NEWS LETTER - The Great East Japan Earthquake, 5 years later

Amsterdam, March11, 2016

Dear all,

March 11, 2011 was a dark day for Japan – and the world. At 14:46 the most powerful earthquake ever recorded in Japan (and the fourth most powerful earthquake in the world since modern record-keeping began in 1900) hit Japan. The Great East Japan Earthquake triggered powerful tsunami waves that reached heights of an estimated 39 meters in Miyako in Tōhoku's Iwate prefecture and which travelled in the Sendai area up to 10 km inland. The earthquake moved the main island Honshu 2.4 m east. 400 km of Japan's northern Honshu coastline dropped by 0.6 meters and the earth shifted on its axis between 10 cm and 25 cm. The temblor also shortened the length of a day by about a microsecond.
On that very day I was in Tokyo and without exaggeration: March 11, 2011 has been one of the most memorable days in my life.

This weekly issue with news on and from Japan will be about this earthquake, the tsunami that followed and that crippled reactor units 1-4 of the Fukushima Daiichi nuclear power plant. It will tell you about the loss of lives in Tohoku prefecture, the economic damage as a result of the tsunami, the history of nuclear energy in Japan but also about the seismicity of Japan. It will show you images of the Tohoku region, then and now. To begin with, I would like to share with you some personal experiences on that dramatic day of March 11, 2011.

March 11, 2011

That day, Friday March 11, 2011, started off as a splendid day. Although it was still winter and the temperature being moderate in the morning, it became true springtime during the day.
Everybody who has lived in Japan for an extended period, like me, is aware that earthquakes can happen any given day, any given moment. The previous days there had been frequent earthquakes but simply stated: no one had taken these warning shots seriously.
At 13:00 I visited, with two colleagues of our Tokyo office a small listed company, Something Holdings Co., Ltd. (TS 1408), specialized in Ground Improvement for housing foundation, and operational support for foundation- and earthquake related activities. The management's question to us was simple: in what way could we help boost the share price. Perhaps by inviting a non-Japanese company as external investor? "Let's think about it and propose a plan" were our words on leaving the company. 30 minutes later the earthquake hit (and the share price tripled the following Monday.)

As soon as the earth started trembling, we were out in the middle of the street: this is supposed to be the safest place as the danger might come from above (falling roof tiles, glass windows, siding.) Nothing fell down; Tokyo buildings are too well prepared for "the big one". However, walking on the street felt like walking on a waterbed. For more than four minutes. Then I noticed office workers descending emergency stairways, disciplined, most of them wearing a yellow helmet.
Trains stopped running, there was no subway, no taxis, mobile networks halted.
It took us two hours to walk from Kayabacho to Hotel Okura Tokyo where the lobby had turned into a frenetic place with dozens of TV's reporting on the earthquake, the tsunami and the many aftershocks from all corners of the country. The Okura showed its most generous face: beds were provided for stranded businessmen, travellers, tourists. Strangers became friends, all sharing the horror of what we saw on the televisions, while experiencing ourselves numerous aftershocks. It was a very memorable day indeed.

Earthquakes in Japan

Japan is part of the Ring of Fire, an area in the basis of the Pacific Ocean where a large number of earthquakes and volcanic activities occur. In a 40,000 km horseshoe shape, it is associated with a nearly continuous series of oceanic trenches, volcanic arcs and plate movements. The Ring of Fire has 452 volcanoes, 75% of the world's active and dormant volcanoes.
Japan itself has over 100 active volcanoes, more than almost any other country and accounts alone for about 10 % of all active volcanoes in the world. The islands of Japan are primarily the result of several large oceanic movements occurring over hundreds of millions of years as a result of the subduction of the Philippine Sea Plate beneath the continental Amurian Plate and Okinawa to the south, and subduction of the Pacific Plate under the Okhotsk to the north.
Originally Japan was attached to the eastern coast of the Eurasian continent. The subducting plates, being deeper than the Eurasian plate, pulled Japan eastward, opening the Sea of Japan around 15 million years ago.
The Great Tohoku Earthquake on March 11, 2011 was a sudden movement of the Pacific tectonic plate under the North American plate causing the massive earthquake followed by the tsunami. This link shows you what happened: http://www.nytimes.com/interactive/2011/03/11/world/asia/maps-of-earthquake-and-tsunami-damage-in-japan.html?_r=2&
What is amazing, is the little damage that had been caused to buildings in Japan by this March 11 quake. Why? Japan is considered to be the world leader in engineering earthquake-proof structures. Huge shock absorbers, walls that slide and Teflon foundation pads that isolate buildings from the ground all help explain why medium- and high-rise structures in Japan remained standing. Building procedures are very regulated and strict in Japan. So it wasn't the earthquake, but the tsunami that caused the disastrous fall-out: 15,891 confirmed deaths. Most people died by drowning. More than 2,500 people are still reported missing.
Less than an hour after the earthquake, the first of many tsunami waves hit Japan's coastline. The tsunami waves reached run-up heights (how far the wave surges inland above sea level) of up to 39 meters at Miyako city and travelled inland as far as 10 km in Sendai. The tsunami flooded an area of approximately 561 square kilometers in Japan. 45,700 buildings were destroyed and 144,300 were damaged by the quake and tsunami. Three hundred hospitals with 20 beds or more in Tohoku were damaged by the disaster, with 11 being completely destroyed. The tsunami created an estimated 25 million tons of rubble and debris in Japan. The damage was tens of billions of dollars.

