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INVITED PAPERS

**DISASTER REDUCTION EXPERIENCE IN DEVELOPING COUNTRIES:
SOME CONCRETE EXAMPLES**

**Submitted by World Agency of Planetary Monitoring and
Earthquake Risk Reduction (WAPMERR) ****

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DISASTER REDUCTION EXPERIENCE IN DEVELOPING COUNTRIES: SOME CONCRETE EXAMPLES

WAPMERR works for the purposes of reducing risk due to disasters and for rescue planning after disasters. These goals are achieved by advancing methods of real-time loss estimates after earthquakes, through monitoring by satellite images and by earthquake prediction research. In these efforts, we are collaborating with various scientists all over the world.

There is a need to estimate human losses in real time after earthquakes worldwide to assist rescue agencies and governments in their decisions to mobilize for a rescue mission or not. Speed is important in the service of estimating losses because the chances of rescuing people diminish rapidly with time. Every hour that rescuers and governments are in the dark about an earthquake disaster, increases the toll. The real-time loss estimates are important because it is standard for news media and government officials to believe that casualties are low (for example 20 fatalities) for hours to days after an earthquake disaster, when in reality the casualties are two orders of magnitude higher.

Real-Time Loss Estimates after Earthquakes:

Within about two hours of any significant earthquake worldwide, WAPMERR issues a loss estimate in collaboration with the Swiss Seismological Service. This includes number of fatalities and injured, as well as average damage to buildings in all affected settlements.

As an example:

Real-Time estimate of losses due to strong motions after the Sumatra earthquake of M8.2 on 28 March 2005 (epicenter 2.09N 97.02E)

The figure below gives our real time estimate of the probable average damage in the region:

There are likely more than 100 settlements that have been shaken with intensities stronger than VII. One has to be prepared for possibly 300 to 1000 fatalities.

Now (18:30 GMT) that the magnitude estimate for Tsunami warning has been given as M8.5 (and the new USGS magnitude is M8.7 at 19:00 GMT), the number of fatalities are likely to exceed 1000 significantly.

These messages and picture have been posted in real time in 34 minutes after the earthquake.

To assist rescue agencies in reaching decisions regarding mobilizing, rapid loss estimates in real time are important. Our estimates of losses depend on the timely availability of accurate information on earthquake hypocenter and magnitude.

We use data from various survey agencies however we found that the source for detailed and correct publicly available data that comes earlier than others is U.S. Geological Survey (USGS).

WAPMERR uses satellite images to assess damage after earthquakes and to estimate the properties of the building stock. The latter are important for improving estimates of losses in the scenario and real-time mode for developing countries (Earthquake of Magnitude 6.7 in Bam, Iran, on 26 Dec. 2003).

At present WAPMERR together with the Tsunami Laboratory of the Russian Academy of Sciences is developing the system for tsunami risk assessment. The system will consist of uniform historical databases, tsunami modelling, hazard assessment and risk calculation tools and will be applicable at the national and regional levels for protection of property and human lives in the tsunami-prone areas. For the moment our system gives us possibility to determine risk areas and possible tsunami travel time and wave height. Next step will be wave inundation.

We can also model possible disasters that could happen in future in order to determine risk areas. This information is important for elaboration of rescue plans and evacuation maps.

In addition to real time loss estimates, we calculate the consequences of hypothetical earthquakes that we consider likely to happen in the future. The purpose of these scenario loss estimates is to assist civil defense officials in planning for the earthquake disasters that will hit their country in the future. In March 2005, we published seven loss scenarios for the Himalaya in the journal *Natural Hazards*. The scenario for “Kashmir” in that publication correctly predicted the extent of the disaster that occurred on 8 October 2005. If our warning had been taken seriously and schools in the Kashmir area had been reinforced, the lives of thousands of school children might have been saved.

	Location.	Lat. (deg.)	Lon. (deg.)	Depth (km)	M	Expected Deaths (thousands)	Number Injured (thousands)	No Settle I = 7	No Settle I = 5
1	Assam	27.8	92.3	25	8.1	24 – 49	52 - 99	160	1900
2	Bhutan	27.3	89.5	25	8.1	76 - 151	163 - 274	270	2500
3	Katmandu	28.1	84.2	25	8.1	21 -42	45 - 86	330	2600
4	W. Nepal	28.7	81.8	25	8.1	11 – 22	24 - 53	370	2800
5	Garhwal	29.7	79.6	25	8.1	58 - 115	125 - 230	380	3000
6	Dehra Dun	30.7	77.7	25	8.1	96 - 199	210 -433	450	3300
7	Kashmir	33.0	75.0	25	8.1	67 - 137	146 - 293	550	4000

One of the most serious obstacles for the international real-time loss estimators are problems related to cartographic data. This data is not always accurate and relevantly the results of the loss estimations could be different from reality. Sometimes we can't determine affected settlement name, simply because it does not exist on any map. This is mainly related to the settlements population of which is below the 100,000. Detailed unified map does not exist. Each country makes its own map but when we try to integrate them we face the problem that they do not match each other. Very important problems are related to geographical names as well. As you are well aware the work of rescue

teams very much depends on our accurate information. We believe that the making of the unified standardized data has crucial importance and that's why we fully support the initiative of the United Nations Statistics Division on creation of website where each country will store its own standardized geographical names with accurate geo-references and we are ready to participate in this work.