



CBMS

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The impact of natural disasters on income and poverty: framework and some evidence from Philippine households*

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Introduction

Although understanding the impact of natural disasters on income and poverty at the household level is important for disaster-prone and poverty-stricken countries, empirical works on the subject have been limited so far. A major reason behind this is that standard national household surveys generally do not include the collection of data and information on natural disasters (De la Fuente et al. 2009). In the Philippines, however, the Community-Based Monitoring System (CBMS) Household Profile Survey has started to include selected natural disaster-related data and information among those that it collects and monitors.

This *Policy Note* provides a framework for analyzing the impact of natural disasters on household income and household poverty and empirically estimates the effects of natural disasters on household income using 2011 CBMS data for Pasay City, Metro Manila. The *Note* summarizes some of the results and findings of a recent study entitled "Disasters, Poverty and Coping Strategies: The Framework and Empirical Evidence from Micro/Household Data - Philippine Case" conducted by the Philippine Institute for Development Studies (PIDS) and funded by the Economic Research Institute for ASEAN and East Asia (ERIA).



TRAIL OF DEVASTATION. Super Typhoon Haiyan/Yolanda struck Eastern Visayas on November 8, 2013 and left a trail of destruction and tragedy in its wake including totally washed-out homes in the coastal barangays of the municipality of Balangkayan, Eastern Samar.

Framework of analysis

A general framework for studying the impact of natural disasters at the household level can be developed based on Lindell and Prater (2003). In summary, the physical impact of a natural disaster on households is determined by geographical and natural factors, hazard agent characteristics, hazard mitigation practices, and emergency preparedness practices (Figure 1). The framework further explained that after the physical impact,

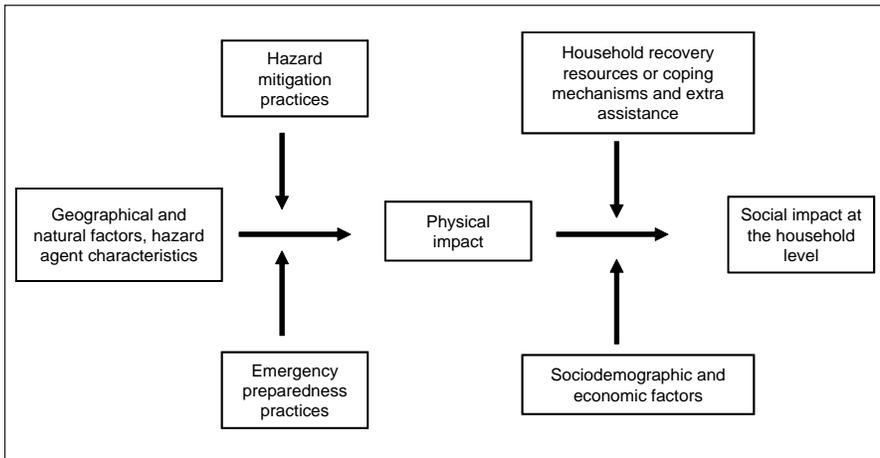
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Research Results

Figure 1. Model of disaster impact at the household level



Household Profile Survey was used because it contained data and information that can be utilized to measure the occurrence and frequency of natural disasters, household income, and other household variables. Pasay City was selected because the authors were granted permission by the city government to use its data.

Furthermore, the city is among the hardest hit areas by floods, including those caused by typhoons, in Metro Manila. While the CBMS survey gathered data and information on other forms of natural disasters, typhoons and floods were considered because they are more applicable for Pasay City. The sample consisted of 70,326 households.

the social impact of a natural disaster on the households follows, which is determined by the physical impact, as well as household recovery resources or coping mechanisms, extra assistance, and sociodemographic and economic factors.

The said framework can also be extended to allow the identification of the links among natural disasters, household income, and household poverty (Figure 2). Specifically, the social impact of natural disasters can be classified into four types: socioeconomic, sociodemographic, sociopolitical, and psychosocial factors. Individually and collectively, these factors are likely to reduce household income in general and worsen poverty among poor households in particular (with the possible exception of politically favored and well-organized poor households actually benefiting from outside assistance after the occurrence of natural disasters). Consequently, reduced incomes and increased poverty among poor households result in their reduced access to adequate nutrition, education, health and other social services, and overall welfare.

