



Getting to know Kelvin

by Alfredo Mahar Francisco A. Lagmay

During Pinatubo's eruption in 1991, a tall white-bearded man stood in the Mayor's office of Olongapo. Surrounded by a throng of terrified men and sacs of foreign mail, he spoke in English and Ilocano, advising everyone to remain calm as Pinatubo vented its fury.

This was the first time I saw Kelvin Rodolfo. He was 54 years of age and I was 25.

That single encounter with Kelvin forever changed my life from a Geologist to a Volcanologist. He did not do anything out of his ordinary self to make this impression. He was just there when it mattered, and simply spoke his science in his usual passionate way.

It took a decade before I really came to know him, when he became an adjunct faculty member at the National Institute of Geological Sciences, University of the Philippines; his office merely three rooms away. He would visit U.P. annually for a few months to work with Dr. Siringan and some other colleagues in the department.

As I regarded him as an iconic figure, he seemed difficult to approach. But an Oxfam funded research work at the lake of Pinatubo changed all that, enabling me to work with Kelvin and break through his intimidating facade. It turns out he is a gentle, humorous and sensitive man.

Mayon Lahars

In 1984, Kelvin began to conduct pioneering research work on Mayon lahars funded initially by the National Science and Technology Authority (NSTA), Philippines, and later by the National Science Foundation (NSF), USA. At that time, lahars were a poorly understood phenomenon. Usage of the term lahar created more confusion than it led many volcanologists and

sedimentologists to recommend the word to be discarded entirely. Experts suggested that debris flows be adopted instead, as it was a more general term used to describe fast-moving landslides that had consistency of wet concrete.

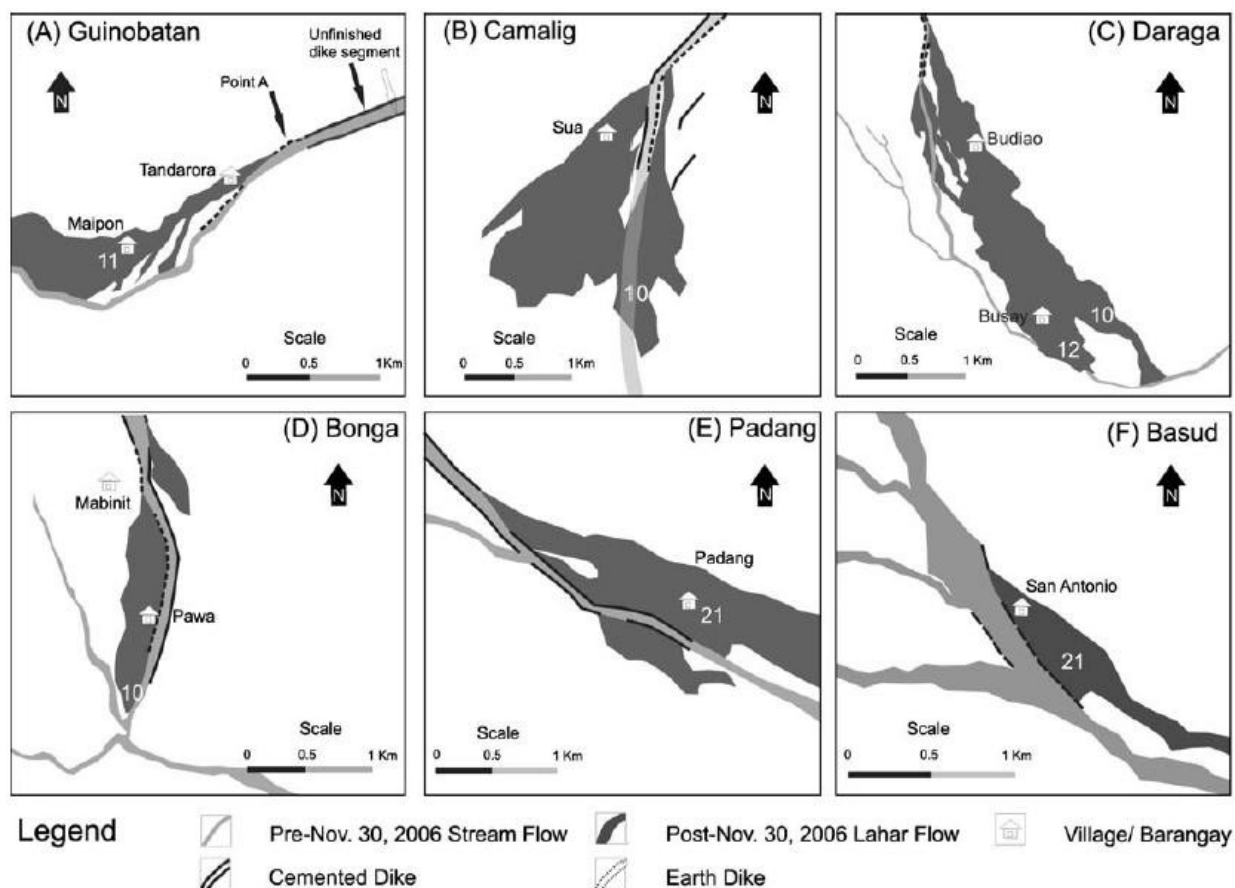
Kelvin and his co-workers at Mayon, as well as scientists who investigated the Mount St. Helens debris flows, contended "*that a single lahar can change in character from dense debris flows to more dilute hyperconcentrated streamflows and vice-versa*". "*Either flow erodes or deposits along its path but the processes involved in each type differ*", they explained. Thus, Kelvin argued that the term lahar must not be replaced, since it is a hybrid of two beasts.

