DLSU RESEARCH CONGRESS 2020
"Building Resilient, Innovative, and Sustainable Societies"
June 17-19, 2020

Exploring the Gap in Implementing the Philippine Disaster Risk Reduction and Management Law (RA 10121) in the K-12 Senior High School Institutions' Curricula

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Abstract: The Philippines is one of the most disaster-prone countries in the world, as it is located between two major tectonic plates and within the Pacific Typhoon Belt. To respond to the Philippines's situation, the Philippine Government enacted RA 10121 or the Philippine DRRM Law in 2010 which institutionalized Disaster Risk Reduction and Management in the country. Section 14 of the Philippine DRRM Law states that DRRM education should be a required subject in all courses whether academic or technical vocational. In line with this, the Department of Education (DepEd) included the Disaster Readiness and Risk Reduction (DRRR) subject in the K-12 Senior High School curriculum after launching the K-12 program in 2013. However, after reviewing the curricula of two selected schools from the Philippines, it was discovered that the DRRR subject was only offered in the Science, Technology, Engineering, and Math (STEM) strand as a required subject while it is offered in the General Academic (GAS) strand as either a required subject or an elective. Furthermore, DepEd itself prescribed DRRR as a core subject only for STEM, with the other strands not required to take this subject. Therefore, it is recommended for DepEd to revisit the Senior High School curricula and try to include Disaster Readiness and Risk Reduction as a required subject in all Senior High School strands in order to prepare the next generation in dealing with various hazards in the Philippines.

Keywords: RA 10121; Department of Education; K-12 program; Disaster Readiness and Risk Reduction (DRRR) subject

1. INTRODUCTION

The Philippines is ranked third in the 2018 World Risk Index as one of the most disaster prone countries in the world. As it is located at the center of the Pacific Typhoon belt and between major tectonic plates, the country experiences all sorts of disasters due to natural hazards such as typhoons, earthquakes, landslides, and volcanic eruptions every year.

To address the disaster-prone setting of the Philippines, in 2010, the Senate and House of Representatives passed RA 10121 or the Philippine DRRM Law. Section 14 of this Act requires the Department of Education (DepEd), the Commission on Higher Education (CHED), and the Technical Education and Skills Development Authority (TESDA) to integrate disaster risk education into school curricula (RA 10121, 2010). In 2013, the Department of Education released the K-12 basic education curriculum which included Disaster Readiness and Risk Reduction as a core subject in compliance with RA 10121. The course is described as focusing "on the application of scientific knowledge and the solution of practical problems in a physical environment." (DepEd, 2013) It is important for Filipinos to have a good grasp of the concepts taught in DRRR in order to decrease their vulnerability to various types of natural and man-made hazards.

1.1 Background of the Study

1.1.1 RA 10121: The Philippine DRRM Law

RA 10121, or the Philippine DRRM Law, is an act strengthening the Philippine disaster risk reduction and management system, providing for the national disaster risk reduction and management framework and institutionalizing the national disaster risk reduction and management plan, appropriating funds therefore and for other purposes.

RA 10121 is viewed as a paradigm shift in the Disaster Risk Reduction Management (DRRM) plan in the Philippines from the earlier PD 1566, which was enacted in 1978 by President Marcos to cater to the country's need for a disaster risk reduction and management framework. In contrast to PD 1566 which is more reactionary in nature and implements protocols mostly focused on rehabilitation after disasters, RA 10121 employs a more developmental approach in terms of disaster risk reduction and management (Landicho, 2020), (Rimando, 2017), (NDRRMC, 2011).

RA 10121 adopts a more community-based DRRM model wherein the local government units, the private sector, civil society organizations, and even the people making up the communities are empowered to reduce their vulnerability and increase capacity and resilience against disasters. Furthermore, this law gave birth to the National Disaster Risk Reduction and Management Council, which is made of various government and non-government organizations that work together to oversee the DRRM system in the Philippines. It also decentralized DRRM in the country by mandating all levels of government to form Local Disaster Risk Reduction and Management Councils (LDRRMCs) down to the barangay level.

RA 10121 provides the legal framework for the National Disaster Risk Reduction and Management Plan (NDRRMP). The NDRRMP "covers four thematic areas: (1) Disaster Prevention and Mitigation; (2) Disaster Preparedness; (3) Disaster Response; and (4) Disaster Rehabilitation and Recovery, which correspond to the structure of the National Disaster Risk Reduction and Management Council (NDRRMC)." (NDRRMP, 2011).

