

IMPACTS OF FLOODS ON PUBLIC SCHOOLS IN THE MUNICIPALITIES OF LOS BAÑOS AND BAY, LAGUNA, PHILIPPINES

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ABSTRACT – The study described the impacts of floods both on the delivery of education services and on the schooling of children from public schools in two lakeshore municipalities of the Laguna Lake, Philippines. Data were gathered from a survey among teachers; key informant interviews (KII) with local government, education officials and school heads; and focused group discussions (FGD) with students, parents, teachers and other stakeholders. Reports on the damage due to floods and records on drop-out rate were also gathered.

Floods caused cancellation and disruption of regular classes, physical damage to schools, and adverse effects on teachers at home and in school. Problems in teaching such as lack of time to finish all lessons, poor motivation and concentration of students, lack of classrooms, shortage of teaching materials and difficulty in preparing lessons were encountered. Attendance and learning performance among students were adversely affected. Data failed to show that student drop-out in these schools were affected by floods, contrary to previous studies. The study recommends adaptation measures to reduce impact of floods to affected schools.

Keywords: impacts, floods, public schools, Los Baños Laguna, Bay Laguna

INTRODUCTION

Floods are considered the most damaging climate-related hazard in the world (NRC, 2012). Children from the marginalized sector of society dwelling in flood prone, slum areas are among the most affected (IFRC, 2012; Save the Children, n.d.). Being one of the most vulnerable countries to climate change (Yusuf and Francisco, 2010; Maplecroft, 2010), the Philippines has experienced tremendous damage, not only due to the intensity of floods, but also due to the inability of the people to cope with its physical and socio-economic impacts (Eleazar, 2011).

The Asia Pacific Regional Bureau for Education of UNESCO (2012) cited the following studies on the effect of floods and extreme weather events on education. The United Nations Development Program (2007) reported that school absenteeism and drop-out rate were high in flood-prone areas in Cambodia. Floods and other climate-related hazards deteriorate livelihoods that impact both household expenditure on schooling and the nutritional status of children (Bangay and Blum, 2010).

Typhoons Ketsana (local name Ondoy), Parma (local name Pepeng) and Mirinae (local name Santi) in 2009 and the enhanced Southwest monsoon (locally known as Habagat) in 2012 have caused widespread impacts on the education sector (UNICEF, 2009; World Bank 2011; Aljazeera Asia-Pacific, 2012). Floods in the coastal communities surrounding the Laguna Lake lasted for several months in 2009 and subsequently in 2012, since the lake has only a single outlet of flood water which was exacerbated by heavy siltation of the lake bed. Aside from lakeshore communities, upland communities of Los Baños and Bay have also been ravaged by flash floods due to the breaching of major river tributaries of the Laguna Lake as caused by Typhoon Xangsane (local name Milenyo) in 2006.

Hazards alone rarely create disaster. The vulnerability of the system affected, determined by the degree of its exposure to the hazard, its sensitivity, and its adaptive capacity, contribute greatly to disastrous outcomes (O'Brien 2008, IPCC, 2012).

The study examined the effect of floods on public schools in the municipalities of Los Baños and Bay, Laguna, particularly on the delivery of education services and on the schooling of children. In this study, education services referred to all efforts, services and assistance rendered by schools to students particularly to deliver continuous instruction to students. On the other hand, schooling referred to the process involved in attending and being formally educated in school. It focused on attendance, school performance and drop-out rate.

METHODOLOGY⁶

The study area

Los Baños and Bay are adjacent municipalities in the province of Laguna (Figure 1). At the north of these municipalities is the Laguna Lake, the biggest lake in the country. A large area of these two municipalities is situated within the watersheds of Mt. Makiling.

Four major rivers of the Makiling watershed pass through the municipality of Los Baños while three pass through Bay before finally draining to the Laguna Lake. The wet season start as early as May and last up to December while the dry season covers the rest of the year. (Bay MPDO, 2011; Los Baños MPDO, 2010).

6 Adopted from the corresponding author's unpublished PhD dissertation entitled Adaptive Capacities to Floods of Public Schools in the Municipalities of Bay and Los Baños, Laguna, Philippines, University of the Philippines Los Baños, 2015.

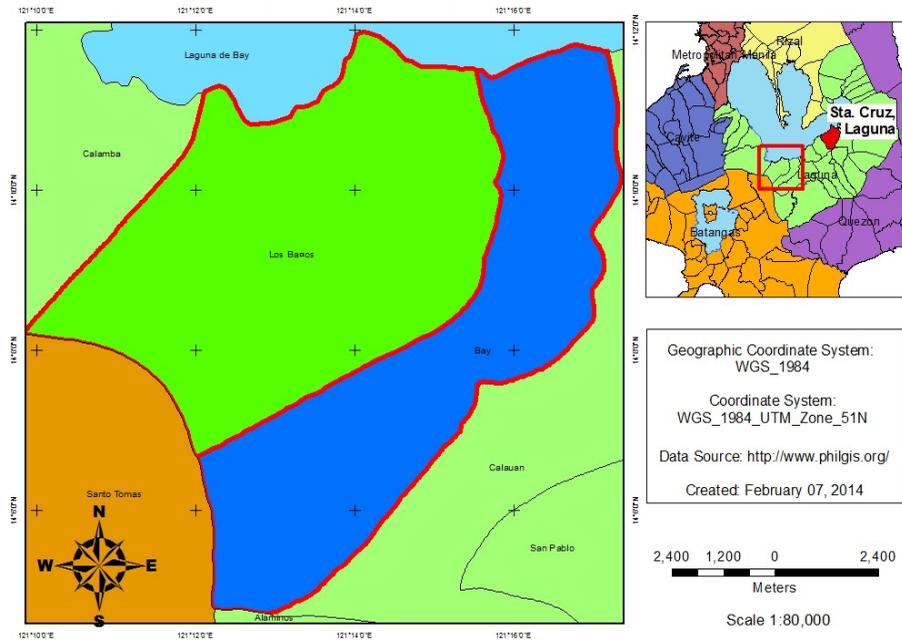


Figure 1. Location Map of Municipalities of Los Baños and Bay

Schools under Study

All the 38 public schools in the two municipalities, composed of 27 elementary and 11 high schools were included in the study. Two high schools are administered by State Colleges and Universities (SUCs) and one is an attached high school to the Department of Education (DepEd). All the rest are administered by the DepEd. Schools were grouped into three, based on experience with floods as determined by school heads or assigned representatives. These groups were:

Group A- Flooded schools. These are schools whose buildings, other facilities and immediate vicinity were flooded during previous flood events. In these schools, floods caused harm or difficulty to students and damage to school property, have resulted to cancellation or disruption of classes or have impeded the access of students and teachers to the schools. It was presumed that floods caused considerable impacts on the provision of education services and on the schooling of children in this group.

Group B- Non-flooded but affected. These are schools that were not flooded but were used as evacuation centers or have shared its facilities with other schools that have been flooded or displaced by flood events. In these schools, there has been considerable number of students or teachers that were affected by floods that caused considerable impacts on the provision of education services and on the schooling of children.

Group C- Non-flooded least affected. These are schools that were not flooded during the previous events, not used as evacuation centers and did not accommodate other schools that were flooded or displaced by floods. Very few teachers' and students' families may have been affected by floods, thereby causing minimal effects on the provision of educational services and on the schooling of children.

Codes were provided to identify each school. Codes starting with ES and HS refer to public school run by DepEd in the elementary and high school levels, respectively. Those starting with NDAHS refer to non-DepEd administered high schools.

Research Design

This study employed eclectic methods to describe the impacts of floods on the schools under study. Data were gathered through survey, key informant interviews, focused group discussions, and desk research by way of gathering school records on drop-out rates and reports on damage and other effects of floods on schools and the community.

Sampling Method

Survey respondents were chosen through random sampling. The 38 schools were stratified into the three groups (A, B and C) differentiating between elementary and high school. From each school, four teachers were randomly selected from among those who have been in active service during the occurrence of flood events in the municipalities. An additional respondent was included for schools in each stratum with the most number of teachers. A total of 157 teachers were selected representing 20 percent of the 779 public school teachers who were still in active service in the same school when the most recent flood in 2012 occurred. Table 1 presents the number of teachers surveyed (N) and the corresponding percentages for the different strata.

Table 1. Number of schools and teacher respondents in each school group

LEVEL	SCHOOL CLASSIFICATION									TOTAL		
	Group A			Group B			Group C					
	No. of Schools	N	%	No. of Schools	N	%	No. of Schools	N	%	No. of Schools	N	%
Elementary	12	48	43.6	11	45	40.9	4	17	15.5	27	110	70.9
High School	3	13	27.7	6	25	53.2	2	9	19.1	11	47	29.1
All Levels	15	61	38.8	17	70	44.6	6	26	16.6	38	157	100

Group A- Flooded; Group B- Non-flooded but affected; Group C- Non-flooded least affected

Twelve DepEd and LGU officials were chosen as key informants to provide overall background on the flood events in the province and in the two municipalities. Included were the provincial and municipal disaster risk reduction management officers; representatives from the health and the social welfare and development offices at the provincial and municipal levels; the disaster risk reduction and management coordinator (DRRMC) of the division of Laguna; and the district supervisors of the schools in the two municipalities. Sixteen school heads were chosen to provide detailed information on the conditions in their respective schools. School heads chosen were from the different school groups, the four schools where FGD was conducted and the DRRM coordinators of each district.

Focused group discussions were conducted with four groups of 12 students. The preferred student participants were those who experienced flooding in school more than once, those from households flooded for more than a month, those who moved to evacuation centers for more than a week and a representative of the student body. Similarly, FGD sessions were also held with four groups composed of teachers and parents preferably those who were flooded for more than a month and whose families moved to evacuation centers for more than a week; the barangay chairman or his representative/s; representatives of the Parent Teachers Association or Alumni Association; and, representatives of community-based organization. The schools for the FGDs were selected to represent one flooded public elementary and one flooded public high school from each municipality. The elementary schools, identified by their school codes were ES108211 and ES108314 while the high schools were HS301262 and NDAHS001.

Instrumentation

A survey questionnaire was developed and pretested with 24 teachers from schools in the city of Calamba who have experienced similar conditions as those in the different school groups in the study area. KII and FGD guides with questions tailored for the specific informant and discussants were prepared.

A Sony CD-PX312 voice recorder was used to record the proceedings of the KIIs and the FGDs. Video recordings of the FGDs were done using a Sony HDR-210 Handycam and photo documentation of the different parts of the study was done using an Olympus Digital Camera Model VG-190. These were done upon the approval of the participants.

Procedure

Permission from DepEd and LGUs was obtained to conduct the study. Letters endorsed or noted by district supervisors were distributed to the different schools. KIIs were done personally by the researcher. School heads chosen as key informants were interviewed by the researcher, simultaneously with the survey of teachers in each school conducted by trained enumerators. Consents were sought from the parents of the students and letters of invitation were sent to other prospective FGD participants. FGD sessions were held in the school premises, with each session lasting for not more than 90 minutes. Data were gathered from March to October 2013.

Data Analysis

The recorded KII and FGD sessions were transcribed and analyzed based on content. Entries in the transcripts were classified into themes or categories. The entries were organized and synthesized depending on their relevance to the study.

Descriptive statistics were used to analyze quantitative data using the Statistical Package for the Social Sciences (SPSS Version 20) software. Frequency of responses, percentages and means were used to describe the data obtained from the survey of teachers. Graphical comparison of the average annual drop-out rate across the different school groups were done each for the elementary and high school level. Similar comparison was made for the elementary and high school levels combined.