The debate ensued and was finally settled at the 1988 International Conference on Volcaniclastic Sedimentology where the use of the term lahar and its meaning were agreed upon: "*...a rapidly flowing mixture of rock debris and water (other than normal stream flow) from a volcano*". Experts in the meeting concluded that "*A lahar is an event; it can refer to one or more discrete processes [such as debris flows and hyperconcentrated streamflow], but does not refer to a deposit*".

If it were not for Kelvin, the term lahar may have vanished in scientific literature, only to be found in Indonesian glossaries, where it originated.

Pinatubo's Fire and Mud

Then there was the Pinatubo eruption and its multi-year aftermath, which let almost every Filipino and the whole world know about lahars and its destructive power. Kelvin's knowledge of volcanoclastic flows translated into a predictive tool to inform civil defense officials of the lahar threat before them. Christopher Newhall, a venerated Volcanologist, describe Kelvin's work as "*unusually successful lifesaving studies of Pinatubo lahars*".



Pre-Nov. 30 drainages, dike breaches, and 2006 lahar deposits. The white house icons are the communities devastated by the 2006 lahars and the white numbers are minutes of travel time to each location from the source (Paguican EMR, Lagmay AMF, Rodolfo KS, Rodolfo RS, Tengenociang AMP, Lapus MR, Baliatan EG, Obille EC Jr. Extreme rainfall-induced lahars and dike breaching, 30 November 2006, Mayon Volcano, Philippines. *Bulletin of Volcanology* 2009; 71:845-857).

For his fundamental characterization of volcanic debris flows in both Mayon and Pinatubo, the countless lives that have been saved, and his often controversial views on key issues that underlie the politics of disaster science, Kelvin Rodolfo became a byword of the term lahar. His stature in international scientific circles is reflected in his selection as author on lahar hazards in the *Encyclopedia of Volcanoes*, the only Filipino given that honor. The book summarizes the current state of knowledge on volcanoes with each chapter written by the foremost world expert on a specific volcanic process.

Reunited with Mayon

Lahars keep coming as rains fall in humid tropics. In November of 2006, rain-triggered lahars devastated communities at the slopes of Mayon volcano when typhoon Durian made landfall in Albay. Kelvin rushed to the Philippines in 2007 under the Balik Scientist Program of the Department of Science and Technology (DOST) to study the lethal 2006 Mayon lahars with us. He was exceptionally delighted as he was coming back to the volcano he first loved. We were even more delighted by

his presence.

Now I understand when at Pinatubo, he would say, “*The flimsy, graft-ridden containment dikes will not withstand the erosive power of lahar and to build them is like feeding lahar candy. You are only building for the people, a false assurance of their safety*”. It came as no surprise to our field team that all devastated communities on the slopes of Mayon had breached dikes upstream (see Figure). Kelvin’s unheeded advice more than two decades past caused the 1266 deaths in the lahar ravaged barangays of Guinobatan, Camalig, Daraga, Bonga, Padang and Basud in Albay Province.

Remembering Cabalantian

Each time we saw a breached dike at Mayon, he would remind us of Cabalantian, a barangay of some ten thousand souls in Bacolor, Pampanga, which was devastated by lahars. As strong rains brought by typhoon Mameng battered the area in the early morning of October 1, 1995, the one kilometer stretch of the Gugu Dike breached. According to compiled reports by the

Philippine Inquirer, “*Villagers tried to leave but the route to San Fernando, Pampanga was blocked by floodwaters. Residents were marooned on roofs for four days with lahar flows as high as 20 feet (6.1 meters) reaching Cabalantian*”. About 100 persons died or disappeared in the tragedy, but the actual death toll remains controversial.

“*To this day, no one is accountable for the many deaths in Cabalantian*”, Kelvin laments. Never learning from past lessons, the Gugu dike had breached 3 times, each instance repaired at enormous cost. In 1995, Kelvin published his book, “*Pinatubo and the Politics of Lahar*”, which won the National Book Award the same year, a fitting reminder of the Cabalantian Tragedy.

