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9/13/2004



Republic of the Philippines  
Department of Science and Technology  
PHILIPPINE ATMOSPHERIC, GEOPHYSICAL AND  
ASTRONOMICAL SERVICES ADMINISTRATION (PAGASA)  
PAGASA Science Garden, Agham Road, Diliman, Quezon City



13 Sept. 2004  
(Date)

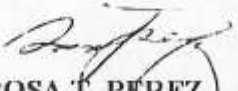
**GROUP TRAVEL ORDER**


The following PAGASA-FFB personnel are hereby directed to proceed to San Miguel and Ipo Dam, Bulacan on September 14, 2004 to do the following: to investigate the reported recent flash flooding of Madlum River in San Miguel Bulacan and to gather flow discharges at Ipo Dam during the flood event of August 25-28, 2004.

1. Mr. Armando P. Taruc
2. Mr. Hilton T. Hernando
3. Mr. Pablito E. Villablanca

A report of your travel must be submitted to the undersigned within thirty (30) days from completion thereof.

Approved:

  
ROSA T. PEREZ

OIC, Flood Forecasting Branch 

  
PRISCO D. NILO

(Deputy Director for O & S)  
Officer-In-Charge, PAGASA

To be Noted by the Division/Branch Concerned for any Further Instructions, as appropriate:

Noted by:	Signature	Remarks
AGSSBB:	_____	_____
CAB:	_____	_____
EMD:	_____	_____
FF B:	_____	_____
FO C:	_____	_____

Note: This form shall be used only if the travel does not exceed seven (7) days.



Republic of the Philippines  
Department of Science and Technology  
**PHILIPPINE ATMOSPHERIC, GEOPHYSICAL AND  
ASTRONOMICAL SERVICES ADMINISTRATION (PAGASA)**

WFFC, BIR Road, Quezon City 1100 Tel. No. 928-27-54/926-50-50 Fax: 929-40-85

September 22, 2004

**For: PRISCO D. NILO, Ph.D.**  
**(Deputy Director for O & S)**  
**Officer-in-Charge, PAGASA**

**Thru: ROSA T. PEREZ, Ph.D.**  
**OIC, Flood Forecasting Branch**

**Subject: Report on the September 12, 2004 Biak-na-Bato River Flash Flood**

Sir:

Respectfully furnishing you our report on the flash flooding of Biak-na-Bato River that occurred on September 12, 2004, which reportedly drowned 8 picnickers / bathers at the Biak-na-Bato National Park (BNBNP) in San Miguel Bulacan. As a correction on our travel purpose, the flash flooding was in Biak-na-Bato River and not the Madlum River, which are both tributaries of the San Miguel River. The investigative survey was conducted last September 14, 2004.

Attached together with our report is a photocopy of the Mines and Geo-Sciences Bureau (DENR, Region III) report of the Regional Director regarding the same flash flooding event.

Very truly yours,



**Armando P. Taruc**  
**Sr. Weather Specialist**

*cc:MGB, Reg.III*

## **The Biak-na-Bato National Park (BNBNP): Flash Flood of 12 September 2004**

By Taruc, Hernando, Paat and Villablanca (FFB, PAGASA)

### **1. Background**

Biak-na-Bato was proclaimed a National Park on November 16, 1937 by virtue of Proclamation no. 233, covering an aggregate area of 2,117 hectares. On April 11, 1989, under Presidential Proclamation No.401, the whole BNBNP was reclassified under land use. Some portions were classified as mineral reservation, watershed, resettlement and National park. The National Park became a protected area being free from quarrying and deforestation activities.

On the afternoon of September 12, 2004, while on a picnic and taking a swim on the river, 8 children were swept and drowned as a result of a flash flooding along the Biak-na-Bato River. It was reportedly the worst disaster-related tragedy so far within the area.

Personnel of the Flood Forecasting Branch (FFB), PAGASA conducted a half-day investigative survey of the area last September 14, 2004 to shed light as to the sudden rise of river stage in such a short duration – the flash flood of September 12, 2004.

### **2. Physiographical Aspect**

BNBNP is located within the municipalities of San Miguel and Doña Remedios Trinidad, Bulacan Province. It is about 90 kilometers north of Manila and can be reached through an asphalted road 12 kilometers from the town of San Miguel.

The Biak-na-Bato River (Figure 1.0) drains an area of about 46.2 km<sup>2</sup> from an estimated point (referenced basin point - 1st hanging bridge within the Park) midway along its river channel. The River length from its headwater to the said point is about 10.2 kilometers. The river is a tributary to the San Miguel River, which eventually discharges out to Pampanga River via the Candaba swamp area.

The BNBNP is characterized by a rugged topography with a verdant forest cover. The highest peak, situated on the eastside of the catchment, Mt Silao, is about 900 meters above mean sea level (MSL).

Geomorphologically, the Biak-na-Bato River catchment is described as "Funnel shaped". It has a relatively wide river channel at upstream reaches because of metavolcanics and metasedimentary formation. However, the channel significantly constricts into a narrow V-shaped valley at the catchment's middle reaches (at the hanging bridge part of the park) or where the limestone sections are. Generally, the river is underlain with limestone deposits that are thinly bedded and hence not favorable for quarrying.<sup>1</sup>

The catchment area is composed of about 4 "active" sub-basins that are somewhat symmetrical and have roughly similar river distances from headwaters to the constricted portion of the catchment. This feature somehow suggests equal rainfall-river response lag times at the referenced point, if not for the slope of the river.