RESULTS AND DISCUSSION

Effect of floods on the school

DepEd officials from the division and district levels reported that floods in their respective areas have tremendous impact on schools. Schools in lakeshore barangays of Bay which include ES164502, ES108207, ES108211, ES108208 and HS301262, were inundated in 2009 and 2012. Meanwhile, similar schools in Los Baños which are ES108314, ES108310 and ES108311 and NDAHS001, were likewise flooded during these events (Fig.2).



Figure 2. Photographs of five schools in Bay and one in Los Baños, Laguna that were flooded in 2012. Photograph by NV Advento* and G. Inciong** used with permission

Other schools like ES108205, ES108206, ES108210, ES108200 and NDAHS003 in Bay; and ES108302 in Los Baños were also severely damaged by flash floods in 2006. This was due to the breaching and overflowing of major rivers due to Typhoon *Mileny*.

In Bay, ES108202, ES108203, ES108210, ES108200 and HS307930 were used as evacuation centers. Despite being flooded, ES164502, ES108207, ES108211 and HS301262, were not spared and were still used as evacuation centers (Table 2). Similarly, ES108308, ES108303, ES108304, ES108313 and ES108306 were used as evacuation centers in Los Baños while ES108310 and ES108311 still served as evacuation centers despite being flooded. ES108306 was temporarily used as evacuation center only at night, in fear of possible flash flood in the area.

Table 2. Number of Evacuees in School Evacuation Centers in the Bay and Los Baños Districts

BAY DISTRICT*			LOS BAÑOS DISTRICT**		
School Evacuation Center	No. of Families	Total Evacuees	School Evacuation Center	No. of Families	Total Evacuees
HS301262	89	357	ES108303	115	470
ES108211	11	51	ES108314	56	259
ES108210	155	549	ES108313	7	25
ES164502	7	25	ES108310	31	141
ES108203	136	481	ES108308	67	269
ES108202	164	721	ES108304	51	244
ES108200/ HS307930	325	1300	ES108306	39	114
ES108207	6	24	ES108311	65	252
TOTAL	893	3508	TOTAL	431	1,774

* Report as of September 6, 2012 by Mr. Nazareth Advento, DRRMC, Bay District

** Excerpt from report as of August 15, 2012 by Dr. Darwin Talambayan, DRRMC, Division of Laguna

About 84 percent of the survey respondents from the elementary and 68 percent from the high school level mentioned that floods affected the delivery of education services to their students (Table 3). As expected, most of these teachers were from flooded schools and non-flooded but affected schools while very few were from non-flooded least affected schools. Respondents from flooded elementary and high schools complained mainly of cancellation and disruption of regular classes, physical damages due directly to floods, and physical damages due to their school's conversion to an evacuation center.

Table 3. Adverse effects of floods on schools that led to difficulty in the delivery of education services.

ADVERSE EFFECTS BY LEVEL	GROUP A		GROUP B		GROUP C		TOTAL	
	FREQ	%	FREQ	%	FREQ	%	FREQ	%
Elementary	N=48		N=45		N=17		N=110	
<i>Number of respondents affected</i>	47	97.9	42	93.3	3	17.6	92	83.6
Effects on the delivery of education services *	N=47		N=42		N=3		N=92	
Cancellation/disruption of regular classes	46	97.9	35	83.3	3	100.0	84	91.3

Table 3. Continued...

ADVERSE EFFECTS BY LEVEL	GROUP A		GROUP B		GROUP C		TOTAL	
	FREQ	%	FREQ	%	FREQ	%	FREQ	%
Damage to school facilities, equipment and educational materials from being an evacuation center.	38	80.9	19	45.2	0	0.0	57	62.0
Damage to school infrastructure, facilities and equipment due to floods.	38	80.9	0	0.0	0	0.0	38	41.3
Difficulties from sharing facilities with other schools	16	34.0	16	38.1	0	0.0	32	34.8
High School	N=13		N=25		N=9		N=47	
<i>Number of respondents affected</i>	13	100.0	16	64.0	3	33.3	32	68.1
Effects on the delivery of education services*	N=13		N=16		N=3		N=32	
Cancellation/disruption of regular classes	12	92.3	14	87.5	3	100.0	29	90.6
Difficulties from sharing facilities with other schools	3	23.1	6	37.5	0	0.0	9	28.1
Damage to school facilities, equipment and educational materials from being an evacuation center.	7	53.8	1	6.3	0	0.0	8	25.0
Damage to school infrastructure, facilities and equipment due to floods.	8	61.5	0	0.0	0	0.0	8	25.0

Group A- Flooded; Group B- Non-flooded but affected; Group C-flooded least affected

* Multiple response

Cancellation/disruption of regular classes was also the main problem in non-flooded but affected elementary and high schools. Other considerable effects mentioned in the survey were the physical damages due to the schools' use as evacuation center and difficulties in sharing of classrooms and facilities with seriously flooded schools. However, among the 16 high school teachers affected in this group, only one complained of damage to their school due to conversion to evacuation center. The schools in this group used as evacuation centers were mostly elementary schools except for HS307930.

Education officials and school heads reported that suspension of classes were declared during floods and extreme weather conditions. In addition, normal classes were disrupted in flooded schools, in schools that were converted to evacuation centers or in schools that shared their facilities with flooded schools since classes were done in shifts and the conditions were not conducive to learning.

Physical damages were also two-fold, These were caused by flood waters and by the evacuees. Most of the schools used as evacuation centers were practically devastated (Table 4). The KIIs and FGDs revealed that classrooms and facilities like toilets and lavatories were vandalized. School furniture, appliances, and equipment were either damaged or completely destroyed. Teaching materials, school records, reports, and documents were also ruined. Light bulbs, doorknobs and other room fixtures were destroyed and many were stolen.