Fukushima Daiichi nuclear reactors and beyond

But apart from the loss of lives, it was the damage to the nuclear reactors in Fukushima Daiichi that shocked the world. The tsunami damaged the cooling systems in reactors 1 – 4 and when radiation levels started to rise, 160,000 people fled from the radiation in Fukushima. In December 2011 the government estimated that managing Fukushima would cost USD 50 billion. By 2014 this had nearly includes 19 billion dollar to decommission the Fukushima plant, 22 billion to decontaminate the surrounding area, 9 billion to build temporary storage facilities for nuclear waste and 43 billion dollar to compensate the victims. Fukushima is now the biggest civil liability case in history. More than two million people have sued TEPCO and 50 billion dollar has already been paid out, according to journalist Makoto Takahashi. Experts predict that the total cost of compensation could rise to USD 120 billion.

Is Japan a good country for nuclear energy? This is not a question that I will answer, but let me share with you a personal experience. In 2000 I visited with my family the largest nuclear power plant in Japan at Kashiwazaki, on the other side of the main island Honshu. The Kashiwazaki Kariwa Nuclear Power plant was the largest nuclear generating station in the world by net electrical power rating. It was by invitation of the management of this plant as my company had worked for one of their suppliers. We had an impressive visit into the heart of the reactor and in the evening we were invited to a large fireworks party at the beach offered by Tepco, while eating fresh fish, straight from the sea and tested by Geiger counter in order to show the safety of the reactor and its cooling systems.
In 2002 I learned that the first reactor in Kashiwazaki was closed, followed by a full closure of all seven reactors in 2003, the reason being the discovery of deliberate falsification of data. In the following years part of the plant was restarted after safety standards for earthquake resistance in Japan's nuclear plants had been modified and tightened in 2006. After the Chuetsu offshore earthquake in 2007 suspicions arose that another fault line may be closer to the plant than originally thought, possibly running straight through the site. Moreover, the 2007 earthquake caused the plant to leak radioactive substances into the air and water. The plant, which has been operating since 1985, was closed until safety checks following the earthquake were completed. The plant was reopened in May 2009. It closed down soon after March 11, 2011.

In 2011 I learned a new word: Genpatsu-shinsai (原発震災), meaning “nuclear power plant earthquake disaster” (from the two words Genpatsu – nuclear power plant – and Shinsai – earthquake disaster). It is a term coined by Japanese professor Katsuhiko Ishibashi of the Research Center for Urban Safety and Security at the university of Kobe in 1997. Genpatsu-shinsai describes the domino effect scenario in which a major earthquake causes a severe accident at a nuclear power plant near a major population centre, resulting in an uncontrollable release of radiation in which the radiation levels make damage control and rescue impossible, and earthquake damage severely impedes the evacuation of the population. Ishibashi envisages that such an event would have a global impact and a 'fatal' effect on Japan, seriously affecting future generations.