The river slopes of the sub-basins within the catchment are steeper than 1/100, thus producing rather fast river velocities in the range of more than 3 meters per second (Kravens), hence, with these slopes and velocities the river is highly susceptible to flash flood periods.

### **3. Meteorological Aspect**

On September 12, 2004, Tropical Storm "OFEL" was estimated based on satellite and surface data at 400 kms north of Basco, Batanes, moving north northwest at 15 kph. This system is quite far from the BNBNP area. A pronounced southwest monsoon (Habagat) was the prevailing weather condition over at the northern and western sections of Central Luzon. These areas were forecasted to have scattered rainshowers and thunderstorms, and the rest of the country with isolated rainshowers or thunderstorms.

The satellite image taken at around 1500H (LST) of that day (Figure 2.0) showed an almost overcast Luzon Island, which is ideally indicative of scattered rainshowers and thunderstorms. BNBNP area, at that time, somehow experienced rainshowers coming mainly from the northwest side of the basin. Rains were not fairly distributed over a large area, therefore indicating a possible brief thunderstorm rather than a wide-scale system that are normally associated with tropical cyclones.

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<sup>1</sup> Cabantog, A.V., MGB R-3 report: The Drowning of (8) Picknickers at the Biak-na-Bato National park on September 12, 2004.

#### 4. Hydrometeorological Aspect

##### 4.1 Rainfall Intensity Classification (millimeters)

Category	1 hour	3 hours	6 hours	12 hours	24 hours
Light	< 2.5	< 7.5	< 15	< 30	< 60
Moderate	2.5 – 7.5	7.5 – 22.5	15 – 45	30 – 90	60 – 180
Heavy	> 7.5	> 22.5	> 45	> 90	> 180

##### 4.2 Rainfall Data

Hourly Rainfall (mm) depths at various Telemetering stations within the eastern portion of the Pampanga River Basin (September 12, 2004)

Time (LST)	Papaya	San Isidro	Arayat	Candaba	Sibul Spring	Sulipan	San Rafael
1400	0	0	0	0	0	0	0
1500	0	4	0	8	0	0	6
1600	3	1.5	0	0	10	0	5
1700	19	1.5	0	0	3	No report	0

##### 4.3 Rainfall Analysis

Heavy rainfall, as per classification of intensity, was observed for about an hour over at Sibul Spring telemetering station. The station is about 7 kilometers NW of the BNBPN. A 1-hour isohyetal map (Figure 3.0) plotted within the vicinity of BNBPN showed concentration of rains over at the area with maximum occurring at the northwest portion of the catchment. Based on the pluviograph taken from Sibul Spring station, rainfall started at around 1520H (LST), and the next 20 minutes indicating a maximum rainfall depth of 6 mm while the succeeding 20 minutes recorded a depth of 4 mm. Therefore, the 10 mm rainfall depth recorded at Sibul Spring station happened within a timeframe of merely 40 minutes. The rainfall intensity over at the BNBPN as derived from the isohyetal map analysis is around 7-mm/hr occurring between 1500H-1600H (LST). The flash flood at BNBPN was reportedly to have happened sometime midway 1500H to 1600H (LST) of that day, coinciding with the derived rainfall time at BNBPN.

#### 4.4 Estimation of Discharge

There are no river stage or streamgaging stations within the BNBNP or along the Biak-na-Bato River. BNBNP is an ungauged catchment. Hence, in the absence of available actual measurements of river stage and discharge data, methods using empirical formulae for flood estimation are made used for this purpose.

Time of concentration ( $T_C$ ) is the time required for a drop of water falling on the most remote point of the catchment to reach the outlet. Remoteness really relates to time of travel, not distance. On the other hand, Time lag ( $T_L$ ) is the time difference between the centroid of the hyetograph (RR depth vs. Time) and the peak of the hydrograph (WL vs. Time).

The computed  $T_C$  and  $T_L$  for the longest watercourse within the catchment are 48 and 29 minutes, respectively. For the shorter watercourse, it is 31 mins for  $T_C$  and 19 mins for  $T_L$ . The response time of peak rainfall to effect a peak rise in river stage is therefore around 30 mins or less. This is on the assumption that the rainfall intensity is spatially distributed over the catchment and within the time of flood concentration.

A rough estimate of the maximum (peak) flood discharge during the event was calculated using the Rational Formula,  $Q = 0.278 CAi$ ,

Where:  $Q$  = peak rate of discharge ( $m^3/sec$ )

$A$  = catchment area ( $km^2$ )

$C$  = runoff coefficient (dimensionless)

$i$  = mean rate of rainfall within time of flood concentration ( $mm/hr$ )

The number 0.278 (or  $1/3.6$ ) in the formula is merely a conversion factor to balance the units used.

The computed discharge using Rational Formula at the referenced basin point of BNBNP is around  $72 m^3/sec$ , taking a runoff coefficient of 0.80.