Some evidence: the case of Pasay City

An attempt was made to empirically estimate the relationships among natural disasters, household income, and household poverty given available data (Israel and Briones 2013). The 2011 CBMS

Figure 2. Social impact of natural disasters at the household level

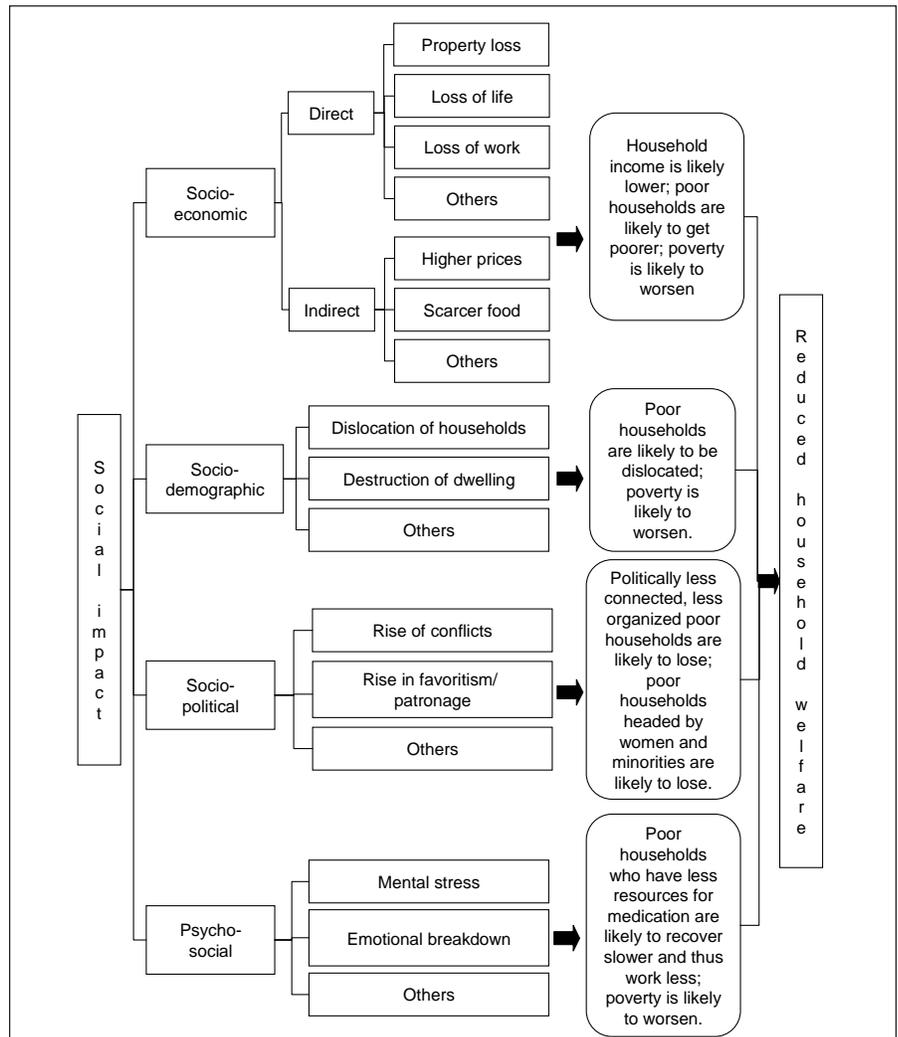


Table 1. Definitions of variables and expected signs of coefficients

Variable	Definition	Expected Sign of Coefficient
INCOME	Household per capita income (total household annual income in pesos/number of household members)	
SEX	Sex of household head (1 if male, 0 if female)	+
AGE	Age of household head (years)	+
STATUS	Civil status of household head (1 if married, 0 otherwise)	+
EDUCATION	Educational attainment of household head (years of schooling)	+
SIZE	Household size (number of individuals)	+
OFW	Overseas Filipino worker (OFW) cash remittance (1 if received OFW cash remittance, 0 otherwise)	+
PROGRAM	Recipient of a government program (1 if household is recipient of a government program, 0 otherwise)	+
DISASTER	Disaster occurrence (1 if household was affected by typhoon or flood during the past 12 months, 0 otherwise)	-
DISASTER1	Disaster frequency (0 if household was not affected by typhoon or flood during the past 12 months, 1 if affected once by typhoon or flood, 2 if affected twice by typhoon and/or flood, 3 if affected more than twice by typhoon and/or flood)	-

Note: "PROGRAM" refers to any one of the following: Pantawid Pamilyang Pilipino Program; NFA Rice; Comprehensive Agrarian Reform Program; Food for School; Food for Work; Self Employment Assistance – Kaunlaran; Day Care; PhilHealth; and Others.