These 4 thematic areas correspond to the four phases of the Disaster Management cycle. Disaster Prevention and Mitigation is the pre-disaster stage wherein efforts are made to prevent potential damage from hazards, along with Disaster preparedness which entails having activities and precautionary measures being taken for ensuring effective response to the impact of hazards. Disaster Response is the immediate assistance given to the affected population after the disaster has occured, and Disaster Rehabilitation and Recovery concerns the rehabilitation of the affected population after a disaster (ADRC, 2020), (Rimando, 2017). At the national level, the NDRRMP asserts that DRRM should be integrated into the various national development and action plans of government agencies (NDRRMP, 2011).

1.1.2 RA 10533: The Philippine K-12 Act

Republic Act No. 10533 also known as the "Enhanced Basic Education Act of 2013" was approved into law by President Aquino on May 15, 2013. Grades 11 and 12 were added as the senior high school stage of the 13-year enhanced basic education system (Philippine Daily Inquirer, 2018). The Philippines improved its basic educational system to be at par with educational institutions internationally enacted Republic Act No. 10533 which will strengthen its curriculum by increasing the number of years for basic education. The enhanced basic education program encompasses at least one (1) year of kindergarten education, six (6) years of elementary education, and six (6) years of secondary education, in that sequence. Secondary education includes four (4) years of junior high school and two (2) years of senior high school education. This K-12 educational system was established to maintain and support a complete, adequate, and integrated system of education relevant to the needs of the people, the country, and the society-at-large (RA No. 10533 Official Gazette of the Republic of the Philippines, 2013).

1.2 Natural Hazards in the Philippines

According to the United Nations International Strategy for Disaster Reduction (UNISDR, 2009), a hazard is "a dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage". Each year, many of these natural hazards hit the country, often resulting

in serious economic and social losses. Once a hazard causes a lot of damage, that is when it is known as a disaster,which is defined by the UNISDR as "a serious disruption of the functioning of a community or society involving widespread human, material, economic or environmental losses and impacts" (2009).

1.2.1. Geology of the Philippines

The Philippine Archipelago is divided into two main geologic blocks, namely the Palawan-Mindoro Microcontinental Block (PMCB) which consists of Palawan, Mindoro, and the northwestern section of Panay, and the Philippine Mobile Belt (PMB), which consists of the remaining islands in the archipelago. During the Cretaceous, the Philippine Mobile Belt started formation from island arcs and obduction of ophiolitic terranes from the subduction of the Pacific Plate under the Philippine Plate. On the other hand, the aseismic Palawan-Mindoro Microcontinental Block was originally a part of the Asian Mainland that rifted away during the Mesozoic (Aurelio, 2012).

The PMB and the PMCB have been colliding in the Visayas Region of the Philippines since the early Miocene. This indentation of the PMCB onto the PMB caused the formation of a major left-lateral strike slip-fault: The Philippine Fault Zone (Yumul, et. al, 2005). In conclusion, the archipelago can be described as "a result of terrane accretion, ocean basin closure, arc formation, and indenter tectonics" (Yumul, et. al, 2008).

The unique tectonic setting of the Philippines is the reason why there are more than 2,000 earthquakes recorded every year, and more than 20 active volcanoes in the country (PHIVOLCS, n.d.). As a result, the country is highly vulnerable to geologic hazards, such as volcanic eruptions, earthquakes, and mass wasting events. Except for glacial and snowfall-related hazards, all types of geologic hazards occur in the Philippines (Balce & Ramos, 2016).

1.2.2. Hydrometeorological Hazards in the Philippines

The Philippines is visited by an average of 20 typhoons per year. Of these 20 typhoons, around 5 or 6 are disastrous (PAGASA, n.d.). According to a research paper written by Kang and Elsner (2019), typhoons are becoming stronger due to rising sea surface temperatures due to global warming. A 2016 article by Balaguru, et. al, stresses that global warming also causes the sea surface salinity to drop because of greater rainfall in places where typhoons form, thereby reducing typhoons' ability to cool the upper ocean. This results in intensification of typhoons, particularly those in the Northwestern Pacific Region and causes the formation of supertyphoons like Typhoon Yolanda which hit the Philippines in November 2013. 6,300 people were killed, 1,062 were missing, and 28,688 were injured (NDRMMC, 2013), and it is considered as one of the most intense tropical cyclones in recorded history.