The cross-section at the referenced point of the basin (the 1st hanging bridge in the park) has been roughly estimated; a somewhat inverted trapezoidal section (Photo 1.0). From this configuration, an estimate of the cross-sectional area, wetted perimeter ( $P$ ) and hydraulic radius ( $r$ ) were derived. The average velocity occurring at this point during the reported flash flood of September 12, 2004 was computed to be roughly  $1 m/sec$ .

## 5. Conclusion and Recommendations

The foregoing results, while computed by empirical formulae, are favorable to the fact that a flash flooding of the Biak-na-Bato River happened on the afternoon of September 12, 2004. The meteorological and hydrological conditions at that time are valid enough to cause a sudden rise of the river in such a short period of time. Hydrologically, in so far as river flash flooding is concerned, Biak-na-Bato River is prone and vulnerable to having flashy river flows.

Since BNBPN is a protected area, measures to mitigate flash flood within the park would require non-structural means:

- a.) Picnickers and visitors of the park, particularly those who will go on bathing or swimming by the river, should well be informed of the dangers and hazards that are posed to happen during their stay in the park.
- b.) Swimming should be limited, if not prohibited, during rainy months or when there is a tropical disturbance close to the BNBPN watershed.
- c.) Establishment of automatic rain gauge and water level monitoring stations at strategic locations within the watershed (upstream areas) to monitor hydrological conditions of the area, though there is really just a short period of time to take actions in cases of brief thunderstorm activities in the area.

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### References:

1. Hon. Felipe Miguel "Pippin" V. Buencamino, Municipal Administrator, San Miguel, Bulacan
2. Mr. Maximo Santos, Municipal Officer, San Miguel, Bulacan
3. Evelyn Santos, Bgy. Councilor, Bgy. Biak-na-Bato, San Miguel, Bulacan
4. Arnulfo V. Cabantog, Regional Director, Mines & Geo-Sciences Bureau, Region III, San Fernando, Pampanga
5. Orly Pineda, Chief Geologist, Mines & Geo-Sciences Bureau, Region III, San Fernando, Pampanga
6. Benedicto Agbisit, Resident Personnel, DENR, Biak-na-Bato National Park, San Miguel, Bulacan

### Computations:

#### 1. Rainfall Intensity at BNBNP catchment: Based on the Isohyetal Map (Figure3.0)

RR (mm)	Area Enclosed %	Net Area %	Ave. Pcpn. (mm)	Volume
5.0	4	4	5.75	23
6.0	50	46	6.5	299
7.0	94	44	7.5	330
8.0	100	6	8.25	49.5
TOTAL				701.5

$$\text{Average Basin RR} = 701.5 / 100 = 7.01 \text{ mm}$$

This is the average areal RR over the basin for 1 hour; therefore, the computed rainfall intensity (  $i$  ) is around 7 mm/hr occurring between 1500H-1600H of September 12, 2004 over at the BNBNP area. This is assumed to be falling spatially over the area.

#### 2. Time of Concentration and Lag Time

Using Kravens, all sub-basins within the referenced basin point (Figure 1.0) have slopes  $> 1/100$ ; therefore  $W$  (flood runoff velocity) is taken as 3.5 m / sec.

$T_C = L / W$  (where  $L$  is the length of the watercourse); thus for the longest watercourse,

$$T_C = (10,200 \text{ m}) / (3.5 \text{ m/s}) = 2,914.3 \text{ sec} * (1 \text{ min} / 60 \text{ sec}) = 48.5 \text{ mins}$$

$$\text{For Time Lag, } T_L = 0.6 T_C = 0.6 * (48.5 \text{ mins}) = 29 \text{ mins}$$

For the shorter watercourse,  $T_C$  and  $T_L$  are 33 mins and 19 mins, respectively.

#### 3. Peak Discharge

Rational Formula:  $Q = 0.278 CAi$  where  $C = 0.80$ ;  $A = 46.2 \text{ km}^2$ ;  $i = 7 \text{ mm/hr}$

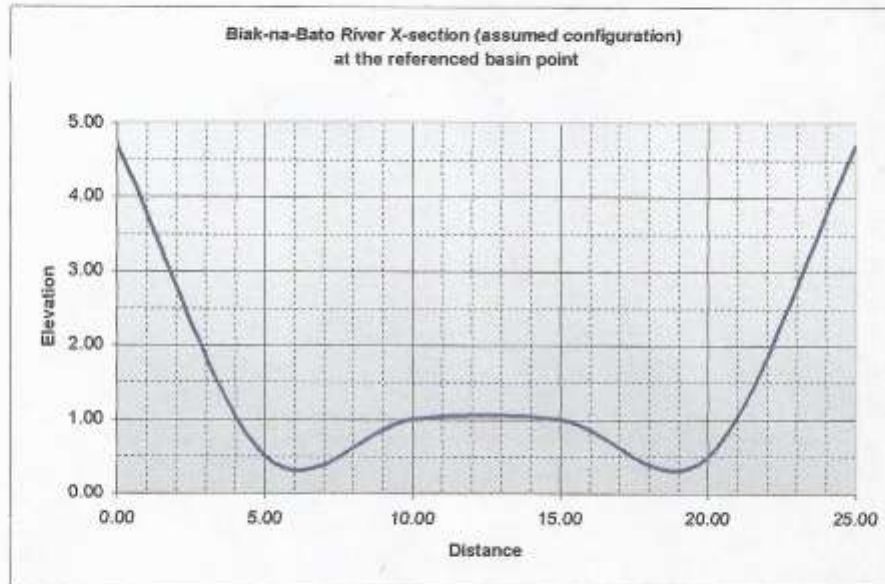
$$Q = 0.278 * (0.80) * (46.2 \text{ km}^2) * (7 \text{ mm/hr}) = 71.9 \text{ m}^3/\text{sec} \text{ or } 72 \text{ m}^3/\text{sec}$$