Table 2. Descriptive statistics of variables used in the estimation

Variable	Mean	Standard Deviation
INCOME	96,509.34	57,009.30
SEX	0.76	0.42
AGE	42.88	14.46
STATUS	0.51	0.50
EDUCATION	10.93	2.76
SIZE	3.85	2.03
OFW	0.03	0.18
PROGRAM	0.49	0.50
CALAMITY	0.29	0.45

Note: The total number of households interviewed is 70,326.

Table 3. Regression results using OLS and Hubert-White estimator (with CALAMITY as independent variable)

Independent Variables	Coefficient, OLS	t-value, OLS	Prob > t, OLS	t-value, Robust	Prob > t, Robust
SEX	-0.0413	-4.42**	0.0000	-4.18**	0.0000
Ln AGE	0.4346	38.67**	0.0000	37.29**	0.0000
STATUS	0.1044	12.31**	0.0000	12.22**	0.0000
Ln EDUCATION	0.6499	55.7**	0.0000	42.80**	0.0000
Ln SIZE	-0.6435	-98.29**	0.0000	-90.41**	0.0000
OFW	0.3975	19.71**	0.0000	22.98**	0.0000
PROGRAM	0.2121	29.55**	0.0000	29.80**	0.0000
CALAMITY	-0.0672	-8.67**	0.0000	-9.01**	0.0000
Constant	8.2707	151.62**	0.0000	135.04**	0.0000

Note: Prob > F = 0.00; No observations = 70,326; adjusted R-squared is 0.178; Cook-

Weisberg test of heteroscedasticity yields Prob > $\chi^2 = 0.00$; t-value significance at 5 percent level is denoted by *; significance at 1 percent level denoted by **.

The following equations were estimated while the definitions of the variables and the expected signs of the coefficients are presented in Table 1. The choice of the variables was limited by the available data from the CBMS survey.

$$\text{LnINCOME}_i = a_0 + a_1\text{SEX}_i + a_2\text{LnAGE}_i + a_3\text{STATUS}_i + a_4\text{LnEDUCATION}_i + a_5\text{LnSIZE}_i + a_6\text{OFW}_i + a_7\text{PROGRAM}_i + a_8\text{CALAMITY}_i + e_i$$

and

$$\text{LnINCOME}_i = a_0 + a_1\text{SEX}_i + a_2\text{LnAGE}_i + a_3\text{STATUS}_i + a_4\text{LnEDUCATION}_i + a_5\text{LnSIZE}_i + a_6\text{OFW}_i + a_7\text{PROGRAM}_i + a_8\text{CALAMITY}_i + e_i$$

The descriptive statistics of the variables considered are shown in Table 2. The average annual income of the households was PHP 96,509.34; 76 percent of the household heads were male; the average age of the household heads was 42.88 years; 51 percent of the household heads were married; the average number of years of schooling of the household heads was 10.93 years; the average household size was 3.85 members; 3 percent of the households received OFW cash remittance; 49 percent of the households were recipients of a government program; and 29 percent of the households were affected by a typhoon and/or flood in the last 12 months. Furthermore, of the households, 71 percent were not affected by a typhoon or flood; 5 percent were affected once by a typhoon and/or flood; 7 percent were affected twice by a typhoon and/or flood; and 17 percent were affected more than twice by a typhoon and/or flood.

The regression results using CALAMITY as the natural disaster occurrence variable are presented in Table 3 (first three columns). All the coefficients of the independent variables are of the expected signs and levels of significance, except that for SEX. The adjusted R-squared is 0.178 which is low but is expected in cross-section data. The results for CALAMITY indicate that households that were affected by a typhoon/flood in the last 12 months tend to have annual per capita incomes that are significantly lower, by 6.72 percent, than those households that were not affected.

