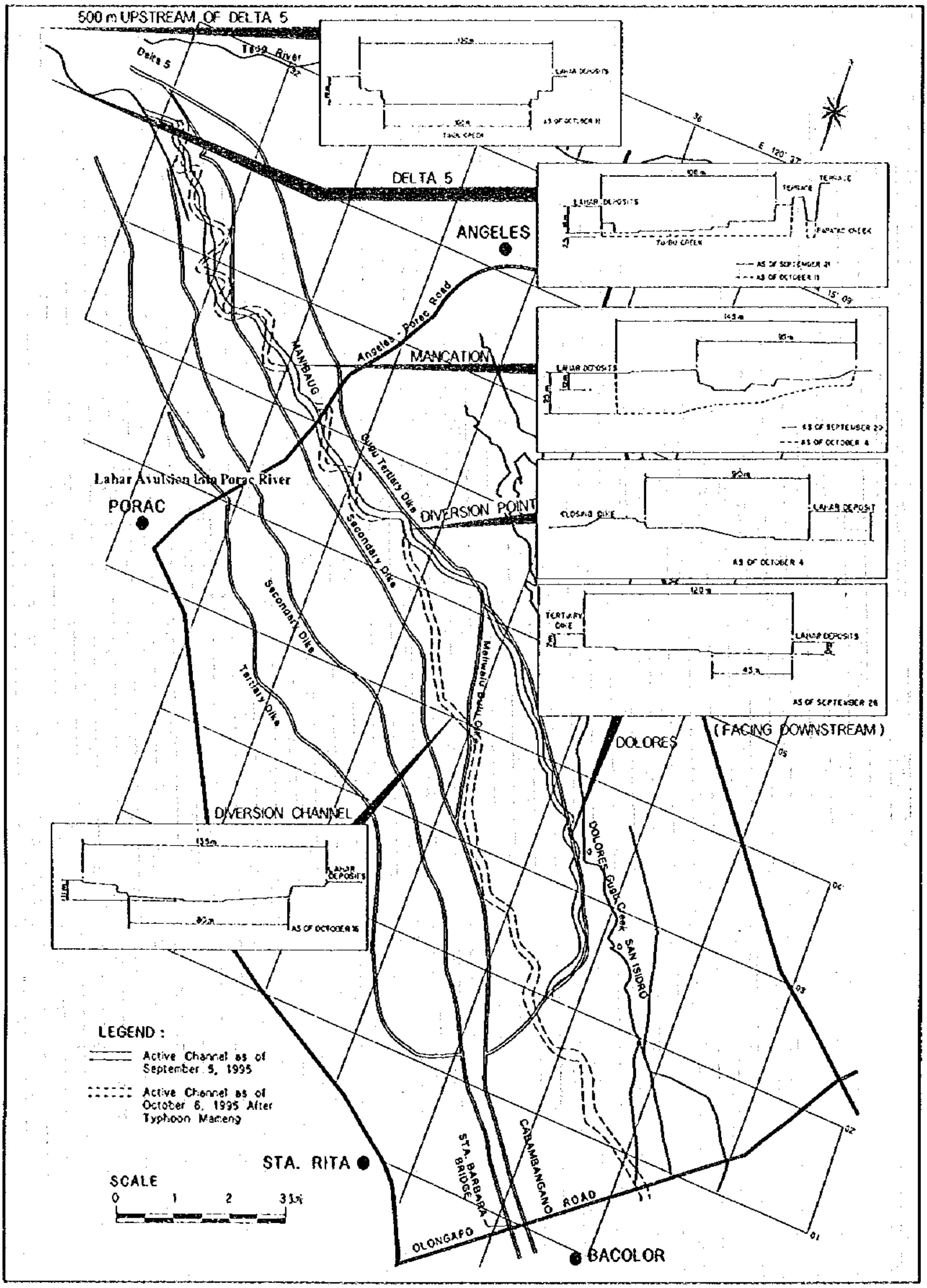
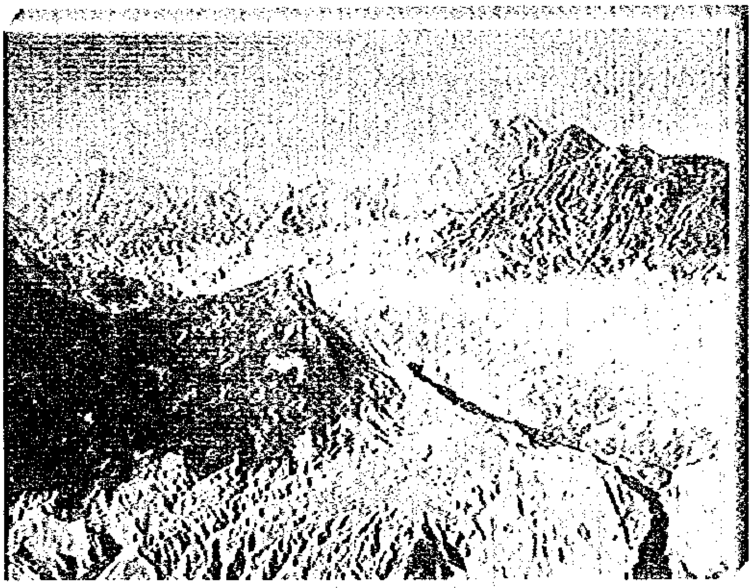
CHAPTER 8 SEDIMENT MONITORING IN PASIG RIVER BASIN