Note: The rainfall used to determine  $Q$  can either be an actual or observed RR, or a design RR of selected design frequency and the RR duration in hour/s.



#### 4. River flow velocity

The configuration of the section at the referenced basin point resembles an inverted trapezoid (Photo 1.0).



The computed parameters of the x-section are as follows:

$A = 79 \text{ m}^2$ ;  $W$  (wetted perimeter) = 28.1;  $R$  (hydraulic radius) = 2.81; width = 25 m.

Taking the velocity of the flow based on a computed  $Q = 72 \text{ m}^3/\text{sec}$ , we have

$Q = VA$ , where  $V$  = average velocity of flow at the section,  $A$  = x-sectional area, and  $Q$  = discharge.

Hence,  $V = Q / A = (72 \text{ m}^3/\text{sec}) / (79 \text{ m}^2) = 0.91 \text{ m/sec}$  or say almost 1.0 m/sec at the referenced basin point of BNBNP.



Figure 1.0 The Biak-na-Bato Catchment Area



Figure 2.0: Satellite Image showing an almost cloud-covered Island of Luzon, particularly over the BNBNP, taken at around 1526(LST) on September 12, 2004.

1-hr isohyets ending at 1600 LST, 12 September 2004

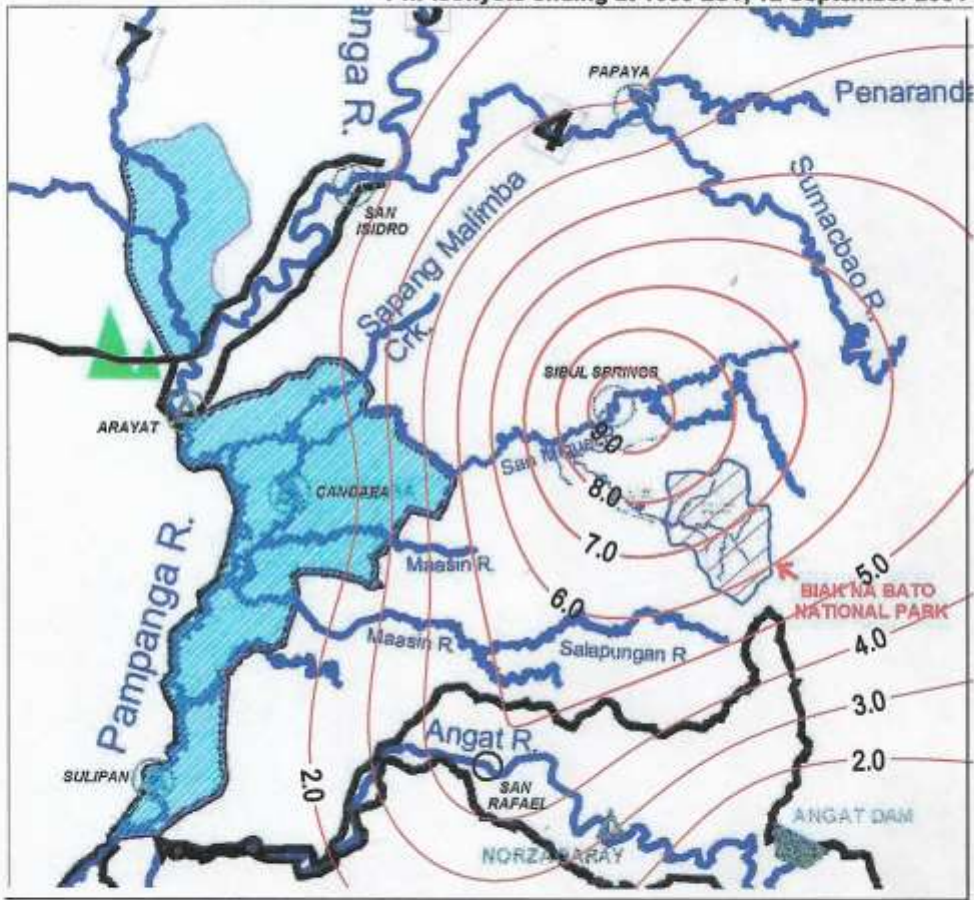


Figure 3.0: The 1-hour Isohyets (1500 – 1600 LST) over BNBPNP and its surrounding areas last September 12, 2004.



Photo 1.0. The Biak-na-Bato River channel section where the reported drowning incident happened. Note the river configuration and channel characteristics at this part of the channel.



Photo 2.0. The Biak-na-Bato river channel downstream of the incident site showing bended small tree trunks and grasses and the estimated flood level attained.