Research Results

Table 4. Regression results using OLS and Hubert-White estimator (with CALAMITY1 as independent variable)

Independent Variables	Coefficient, OLS	t-value, OLS	Prob > t, OLS	t-value, Robust	Prob > t, Robust
SEX	-0.0417	-4.46**	0.000	-4.22**	0.000
Ln AGE	0.4342	38.63**	0.000	37.24**	0.000
STATUS	0.1046	12.33**	0.000	12.24**	0.000
Ln EDUCATION	0.6500	55.69**	0.000	42.81**	0.000
Ln SIZE	-0.6442	-98.39**	0.000	-90.49**	0.000
OFW	0.3972	19.69**	0.000	22.97**	0.000
PROGRAM	0.2118	29.51**	0.000	29.76**	0.000
CALAMITY1	-0.0218	-7.21**	0.000	-7.89**	0.000
Constant	8.2689	151.55**	0.000	135.04**	0.000

Note: Prob > F = 0.00; No observations = 70,326; adjusted R-squared is 0.178; Cook-

Weisberg test of heteroscedasticity yields Prob > $\chi^2 = 0.00$; t-value significance at 5%

level is denoted by *; significance at 1% level denoted by **.

Given the cross-section nature of the data, one may suspect that homoscedasticity of the error term need not hold. The Cook-Weisberg test indeed rejected the null hypothesis of homoscedastic error term at 1-percent significance level. Therefore, standard errors were re-estimated with the same coefficient values applying the Hubert-White correction. The t-values consistent with the robust standard errors are also shown in Table 3 (last two columns). Specifically, the corrected t-values remain statistically significant at low probability thresholds.

The results using CALAMITY1 as the natural disaster frequency variable are presented in Table 4. The findings are similar to those obtained using CALAMITY as the natural disaster variable. CALAMITY1 also has the expected sign and is statistically significant, even with robust standard error (which is preferred as homoscedasticity is again rejected at 5-percent level of significance). The coefficient value implies that each increment in the CALAMITY1 index reduces annual per capita household income by about 2.18 percent.

Conclusion and recommendations

Both the occurrence and frequency of typhoons and/or floods have significant and negative effects on household per

capita income as the case of Pasay City has shown. These effects would have significant and negative impacts on poor households in the city whose poverty situation would likely worsen with natural disasters. The results support the findings of previous studies (e.g., GOP 2009a, GOP 2009b).

The finding that poor households lose a significant portion of about 7 percent of their per capita incomes due to natural disasters hopefully would help government decide more accurately the level of funding it has to allocate for short-term disaster relief and long-term rehabilitation. The result that income losses differ depending on the frequency of natural disasters implies that assistance to poor households may be differentiated based on the number of times they are affected by disasters.

If and when data are available, studies with a larger regional or national coverage further elucidating the effects of natural disasters on household income and poverty in terms of the type of impact (e.g., socioeconomic and sociodemographic), location (e.g., urban and rural areas), sector group (e.g., agricultural and nonagricultural), and other relevant classifications may be conducted. A study on the reverse impact of household poverty on natural disasters

is also worth pursuing. The use of household income as the variable of interest in the study is necessitated by available data and resource constraints. In future studies, other poverty-related indicators can be considered, including household consumption, education, health, nutrition, and other similar variables.

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BARD meets with Union Parishad on local poverty monitoring

CBMS project officials from the Bangladesh Academy for Rural Development (BARD) met with the representatives of Mohammadpur (West) Union Parishad on November 29, 2013 to discuss project activities and details of the revised work plan for the implementation of the Local Level Poverty Monitoring System (LLPMS).

Thirteen elected representatives and the Secretary of the Union Parishad attended the meeting, which was presided by Shamsul Hoq Sarker, chair of Mohammadpur (West) Union Parishad.

The meeting agreed on the following:

- The Chairman of Mohammadpur (West) Union Parishad has formed a CBMS project implementation committee to assist the BARD officials in undertaking the various activities of the CBMS project. Members of the different standing committees of Union Parishad will be the general members of the committee while the Chairman of Union Parishad will chair the committee and the Union Parishad Secretary will be the committee secretary.
- A project brigade was formed in Union Parishad for CBMS-Bangladesh. Brigade members will include all the 12 elected members of the Union Parishad. Their basic functions are (i) to monitor data collection (including tablet-based data collection), and (ii) to assist in the preparation of digital mapping. The data will be used in the preparation of the Ward Information Book (WIB). After completion of the WIB, the brigade will identify the



CONSULTATIVE & ADVOCACY MEETING. The CBMS-Bangladesh team has completed its first consultative and advocacy meeting with Mohammadpur (West) Union Parishad officials who agreed to form a brigade to implement the CBMS in Bangladesh.

problems of the respective wards with emphasis on youth employment and entrepreneurship. It will also organize ward meetings to get feedback and inputs from the people before finalizing the Union Development Plan.