8.1 RIVER MORPHOLOGY



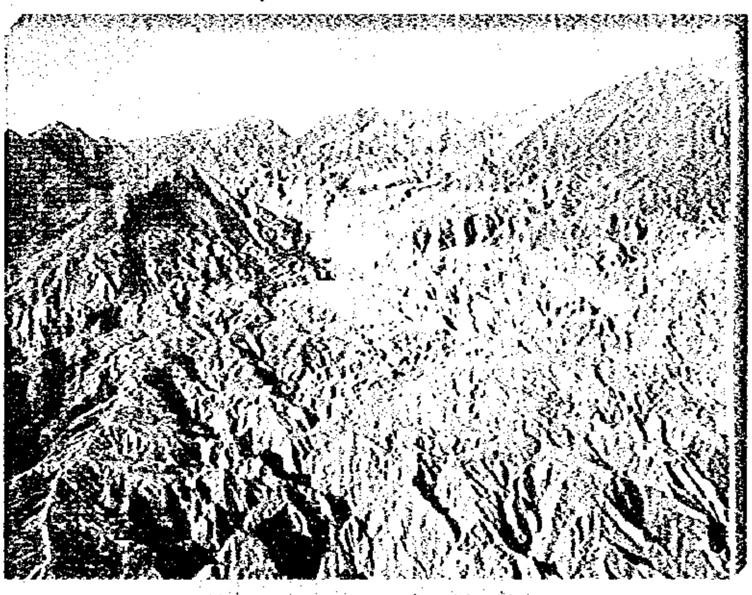
Geomorphologic Changes in 1995

Although five years have passed after the eruption, lahar and mudflow continuously affect the confined channels of the Pasig River. Secondary explosions also contribute to the formation of mudflow by the sudden supply of an enormous loosened material into flash flood. Based on the aerial survey in the headwaters, the predominant processes of channel development were the deepening and widening of older channels as shown in the figure (left), The previous confined deep channels became wider so that likelihood of mudflow formation might be rapidly reduced. Furthermore, the number of big-scale secondary explosions was also reduced by one fourth in 1995 compared with the 1994 events, while massive movement of secondary pyroclastic flows was not observed in 1995. These facts indicate that the source material becomes gradually stable and likelihood of mudflow formation might be consequently reduced. Thus, predominant process of sediment transport may change from hyper-concentrated flow to muddy water in the 1996 rainy season. In accordance with the change of the predominant process of sediment transport, material transported from the upper catchment may decrease by half based on the difference of sediment transport concentrations between mudflow and hyperconcentrated flow. As the sediment supply diminishes, downcutting of river channel would be remarkable in the downstream reach of the Pasig River.