Climate change also poses a significant threat to the Philippines from the rising sea level resulting from the melting of the polar ice caps from global warming. In a report published in 2016, Kahana et. al, stressed that a sea level increase of 5-7 mm per year had been observed in recent satellite observations in the Tropical Western Pacific region which is to the east of the Philippines. Because of this, sea level rise is projected to be slightly larger in the Philippines and can increase the risk posed by storm surges to coastal cities. Land subsidence because of excessive groundwater extraction further compounds the problem of sea level rise in some coastal cities like Metro Manila.

As it is located in the western tropical Pacific, the country is also vulnerable to the effects of the El Nino Southern Oscillation (ENSO), a phenomenon that occurs in the tropical Pacific Ocean every few years (Wang, et. al, 2016). It is characterised by a rise and fall in tropical sea level air pressure which causes the easterly trade winds to reverse direction coupled with a rise in average sea-surface temperature. El Nino causes arid conditions in the typically wet Tropical Western Pacific and wet conditions in the typically arid Tropical Eastern Pacific. Afterwards, this could be followed by a bout of La Niña in which the trade winds revert back to their original setting albeit they become stronger. La Nina also causes a fall in average sea surface temperature (NOAA, n.d.).

ENSO events have pronounced effects on the Philippines, with the warm events (El Nino) often associated with drought that puts pressure on water resources and agriculture. On the other hand, cold events (La Nina) are often associated with excessive amounts of rainfall, along with an increase in the number of tropical cyclones entering the country (Hilario, et. al, 2009). According to Cai, et. al, (2014), the

frequency of such events will continue to increase because of warming of the ocean's surface due to climate change, especially in an archipelagic country like the Philippines.

1.3 Framework

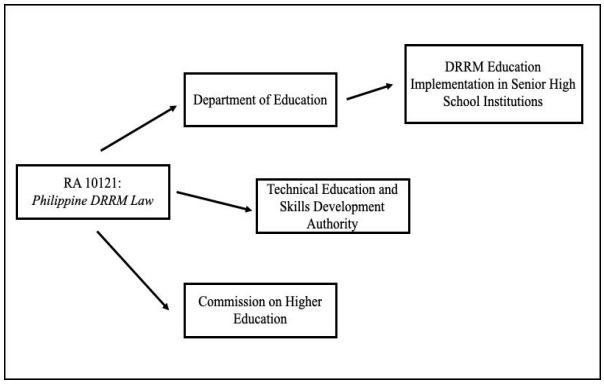

Figure 1: Conceptual Framework of the study

Section 14 of RA 10121 requires the Department of Education (DepEd), the Commission on Higher Education (CHED), and the Technical Education and Skills Development Authority (TESDA) to integrate disaster risk education into school curricula (RA 10121, 2010). Furthermore, it is the Department of Education that is tasked to implement this into elementary and high school curricula. DepEd mandated the DRRR subject to be offered in Senior High School, with it being a required subject in the STEM strand and could be taken as either a required subject or an elective in the General Academic Strand (GAS), and as an elective in the other academic strands (DepEd, 2013), (Geronimo, 2015).

1.3. Scope and Limitation

This study is systematic review of literature concerned with exploring the gap in implementing the Philippine DRRM Law in the K-12 Senior High School institutions under the Department of Education only, while not including CHED and TESDA. Being an exploratory study, only two schools were included as samples in assessing the school curricula and their compliance with the requirement of RA 10121 in terms of DRRM education. This study analyzed only the different strands offered by the two selected schools and assessed where DRRR is included in their curricula. Furthermore, this study only took the percentage of the students required to take DRRR (i.e., STEM students) not including those in other strands taking DRRR as an elective.

2. METHODOLOGY

The researchers requested the school curricula from the two selected schools as the study aims to assess if they are complying with the educational requirements of RA 10121 in terms of DRRM education. They also requested the number of SHS students enrolled for the Academic Year 2019-2020. The corresponding number of students per strands were obtained in order to compute for the percentage of students who have taken or will take DRRR as a required subject out of the total number of senior high school students enrolled. This is done by taking the percentage of GAS and STEM students out of the total number of students. Since the two schools included in the study do not offer the GA strand, only the STEM students were considered in taking the percentage. Lastly, an email containing the following questions were sent to administrators of the two schools included in the study: (1) Why is the DRRR subject not taught in other strands that you are offering when RA10121 Philippine DRRM Law requires teaching DRRM to all? and (2) Why isn't it taught in more courses? Which courses could be sacrificed to make way for DRRM?

