheral countries, like those of Latin America, it will be essential to seek ways to deal with the urgent social needs that will initially require an increase in energy-matter flow, but generated on the basis of a different perspective and modality and for a different end, that is, other forms of development. This means that development be linked to a good way of life, a notion that will vary for each society, but that in any of its forms involves not only the material, but also the emotional, the intellectual, and the spiritual.

The design of different modalities of development must take as its starting point the recognition of the notion of socio-environmental justice; avoiding ecological debt and socio-ecologically unequal trade; decreasing ecological conflicts based on distribution and increasing the quality of life; as well as recognizing non-chrematistic values and reciprocal, non-mercantilist services.[23]

Specifically in terms of energy, we have to wager on a transition from the prevailing energy paradigm toward one that would be increasingly supported by flows and not stocks of energy. Betting on alternative energies that would be less aggressive to the environment in its entire life cycle or *in toto* will not be viable if it is not accompanied by a decrease in energy consumption patterns and decentralized, fair access to energy. The transition process will require a great deal of energy, and most of that will initially be from fossil fuels. In that context, the current waste is at least doubly questionable. At this point, it should already be very clear for humankind that sustained economic growth cannot be maintained infinitely on a finite planet. The construction of a new social imaginary on issues like development and the meaning of life itself is, then, more and more an imperative. VM

Notes

[1] International Energy Agency, *Key World Energy Statistics 2010* (Paris: IEA, 2010).

[2] Marion King Hubbert was a geologist who worked for decades for Shell Oil. He was the first to calculate the point of decline or peak in U.S. and world oil production. His calculations for the United States were correct. See Marion King Hubbert, *Energy Resources: A Report to the Committee on Natural Resources* (Washington, D.C.: National Academy of Sciences/ National Research Council, 1962) and www.peakoil.net.

[3] Colin Cambell, *The Coming Oil Crisis* (Brentwood, Essex, U. K.: Multi-Science and Petroconsultants, 1997), and Gian Carlo Delgado Ramos, *Sin energía. Retos y resistencias al cambio de paradigma* (Mexico City: Plaza y Valdés, 2009), p. 13.

[4] For more about these scientists' estimates, see Kenneth Deffeyes, *Hubbert's Peak: The Impending World Oil Shortage* (Princeton: Princeton University Press, 2001), and L. F. Ivanhoe, "Time Is No Longer on Our Side," *Oil & Gas Journal* 85, September 7, 1987, pp. 70-71 and "Future World Oil Supplies: There Is a Finite Limit," *World Oil* 216, October 1995, pp. 77-88.

[5] Richard Heinberg, *The Party's Over. Oil, War and the Fate of Industrial Societies* (Gabriola Island, British Colombia: New Society Publishers, 2003), p. 113.

[6] Bank Information Center, /Bretton Woods Project/Campagna per la Riforma della Banca Mondiale/CEE Bankwatch Network/Friends of the Earth-International/Institute for Policy Studies/International Rivers Network/Oil Change International/Urgewald, "How the World Bank's Energy Framework Sells the Climate and Poor People Short," September 2006, p. 21.

[7] Nuclear energy should not be considered "sustainable" as the nuclear-electric industry has advertised.

[8] Dinyar Godrej, *No-Nonsense Guide to Climate Change* (Oxford, U.K.: Verso, 2001), p.134.

[9] Dale W. Steffes, "A Proposed World Oil Stability Policy," *The World Oil & Gas Industries in the 21st Century: Conference Proceedings of the 16th Annual North American Conference of the IAEE* (Dallas, Texas: IAEE, 1994), pp. 20-29.

[10] Paul R. Epstein and Jesse Selber, eds., *Oil. A Life Cycle Analysis of Its Health and Environmental Impacts* (Cambridge, Massachusetts: The Center for Health and the Global Environment-Harvard Medical School, 2002), p. 9.

[11] Mutagenic changes are those that cause genetic changes or mutations in living organisms. They are usually the product of exposure to radiation or toxic substances. Ibid., p. 11.

[12] Ibid., p. 25.

[13] Ibid., pp. 20-21.

[14] See the most recent report of the Intergovernmental Panel on Climate Change (IPCC): R.K. Pachauri and A. Reisinger, eds., IPCC *Fourth Assessment Report: Climate Change 2007* (Geneva), www.ipcc.ch/publications _and_data/publications_and_data_reports.shtml.

[15] See the report at www.doi.gov/deepwaterhorizon/loader.cfm?csModule =security/getfile&PageID=33972.

[16] For a modeling of the spill, see www.nytimes.com/interactive/2010/05/01/ us/20100501-oil-spill-tracker.html.

[17] Corexit 9500 contains sorbitan, butanidioic acid, and oil distillates. Corexit 9527, for its part, is produced with 2-butoxyethanol and an organic compound with a low concentration of propylene glycol.

[18] See www.lmrk.org/corexit_9500_uscueg.539287.pdf and www.doh.state. fl.us/chd/bay/Documents/Oilspill/Master_EC9527A_MSDS_539295. pdf.

[19] See *Upstream,* http://www.upstreamonline.com/live/article235210.ece ?mobile=&lots=SITE.

[20] Kevin Baumert, Timothy Herzog, and Jonathan Pershing, Navigating the Numbers. *Green Gas Data and International Climate Policy* (Washington, D.C.: World Resources Institute, 2005).

[21] Dinyar Godrej, op. cit., p. 95.

[22] Nicholas Georgescu-Roegen, *The Entropy Law and the Economic Process* (Cambridge, Massachusetts: Harvard University Press, 1971), p. 21.

[23] Chrematistic values pertain to money or comerce; non-chrematistic values can be tradicional, cultural, historical values, etc.