Photo 3.0. River channel close to the incident area have sandbars at the middle of the river section (where the picnickers / bathers stayed) with tree growths. Note the rushing streamflow at this section.



Photo 4.0. The constricted portion of the Biak-na-Bato River channel roughly 700 to 800 meters downstream of the incident site.



Photo 5.0. The Biak-na-Bato River at a relatively low stage showing the rushing river streamflow as it passes through tree growths along the channel.



Photo 6.0. This photo shows the relative height of the washed out tree growths along the Biak-na-Bato River.

Memorandum

For : The Honorable Secretary  
Department of Environment and Natural Resources  
Visayas Avenue, Diliman, Quezon City

Thru : The Undersecretary for Field Operations

From : The Regional Director  
Mines and Geosciences Bureau  
Regional Office No. 3  
City of San Fernando, Pampanga

Subject : Report on the Drowning of Eight (8) Picnickers at the  
Biak na Bato National Park on September 12, 2004.

Date : September 15, 2004

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The incident was featured on GMA's 24 Oras news report last Monday evening (Sept. 14, 2004) In the interview with the Mayor of San Miguel, Bulacan, the Mayor pinpointed to illegal quarrying as the cause of the flashflood at the Biak na Bato National Park (BNBNP) that lead to the drowning of eight (8) children.

With this, the undersigned decided to conduct an investigation the following day, Tuesday, to determine the real cause of the flashflood. However, at around 7:30 PM on Monday, Mr. Edwin Domingo, Assistant Director, called up and told me about the incident.

The party coordinated with CENR Officer Martin Danao, of CENRO San Rafael, Bulacan before proceeding to BNBNP. We were furnished a copy of the report of CENRO Danao to RED Regidor de Leon regarding the incident.

The BNBNP is underlain by the Angat Formation. This formation consists of a lower clastic member representing a minor part of the formation and an upper limestone member. The clastic is made up of thin beds of calcareous shale and clayey sandstone with occasional lenses of sandy limestone. The sandstone is normally graded and well cemented while the limestone lenses are dense, brittle and partly siliceous.

The limestone member is made up of lower reef-flank deposit and an upper biohermal mass. The lower bedded portion is dominantly calcareous rock detrita



and fine slime with interbedded, finely silicious layers. The biohermal portion is white to buff occasionally gray to pink, cavernous and partly crystalline and essentially consist of skeletal remains of reef building organism with abundant molluscan fragments and bryozoan stems.

Under Presidential Proclamation No. 401, the whole BNBPN was reclassified into under land use. Some portions were classified as mineral reservation, watershed, resettlement and National Park. The new proclaimed National Park covers the area where the Madlum and the historical Aquinaldo Caves are located. The former lies in the northern tip of the former reservation while the latter is on the southern most.

The active quarrying operations are confined on the upper limestone member of Angat Formation particularly in Mt. Nabio (see plate 1) because of the presence of Tea Rose colored variety. This area falls within the classified Mineral reservation and covered by the approved MPSA of Rosemoor Mining and Development Corporation dominated as MPSA-188-R 2002-III. This Tea Rose variety is very much in demand for domestic and foreign market. Mt. Nabio lies on the headwater of one of the tributaries of the Madlum River. This tributary flows northeasterly and join the said river on the middle section then flows on a northwest direction. Madlum River lies north of the Biak na Bato River, the site where the eight (8) children were swept by floodwater. The quarrying operations also are about four (4) aerial kilometers to the north. The watersheds of the Madlum and Biak na Bato Rivers are separated by high divide (ridges) and it is not possible for the Madlum River to flow towards Biak na Bato River.

Within the BNBPN, the Biak na Bato River is underlain by limestone. It is on this area where many visitors go because of the clean water and many caves. The historical Aquinaldo Cave is also found along this river. There are no quarrying activities on this area because it is a protected area and the limestone deposit is thinly bedded and not favorable for quarrying.

Geomorphologically, the Biak na Bato River is characterized by "Funnel shaped" drainage system. The wider upper reaches which lies on the east of the limestone is underlain by the Bayabas Formation. (see plate II) The river channels are wider because this formation consists of metavolcanics and metasedimentary. The flow of water in these channels are not constricted. However, on the limestone section, the river channel is constricted because it is characterized by narrow V-shaped valley. With this kind of drainage system, flash flood is a common phenomenon.

The watershed of Biak na Bato River is 52.6 km<sup>2</sup> or 5260 has. Rainfall data from PAG-ASA showed that at 3:00 PM on Sunday, the Sibul Spring rain gauge station registered 10 mm. amount of rainfall. Based on PAG-ASA's rainfall intensity classification, this amount is classified high because it was registered in one hour only. Based on the account of the Park's Staff, the flashflood occurred at

about 3-4 PM on Sunday. Sibul spring station which is about 7 km northwest of the BNBPNP is the nearest rain gauge station. The high intensity rainfall preceded the flash flood that swept the area.

The site where the children were swept by flashflood is characterized by two active flows with fossilized sand bar on the middle of the channel. Small trees were found thriving on this sand bar and were observed to be leaning downstream indicating the floodwater flows fast and high. The measured height of the floodwater level is 4.2 m. from the river bed. This is based on the debris that were found on the tree near the river bank. With this height, the children aged 7 to 13 years can be easily swept by floodwaters.