3. RESULTS AND DISCUSSION

After reviewing the school curricula of the two schools included in the study along with the prescribed Senior High School curriculum of DepEd, it was observed that the Disaster Readiness and Risk Reduction (DRRR) subject was only offered as a required subject in the STEM strand. After looking at the DepEd website, it was apparent that the Department of Education only prescribed DRRR as a core subject for the STEM strands but it was not a required subject in other tracks and strands, and schools are free to offer DRRR either as an elective or a required subjects for the General Academic Strand (Geronimo, 2015). In the first school, only 44% (i.e., 1,104 out of 2,536) of the students

are taking DRRR as a required subject, while the others, since they are not part of the STEM strand, do not have DRRR as a required subject (the two schools do not offer GAS). In the second school, only 45% (397 out of 890) of the total number of students take DRRR as a required subject.

The schools included in this study are complying with the DepEd's curriculum requirements of including DRRR as a required subject in STEM strand only. However, Section 14 of RA 10121 on the other hand states that:

> "The DepED, CHED, TESDA, in coordination with the Office of Civil Defense, the National Youth Commission, the Department of Science and Technology, the Department of Environment and Natural Resources, the Department of Interior and Local Government -Bureau of Fire Protection, the Department Of Health, the Department of Social Welfare and Development and other relevant agencies, shall integrate disaster risk reduction and management education in the school curricula of secondary and tertiary level of education, including the National Service Training Program (NSTP), whether private or public, including formal and nonformal, technical-vocational, indigenous learning, and out-of-school youth courses and programs" (RA 10121, 2010).

Only the SHS vice principal of one of the schools responded to the interview email. He said that their school was only complying with the DepEd mandate that DRRR was a prescribed course only for the STEM strand since they are not offering GAS. To answer the first and second questions that the researchers posed, he said that the Senior High School curriculum for all the other strands is filled up. Per strand, there are 31 prescribed subjects spread over a two-year period which are delivered for 80 hours per trimester. For the non-STEM strands, they have Physical Science and Earth and Life Science as core Science subjects. For STEM, since they already have Biology, Physics, and Chemistry as specialized subjects, Earth Science and DRRR are offered instead of Physical Science and Earth and Life Science.

Nevertheless, they do try to integrate DRRM education in their Science subjects such as Earth & Life Science, a core subject which all students take. They also share relevant and timely resources to their students during homeroom periods and in school-wide assemblies. Their school has a Disaster Readiness program under the Administrative Services Department. In this program, all employees including teaching and non-teaching staff and students are given orientations and seminars on disaster preparedness. Everyone in school is actively involved in institutional activities such as fire drills and earthquake drills, which are also mandated by the local government. However, they are open to adding DRRR to the curriculum of all subjects albeit with some reservations since if DRRR is to be given as an added subject, they have to look at their curricula and see how it fits without displacing the mandated subjects of DepEd.

4. CONCLUSIONS AND RECOMMENDATIONS

In a systematic review of literature conducted by Agahei, et. al, 2018, they found out that education is indeed vital in reducing the vulnerability of the population to disasters. Hoffman and Muttarak, (2017) compared the education levels on disaster risk reduction of the Philippines and Thailand and the disaster preparedness of respondents from both countries. The researchers found out that the Philippines, which had directly implemented disaster risk reduction management into the school curriculum was more prepared in terms of dealing with natural disasters than in Thailand where DRRM education had not been directly implemented yet. In the study, the authors saw a direct correlation not only with DRRM education and disaster management behavior but also disaster experience and disaster management behavior. Respondents from the Philippines were more likely to have experienced disasters in the past, and this contributes to their perception and attitude towards disaster risk.

This study only serves to show us how crucial DRRM education is in reducing the vulnerability of people to natural and even man-made disasters, especially those situated in disaster-prone areas in the

Philippines. In teaching DRRR, a multi-disciplinary approach of bringing together biological, geophysical, socio-cultural, political, and economic factors are necessary to make these various subject matters relevant to the lives of the people.