Table 4. Extent of Damage to School Properties due to Floods and use as Evacuation Centers in 2012

SCHOOL	ROOMS	CHAIRS/ ARMCHAIRS	BOOKS (ALL SUBJECTS)	COMFORT ROOMS
Damage to Public Schools in the Bay District due to Floods*				
ES108211	8	225	1, 293	2
ES164502	8	680	2, 580	1
ES108208	8	29	404	1
ES108207	16	494	2, 481	1
TOTAL	40	1, 428	6, 758	5
Damage to Public Schools in the Bay District from Use as Evacuation Centers*				
HS301262	21	260	150	6
ES108200	41	62	1, 116	3
ES108202	23	350	3, 641	5
ES108203	4	130	0	3
ES108210	5	93	11	0

Table 4. Extent of Damage to School Properties ... (Continued)

Damage to Public Schools in the Bay District from Use as Evacuation Centers*				
ES108207	16	494	2, 481	1
ES164502	8	680	2, 580	1
ES108211	8	2250	1, 293	2
TOTAL	126	2, 294	11, 272	21

Damage to Schools in the Los Baños District from Floods and Use as Evacuation Center**				
	Classroom	Furniture/Fixtures	Books	Equipment
All Affected Schools	18	528	6113	24

* Report submitted by Mr. Nazareth Advento, Bay District DRRMC

** Excerpt from report by Dr. Darwin Talambayan, DRRMC, Division of Laguna

School evacuation centers were made to hold more people beyond their capacities. Toilet facilities were not enough to provide the needs of all the evacuees, hence these often got clogged and damaged causing serious sanitation problems as people disposed their human waste improperly.

Maintaining discipline and order within the school evacuation center was also a problem. This was true especially in prohibiting drinking, smoking, gambling and other unwanted activities and imposing curfew. Some families even brought their pets, increasing the incidence of animal bites. Even the school vegetable gardens were not spared. There were even instances when school gates and classrooms were forcibly opened just to accommodate the evacuees. Electric and water consumption surged up as some evacuees brought their appliances with them, which led to the disconnection of power services in some schools.

A considerable number of teachers and school personnel were also affected by floods in their homes (Table 5). Aside from the challenges they have to face at home, they also encountered difficulties in coming to school. Exposure to floods also made teachers sick, forcing them to be absent from their classes. Students felt sorry for their teachers who were often preoccupied with problems due to floods both in school and at home. The effects of floods on teachers were reflected in their delivery of instruction. Students said some teachers tended to be ill-tempered while some just kept on giving homework.

Table 5. School personnel of Bay and Los Baños districts affected by floods in their homes

SCHOOL DISTRICT	NO. SCHOOL PERSONNEL AFFECTED
Bay District*	53
Los Banos District**	30
TOTAL	83

Source: * Report submitted by Mr. Nazareth Advento, Bay District DRRMC

** Excerpt from the DRRMC Division of Laguna report by Dr. Darwin S. Talambayan,

Both high schools where the FGDs were conducted were less seriously damaged by floods since the buildings of HS301262 are elevated higher than ground level while the area of NDAHS001 is located at the side of a hill. But since the surrounding area was inundated, students and teachers in both schools had difficulty in coming to school. HS301262 was also seriously vandalized by evacuees, leaving the students and teachers to fully clean and disinfect the school for several weeks. The conditions in NDAHS001 during the 2009 floods became very non-conducive to learning when classes in the college level were all held in their area. This was because their college campus was inundated for several months.

Problems in the Delivery of Education Services

The major problem encountered in teaching in both flooded and non-flooded schools were the lack of time to finish all the lessons and poor motivation and concentration of students (Table 6). Lack of classrooms and shortage of teaching materials were greater problems in flooded schools than non-flooded but affected schools. This was because, in addition to the damage from floods, many of the inundated schools were also used as evacuation centers. A considerable number of teachers also complained of difficulty in preparing lessons due to the effect of floods on their family since they also have to attend to the needs of their family and home.

Table 6. Problems in teaching encountered by respondents due to floods

PROBLEMS ENCOUNTERED BY LEVEL	GROUP A		GROUP B		GROUP C		TOTAL	
	FREQ	%	FREQ	%	FREQ	%	F	%
Elementary	N=48		N=45		N=17		N=110	
<i>Number of respondents who encountered problems</i>	47	97.9	33	73.3	1	5.9	81	73.6
Problems encountered in teaching*	N=47		N=33		N=1		N=81	
Lack of time to finish all the lessons	40	85.1	24	72.7	1	100.0	65	80.2

PROBLEMS ENCOUNTERED BY LEVEL	GROUP A		GROUP B		GROUP C		TOTAL	
	FREQ	%	FREQ	%	FREQ	%	F	%
Problems encountered in teaching*	N=47		N=33		N=1		N=81	
Poor motivation/ concentration of students	32	68.1	21	63.6	1	100.0	54	66.7
Lack of classrooms	35	74.5	18	54.5	0	0.0	53	65.4
Lack of teaching materials	35	74.5	11	33.3	0	0.0	46	56.8
Difficulty in preparing lessons due to the effect of floods on own family	19	40.4	5	15.2	1	100.0	25	30.9
High School	N=13	N=25	N=9	N=47				
<i>Number of respondents who encountered problems</i>	13	100.0	17	68.0	4	44.4	34	72.3
Problems encountered in teaching*	N=13	N=17	N=4	N=34				
Lack of time to finish all the lessons	11	84.6	9	52.9	3	75.0	23	67.6
Poor motivation/ concentration of students	6	46.2	12	70.6	1	25.0	19	55.9
Lack of classroom	10	76.9	4	23.5	0	0.0	14	41.2
Lack of teaching materials	7	53.8	4	23.5	2	50.0	13	38.2
Difficulty in preparing lessons due to the effect of floods on own family	1	7.7	6	35.3	1	25.0	8	23.5

Group A- Flooded; Group B- Non-flooded but affected; Group C-flooded least affected

* Multiple response

Lack of time to finish all lessons

Classes in schools affected by the flash floods of Typhoon *Milenyo* had to be cancelled for at least one week to provide time for cleaning and restoration. Classes in schools flooded by *Ondoy* and *Habagat* also had to be cancelled for almost the same number of days to recover damaged materials, plan and coordinate the resumption of classes either in their school or in alternative locations. Even non-flooded least affected schools were also affected by cancellation of classes declared for the entire province.

