

# DAWN

## *Fukushima lessons*

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**THE March earthquake and tsunami in Japan have already claimed more than 10,000 lives, and some 17,500 people are still missing.**

This disaster has been compounded by the continuing threat of widespread radioactive contamination from the accidents at four nuclear reactors at the Fukushima-Daiichi site and the pools that contain their still hot, intensely radioactive spent nuclear fuel. Even if the nuclear accident is contained, it carries many lessons for South Asia.

Dependence on nuclear energy in South Asia is growing. India has 20 operating nuclear power reactors, with several more under construction, and plans for a large expansion in the coming decades. Pakistan has two operating nuclear power plants, another almost completed, and plans for many more in the next 20 years. Both countries also have reactors that are part of their nuclear weapons programmes. Bangladesh and Sri Lanka have plans to build their first nuclear power reactors.

The first lesson for South Asian publics and decision-makers is that nuclear establishments underestimate the likelihood and severity of possible accidents. The Fukushima reactors were not prepared to cope with an earthquake and tsunami of the size that took place. A month before the accident, the Fukushima plant was given a permit to operate for another 10 years. The Tokyo Electric Power Company that owns and operates the reactors, the nuclear safety agency in Japan and the Japanese government all convinced themselves the reactors were safe.

This confidence is evident in South Asian nuclear establishments. After the accident in Japan, S.K. Jain, the chairman of India's Nuclear Power Corporation said that in India "We have got total knowledge and design of the seismic activities. Worst seismic events and tsunami have been taken into consideration in our designs." The Japanese nuclear authorities no doubt thought the same way before Fukushima.

Similarly, the Pakistan Atomic Energy Commission said that the safety of its reactors was checked by foreign experts, including those from the World Association of Nuclear Operators. This should reassure no one. The Tokyo Electric Power Company is a member of the World Association of Nuclear Operators.

The second lesson is that extreme natural disasters only make nuclear accidents more likely. The accidents at Chernobyl in the Soviet Union in 1986, at Three Mile Island in the United States in 1979, at Windscale in the United Kingdom in 1957 and at Chalk River in Canada in 1952 were not triggered by natural disasters.

Earthquakes make reactor accidents more likely because they simultaneously affect large parts of the plant. They take out multiple safety systems or create multiple failures. Floods and fire can pose a

threat. It was a fire that caused the blackout in Narora in 1993, India's closest brush with a major nuclear accident.

The third lesson is that nuclear accidents are a result of the nature of nuclear technology. They do not have to result from technological weakness or lack of skilled operators. Japan is a country with immense expertise in nuclear technology. The Chernobyl disaster, Three Mile Island, Windscale and Chalk River accidents all happened in countries with plenty of nuclear expertise.

A fourth lesson is that no reactor design can claim to be totally safe. The Fukushima accident was at a Boiling Water Reactor. The five most serious accidents before Fukushima were in five different reactor designs. Accidents have occurred also at experimental reactors, such as the fast breeder reactors that India's nuclear establishment is investing in.

A fifth lesson is that spending more money on safety cannot stop small failures combining to produce disaster, and may cause new problems. At the Fukushima reactors, many safety systems failed, some for reasons still not understood. To anticipate every possible failure and build backups for backups would make reactors yet more complicated with more things to go wrong, and even more expensive to build.

A sixth lesson is that nuclear reactors and people don't mix. People can cause accidents and accidents affect people. Operator error contributed to the accidents at Chernobyl and Three Mile Island. The Fukushima workers have faced high levels of radiation as they struggle to regain control over the reactors and spent fuel pools. Nearly 200,000 people living within 20km of the Fukushima reactors were evacuated; those living between 20km and 30km away were told to remain indoors to avoid radioactivity. The United States has told its citizens in the area to move at least 80km away from the reactor. Contaminated food and water have been found at distances of 250km. Traces of radiation have arrived on the west coast of the United States, 8,000km across the Pacific Ocean.

In South Asia, there are reactors close to major population centres or rivers that provide water for drinking and agriculture. Pakistan's Karachi Nuclear Power Plant, for example, is located on the coast and is vulnerable to earthquakes and tsunamis. Built over 40 years ago, the reactor was originally far from the city. There are now housing schemes within 20km of the site. Northern Karachi receives a sea breeze that first passes over the nuclear plant. In case of an accident, it is unthinkable that everyone within 80km of the Karachi reactor could be quickly and safely evacuated.

Around the world, people are rethinking nuclear energy. After Fukushima, the German chancellor, Angela Merkel, observed that "when... the apparently impossible becomes possible and the absolutely unlikely reality, then the situation changes". She announced a "measured exit" from reliance on nuclear energy, which means closing Germany's 17 reactors. The longer South Asia waits, the more reactors will be built and the harder it will be to change direction.

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