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Geophysical Risk and Vulnerability: The Population-Hazard Interaction

Genpatsu-Shinsai: Catastrophic Multiple Disaster of Earthquake and Quake-induced Nuclear Accident Anticipated in the Japanese Islands

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The most serious factor of civilized infrastructure that has maximized vulnerability to earthquakes in Japan is a cluster of nuclear power plants distributed all along the coastlines of the world's most earthquake-prone archipelago. At present, 16 commercial nuclear power stations with 52 large-scale reactors are being operated in tiny and densely-populated islands.

The most dangerous nuclear power station is Hama'oka located just above the hypothesized huge fault plane of the impending M8-class Tokai earthquake on the Pacific coast of central Japan. If this earthquake, a nationwide concern and the subject of a special countermeasures act, happens, the seismic disaster will definitely be devastating in a broad area between Tokyo and Nagoya with officially estimated collapsed buildings of more than 200 thousands and with huge tsunami. If this earthquake causes a severe accident to the Hama'oka station with massive leakage of radioactivity outside, then the rescue and restoration works in the earthquake disaster area become impossible, and at the same time, management of the nuclear accident and evacuation of inhabitants from radioactivity are extremely difficult due to the earthquake damages. Therefore, the nuclear accident would be left to expand to the maximum scale and victims of radiation exposure and ordinary earthquake disaster would become numerous. Even a few tens of million inhabitants around Tokyo, nearly 200 km away from Hama'oka, would be forced to evacuate. I call this disaster of earthquake-nuclear complex as <Genpatsu (nuclear power plant)-Shinsai (earthquake disaster)>, which is a totally new type of natural-manmade disaster that the human beings have never encountered. Its final effect will be global as well as a fatal blow to Japan, and affect deeply future generations.

The authorities concerned claim that the aseismic measures of Japanese nuclear power plants are perfect and all plants and related atomic facilities are safe against any kind of earthquake. But, construction of nuclear power plants in Japan was started around the early 1960's, just on the eve of the birth and spread of two basic theory of modern earthquake science, fault model of earthquakes and plate tectonics. Therefore, the official standards of aseismic design of nuclear facilities are oldish and insufficient in view of modern earthquake sciences. Not only Hama'oka but also most other nuclear power stations in Japan seem accident-prone due to large earthquakes, because many are located in seismic gaps with clear active faults or just above subducted oceanic plates where large slab earthquakes may occur. These kinds of scientific matters were not taken into account during planning and construction of plants.

In order to avoid Genpatsu-shinsai we should first face this problem squarely and assess its risk as objectively as possible. I think this serious vulnerability of modern society is not restricted in Japan but should also be a global concern.

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