Piracy Point on August 15, 1994

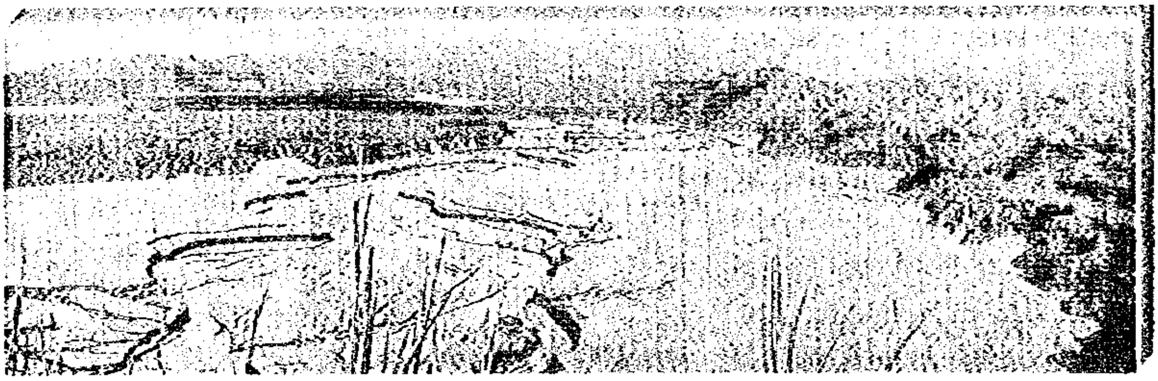
Piracy Point on June 28, 1995



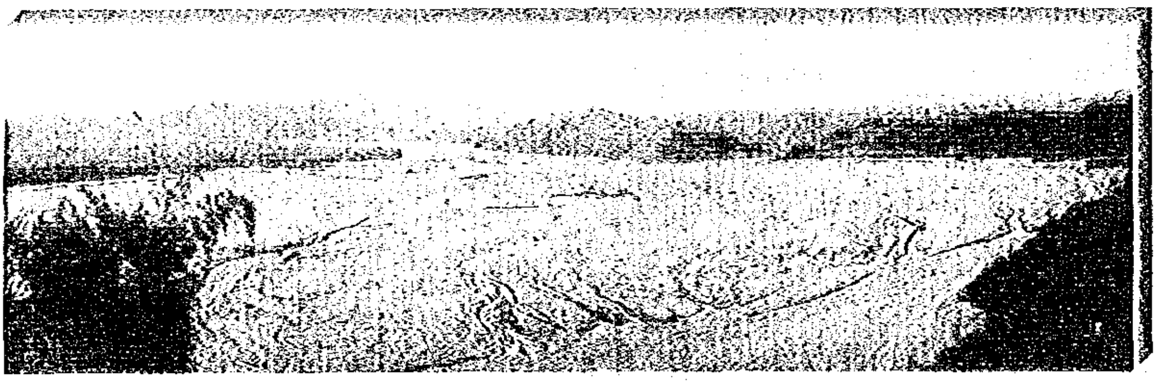
Piracy Point on October 31, 1995

8.2 FIXED POINT OBSERVATION AT WATCH POINT NO.5

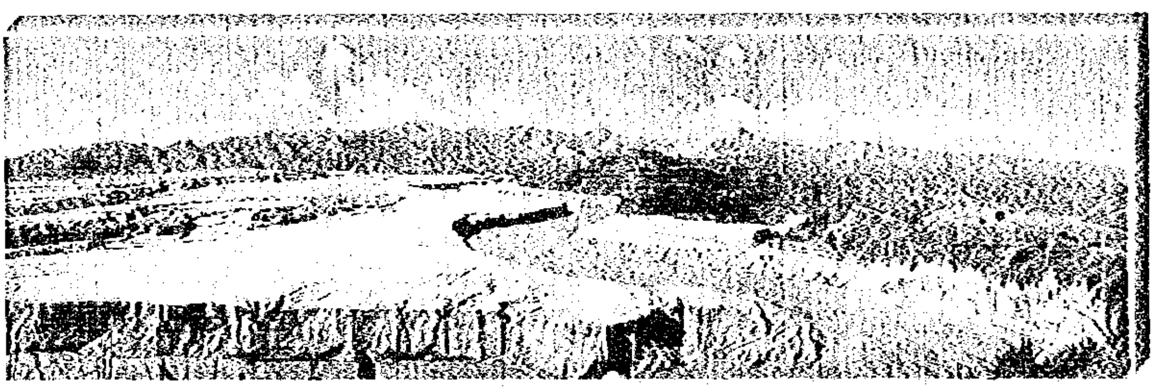
Fixed point observation at the upstream reach of Watch Point No.5 was carried out by JICA Study Team to monitor the geomorphologic changes of the river channel. The catchment area at Watch Point No.5 was increased from 21.3 to 45.0 square kilometers after the piracy in October 1993.



