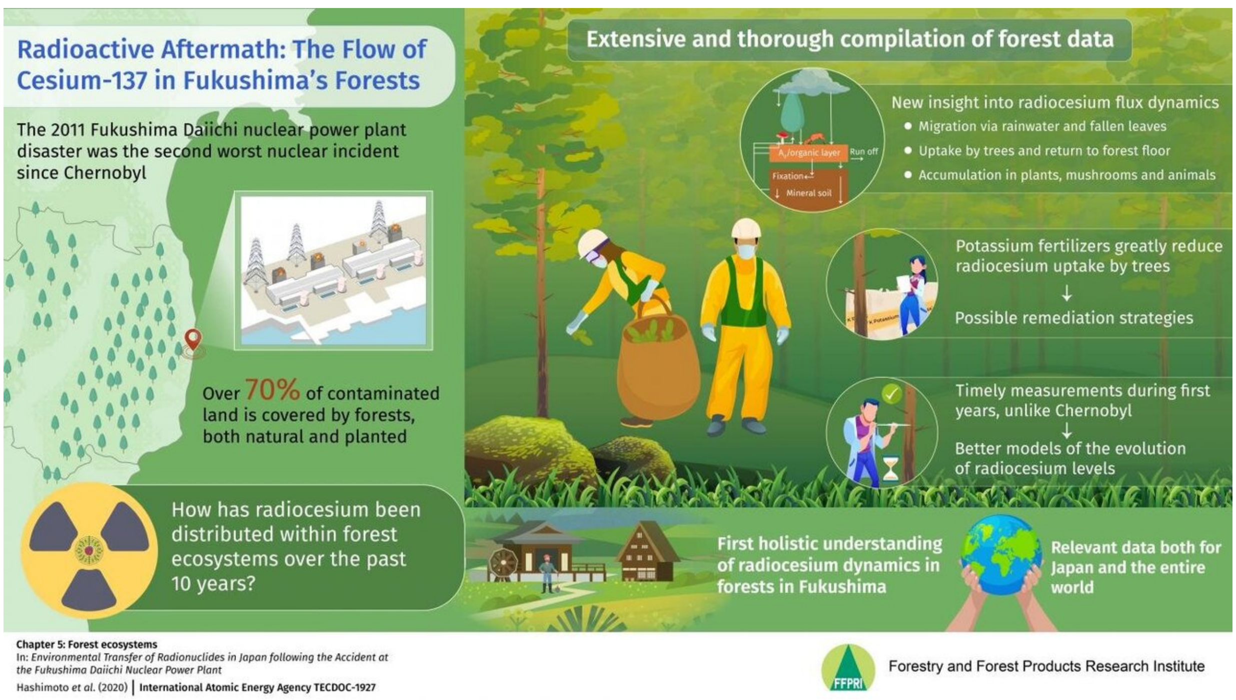
Dynamics of radiocesium in forests after the Fukushima disaster: Concerns and some hope

February 3 2021



Scientists compile available data and analyses on the flow of radionuclides to gain a more holistic understanding Credit: Forestry and Forest Products Research Institute, Japan

After the Chernobyl disaster of 1986, the 2011 Fukushima Daiichi nuclear power plant (FDNPP) disaster was the second worst nuclear incident in history. Its consequences were tremendous for the Japanese people and now, almost a decade later, they can still be felt both there and in the rest of the world. One of the main consequences of the event is the release of large amounts of cesium-137 (137Cs)—a radioactive "isotope" of cesium—into the atmosphere, which spread farther away from the power plant through wind and rainfall.

Considering the massive threat posed by 137Cs to the health of both humans and ecosystems, it is essential to understand how it has distributed and how much of it still lingers. This is why the International Atomic Energy Agency (IAEA) has recently published a technical document on this specific issue. The fifth chapter of this "Technical Document (TECDOC)," titled "Forest ecosystems," contains an extensive review and analysis of existing data on 137Cs levels in Fukushima prefecture's forests following the FDNPP disaster.

The chapter is based on an extensive study led by Assoc. Prof. Shoji Hashimoto from the Forestry and Forestry Products Research Institute, Japan, alongside Dr. Hiroaki Kato from the University of Tsukuba, Japan, Kazuya Nishina from the National Institute of Environmental Studies, Japan, Keiko Tagami from the National Institutes for Quantum and Radiological Science and Technology, Japan, George Shaw from the University of Nottingham, UK, and Yves Thiry from the National Agency for Radioactive Waste Management (ANDRA), France, and several other experts in Japan and Europe.

The main objective of the researchers was to gain a better understanding of the dynamics of 137Cs flow in forests. The process is far from straightforward, as there are multiple elements and variables to consider. First, a portion of 137Cs-containing rainfall is intercepted by trees, some of which is absorbed, and the rest eventually washes down onto the forest floor. There, a fraction of the radiocesium absorbs into forest litter and the remainder flows into the various soil and mineral layers below. Finally, trees, other plants, and mushrooms incorporate 137Cs through their roots and mycelia, respectively, ultimately making it both into edible products harvested from Fukushima and wild animals.

Considering the complexity of 137Cs flux dynamics, a huge number of field surveys and gatherings of varied data had to be conducted, as well as subsequent theoretical and statistical analyses. Fortunately, the response from the government and academia was considerably faster and more thorough after the FDNPP disaster than in the Chernobyl disaster, as Hashimoto explains: "After the Chernobyl accidents, studies were very limited due to the scarce information provided by the Soviet Union. In contrast, the timely studies in Fukushima have allowed us to capture the early phases of 137Cs flow dynamics; this allowed us to provide the first wholistic understanding of this process in forests in Fukushima."

Understanding how long radionuclides like 137Cs can remain in ecosystems and how far they can spread is essential to implement policies to protect people from radiation in Fukushima-sourced food and wood. In addition, the article also explores the effectiveness of using potassium-containing fertilizers to prevent the uptake of 137Cs in plants. "The compilation of data, parameters, and analyses we present in our chapter will be helpful for forest remediation both in Japan and the rest of the world," remarks Hashimoto.

When preventive measures fail, the only remaining option is trying to fix the damage done—in the case of radiation control, this is only possible with a comprehensive understanding of the interplay of factors involved.

In this manner, this new chapter will hopefully lead to both timely research and more effective solutions should a nuclear disaster happen again.

More information: INTERNATIONAL ATOMIC ENERGY

AGENCY, Environmental Transfer of Radionuclides in Japan following the Accident at the Fukushima Daiichi Nuclear Power Plant, IAEA-TECDOC-1927, IAEA, Vienna (2020). www.iaea.org/publications/1475 … -nuclear-power-plant

Provided by Forestry and Forest Products Research Institute

Citation: Dynamics of radiocesium in forests after the Fukushima disaster: Concerns and some hope (2021, February 3) retrieved 12 May 2024 from https://phys.org/news/2021-02-dynamics-radiocesium-forests-fukushima-disaster.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.