

Promoting geophysics in the Philippines

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The Philippines has about 36 290 km of coast-line and a surface area of 300 000 km² (slightly larger than the state of Arizona in the United States). When compared to her immediate Southeast Asian neighbors (Indonesia, Malaysia, Singapore, and Vietnam), the Philippines has relatively limited exposure and application of advanced geophysical technologies to facilitate exploration of domestic resources and better evaluate/manage its environment. According to SEG's 2003 data, there are only 11 geophysicists associated with SEG in the country.

Indonesia, Malaysia, Singapore, and Vietnam have considerably higher numbers of active applied geophysicists—160, 74, 25, and 34, respectively. These totals indicate that the Philippines, with a current (and growing) population of 84 million, need to train more geophysicists to meet their future challenges regarding energy supplies and some major environmental issues such as uncontrolled deforestation in watershed areas; soil erosion; air and water pollution in metropolitan areas; and increasing pollution of fish breeding grounds in coastal swamps.

I believe that these issues should be addressed sooner rather than later and that the best tools available for these studies, advanced geophysical technologies, are severely underutilized in the country. This low utilization rate, likely due to their minimal amounts of geophysics in higher education curricula and lack of professional training, may contribute to heavy reliance on geology and geography which can only provide limited subsurface information. In order to gather more detailed, site-specific, and accurate subsurface data, various geophysical methods need to be employed to address their petroleum, mining, engineering, and environmental challenges.

For nearly 10 years, I advocated geophysics to a local university as a vitally needed academic discipline that should be added to its curriculum because the country is in short supply of geoscientists. Discussions didn't go anywhere, and my calls to arrange appointments with key government officials also went unanswered. However, I noted that the tide was beginning to change when I had a chance encounter with Rufino Bomasang, president and CEO of Philippine National Oil Company—Exploration Corporation (PNOC-EC), at the 2002 AAPG convention in Houston. We subsequently collaborated on the article "Growth opportunities in the Philippine natural gas industry" which appeared in *TLE's* September 2002 issue.

This serendipitous meeting was one of several events that converged to create a rare opportunity for decision-makers



Gil Cardiel, dean of the School of Earth and Material Science and Engineering at Mapua Institute of Technology (left), and Lawrence Gochioco (right) pose with Mapua's geotechnical and geoscience students.

in the Philippines to be more receptive to applied geophysics. I am reporting on these events in some detail because they might serve as a kind of template to introduce advanced geophysical technologies into other countries.

First, the success of the world-class Malampaya gas-to-power project, which received the 2002 World Summit Business Award for Sustainable Development Partnership, brought about a greater awareness of the advantages of applying innovative technologies. Shell International demonstrated to key government officials the value of using advanced 3D seismic imaging and drilling technologies that resulted in the project coming in ahead of schedule and under budget. This project dated from the early 1990s when chronic power blackouts made energy supplies and energy policy rather prominent items with government officials. The crisis was solved by policies which imported foreign capital and technical expertise to exploit Malampaya (recoverable reserves estimated at 4.2 trillion ft³). Shell was chosen, because of its deepwater experience, to develop the field. A joint venture was later formed among Shell (45%), ChevronTexaco (45%), and PNOC-EC (10%).

Second, the 2002 meeting with Bomasang and subsequent collaboration provided much needed entrée to key decision makers in government and academia.

Third, the establishment of the first SEG student chapter in the country provided a venue to meet the students and faculty members at Mapua and other schools.

Fourth, the government sponsored a weeklong program on energy, that coincided with a working vacation I made to the Philippines, to educate and inform the public about important issues and processes related to energy.

Student section and lectures at local universities. SEG's Global Affairs Committee (GAC), which has been very energetic about increasing the number of "international" student sections, approved the first Philippine student chapter in 2003.



(Left) Fabian Dayrit, dean of Ateneo de Manila University, and Jett Villarín, S.J., Manila Observatory. (Right) Eduardo Mañalac, Philippine DOE undersecretary, and Rufino Bomasang, president and CEO, PNOC-EC.

Gil Cardiel, dean of the School of Earth and Material Science and Engineering at Mapua Institute of Technology, played a major role in motivating his geotechnical and geoscience students to establish a local geophysics chapter.