Many teachers and students in flooded and in school evacuation centers, complained that holding classes in shifts resulted to learning only half of what they were supposed to cover. Students also spent a lot of time cleaning the rooms from the filth due to floods and those left by the evacuees.

Poor motivation and concentration of students

Even alternative areas provided for flooded schools to continue their classes were very inconvenient. Aside from being hot and crowded, they usually have no wall partitions to separate classes. In school evacuation centers, aside from the dirty surroundings, the place was also very noisy. Teachers had to raise their voices to be heard, which oftentimes, distracted other classes. The poor conditions were even aggravated by the lack of power and water supply. Poor motivation in non-flooded least affected schools, on the other hand, is common even without floods.

Lack of classrooms

School heads from flooded schools had to look for alternative places or had to deal with a very limited area to hold classes as some flooded schools were even used as evacuation centers. Some evacuees in ES108303 in Los Baños even stayed up to March, the following year, after the monsoon floods in 2012. Many of the schools used as evacuation centers held classes in their covered basketball courts since the rooms were filled with the evacuees' belongings.

Shortage of teaching materials

Books, visual aids and other teaching materials and even school furniture were damaged, not only by floods, but also by evacuees in school evacuation centers. These materials were even used as fuel for cooking, for toilet and for disposing human wastes. Shortage of teaching materials in non-flooded least affected schools, however, may not be due to floods but may be indications of the need to provide more teaching resources to these schools.

Difficulty in preparing lessons due to the effect of floods on teachers' homes

Aside from the difficulty in coming to school, teachers whose families were affected by floods had to exert extra effort to prepare their lessons over and above the usual workload assigned to each of them. Lack of electricity made preparation of lessons even more difficult. There was also the greater need for some to repair their damaged house and properties.

Effect on Floods on the Schooling of Children

As high as 87 percent of all the 110 elementary and 70 percent of all the 47 high school teachers surveyed reported that the floods have affected the schooling of their students (Table 7). More teachers from flooded schools reported adverse effects on the schooling of their students than those from

the non-flooded school groups. The most common effects of floods on the schooling of both elementary and high school students across school groups were absenteeism followed by poor school performance. Only about a quarter of teachers from flooded schools and very few from the non-flooded schools, especially at the high school level, reported an increase in the drop-out rate due to floods.

Table 7. Effects of floods on the schooling of children

EFFECTS ON SCHOOLING BY LEVEL	GROUP A		GROUP B		GROUP C		TOTAL	
	FREQ	%	FREQ	%	FREQ	%	FREQ	%
Elementary	N=48		N=45		N=17		N=110	
<i>Number of respondents with students whose schooling was affected</i>	47	97.9	37	82.2	12	70.6	96	87.3
Effects on schooling of students *	N=47		N=37		N=12		N=96	
Increased absenteeism	45	95.7	36	97.3	12	100.0	93	96.9
Low scores/class performance	33	70.2	20	54.1	7	58.3	60	62.5
Increased drop-out rate	12	25.5	7	18.9	1	8.3	20	20.8
High School	N=13		N=25		N=9		N=47	
<i>Number of respondents with students whose schooling was affected</i>	11	84.6	19	76.0	3	33.3	33	70.2
Effects of floods on schooling of students *	N=11		N=19		N=3		N=33	
Increased absenteeism	10	90.9	18	94.7	3	100.0	31	93.9
Low scores/class performance	5	45.5	14	73.7	2	66.7	21	63.6
Increased drop-out rate	3	27.3	0	0.0	0	0.0	3	9.1

Group A- Flooded; Group B- Non-flooded but affected; Group C- Non-flooded least affected

* Multiple response

Increased absences

The reasons for the increase in absences derived from the survey as well as in the KIIs and FGDs were grouped into three. These were: (1) floods and adverse weather hindered students from going to school; (2) students had to absent themselves due to the effects of floods on the households; and (3) lack of motivation to go to school (Table 8).

Table 8. Reasons for increased absences due to floods

REASONS FOR INCREASED ABSENTEEISM	GROUP A		GROUP B		GROUP C		TOTAL	
	FREQ	%	FREQ	%	FREQ	%	FREQ	%
All Levels	N=55		N=54		N=15		N=124	
Floods and adverse weather hindered schooling	20	36.4	25	46.3	11	73.3	56	45.2
Effect of floods on households	20	36.4	16	29.6	2	13.3	38	30.6
Lack of motivation	8	14.5	6	11.1	0	0.0	14	11.3
No reason given	7	12.7	7	13.0	2	13.3	16	12.9

Group A- Flooded; Group B Non-flooded but affected; Group C- Non-flooded least affected

Parents were hesitant to let their children go to school especially during heavy rains and typhoons due to difficulties and risks especially if they had to cross flooded areas, rivers, or take boat rides. Some had to take alternative routes that were farther and even more costly due to additional rides. Higher fares were often charged during floods. Children got sick or had traumatic experiences, preventing them from going to school.

Some children needed to help restore and repair damaged houses and other properties. Others were forced to absent themselves to secure their valuables and belongings in evacuation centers. Many needed to take care of young or sick family members while others needed to help in earning a living. Still some families could not provide allowances for transportation, food and other school needs.