Has the Fukushima disaster resulted in a fatal effect on the citizens from the area and beyond? Reports on radiation levels are sometimes contradictory so it may be too early to draw firm conclusions. For farmers and fishermen “Fukushima” has changed their lives considerably as they have difficulty in selling their produce. Five years later almost 100,000 people from Fukushima have yet to return to their homes. And the contamination in Fukushima is not yet confined. For now, Fukushima is bustling with about 7,000 workers to clean up the contaminated rubble, much more than before the disaster and twice as many as two years ago. The town of Iwaki to the south has become a kind of workers’ village. At dawn, vans and buses line up to ferry workers to the plant via staging areas where they don protective white Tyvek suits, radiation monitors and gas masks. Water is perhaps the biggest challenge at Fukushima. Engineers must keep it flowing through the damaged reactor cores to prevent the melted fuel from overheating, and then through miles of plastic pipes to recycle it inside the plant. But because the buildings are damaged, radioactive water leaks out and builds up in the basements. When it rains, more water seeps in. To prevent it from spreading, Tepco pumps out about 720 tons of water from the basements every day, storing it in huge tanks that workers are building. About 1,000 of the tanks have already been filled. But because there are not enough tanks, the plant also releases 2,000 tons of the water into the ocean every week after a process that removes most, but not all, of the radioactive particles.

Tepco says the water poses no danger to people or marine life because radiation levels are low and are further diluted in the ocean. But environmentalists are worried, nearby fishing grounds remain closed and it is a public-relations nightmare for the government.

Other workers are building a mile-long “ice wall” around part of the plant to prevent rain and groundwater from seeping into the basements. The plan is to pump chemicals into the soil to freeze it, but the technique has never been used on such a large scale before. Solid waste is piling up as well. Cleaning streets, houses and playgrounds within the evacuated zone, which stretches some 50 kilometers northwest of the plant site, has generated millions of bags of contaminated topsoil and debris, which also await a final resting place. Almost 800 bags got carried off by typhoon Etau last year, however, and were deposited miles away.

In the last months, three nuclear reactors in different locations have restarted. But last week a court in Japan has ordered Kansai Electric Power to shut down two of its reactors in Takahama, western Japan, one of them already in operation. The Otsu District Court ruling came after complaints by local residents about the safety of the plant. For now, only two other reactors, in Sendai, have been allowed to operate again in Japan under new safety rules.

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There is also, definitely, good news. Five years after the Great East Japan Earthquake and tsunami, many locations have returned to live again. This week various publications (Business Insider, Gizmodo) have compared views on specific locations in the effected region in 2011 and 2016, and they show how much work has been done, by private individuals, companies, government organizations. With a discipline similar to the one shown when I witnessed hundreds of office workers descending the emergency stairs from high-rise buildings on March 11, 1011, sites have been cleared, new buildings have been constructed, schools have opened. Each of them impressive examples of hard work, determination and the hope and believe that things will be better tomorrow. I recommend you to read “Bending Adversity” by Financial Times editor David Pilling.

Epilogue

To finish with a personal experience and lessons learned. On December 16, 2011 I had the honor to open the exhibition “Natural Stories” by photographer Naoya Hatakeyama in Huis Marseille, a Dutch museum for contemporary photography. Hatakeyama was born in Rikuzentakata, a town destroyed by the tsunami and where he lost several relatives. Part of the exhibition showed snapshots that he had taken years before March 11, 2011 and they were sided by new snapshots of the flooded Rikuzentakata. In one of his books Hatakeyama had written about his idea of “nature”. “To fight against the indifference, the unresponsiveness of Nature vis-à-vis man and in order to survive everyday we need to act, even if it is in a one-directional way, in order to give meaning to Nature.”
The day before the opening he guided me through his exhibition and I asked him how he defined “Nature”? There was a silence – and then he answered me, “it is beyond what we can imagine. You even can not say that it is good or bad, or beautiful or ugly”. “Do you include in “Nature” also the non-visual phenomena such as what we cannot see, like gravity and cosmic radiation?” I asked. “Yes”, he answered, “but Nature remains beyond words”. Nature as something that we of course can speak about, but that remains beyond our imagination.

I told him that earlier that year we organized with DUJAT a Dutch – Japanese seminar on new energy, titled: ”Re-thinking Energy”. We invited two astronauts, a Dutch and a Japanese. Both had, independently from each other, the same statement about Nature: when they were in space in their protective space shuttle, they realized “Nature has no mercy”. And they are right: Nature is not only “cherry blossom, the seasons or a beautiful moon over Tokyo”. Nature is also what you find in space: minus 270C, cosmic radiation, an extreme hostile environment for us humans. “This exhibition”, I told him, “including the very moving and sad pictures of your hometown Rikuzentakata shows us that Nature indeed has no mercy, but that the only way to survive is to create a relation with it, to accept Nature as it is and where needed to act, even in a one-directional way.”
March 11, 2011 has taught me to accept nature as it is, but also to see – and appreciate – the way Japanese (and everybody else) has to act every day in order to survive, even if it is in a one-directional way, in order to give meaning to Nature.

Radboud Molijn
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