OEAS 250N “Natural Hazards and Disasters” Final Exam, December 11, 2018

Name:

General Questions: (answer at least three out of the four questions)

Q1.1: How are “natural hazard” (hazardous event) and “disaster” defined? What is the connection between them that determines the size of a disaster caused by a hazard? You can use an example to explain the connection.

Q1.2: How did we define “risk” in class? What are the three factors that determine the risk associated with a hazard?

Q1.3: Which of these three factors determining the risk associated with a natural hazard can humans control to reduce this risk?

Q1.4: Does recent climate change have an impact on the spectrum (amplitude and frequency as function of recurrence) of some natural hazards? If so, give an example. For example, are there natural hazards that occur more often or are more severe because of climate change?

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Event 1: April 6, 2009 L’Aquila Earthquake (answer at least three out of the four questions)

Q2.1: What was the magnitude of the L’Aquila earthquake on what scale?

Q2.2: What is the main reason for the relatively large number of people killed during or after this earthquake? What could have reduced this number?

Q2.3: What were the signs/indications before the earthquake that a significant earthquake might happen soon?

Q2.4: Did scientists provide information that helped to increase preparedness shortly before the earthquake?

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Event 2: Tropical cyclones and comparison of Hurricane Katrina and Typhoon Haiyan (answer at least four out the six questions)

Q3.1: Where geographically do tropical cyclones originate?

Q3.2: What is the typical initial **travel** direction of all tropical cyclones? What effect impacts the travel direction as they move on and how does this effect change the direction on the northern and southern hemisphere?

Q3.3: In which direction do tropical cyclones **rotate** on the northern and southern hemisphere?

Q3.4: Where geographically did Hurricane Katrina and Typhoon Haiyan trigger disasters?

Q3.5: What was the extent of the disasters caused by Katrina and Haiyan and what explains the difference?

Q3.6: Why are typhoons often larger than hurricanes?

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Event 3: The 1974 Super Outbreak of Tornadoes (answer at least four out for the six questions)

Q4.1: What scale is used to measure tornado strength? How are the different strengths characterized in terms of damage extent?

Q4.2: What is the atmospheric phenomenon out of which most of the tornadoes originate?

Q4.3: Globally, in which region do most tornadoes occur?

Q4.4: In the USA, where are the regions with the highest likelihood of tornadoes?

Q4.5: What are the main characteristics of the 1974 Super Outbreak in terms of the number of severe tornadoes?

Q4.6: What are the fatalities, injuries, and damage associated with the 1974 outbreak?

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Event 4: Holocene and Post-Holocene (answer at least three out for the four questions)

Q5.1: What are the most important characteristics of the Holocene that made this epoch a “safe-operating space for humanity”?

Q5.2: Nine global boundaries have been identified for the “safe-operating space.” Which are two of these nine boundaries that have been crossed in the last 50 to 100 years due to human activities?

Q5.3: Are current climate variables such as Greenhouse gases, albedo forcing, global temperature, and sea level within or outside of the “normal range” for these variables during the Holocene? How far are projections for these variables by 2100 away from the “normal range”?

Q5.4: How does the current rate of extinction of species compare to the pre-human background and what are risks associated with human-caused extinction?