Some children were reluctant to go to school after losing their school materials (books, school supplies, uniform, etc.) in the floods. Some of them felt hopeless with their conditions. Many students also preferred to absent themselves from school since the conditions were not conducive to learning. A few students got used to the frequent cancellation of classes, while others felt they were not ready to go to school after the disaster.

Effect on school performance

The decrease in school performance of affected students were attributed to: (1) the absences they incurred that led to more lessons missed and inability to meet the requirements in class; (2) inconvenience and poor conditions at school, at home or in the evacuation centers that caused difficulty in understanding the lessons, distraction, poor concentration and focus, poor mastery which eventually led to lower learning outcomes; (3) cancellation of classes and disruption in normal classes that reduced class hours; and (4) adverse effects on households that forced families to set aside education for more immediate needs, hence the lack of needed support and guidance in the children's schooling (Table 9). Some students lost their school materials from the floods. Many families even failed to provide the school needs of their children.

Some school heads admitted that although they were able to cover all the required lessons, the students' mastery of these lessons was sacrificed. This was especially true for flooded and non-flooded but affected schools, that had classes in shifting schedules, since the class hours were reduced practically to almost half the normal time. Many high school students who participated in the FGDs complained that the modules distributed as supplement for limited classroom discussions were not always effective. Some students insisted that they understand their lessons better through classroom discussions and that they easily forget the lessons through self-study.

Table 9. Reasons for the decrease in school performance due to floods

REASONS FOR LOW CLASS PERFORMANCE	GROUP A		GROUP B		GROUP C		TOTAL	
	FREQ	%	FREQ	%	FREQ	%	FREQ	%
All Levels	N=38		N=34		N=9		N=81	
Absences or missed lessons	17	44.7	14	41.2	4	44.4	35	43.2
Cannot concentrate due to inconvenient and poor conditions at home, EC and school	10	26.3	13	38.2	0	0.0	23	28.4
Due to effect on households	3	7.9	1	2.9	1	11.1	5	6.2
Reduction in class hours	3	7.9	0	0.0	2	22.2	5	6.2
No reason given	5	13.2	6	17.6	2	22.2	13	16.0

Group A- Flooded; Group B Non-flooded but affected; Group C Non-flooded least affected

In spite of these, some students claimed that many of their grades were not affected since their teachers made necessary adjustments in giving requirements and in their expectations. School heads added that the adverse effects of floods on grades were more pronounced among low performing students.

Effect on drop-out and school enrolment

Despite the increase in absences, drop-out due to floods was not a problem for most of the teachers surveyed (Table 7). Only one school head from a flooded elementary school in Los Baños, reported increased drop-outs in their school. A high school teacher, in an FGD session, pointed out that three of her students dropped out to guard their belongings in the Tent City, an evacuation area in Bay. A key informant, from a non-flooded but affected high school in Los Baños, claimed that the high drop-out rate in their school was just normal and cannot be attributed to flooding.

The drop-out rate data for the last five years, from the DepEd Division Office and from the registrars' offices of non-DepEd administered high schools, were compared. In flooded elementary schools, although the number of drop-outs increased in school year (SY) 2012-2013, there was no similar increase in the earlier flooded SY in 2009-2010 (Fig.3). The decrease in drop-outs in both flooded school years, for the non-flooded but affected elementary schools, and the abrupt increase in the drop-out rate during non-flooded school years in non-flooded least affected schools, further disprove that flooding is the main cause of drop-out in public elementary schools in these two municipalities.

The drop-out rate in both flooded and non-flooded least affected high schools exhibited increasing trends in the first four school years followed by a decline in the fifth year (Fig. 4). Again, this trend does not show convincing evidence that floods were the main cause of drop-outs in these groups of schools. The increasing drop-out rates during non-flooded school years point to other causes.

Although there were increases in the drop-out rate during both flooded school years for non-flooded but affected high schools, this was contrary to the results of the survey conducted where none of the respondent teachers in the same group said that floods increased drop-out (Table 7). This is also contrary to the statement of a key informant from the same group of high schools who insisted that the high drop-out in their school was normal and cannot be attributed to floods.

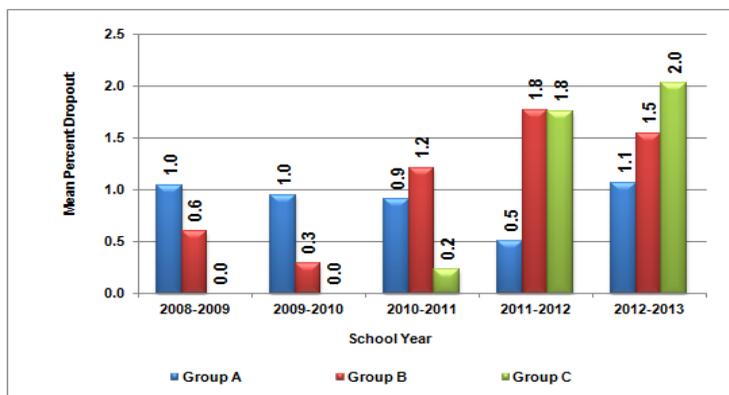


Figure 3 . Mean percentage drop-out in public elementary schools in Bay and Los Baños in the last five school years. Note: Floods occurred in SY 2009-2010 and 2012-2013.

