

Historical Mapping for Marikina Flooding: learning from the past - land, people, and science

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Given the recent disaster in Marikina Valley with typhoons Ondoy and Pepeng, ESSC is sharing historical data, however limited, in order to draw other data together to support a value change and commitment to better environmental planning and making Marikina a safer place to live.

In site development, landfill and canalling may be viewed as sufficient responses to the construction of a subdivision.

However, even if the landfill on a site were of adequate depth to prevent local flooding, it would only mean displacing water but will not improve risk reduction for people living in the valley. As we now clearly know, putting this experience into the context of a 50-year flood event, our national provisions for site development and city planning are insufficient for a natural flood zone.

ESSC developed these six maps in relation to the Marikina experience:

Map 1: Dams within Marikina Watershed ?

Map 2: Wawa-Marikina River 1990

Map 3: Upper Watershed of Wawa River

Map 4: Marshland Marikina, 1947-1955

Map 5: Marshland Marikina, 1997 and the 2009 flood

Map 6: Dams and their Watersheds in Central Luzon

Map 7: Water area divisions of steep slope and broad flood path

Map 1: Dams within Marikina Watershed. ([Click here](#))

During Ondoy, several people blamed the dam operators of Wawa, Angat, and La Mesa for the "flashfloods" in Marikina. Angat and La Mesa Dams do not overflow through the Marikina River; there are no dams in the Marikina Valley. Wawa Dam was built in the 1900s and has been non-operational since the 1950s. For almost 60 years, the "dam" is merely a weir with no significant volume of water held behind. The rapid flow came from the catchment area. Studies in the

1970s recommended that the Marikina riverbank be monitored by government so that that the water will not reach 90 meters. Likewise, no structure was to be built within nine meters from the riverbank, but comprehensive controls along the valley exposed to high risk the individual developments, low cost housing, and squatter areas from San Mateo to Nangka, Loyola Grand Villas and down river.

The Wawa River in Montalban (now Rodriguez), Rizal had been controversial since long before 1990. Local communities and concerned groups have raised several issues on the changing course of the river. Quarrying and dredging for gravel and sand are extensive in the area. There are large corporate interests involved, and these activities are a common livelihood source for many people. These quarrying and dredging activities are often considered as the primary culprit for environmental degradation downstream from Wawa. This material has contributed to the shallowing of the riverbed and to the debris in the flood. But yet again in the September flood event, it is the volume of rainfall that is the trigger and primary cause of the flood in an area historically delineated as a marshland.

Map 2: Wawa-Marikina River 1990 ([Click here](#))

This is the Wawa River transect (Wawa Dam to Barrio Forestry, Montalban, Rizal) drawn by the ESSC in November 1990. At least for 20 years the banks are exposed, quarrying and dredging are operational, and vegetation cover is minimal. The significant difference between 1990 and the present is that there are more people living along the riverbanks so more people are extracting livelihood from the river and living with greater risk. There are photographs from 1990 and 2009 after Ondoy that give a sense of the impact in the area. ([Click the title of the photo for the larger view of the image](#))

1. Down river from Wawa dam note the rock outcrop and presence of rocks within the river. November 1990

Facing upstream to dam after Ondoy typhoon, September 2009

2. Wawa Dam November 1990

Wawa dam after Ondoy September 2009

4. Large-scale river dredging November 1990

The river after Ondoy September 2009

7. Gravel ready for collection protection from the sand but not from the rock soil, November 1990

After Ondoy, area for gravel collection September 2009

Twenty years ago, the quarrying and dredging were held responsible for the changing course of the river during the rains and the foul odor during the dry season. The reason behind the discoloration and foul odor was the piggery activities upstream. Without undermining the quarrying and dredging needs, these affect the channel pattern and add to the erosion of the banks at particular points.