Small stream meanders on lahar deposition. Channel aligament changed day by day (August 11, 1994)

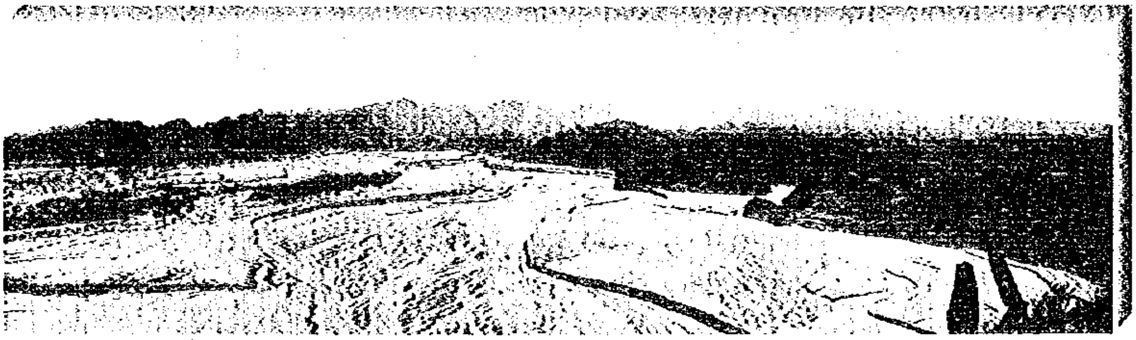


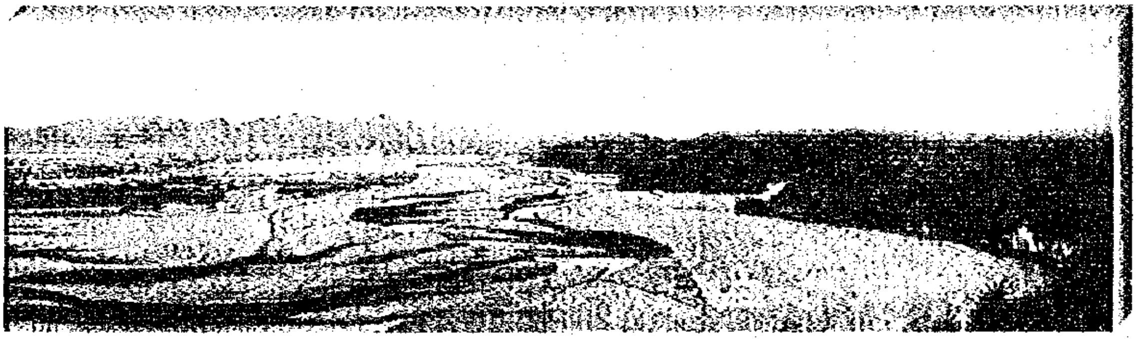
Remarkable volume of lahar raised surface elevation by 3 m in a day. (September 1, 1994)



River channel meandered and eroded the basin boundary of the Abacan River. (December 13, 1994)

River channel swerved again into the center of the Pasig River. (March 25, 1995)


Lateral erosion of both banks developed wider and shallower river channel. (June 28, 1995)


Downcutting of river channel progressed due to the absence of rainfall in July. (July 23, 1995)


Small scale lahar supplied sediment causing gradual riverbed aggradation. (September 8, 1995)


Downcutting of river channel progressed again because of scarce rainfall. (September 19, 1995)