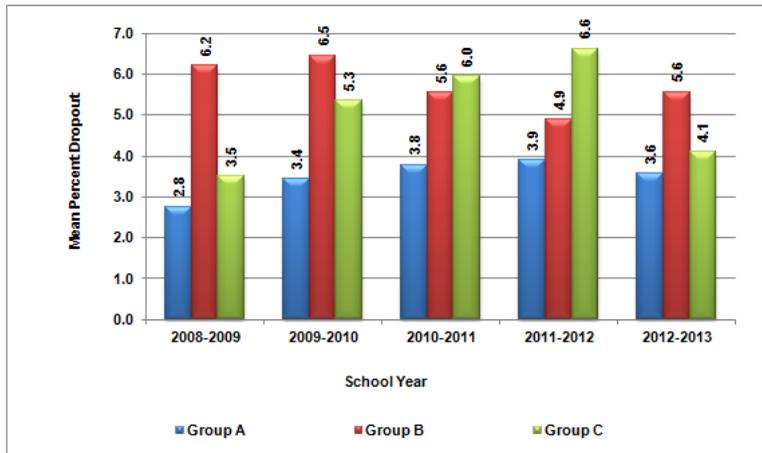


Figure 4. Mean percentage drop-out rate of public high schools in Bay and Los Baños in the last five school years. Note: Floods events occurred in SY 2009-2010 and 2012-2013.

The trend in the combined drop-out rate for flooded elementary and high schools in the last five years failed to show any conclusive proof that flooding was the major cause of drop-outs (Fig. 5). The increase in the drop-out rate of flooded elementary and high schools combined in SY 2012-2013 was again not consistent with SY 2009-2010 when the floods occurred. The generally increasing trends in the drop-out rate for both non-flooded school groups, elementary and high schools combined, regardless of the occurrence of floods in the last five years, point out that there are other factors that increased drop-out rate in the public schools of Bay and Los Baños.

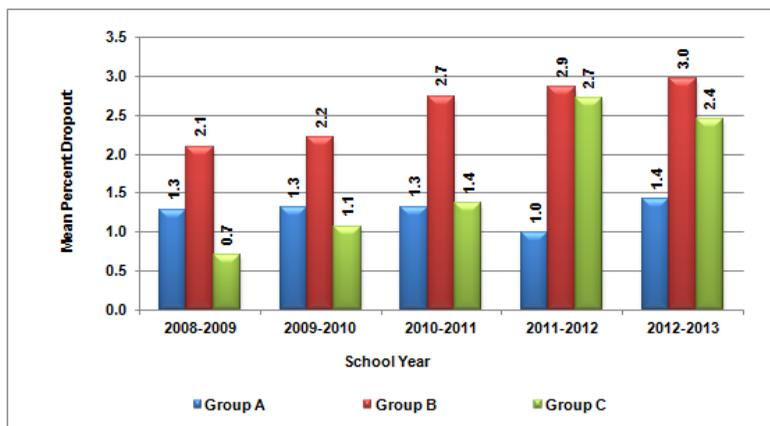


Figure 5. Mean percentage drop-out of public elementary and high schools combined in Bay and Los Baños in the last five school years. Note: Floods occurred in SY 2009-2010 and 2012-2013.

Dropping-out of students from public schools may be primarily due to poverty. Poverty highly affects education (Save the Children, 2007). Inability of households to afford school expenses, the need to earn a living and the need to care for the other members of the family are some of the major reasons why children are pulled out from schools (PIDS, 2010). Furthermore, poverty is considered as a major factor that limits the ability of Filipino families to recover from impacts of natural and manmade hazards (USAID and Save the Children, n.d.). Due to these conditions, children of indigent families are predisposed to leaving school to meet urgent household needs, with or without floods. Efforts to reduce dropping out from school during floods may have been effective. However, efforts to mitigate poverty in the communities were not enough; hence, the drop-out rate was most probably due to poverty.

School heads confirmed that, indeed, some students transferred to other schools either on a temporary or on a permanent basis. This was consistent with observations of students, particularly from the DepEd administered schools where the FGDs were conducted. They were unaware of schoolmates who dropped-out from school due to the floods but knew some who transferred to other schools that were not flooded. School heads added that there was not much effect on the school enrolment since some of the students who left also came back before the end of the school year.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Delivery of education services and the schooling of children were badly affected by the impacts of floods on the school and at home. Flood caused cancellation and disruption of classes, physical damages as well as adverse effects on teachers in school and at home that led to problems in the delivery of education services. Problems in teaching such as lack of time to finish all the lessons, poor motivation/concentration of students, lack of classrooms to hold classes, shortage of teaching materials, and difficulty in preparing lessons were encountered.

Cancellation as well as holding classes in shifts resulted to major reduction in the time needed to cover all the lessons. Classroom conditions in flooded schools, school evacuation centers and in alternative school areas were not conducive to both teaching learning. There was very limited space since some flooded schools were even used as evacuation centers while non-flooded school evacuation centers held classes in their covered basketball courts since the classrooms were occupied by evacuees.

Teaching materials were damaged, not only by floods, but also by evacuees. Flood affected teachers need to contend with poor conditions at home or in evacuation centers to prepare their lessons, plus the need to attend to their damaged house and properties.

Schooling of children was affected in terms of attendance and school performance of children. Floods hindered students from going to school. Students had to absent to attend to the effects of floods on their families. Floods also dampened the motivation of students to go to school.

Increased absences led to more lessons missed and inability to satisfy requirements in class. Inconvenience and poor conditions at school, at home or in the evacuation centers hindered understanding and mastery of lessons. Cancellation and disruption of classes reduced contact hours. Adverse effects of floods on households reduced the needed support and guidance of families for their children's schooling.

There was no clear evidence that the floods in 2009 and 2012 increase student drop-out rate contrary to past studies. Instead, drop-out was attributed to poverty of households in the schools covered by the study.

RECOMMENDATIONS

The following recommendations to reduce the impacts of floods on schools, in general, and in the delivery of education services and the schooling of children, in particular, are addressed to LGU, and to DepEd officials and school officials. The following recommendations are addressed to LGU officials:

Prolonged cancellation of classes should only be declared depending on the actual situation in the area to avoid unnecessary loss of school days in less affected schools.

LGUs should strive to establish permanent evacuation centers in order to lessen physical damage and disruption of classes in schools. These centers should provide good living conditions, adequate sanitation and the necessary privacy and security to avoid untoward incidents. These facilities should be fit for other purposes while it is not used for evacuation.