This "Freak Accident" probably happened while the children are bathing/swimming unaware of the rushing flood water from upstream.

From the informations and evidences gathered during the investigation, it shows that the cause of flashflood is not due to quarrying but due to the big volume of rain water that fell within the funnel shaped watershed of Biak na Bato River. There was a sudden rise of water level on the limestone area because the channel is constricted or narrow. There were no quarrying on the Bayabas Formation because the quarry operator are interested only on the limestone deposit in Mt. Nabio.

To prevent the recurrence of such untoward incident, the following are recommended:

1. Swimming should not be allowed during rainy months because Biak na Bato River is prone to "Flash Floods"
2. If swimming will be allowed, there should be designated places since the river course have different depths, speed of flow of water and nature of riverbed. Areas with high boulders and irregular water depths should be prohibited from swimmers/visitors.
3. "Rain gauge" should be installed to monitor weather condition and forthcoming flash floods.

For his information

  
f: **ARNULFO V. CABANTOG**

Cc: MGB Central Office  
RED Derr-R3  
PAG-ASA



**MAP SHOWING THE QUARRY SITE & SITE OF DROWNING INCIDENT IN BIAK  
NA BATO NATIONAL PARK**

**SCALE 1 : 100,000**



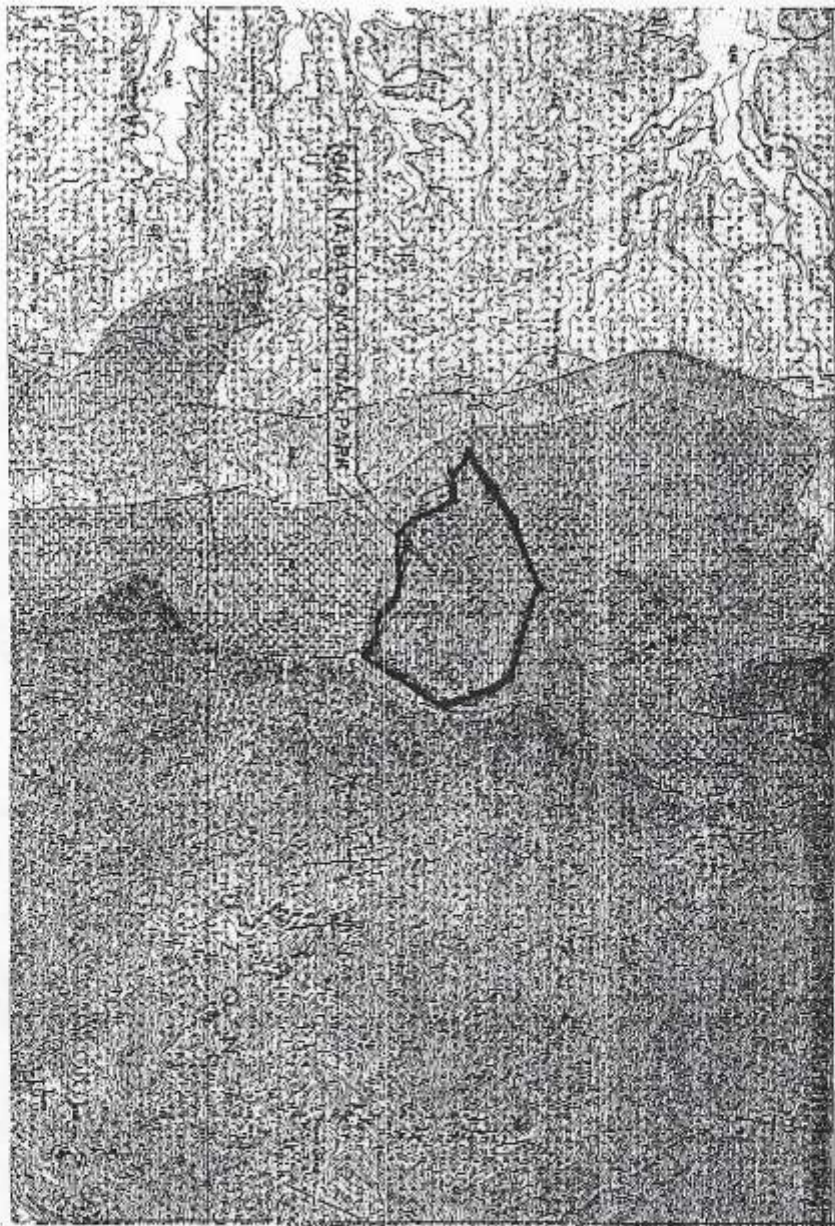
**E X P L A N A T I O N**

**PLATE - 1**

- - QUARRY SITE
- - SITE OF DROWNING INCIDENT
- MADIUM RIVER WATERSHED  
31.15 KM<sup>2</sup>
- BIAK NA BATO RIVER WATERSHED  
52.6 KM<sup>2</sup>
- RIVER / CREEK
- 500 - CONTOUR LINE
- ROAD / TRAIL