- The Union Parishad is still using the previous year's (2004) WIBs in its decisionmaking on such matters as selection of beneficiaries for government safety-net programs. After updating the WIBs through tablet-based and paper-based data collection, the Union Parishad will use the data for better transparency and accountability in its decision-making process.

In his closing remarks, the chairman of the meeting said that in 2004 they were

still not fully aware of the importance of the database. But when they started using the database they benefited significantly and got maximum support from the government because the Upazila (sub-district) Parishad were informed that Mohammadpur (West) Union had its database and WIBs for making development-related decisions. Finally, he thanked the CBMS Network and BARD officials for selecting their Union Parishad as a project partner.

The CBMS project titled "Institutionalizing Local Level Poverty Monitoring System in Bangladesh" is being implemented by BARD. The project aims to develop an institutional mechanism for implementing a community-based poverty monitoring system with emphasis on youth employment at the local level, and to ensure the effective use of CBMS information by the local government functionaries in preparing development plans. *

CBMS Team in Pakistan assured of support by district officials in Punjab



MEETING WITH OFFICIALS OF THE FAISALABAD DISTRICT COORDINATING OFFICE. The CBMS-Pakistan team, represented by Nadeem Akhtar and Shujaat Farooq, meets with officials of the District Coordinating Office in Faisalabad, province of Punjab.

The CBMS team in Pakistan has received assurance of support for their project from the District Coordinating Offices (DCOs) of Faisalabad and Mandi Bahauddin and the Tehsil Municipal Administration during a series of consultative meetings held in November 2013.

The consultative meetings, conducted ahead of the local elections scheduled in January 2014 in the Punjab Province, introduced the community-based monitoring system (CBMS) methodology to district and local governments, discussed the list of indicators for the first and second phase of the CBMS project, and gathered suggestions from project stakeholders. The CBMS team also received endorsement letters from district and local governments to carry out field activities, and were helped to understand the new delimitations of the union councils in rural areas and municipal committees/corporations in urban areas

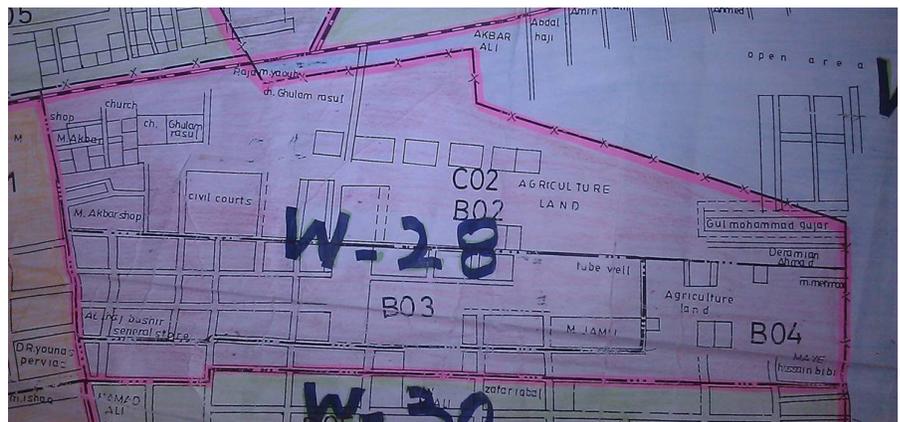
based on the new Local Government Ordinance 2013 of the Punjab Government.

The project team also visited local educational institutes to introduce the project as part of

the community development initiatives that they can take up as topics of research. The project had attracted the interest of economic and sociology departments, which are the main source of interviewers for the project's data collection activities.

Meanwhile, the CBMS team has also jumpstarted its resource mobilization activities by exploring potential collaborations on youth employment and entrepreneurship with organizations that have the same objectives. These organizations include the Erwing Marion Kauffman Foundation, the USAID Ambassador Program, the Royal Embassy of Norway with its projects and program support, and the Embassy of Denmark in Pakistan.