The following recommendations are addressed to DepEd and school officials:

In the absence of permanent evacuation centers, education officials should push for the use of other government facilities or other areas for evacuation, instead of schools. If schools will still be used as evacuation centers, these should not exceed one week. They should also stand firm that students should be the ones using the classrooms, instead of the covered courts for their classes, that only the right number of evacuees should be assigned to each school evacuation center based on available space, available safe water and other sanitation facilities, and that there should be a clear definition of duties and good coordination among the school authorities and the different agencies involved.

Reasonable flexibility be given to schools in terms of scheduling make-up or remedial classes. Adjustments in the school calendar to cover the all lessons to be taken up with the proper time allotted can be considered.

Climate-resilient, child-and environment-friendly school buildings must be constructed to reduce damage to schools, minimize risks of accidents during floods and reduce disruption of school operation. Classrooms on stilts or on upper levels, when provided with the necessary and safe access, can still be used to hold classes or secure important school materials during floods. Additional classrooms must be constructed in non-flooded schools that accommodate students or schools displaced by floods to provide more conducive learning atmosphere.

Damaged teaching and learning materials be replaced at the soonest possible time to avoid difficulty for both teachers and students.

Teachers must be trained in using teaching strategies that are effective under unfavorable conditions. Training on handling large class sizes and the use of needed IT equipment to include generators, if applicable, must be provided. Training to enhance skills and in managing school property and vital school records during emergencies must be provided.

Additional teachers need to be hired either on a contractual or regular basis, not only relieve the burden of flood-affected teachers but also to improve the capacity of non-flooded schools to accommodate students from inundated schools.

Alternative delivery modes (ADM) should be developed for both the elementary and secondary levels to address problems on attendance and low class performance due to reduced contact time between teachers and students. Regular review of these materials must be done to ensure their effectiveness.

School-initiated instructional and non-instructional interventions like peer tutoring, home visitations, guidance and counselling services, financial assistance, school feeding and scholarships programs for the welfare of students must be encouraged, adopted, supported and further improved. These measures can address absenteeism and decreased school performance.

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STATEMENT OF AUTHORSHIP

The final paper was done primarily by the senior author with significant contributions from the other authors who are member of his PhD advisory committee.

REFERENCES

- ALJAZEERA-ASIA PACIFIC. 2012. Floods submerge most of Philippine capital. Retrieved from <http://www.aljazeera.com/news/asia-pacific/2012/08/2012885413360470.html>. Accessed September 18, 2012.
- BAY MPDO. 2011. Updated Fact Sheet of the Municipality of Bay, Laguna.
- ELEAZAR, L. 2011. "Land Tenure and Natural Disasters- Philippines" In Land Tenure and Natural Resources: Addressing land tenure issues following natural disasters. Copyright FAO, 2010. pp 75-96.
- INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, 2012: Glossary of terms. In: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC). Cambridge University Press, Cambridge, UK, and New York, NY, USA, pp. 555-564.
- INTERNATIONAL FEDERATION OF THE RED CROSS. 2012. Emergency appeal Philippines: Floods. Retrieved from <http://www.ifrc.org>. Accessed: November 12, 2008.
- LOS BAÑOS MPDO. 2010. Socio-economic and Physical Profile of the Municipality of Los Baños, Laguna
- MAPLECROFT. 2010. *Big economies of the future - Bangladesh, India, Philippines, Vietnam and Pakistan- most at risk from climate change.*

- NORWEGIAN REFUGEE COUNCIL. 2012. Assessment capacity project (ACAPS). Disaster summary sheet-floods. Retrieved from <http://www.acaps.org/img/disasters/dss-floods.pdf>. Accessed December 10, 2012
- O'BRIEN, K. et al. 2008. Disaster risk reduction, climate change adaptation and human security. Report prepared for the Royal Norwegian Ministry of Foreign Affairs by the Global Environmental Change and Human Security (GECHS) project, GECHS Report 2008:3
- PHILIPPINE INSTITUTE FOR DEVELOPMENT STUDIES, 2010. The Filipino Child: Global Study on Child Poverty and Disparities- Philippines. A Glimpse at School Drop-out Problem. Policy Brief No. 4, 2010. <http://dirp4.pids.gov.ph/ris/pn/pidsbrief04.pdf>. Accessed December 10, 2014.
- SAVE THE CHILDREN. 2007. Legacy of disasters: The impact of climate change on children. Save the Children UK's humanitarian policy team. Retrieved from http://www.savethechildren.org.uk/sites/default/files/docs/legacy-of-disasters_1.pdf. Accessed September 12, 2012.
- SAVE THE CHILDREN. ND. Reducing risks, saving lives: Save the children's approach to disaster risk reduction and climate change adaptation. Retrieved from http://www.savethechildren.org.uk/sites/default/files/docs/Reducing_Risks_Saving_Lives_1.pdf. Accessed September 10, 2012.
- UNITED NATIONS CHILDRENS FUND. 2009. Schools adapt and continue despite post-typhoon flooding in the Philippines. Retrieved from http://www.unicef.org/infobycountry/philippines_51928.html. Accessed August 21, 2012.
- UNESCO, ASIA PACIFIC REGIONAL BUREAU FOR EDUCATION. 2012. Education sector response to climate change: Background paper with international examples.
- USAID AND SAVE THE CHILDREN. ND. Nurturing Safe Schools: A Teacher Guide to Child-centered Disaster Risk Reduction.
- WORLD BANK. 2011. Philippines-typhoons *Ondoy and Pepeng*: Post disaster needs assessment. Main report.
- YUSUF, A.A. and H.A FRANCISCO. 2010. Climate change vulnerability mapping for Southeast Asia. Economy and Environment Program for Southeast Asia (EEPSEA).



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