**GEOLOGIC MAP SHOWING THE BIAK NA BATO NATIONAL PARK**

**S C A L E 1 : 100 , 000**



121-00-00 121-05-00  
 15-10-00 15-05-00

**C E N T I A L Y**

TERTIARY      QUATERNARY

Eocene      Pliocene      Pleistocene

**PLATE - II**

**EXPLANATION**

SHOWN AS PER CHARTERED MAPS  
 ESTABLISHED AND THE ESTABLISHED MAPS

**EXPLANATION**

SHOWN AS PER CHARTERED MAPS  
 ESTABLISHED AND THE ESTABLISHED MAPS

**STRATIGRAPHY:**  
 TERTIARY      QUATERNARY  
 Eocene      Pliocene      Pleistocene

**Geologic Symbols:**  
 Symbols for various geological units and structures are defined here.

**Structural Symbols:**  
 Symbols for various geological structures are defined here.

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**Structural Symbols:**  
 Symbols for various geological structures are defined here.

LITHOLOGICAL SYMBOLS		STRUCTURAL SYMBOLS	
[Symbol]	Granite	[Symbol]	Normal fault
[Symbol]	Quartzite	[Symbol]	Overthrust fault
[Symbol]	Schist	[Symbol]	Strike-slip fault
[Symbol]	Sandstone	[Symbol]	Geanticline
[Symbol]	Mudstone	[Symbol]	Monocline
[Symbol]	Siltstone	[Symbol]	Syncline
[Symbol]	Shale	[Symbol]	Anticline
[Symbol]	Sandstone	[Symbol]	Unconformity
[Symbol]	Mudstone	[Symbol]	Discontinuity
[Symbol]	Siltstone	[Symbol]	Lineament
[Symbol]	Shale	[Symbol]	Linear depression



Republic of the Philippines  
 Department of Science and Technology,  
 PHILIPPINE ATMOSPHERIC, GEOPHYSICAL AND  
 ASTRONOMICAL SERVICES ADMINISTRATION (PAGASA)  
 Weather Forecasting Section, Weather Branch  
 WFFC Bldg., BIR Road, Diliman, Quezon City 1100



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Website: <http://210.23.201.243>, <http://www.pagasa.dost.gov.ph> Email: [pagasa\\_wb@pacific.net.ph](mailto:pagasa_wb@pacific.net.ph) Voice Server: 9256201

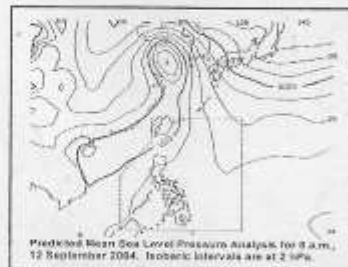
**24-HOUR PUBLIC WEATHER FORECAST**

ISSUED AT: 4:30 AM 12 SEPTEMBER 2004  
 VALID BEGINNING: 5:00 AM TODAY UNTIL 5:00 AM TOMORROW

**SYNOPSIS:** AT 2:00 AM TODAY, TROPICAL STORM "OFEL" WAS ESTIMATED BASED ON SATELLITE AND SURFACE DATA AT 400 KMS NORTH OF BASCO, BATAINES (24.2°N 122.1°E) WITH MAXIMUM WINDS OF 65 KPH AND GUSTINESS UP TO 80 KPH IT IS MOVING NORTH NORTHEAST AT 15 KPH.

**FORECAST:** NORTHERN AND THE WESTERN SECTIONS OF CENTRAL LUZON WILL EXPERIENCE CLOUDY SKIES WITH SCATTERED RAINSHOWERS AND THUNDERSTORMS. THE REST OF THE COUNTRY WILL BE PARTLY CLOUDY TO CLOUDY WITH ISOLATED RAINSHOWERS OR THUNDERSTORMS.

MODERATE TO OCCASIONALLY STRONG WINDS BLOWING FROM THE SOUTHWEST WILL PREVAIL OVER NORTHERN LUZON AND WESTERN SECTION OF CENTRAL LUZON AND ITS COASTAL WATERS WILL BE MODERATE TO OCCASIONALLY ROUGH. LIGHT TO MODERATE WINDS BLOWING FROM THE SOUTHWEST WILL PREVAIL OVER THE REST OF LUZON AND COMING FROM THE SOUTH AND SOUTHEAST OVER THE REST OF THE COUNTRY WITH SLIGHT TO MODERATE SEAS.



