

Measurement of disaster damage utilizing disaster statistics: A case study analyzing the data of Indonesia

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SUMMARY

The Global Centre for Disaster Statistics (GCDS) in Tohoku University was established in April 2015. Its aim is to support the SFDRR in the monitoring and evaluation of progress by providing support at country level for capacity building in developing national statistics on disaster damage and by establishing an improved global database for such statistics. This study aims to find a clue to effective measurement of disaster damage utilizing disaster statistics. In disaster loss databases, there often exist so many observed variables that we can hardly recognize how severe each occurred disaster is in total. Thus, it appears to be beneficial to introduce new compound indicators so that we can estimate the scale of each disaster properly. The study also aims to find out the relation between the existing indicators of SFDRR's global targets by the UNISDR. We conduct principal component analysis to introduce new compound indicators. The material data for the analysis are retrieved via the global disaster-related database (GDB) provided by the GCDS. More specifically, these data were originally acquired from the Indonesian government agency in charge of disaster risk reduction called BNPB. As a result of principal component analysis, we found that it might be possible to introduce some of new compound indicators for the purpose of measurement of disaster damage. We can also see that these compound indicators have a close relationship with the existing indicators of SFDRR's global targets by the UNISDR. Thus, a set of the new compound indicators introduced in this study could be a good reference in terms of SFDRR's monitoring. Furthermore, one of the future challenges is to apply to policy advocacy in a concrete manner.

Keywords: Sendai Framework for Disaster Risk Reduction 2015-2030 (SFDRR), Global Centre for Disaster Statistics (GCDS), SFDRR's global targets, disaster statistics, disaster loss database, principal component analysis

INTRODUCTION

Background

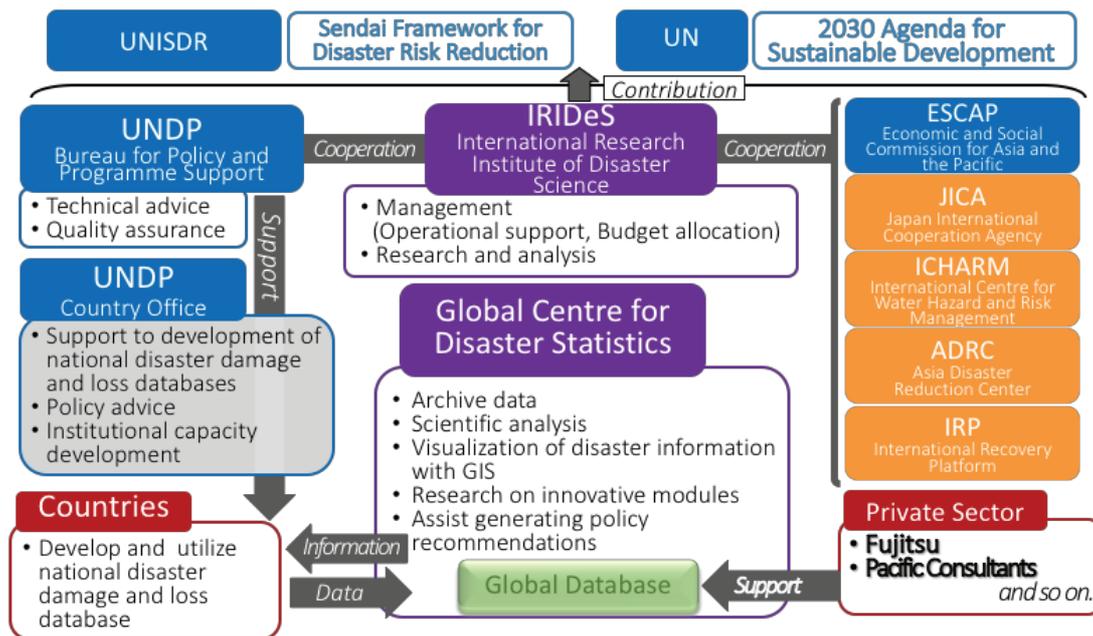
At the Third UN World Conference on Disaster Risk Reduction (UNWCDRR) held in March 2015 in Sendai City, Japan, the new framework referred to as the Sendai Framework for Disaster Risk Reduction 2015-2030 (SFDRR), containing seven global targets, was adopted by 187 UN member states (UNISDR, 2015). The seven global targets are set as follows: (i) mortality, (ii) the number of affected people, (iii) direct disaster economic loss, (iv) damage to critical infrastructure, (v) the number of countries with national and local disaster risk reduction (DRR) strategies, (vi) international cooperation, and (vii) access to multi-hazard early warning systems and disaster risk information and assessments to people.

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improved global database for such statistics (Ito, Miyamoto, & Ono, 2016). One of the main features of the GCDS is the collaboration among a variety of actors involved in disaster risk reduction and sustainable development as shown in Figure 1; that is, the GCDS aims at creating a synergy effect among academia, the UN organization, and private companies in order to provide unprecedented values to all stakeholders worldwide (Sasaki & Ono, 2018).

Research Objectives

This study aims to find a clue to effective measurement of disaster damage utilizing disaster statistics. In disaster loss databases, there often exist so many observed variables that we can hardly recognize how severe each occurred disaster is in total. Thus, it appears to be beneficial to introduce new compound indicators so that we can estimate the scale of each disaster properly. The study also aims to find out the relation between the existing indicators of SFDRR's global targets introduced in the technical guidance for monitoring and reporting on progress in achieving the global targets of the SFDRR published by the UNISDR (UNISDR, 2017).



Source: (Sasaki & Ono, 2018; Ono, 2016)

Figure 1. Detailed scheme of the GCDS.

METHODOLOGY

In this study, we conduct principal component analysis to introduce new compound indicators. By adding a set of the negative samples corresponding to the original data, the original point of the indicator is supposed to be set to 0. In other words, the indicator keeps the property of ratio scale that secures comparability. The material data for the analysis are retrieved via the global disaster-related database (GDB) provided by the GCDS. More specifically, these data were originally acquired from the Indonesian government agency in charge of disaster risk reduction called BNPB. As Sasaki, Moriyama, & Ono (2018) described, another famous global disaster database called the Emergency Events Database (EM-DAT) has the limitation on the disaster data; therefore, we consider that the GDB rather than EM-DAT should be adopted for the analysis. As for the software package for statistical analysis, we utilize SPSS Statistics 25.

RESULTS AND DISCUSSION

As a result of principal component analysis, we found that it might be possible to introduce some of new compound indicators for the purpose of measurement of disaster damage. We can also see that these compound indicators have a close relationship with the existing indicators of SFDRR's global targets by the UNISDR. Thus, a set of the new compound indicators introduced in this study could be a good reference in terms of SFDRR's monitoring. Furthermore, one of the future challenges is to apply to policy advocacy in a concrete manner.

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