Metro Manila and its neighboring provinces were flooded after Ondoy dumped 341mm of rainfall from 8:00 a.m. to 2:00 p.m. on 26 September 2009. The total amount in 24 hours reached 455mm and Pepeng followed this closely. In all, about 800 people died, 400,000 people were displaced, and PhP17 billion worth of infrastructure and agriculture were damaged. Marikina City, Cainta, Pasig City, and the towns ringing Laguna Lake were devastated, some remaining so for three months. Most of Marikina City was submerged in 10 feet of water and tons of knee-deep mud and sludge. Provident Village got the worst of it being on the river meander.

"There was more rain than the usual," is the usual comment after every flood since the Ormoc tragedy in 1991. Records show that the 24-hour rainfall of Ondoy surpassed the expected average rainfall of 391.7mm in Quezon City for the

month of September.

Map 3: Upper Watershed of Wawa River. ([Click here](#))

Map 4: Marshland Marikina, 1947-55. ([Click here](#))

This is where we have built subdivisions without integrated accountability for the natural flows of the area. The hydro-geomorphology needs to be strategically accounted for in the serious re-planning of this area before any new ventures are initiated.

Local government planners and housing developers might well examine the historical reality of the land and water of the Marikina Valley and its river, where the broad floodplain south from the Wawa makes up nearly 40% of the total drainage area. The extent of the flood area and the very gentle slope (greatest 7 to 0%) and breadth, show the natural history of flooding in this area. The flooding is also exasperated by the limited flow of the Pasig River, the shallowness of Laguna de Bay, and the propensity of water to back up. This flooding potential lay dormant, but scientifically is no surprise; it is just a question of when. Landfill and embankments in the individual areas of development are not enough to deal with the expected floodwaters of a 50- or 100-year event. The rains in Real, Infanta, and General Nakar in Quezon in November and December 2004 should have been enough reminders of the impending disaster.

Map 5: Marshland Marikina, 1997 and the 2009 Flood. ([Click here](#))

Fifty years after, subdivisions were built on areas that used to be planted with rice and mangroves. Out of approximately 11.23 square kilometers of marshland from 1947 to 1955, only 8% was left by 1997. Did local planners and developers consider this marshland and how it operates naturally in response to heavy rains and as inputs from the Sierra Madre? ShoeMart plays safe, why can't we as a people?

Map 6: Dams and their Watersheds, Central Luzon. ([Click here](#))

The powerful public or private operating dams need much more critical integration with the life and the land downstream. We need to build dams that we can manage at times of risk, otherwise this development only undermines the life of the poor and destroys the little security they have.

Pepeng hit Northern Luzon and subsequently triggered massive landslides. Surface water level was high due to soil saturation by Ondoy, so a further risk of flooding due to the dams arose in Bulacan and beyond. As the critical level was being reached, over 11,000 cubic meters per second of water were released for one day, excluding the volume released over the preceding five days. Obviously there is little premeditation of the different possible scenarios and a lack of accountable systems and guidelines to effectively manage an emergency caused by human design.

Better master plans for re-development are needed, securing not only adequate relocation housing for the poor, but also considerably better locations for housing with accessible livelihood opportunities. Poor relocation far from the market and work centers only results in high-risk illegal settlements back along the waterways.

Map 7. Water area divisions of steep slope and broad flood path. ([Click here](#))

Flood water in Marikina, Pasig and low lying areas of Rizal Province originated from the sloping areas in the upper Marikina watershed. While the floodpath within the catchment is small (less than 8% of the total area), flood waters extend even outside the catchment and into the wider floodplains draining towards Laguna Lake and Pasig River.

The major typhoons have a very broad width and area of coverage. It is the center of the typhoon that delivers the greatest rainfall. People may say "a typhoon passed our area a few years ago and did not affect us, why now do we have a disaster?" This may mean the center of the typhoon was to the north or south; it does not mean that flooding or debris floods of destructive levels will not happen. When Typhoons Winnie and Yoyong hit Infanta and Real in November 2004 and veered north of Marikina (though it rained in Marikina), many people thought they were "safe" from major events. Each watershed needs to be assessed for its total flood impact, which means an integrated assessment of all the area's land use and drainage with range of rainfall events. This assessment can then be used for developing the appropriate responses and action so that both poor and rich do not suffer the human loss, the physical trauma, and the insecurity these events bring.