As noted above, my two-week working vacation (22 November to 8 December 2003) coincided with a government-sponsored Energy Week. Some government agencies and local universities promoted Energy Week by inviting special speakers and companies to talk and display their products and technologies. When they learned of my travel plans, I was invited to lecture at Ateneo de Manila University and Mapua on the topic of Geophysics and the World Energy Outlook. I attempted to provide a balanced view of the projected world energy requirements between the present and the year 2020 and the role advanced technologies will play in discovering and exploiting the necessary natural resources to meet the demand. Each lecture was followed by an open Q&A forum to generate debate and discussions.

The Manila Observatory has been directed by the Philippine government to conduct extensive environmental studies associated with population growth, resource usage and management, deforestation, soil erosion, air and water pollution studies, etc. This work relies heavily on remote-sensing technologies via satellites, and I took advantage of my lecture invitation to meet with some department heads to discuss other geophysical methods—such as electrical resistivity, ground-probing radar, ground conductivity, magnetometer, high-resolution seismic, microseismic—that can enhance their environmental research.

I am happy to report that, at least in part as a result of my visit, discussions are under way with faculty members and students at the University of the Philippines to form another student chapter.

PNOC-EC and DOE. Although the Malampaya deepwater gas-to-power project was a major success story for PNOC-EC, and DOE and was instrumental in helping to resolve the power crisis in the country, the country has only one major field in production and will soon need to explore/develop other fields as demand for energy continues to grow.

In my meeting with Bomasang, we discussed ways and measures for attracting more foreign investors or partners, and adopting innovative technologies to enhance domestic exploration and development. We concurred that a good place to start is from within by promoting and supporting the local student chapters in geophysics.

Eduardo Mañalac, who retired from Phillips in 2001 after spending 25 years in various technical and managerial positions, was recently appointed undersecretary in the Philippine Department of Energy. Even though his academic background is in geology, he has worked extensively with geophysical data, and it is expected that he will advocate more geophysical appli-

cations in the country. Bomasang arranged for me to meet Mañalac and we discussed the country's future challenges. I was also given a tour of the energy fairgrounds at the DOE's Fort Bonifacio complex.

Conclusion. The seeds sown 10 years ago are beginning to sprout. It is truly encouraging to see academia and government considering how to use sophisticated geophysical applications on my native country's near-term and complex challenges. Since the population of the Philippines is expected to continue to grow and with more people desiring

better living standards, energy demands will increase considerably. If these requirements are not met, then chronic power blackouts will return. In addition, population growth usually strains the natural resources and environment. Therefore, local research organizations need to conduct extensive assessment studies to make accurate predictions and recommendations to government agencies on what actions are needed to maximize the utilization of the country's natural resources while minimizing its impact on the environment.

In order to address these complex challenges, the one common cost-effective denominator I see is for them to adopt and apply innovative geophysical technologies. Because a robust IT infrastructure is already in place and the country's educational system is well recognized for producing good computer programmers, medical professionals, engineers, and scientists, circumstances are ideal for geophysics to thrive in this nation. Hopefully, with enough local students and professionals studying/practicing geophysics and support from the GAC, the next step will be to form a Philippine Geophysical Society.

Suggested reading. "Growth opportunities in the Philippine natural gas industry" by Bomasang and Gochioco (*TLE*, 2002). "The Manila Observatory: Cradle of early Philippine geophysics" by Gochioco (*TLE*, 1998). "A new era dawns in the Philippine energy industry" (*PetroMin*, 2001) and "A history of the Philippine O&G industry" (*PetroMin*, 2001). **TJE**

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exploration business:

- 1 October 1960, Nigerian Independence Day when Princess Alexandra came to Port Harcourt. There was a very colorful celebration on the polo grounds with all the chiefs and their numerous ladies dressed in their finery.
- 1 September 1969, Revolution day in Libya with Col. Mummar Ghadaffi deposing King Idris who was out of the country for medical treatment. The sale of alcohol was immediately banned, thus initiating what became a flourishing home brew industry and a shortage of potatoes."

Thanks, Ron. After I read your note, I decided that you are a true doodlebugger. Someone should erect a statue in your honor. Wait a minute! We have already done that. Visit the Doodlebugger hall of fame in Tulsa (SEG Business Office) to see it. **TJE**