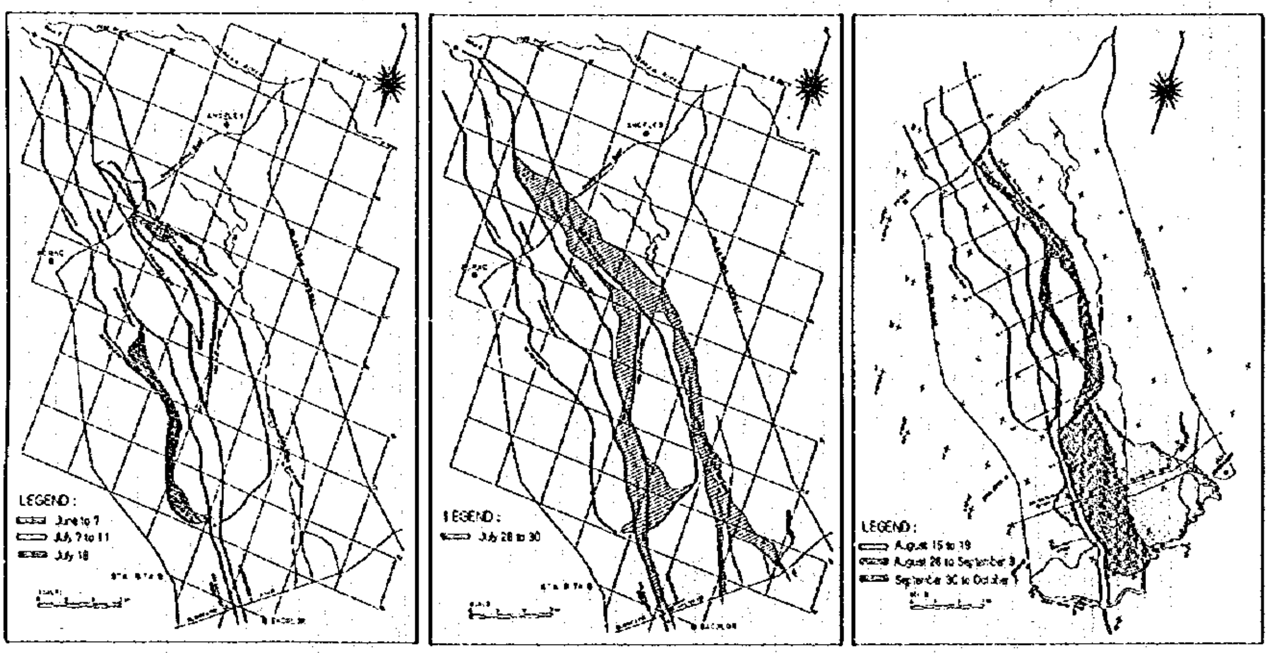

Flood on October 1 caused lateral erosion and downcutting of river channel. (October 28, 1995)

8.3 LAHAR DISASTER AREA IN 1995

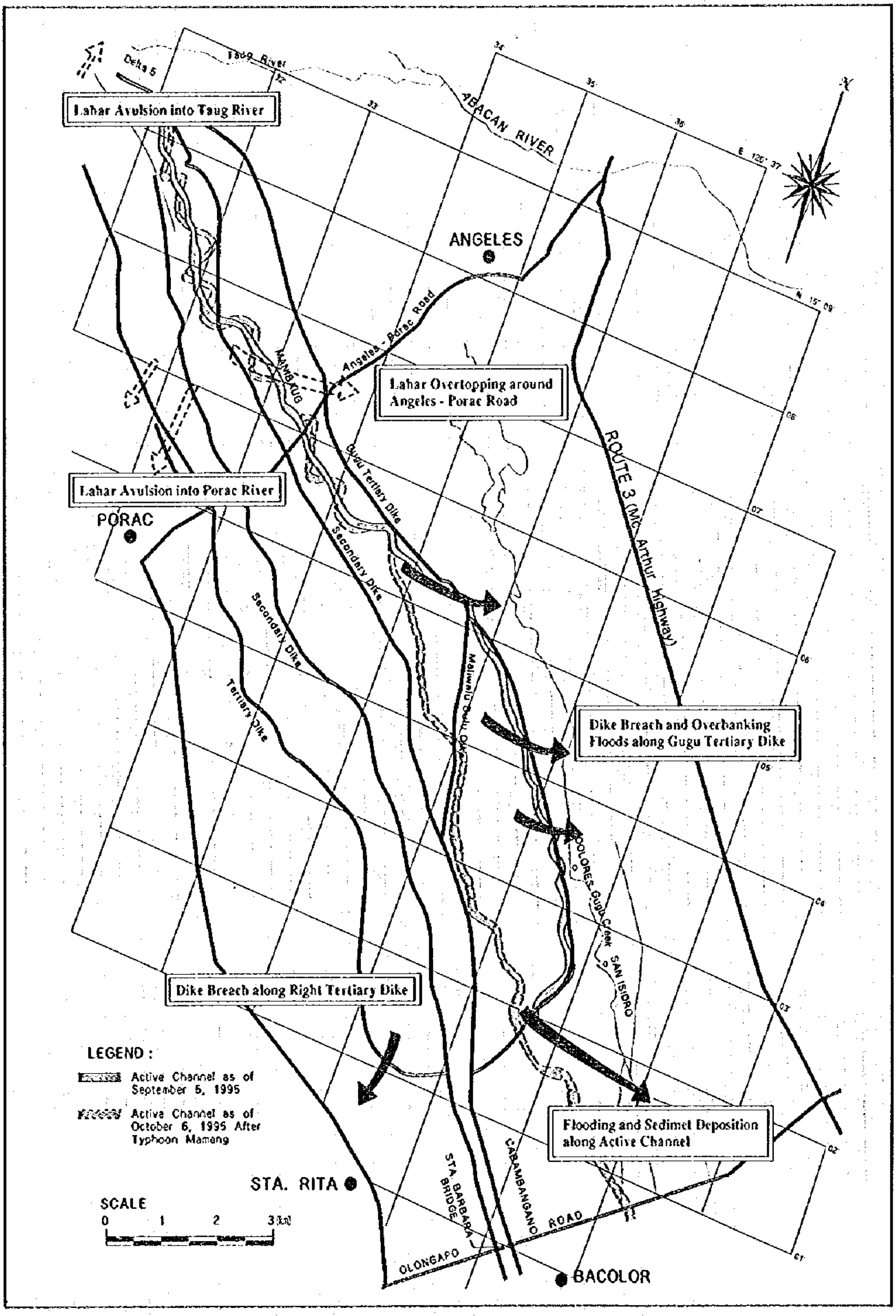
Lahar monitoring was commenced to establish the stations of around 40 sites inside of the tertiary dike using abandoned buildings, tree trunks and electric posts. After every lahar event, the depth of deposition and extent of deposits were verified by spot measurement at each station, interview survey to the residents outside of tertiary dike, and review the latest survey results done by PHIVOLCS and DPWH. The extent of lahar disaster area in 1995 are shown below while the critical portions against lahar or flooding in 1996 were specified as follows:

Low Possibility	*(1) Lahar Avalanche into the Abacan River*
	(2) Lahar Avalanche into the Porac River
	(3) Lahar Overtopping around the Angeles-Porac Road
High Possibility	*(1) Dike Breach and Overflow along Gugu Tertiary Dike*
	(2) Dike Breach along the Right Tertiary Dike
	(3) Flooding and Sediment Deposition along the Active Channel

In the 1995 rainy season, the river channel of the Pasig River incised deeply into the old alluvial deposits, and sharp meandering was observed frequently since the river bank material has a non-cohesive nature due to the lack of clay particles. In 1996, the sediment volume is expected to be 55 to 88 million cubic meters: namely, 34 to 47 million cubic meters from pyroclastic flow deposit field and 21 to 41 million cubic meters due to the erosion of river channel. The continuous monitoring of geomorphologic change would play an important role to prevent serious flooding and sediment deposition in 1996.



Extent of the Lahar Disaster Area in 1995



Critical Portions against Lahar and Flooding in the Pasig River Basin

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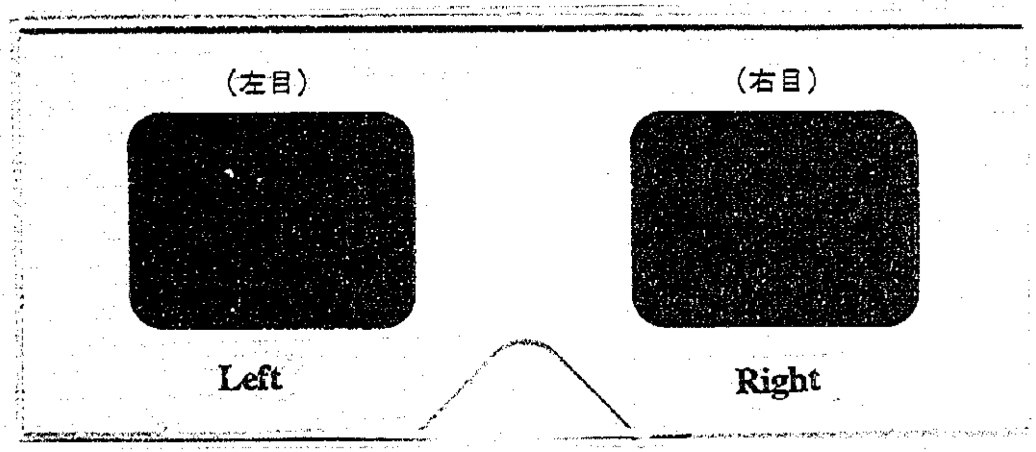
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