Mapping Environments of the World

Peijun Shi, Jing'ai Wang, Ying Wang, and Tian Liu

1 Introduction

A regional disaster system is essentially the product of the interaction of humans and nature, which is composed of the disaster-formative environment, exposure, hazard, and disaster losses. It is a dynamic system with complex characteristics on the surface of the earth (Fig. 1) (Shi 1991).

Disaster-formative environment (E): Broadly defined, it is the natural and human environments. The regional differences of disaster-formative environments not only have a profound impact on the generation of hazards but also have an obvious influence on the human casualties and property losses caused by the hazards. Hazard (H): A hazard is a process or phenomenon that may pose negative impacts on the economy, society, and ecology, including both natural factors and human factors that are associated with the natural ones. Exposure (S): It covers humanity itself and lifeline systems, production systems, cultural and social systems, and various natural resources and ecological systems. Disaster loss and effect (Ds): It includes casualties and psychological impacts, direct and indirect economic losses, building (structural) destruction, social network (non-structural) disorder, ecosystem degradation, environmental pollution, resource damages, and so on (Shi 1991, 1996, 2002, 2005, 2009, 2019).

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2 Environments

The disaster-formative environment shown in this part mainly refers to the natural physical environments, namely geology, landform, climate, hydrology, vegetation, and soil.

Land elevation and slope of the terrain will affect the spatial distribution of disasters. River systems will affect the occurrence and scope of floods. Land cover and soil will directly or indirectly influence the severity of floods and droughts. In addition, climate zones directly or indirectly reflect the distribution of extreme climatic events.

3 Maps Based on Reference Data

The maps based on reference data contain World Political Map, Global Land Cover, Global Soil, Global Climate Zones, Global River Systems, Global Digital Elevation Models, Global Terrain Slope, and Global Satellite Image, and their sources are shown in Table 1.

E: Disaster-formative environment, H: Hazard,
S: Exposure, Ds: Loss and effects

Fig. 1 Disaster structural system

Table 1 Maps included in the Environments section

Maps	Source
World Political Map	World Atlas of Natural Disaster Risk (2015)
Global Land Cover	Copernicus Global Land Service https://lcviewer.vito.be/download
Global Soil	Food and Agriculture Organization (FAO), United Nations Environment Programme (UNEP), Land Degradation Assessment in Drylands (LDAD) Project http://www.fao.org/geonetwork/srv/en/metadata.show?id=37139&currTab=distribution
Global Climate Zones	Food and Agriculture Organization (FAO) https://data.apps.fao.org/map/catalog/srv/eng/catalog.search?uuid=7538cb25-7b2e-4030-8454-7197a49af48a#/home
Global River Systems	Food and Agriculture Organization (FAO) http://www.fao.org/geonetwork/srv/en/main.home?uuid=9264483f-ca14-496b-aeae-fe1b8aebf520
Global Digital Elevation Models	NOAA's National Centers for Environmental Information (NCEI) https://data.nodc.noaa.gov/cgi-bin/iso?id=gov.noaa.ngdc.mgg.dem:316
Global Terrain Slope	Calculated based on Global Digital Elevation Models of the NOAA National Centers for Environmental Information
Global Satellite Image	National Aeronautics and Space Administration (NASA) http://visibleearth.nasa.gov/view.php?id=57752

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4 Maps

Global Soil

Data Source: Food and Agriculture Organization (FAO) United Nations Environment Programme (UNEP) Land Degradation Assessment in Drylands (LDAD) Project
<http://www.fao.org/geonetwork/sv/en/metadata.show?id=37139&currTab=distribution>

Data Source: Food and Agriculture Organization (FAO)
<http://www.fao.org/geonetwork/srv/en/metadata.show?id=37139&currTab=distribution>

Global River Systems

Data Source: Food and Agriculture Organization(FAO) AQUASTAT - programme of the Land and Water Division Montana
<http://www.fao.org/geonetwork/?uid=7538cb25-7b2e-4030-8454-7197a9af48a>

Global Land Elevation

Data Source: NOAA's National Centers for Environmental Information (NCEI)
<https://data.node.noaa.gov/cgi-bin/iso?id=gov.noaa.ngdc.mgg.dem:316>

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