A Seasoned Fighter

Kelvin is a veteran fighter, one who has fought many bouts with politicians and scientists in the risk management arena. His latest and ongoing battle is in Bataan, with pen and paper in hand, he defends the province against aggressive moves to reactivate the mothballed nuclear power plant. Old and gray but still strong, he refuses to lay down his arms. He wears his boots even at past 70 years of age to join our field works on Natib Volcano and its vicious sister, Pinatubo.

Kelvin has also mainly been involved in the study of ground subsidence, where he reports alarming rates of as much as 6.1 cm/year decrease in surface elevation of the Kamanava area. The phenomenon “*is mostly due to excessive groundwater extraction*”, he said.

Compounded by relative sea-level rise and worsening rains, Kelvin saw well in advance of the Ondoy disaster, the worsening flood problem of Metro Manila. This is the bigger fight that he fights - Global Warming.

Kelvin’s main frustration is that his data, if judged inconvenient by government entities, get trivialized, distorted and disregarded. “*Because of this attitude, the people have suffered*”, he said. If only his knowledge made it to the engineer’s table or to a structure in the field, then his faith in science would have reaped its reward and he can finally hang his gloves on the wall to retire blissfully. As yet, he desires to come back in 2010 under the Balik Scientist Program to study the flooding problem in Metro Manila.

Revered Mentor

Dr. Rodolfo is an adept advocate and interpreter of science, and enjoys teaching the general public. “*There are few things more rewarding than this: Studying an interesting, complex geological phenomenon well enough to understand it, and finally learning how to teach it properly. When you succeed, the reward is the look of comprehension in students’ eyes*”, he said.

He has expended much of his energy in undergraduate teaching. Each year, graduating University of Illinois at Chicago (UIC) seniors select ten professors to receive the “Silver Circle

UIC Award for Excellence in Teaching”. Many of the UIC’s more than 2,000 faculty members never get the award; Kelvin won it five times in 1974, 1977, 1984, 1989, and 1994. In 1989, the UIC Faculty designed and enacted its own Excellence in Teaching Award and made him the first recipient from Liberal Arts and Sciences, the largest College.

Kelvin has trained many Filipino scientists including several that obtained their M.Sc. degrees at UIC, among them Dr. Renato Solidum, Director of the Philippine Institute of Volcanology and Seismology, and Dr. Carlo Arcilla, Director of the National Institute of Geological Sciences at UP Diliman. At NIGS, he also served as Reader or Co-adviser to many M.Sc. students.

Even if he is not a member of many students’ thesis committees, he willingly sits down with them, not only to help improve the thesis through tedious editing, but to improve the student’s skills in scientific writing and illustration as well. The Manila Observatory of Ateneo de Manila has expressed their desire for him to guide their graduate students as well. He continues to teach at the UP-NIGS as adjunct professor and for the Honors College at UIC as Professor Emeritus, for the last three years, courses on hazard mitigation, Peak Oil, and climate change.

Academic Career and Research Contributions

After graduating from UP Diliman in 1958, he worked for two years as a petroleum exploration geologist in Luzon, Cebu and Mindanao, and has been an interested observer of the petroleum industry ever since. He earned his Master of Science and Ph.D. degrees at the University of Southern California from 1960 to 1967, and rose from Instructor to Professor at the University of Illinois at Chicago.

Kelvin’s first major contribution to international geology began in 1964 when he was a shipboard scientist on the USS PIONEER, the NOAA participant in the UN-sponsored International Indian Ocean Expedition. On that cruise, he gathered submarine data in the Andaman Basin between The Indian-owned Andaman and Nicobar Islands, Burma, the Malay Peninsula, and Sumatra. His 1967 doctoral dissertation anticipated the plate tectonic revolution that only broke into geological consciousness a year later. Purely from his empirical evidence, unguided by the plate-tectonic model to come, he correctly described how Andaman Basin was formed by the “seafloor spreading” that broke the crust and split it open, moving the Andaman Islands away from the Malay peninsula.

Kelvin’s dissertation, published by the GSA Bulletin in 1969, was praised for its scientific foresight and earned him an invitation to the first international Penrose Conference hosted by the Geological Society of America. He describes that conference as “*the most exciting event in the young life of a fledging scientist*”, as the younger geologists and geophysicists vigorously expounded the details of the new theory for

“establishment” scientists, who just as vigorously needed to be convinced by being shown how their own ideas were subsumed and explained by the new model.

Benevolent Scientist

As I write the final part of this article, I realize that Kelvin is not a Volcanologist as I had originally thought. The man who inspired me to pursue Volcanology turns out to be a specialist in Marine Geology and is amazing that with his graduate training became a prominent figure in my field. Revered in the international scientific community, I take pride whenever

foreign students introduce me to their Professors as “*Kelvin’s colleague in U.P. and co-author in ISI papers on lahars*”.

He continues to incisively employ the methodical approach to understand any natural hazard, with the purpose of finding cures against disasters that plague the Filipino people. Kelvin really does not need to come to our country, because it is difficult for him. And he really does not need to passionately speak out, because he is a scientist. But he does nonetheless, because it mattered. **PSL**