- METRO MANILA:** PARTLY CLOUDY TO CLOUDY WITH RAINSHOWERS AND THUNDERSTORMS, WINDS LIGHT TO MODERATE BLOWING FROM THE SOUTHWEST, MANILA BAY SLIGHT TO MODERATE, TEMPERATURE RANGE 24 TO 34°C (75 TO 93°F).
- BAGUIO CITY:** CLOUDY WITH RAINSHOWERS AND THUNDERSTORMS, WINDS MODERATE BLOWING FROM THE SOUTHWEST, TEMPERATURE RANGE, 15 TO 23 (59 TO 73°F).
- TAGAYTAI CITY:** PARTLY CLOUDY TO CLOUDY WITH RAINSHOWERS AND THUNDERSTORMS, WINDS LIGHT TO MODERATE BLOWING FROM THE SOUTHWEST, TEMPERATURE RANGE 22 TO 31°C (72 TO 88°F).
- S B H A:** PARTLY CLOUDY TO CLOUDY WITH RAINSHOWERS AND THUNDERSTORMS, WINDS LIGHT TO MODERATE BLOWING FROM THE SOUTHWEST, SUBIC BAY SLIGHT TO MODERATE, TEMPERATURE RANGE 24 TO 33°C (75 TO 91°F).
- CLARK ZONE AND LAHAR AREAS:** PARTLY CLOUDY TO CLOUDY WITH RAINSHOWERS AND THUNDERSTORMS, WINDS LIGHT TO MODERATE BLOWING FROM THE SOUTHWEST, TEMPERATURE RANGE 24 TO 33°C (75 TO 91°F).
- METRO CEBU:** PARTLY CLOUDY TO CLOUDY WITH ISOLATED RAINSHOWERS OR THUNDERSTORMS, WINDS LIGHT TO MODERATE BLOWING FROM THE SOUTH AND SOUTHEAST, COASTAL WATERS SLIGHT TO MODERATE, TEMPERATURE RANGE 22 TO 32°C (72 TO 90°F).
- METRO DAVAO:** PARTLY CLOUDY TO CLOUDY WITH ISOLATED RAINSHOWERS OR THUNDERSTORMS, WINDS LIGHT TO MODERATE BLOWING FROM SOUTH AND SOUTHEAST, COASTAL WATERS SLIGHT TO MODERATE, TEMPERATURE RANGE 24 TO 32°C (75 TO 90°F).
- CAGAYAN DE ORO:** PARTLY CLOUDY TO CLOUDY WITH ISOLATED RAINSHOWERS OR THUNDERSTORMS, WINDS LIGHT TO MODERATE BLOWING FROM THE SOUTH AND SOUTHEAST, COASTAL WATERS SLIGHT TO MODERATE, TEMPERATURE RANGE 22 TO 32°C (72 TO 90°F).

ANG KALAKHANG MAYNILA AY MAKAKARANAS NG BANAGYA HANGGANG SA MAULAP NA KALANGITAN NA MAY PAG-ULAN AT PAKIKULO-PAGKIDLAT. MAHINA HANGGANG SA PATAMANG HANGIN MULA SA TIMOG-KANLURAN ANG IIRAL AT ANG LOOK NG MAYNILA AY BANAYAD HANGGANG SA KATAMANG ANG MAGIGING PAG-ALON. ANG TINATAYANG AGWAT NG TEMPERATURA AY MULA 24°C HANGGANG 34°C ANTAS NG SENTIGRADO (75°F HANGGANG 93°F).

ANG HILAGA AT KANLURANG BAHAGI NG GITNANG LUZON AY MAKAKARANAS NG MAULAP NG KALANGITAN NA MAY PAG-ULAN AT PAKIKULO-PAGKIDLAT. ANG NATITIRANG BAHAGI NG BANSA AY MAGIGING BANAGYA HANGGANG SA MAULAP NA MAY PULU-PULONG PAG-ULAN O PAKIKULO-PAGKIDLAT.

KATAMANG HANGGANG SA KUNG MINSAN AY MALAKAS NA HANGIN MULA SA TIMOG-KANLURAN ANG IIRAL SA HILAGA AT KANLURANG BAHAGI NG GITNANG LUZON AT ANG BAYBAYING DAGAT NITO AY KATAMANG HANGGANG SA KUNG MINSAN AY MAALON. MAHINA HANGGANG SA PATAMANG HANGIN MULA SA TIMOG-KANLURAN ANG IIRAL SA NALALABING BAHAGI NG LUZON AT KANGGALING NARAN SA TIMOG-SILANGAN ANG IIRAL SA NALALABING BAHAGI NG BANSA NA MAY BANAYAD HANGGANG SA KATAMANG PAG-ALON NG KARAGATAN.

**EXTREMES OF TEMPERATURE AND RELATIVE HUMIDITY FOR THE 24-HR PERIOD ENDING AT 2:00 AM TODAY AS RECORDED AT SCIENCE GARDEN, DILIMAN, QUEZON CITY:**

MAX. TEMP. AT 1:00 PM YESTERDAY -- 33.5°C (92.30°F) MAX. REL. HUM. AT 5:30 AM YESTERDAY -- 93%

MIN. TEMP. AT 5:30 AM YESTERDAY -- 24.5°C (76.10°F) MIN. REL. HUM. AT 1:00 PM YESTERDAY -- 58%

**TIDAL PREDICTIONS ALONG MANILA BAY COURTESY OF THE NATIONAL MAPPING AND RESOURCES INFORMATION AUTHORITY (NAMRIA):**

HIGH TIDE TODAY AT 7:57 AM ----- 1.22 METERS

LOW TIDE TODAY AT 4:34 PM ----- 0.09 METER

**OVER METRO MANILA:**

SUNRISE TODAY AT 5:45 AM MOONSET TODAY AT 4:38 PM

SUNSET TODAY AT 6:00 PM MOONRISE TOMORROW AT 4:24 AM

ILLUMINATION TODAY = 09%

END OF FORECAST

PREPARED BY:

FA ARANIADOR / MF PALFOX / RS SANTI