In making disaster plans, we have to imagine the worst case: Robert R.M. Verchick

Published: Thursday, April 28, 2011, 8:37 AM

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How should government plan for the worst-case scenario? A year after the BP blowout, which claimed 11 lives and spewed nearly 5 million barrels of oil into the Gulf of Mexico, the question is more than academic.

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Oil skimmers try to clean up oil released from the Macondo well last April.

Nor is it limited to that event. Earlier this month 12 people were killed and 200 injured when an explosion ripped through a metro station in Belarus during rush hour. A week before, Southwest Airlines passengers watched in horror as a chunk of their plane's roofing tore away from the fuselage, forcing an emergency (and, thankfully, safe) landing.

Did I mention that Japan's Fukushima Daiichi nuclear power plant, crippled by last month's tsunami, is still streaming radioactive iodide into the air?

The truth is that even with the events of 9/11 and Hurricane Katrina in our recent past, we are still not paying enough attention to catastrophic threats. And when we do, we go about it the wrong way. Low-probability, high-impact events -- sometimes called "black swans" -- are notoriously hard to plan for.

Policy makers are used to managing threats to safety or the environment according to a loose formula in which risk is the product of an event's probability multiplied by its potential harm. This equation helps government set priorities. The probability-impact relationship informs a wide array of government standards, from the quality of your drinking water to the wattage in your car's headlights.

But what if you don't know the probability of an event or the full dimensions of its impact? If that formula is your only decision-making tool, a black swan will eat you for lunch.

Estimating the probability of a worst case is often impossible because they occur so rarely. Our measurements of hurricanes in the Gulf go back only a few decades; and climate change will likely

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alter those trends. Before last year, a catastrophic blowout in the Gulf had never occurred.

Even when you can ballpark a low probability, psychologists note that people underestimate the significance. We're pretty good at comparing, say, a 50 percent risk to a 25 percent risk. But when risks fall below 1 percent, we stare at our shoes and reduce all likelihood to zero. That's why you probably don't think much about a major earthquake striking Manhattan or a tsunami battering the Oregon coast, even though each has happened and will probably happen again.

Experts fall prey to this bias, as well. While assessing flood-control measures before Katrina, scientists used storm models that intentionally left out data from two previous hurricanes on the theory that their force was atypical. When officials at BP performed analyses before beginning operations in the Gulf, they similarly down played the threat of undersea blowouts on the grounds that they were unlikely.

In addition, because black swans come in so many shapes and sizes, it is hard to imagine their full impact beforehand or to predict how the next one will be triggered. Too often we look only behind us, preparing ourselves for the last disaster. We imagine we can avoid our problems with narrow fixes. Worried about leaking tankers off the Alaska coast? Require double-hulled vessels. Terrorists with shoe bombs? Slide your heels and loafers through a scanner. Sonar shut-off valves for blowout preventers sound like a good idea and will probably come next. But we need more.

The way out of this quandary is to supplement standard risk management strategies with a robust array of planning and economic initiatives designed to reduce vulnerability and increase resilience on a broad scale, doing as much as is reasonably affordable and preferring options that provide multiple benefits. Such a strategy would present risk categories from a holistic perspective. It would educate policy makers and the public about a range of plausible worse cases and work toward acceptable resolutions. In addition to asking, "What would make this oil rig safer?" we would ask, "What would make us less vulnerable to the risk of blowouts and more resilient afterwards?"

In addition to oil rig safety, the answer might include a host of other concerns like strengthening deep-sea fisheries and shoreline ecosystems, developing contingency plans for native tribes that rely on fish, diversifying coastal economies and diversifying our sources of energy production.

Planning for resilience is like eating a healthy diet. You don't eat right only to avoid colon cancer; you eat right because it makes your body stronger, more vital and less vulnerable to risks of all kinds. No one can say what the next black swan will look like. All we know is that it's coming.

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Pre-K, the Corps of Engineers used a 1959 definition as a worst-case hurricane model for building the hurricane surge protection. In 1965, Congress ordered the Corps to build civil works to protect New Orleans and vicinity from the worst storms characteristic of the region.