The CBMS project, which started in September 2013, is implemented by the Research Analytics International (Pvt.) Limited in collaboration with the Pakistan Institute for Development Economics. The project aims to work closely with local stakeholders, including educational institutions, to engage in community research and to help identify key indicators that require specific policy attention at the grassroots level, particularly poverty-related and youth employment indicators. *



CBMS PROJECT SITE. A sketch map of Ward 28 in the district of Mandi Bahauddin.

CBMS Team in Bolivia launches website

The CBMS Project Team from Fundacion ARU has recently unveiled its website: <http://www.comunidad-i.info/>, which is devoted to presenting and promoting the objectives, outputs and impacts of the community-based monitoring system (CBMS). The website also features a demo of the Android application that the team is going to use in collecting household-level data.

Fundacion ARU has also conducted a training in October 2013 for the technical staff of the Cruceño Institute of Statistics (ICE) on procedures and protocol of CBMS data collection. The training was part of a set of activities related to the pilot-testing of the CBMS methodology in the local government of Santa Cruz de la Sierra, the capital of the Santa Cruz department in eastern Bolivia.

Aside from strengthening the institutional capacity of ICE, Fundacion ARU and the local government also agreed to replicate the CBMS methodology in other locations.



El Sistema de Monitoreo Basado en Comunidades (SMBC) busca fortalecer las capacidades de las comunidades en el uso de la información como herramienta para la toma de decisiones en política pública.

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Aplicación Android

A continuación puedes descargar el DEMO de la aplicación para la recolección de datos dentro del proyecto. Este DEMO es un prototipo de la encuesta que se desarrolla para la prueba piloto.

Descargar

HOME PAGE. This photo is part of the initial or main webpage of [comunidad-i.info](http://www.comunidad-i.info).

The main objective of the CBMS project in Bolivia is to analyze the individual and social risks that recur more often among informal workers, with emphasis on the characteristics and circumstances of workers who face different social or occupational risks, the vulnerability of

workers, and institutions that contribute to address those risks. The analysis of risks, through a profile of workers and social protection mechanisms, is expected to contribute to the formulation of social protection interventions associated with informal employment. *

CBMS results galvanize officials into action



DAYCARE. Children in a daycare center run by the municipality of Greater Tzaneen.

The results of the community-based monitoring system (CBMS) census conducted in the Greater Tzaneen Municipality in the province of Limpopo in South Africa have

raised a lot of interest from its local officials.

According to the CBMS Team in South Africa, the officials were alarmed by the

fact that the majority of the household heads in the area are unemployed and that only 0.2 percent of individuals earn above R50,000 per annum. As a result, their immediate recommendation was to ensure that the local economic development strategy and other related programs must be geared towards improving the above figures through the creation of decent work and sustainable livelihoods.

In addition, the Greater Tzaneen Municipality has committed to use the results to deal with extreme poverty through integrated delivery of services and partnership with structures in Ward 1. The process will help mobilize stakeholders and resources in a more systematic way. The local officials have also committed to use the CBMS results in empowering communities and in facilitating a participatory and evidence-based approach in the formulation of integrated development plans. *

News Updates

CBMS Philippines to hold 10th National Conference



BOOK LAUNCHING. One of the highlights of the 9th CBMS Philippines National Conference held last year was the launching of the 4th volume of *The Many Faces of Poverty*.

The CBMS Philippines is set to hold its 10th National Conference on March 24-26, 2014 at the Crowne Plaza Manila Galleria in Pasig City.

The 3-day event will gather key officials and representatives of national government agencies, local government units (LGUs), nongovernment organizations (NGOs), and development partner agencies to discuss latest developments in the implementation and uses of the community-based monitoring system (CBMS) in the Philippines.

This year's conference will take up, among others, the uses of CBMS for bottom-up budgeting, disaster risk reduction and

management, local governance, vulnerability mapping, program design and targeting, and impact monitoring. Highlights of the conference will include the annual recognition of good practices and innovations among LGUs in the institutionalization and use of CBMS in their areas.

The annual CBMS Philippines national conference is organized by the PEP Asia-CBMS Network Office of the De La Salle University (DLSU)-Angelo King Institute (AKI).

For more information, please visit: http://www.pep-net.org/events/event/article/10th_cbms_philippines_national_conference/*

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