

Report on “Radiation Disaster Recovery Studies”

Course: Radioactivity of Environmental Protection

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○Regarding “Radiation Disaster Recovery Studies”

(Describe your thoughts, the process you engaged in and your research progress regarding Recovery from Radiation Disaster.)

Recovery can be seen as a natural event as a manifestation of a resilience property of a social-ecological system. A social-ecological system needs to cope with and recover from an environmental shock (catastrophe) or it will extinct or transform into a complete different system (form and/or identity). In the post-disaster phase, science is needed to understand the scale and extent of disaster impact, which is important to formulate an effective measure and recovery plan. A science-based policy is widely recognized as an important key for recovery in a modern society. In the implementation, the authority may require a variety of scientists and professionals (expert) to formulate a comprehensive recovery strategy and plan and action. This is what we have seen for years since the accident of Fukushima Dai-ichi Nuclear Power Plant took place, a policy resulted from a top down approach. It is a response based on deficit-based model which too much pay attention to the loss and shortcomings and the resulted recommendation of reconstruction usually be imposed to the disaster-affected stakeholders (Weinstein and Tidball, 2007).

The alternative approach or a more bottom-up approach requires the involvement of public or citizen in science for disaster response. The pursuit of knowledge in which the citizen is involved or give their contribution voluntarily, partly or entirely to scientific activities is called citizen science. Tidball and Krasny (2011) argued that citizen science can provide a more contextual or grounded recovery strategy and action for the affected community. A specific example of this approach is what has been claimed through ETHOS project, a rehabilitation project that used participatory approach by involving multiple stakeholders in the routine management of radiological situation (Lochard, 2004). Recently, the project has been replicated in some affected community in Fukushima as well.

Citizen participation is not limited to a very small and local communities. With the advanced of information and communication technology, the window for public to

participate in science is wide opened. Recently, many enterprises including science enterprise are benefitted from a huge contribution from volunteers without borders which then be called “crowd science” or crowdsourcing in science (or it could be comprehended as crowdsourcing in data collection, interpretation and so forth). One of the obvious implication of utilizing a great number of data collectors is the huge amount of collected data which raise concerned to the data accuracy assessment and reliability of the data.

The crowdsourcing on radiation data in Japan emerged after the accident led by a civil society organization based in Tokyo, Japan. A lot of participation from all over the world is kept coming up to now. It has a lot of radiation datasets not exclusively from Japan but the assessment of reliability of the data has not yet been done despite the benefit that it might have like the other citizen science project (citizen participation) had. In my research, the assessment was done to the radiation data that collected within Fukushima Prefecture only. The result of my research is expected to give more information about the crowdsourced data as well as some feedbacks to improve the initiative.

○Title of Doctoral Thesis

The Assessment of the Crowdsourced Radiation Data to Provide Radiological Information in Fukushima Prefecture, Japan

○Summary of Doctoral Thesis

(Describe so as to be easily understood, by relating it to “Radiation Disaster Recovery Studies”.)

Despite of large measurements data have been collected by citizen science, it seems that very little recognition from the expert/scientist group has been given to the work that they have done. My study is an attempt to assess the quality of crowdsourced radiation data in Fukushima by examining the agreement of the data with the expert group data and the possibility to extend measurement on the complex landscape such as forests.

What we found from this study is that the citizen science data have a well agreement with expert group data, although the discrepancy between both data source are exist (the value of air dose rate, or a radiation quantity which is related with the potential danger to human health, of crowdsourced data are generally lower than the expert group data). Crowdsourced data can be used to evaluate the air dose rate

reduction as it showed the similar pattern of air dose rate reduction with the expert group data from time to time.

Crowdsourced radiation data were collected by layperson on the ground, so the measurements tends to be done on accessible place such as road side and seldom on difficult to access landscape object such as forests. In this study, we investigate whether extending the target of measurements on the forest using the citizen-science designed detector and UAV (Unmanned Aerial Vehicle) will be possible to provide reliable radiation information as well. Our study shows that the visual pattern of air dose rate measured on the UAV did not show a similar pattern to air dose rate measured on the ground. There was no significant correlation between air dose rate measured on the ground and on the UAV. We suspected that it was probably due to the low sensitivity of the citizen science detector in providing a stable radiation measurement within the high speed of UAV as platform and the distance to radioactivity source on the ground (forest floor).

From this study, we learned that citizen science group data with crowdsourcing approach could potentially be alternative source of radiation information. Despite of its limitation in measuring radiation in difficult landscape, given the fact that the citizen science group respond to the Fukushima nuclear crisis earlier than the expert group in collecting radiation data, we emphasized that this group have a great potential as a partner for government or expert group to provide radiation information.

○Other theses published in academic research journals

- **Title of published article**

Potential of Crowdsourcing Approach on Monitoring Radioactivity in Fukushima Prefecture

- **Joint authors**

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