It is recommended that the Philippine Department of Education should revisit the various Senior High School curricula and try to include Disaster Readiness and Risk Reduction as a required subject in all Senior High School strands as it is relevant to the lives of all those living in the highly disaster-prone Philippine archipelago. This study may help in gathering information on and strengthening the DRRM curriculum in the country because education plays a vital role in educating people about the dangers posed by various natural hazards and what to do when they occur (UNISDR, 2016). In addition, a strong disaster risk reduction program is needed in order to prepare the next generation in dealing with various natural and man-made hazards that normally hit the Philippines through adequate and effective education in DRRR.

4.1. Areas for Further Study

For further research purposes, it is recommended that other educational institutions such as CHED and TESDA be included in the sample in order to assess their compliance with the Philippine DRRM Law as well. Surveying more schools may also help in getting a more detailed profile of the situation of DRRM education in the country.

It is also recommended to conduct a survey on the Senior High School students themselves to assess the effectiveness of the DepEd DRRR course. This may be done using a comparative study in which the DRRM knowledge of Grade 11 and Grade 12 students (those who have and have not taken DRRR yet) will be compared to see if there is a significant increase in their knowledge after taking the course. Along with this, it is recommended to assess the educational attainment, knowledge and skills, and training on DRR related subjects of the DRRR teachers themselves.

5. ACKNOWLEDGEMENT

The authors would like to thank Dr. Romeo G. Manalo for his guidance.

6. REFERENCES

ADRC. (n.d.). Disaster Risk Management Cycle . Retrieved March 6, 2020, from https://www.adrc.asia/publications/TDRM2005/TDRM_Good_Practices/PDF/PDF-2005e/Chapter2_2.2.pdf

Aghaei, N., Seyedin, H., & Sanaeinasab, H. (2018, August 2). Strategies for disaster risk reduction education: A systematic review. Retrieved February 23, 2020, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6089020/

Aurelio, M. A., Peña, R. E., & Taguibao, K. J. L. (2012). Sculpting the Philippine archipelago since the Cretaceous through rifting, oceanic spreading, subduction, obduction, collision and strike-slip faulting: Contribution to IGMA5000. Journal of Asian Earth Sciences, 72, 102–107. doi: 10.1016/j.jseaes.2012.10.007

Balaguru, K., Foltz, G. R., Leung, L. R., & Emanuel, K. A. (2016). Global warming-induced upper-ocean freshening and the intensification of super typhoons. Nature Communications, 7(1). doi: 10.1038/ncomms13670

Balce, G. R., & Ramos, E. G. (1988). Geologic Hazards in the Philippines; A Definition and an Overview. Safety and Reliability, 8(3), 31–46. doi: 10.1080/09617353.1988.11691173

Cai, W., Borlace, S., Lengaigne, M., Rensch, P. V., Collins, M., Vecchi, G., … Jin, F.-F. (2014). Increasing frequency of extreme El Niño events due to greenhouse warming. Nature Climate Change, 4(2), 111–116. doi: 10.1038/nclimate2100

Department of Education (2013). K to 12 Basic Education Curriculum Senior High School - Disaster Readiness and Risk reduction. Retrieved January 19, 2019 from https://www.deped.gov.ph/wp-content/uploads/2019/01/SHS-Core_Earth-Science-CG.pdf

Department of Education (2013). K to 12 Basic Education Curriculum Senior High School - Earth Science. Retrieved January 19, 2019 from https://www.deped.gov.ph/wp-content/uploads/2019/01/SHS-Core_Earth-Science-CG.pdf

Geronimo, J. Y. (2015, April 15). K to 12: 80-hour subject on disaster readiness 'too much'? Retrieved March 24, 2020, from

https://www.rappler.com/nation/89939-pia-cayetano-disaster-readiness-subject-k12

Heintze, H. J., Kirch, L., Küppers, B., Mann, H., Mischo, F., Mucke, P., … Weller, D. (2018). 2018 World Risk Index. Retrieved February 16, 2020, from https://reliefweb.int/sites/reliefweb.int/files/resources/WorldRiskReport-2018.pdf

Hilario, F., Yumul, G., Dimalanta, C., & Nervando, N. (2010). The 2009-2010 El Niño Southern Oscillation in the Context of Climate Uncertainty: The Philippine Setting. Philippine Journal of Science, 139(1), 119–126.

Hoffmann, R., & Muttarak, R. (2017). Learn from the Past, Prepare for the Future: Impacts of Education and Experience on Disaster Preparedness in the Philippines and Thailand. World Development, 96, 32–51. doi: 10.1016/j.worlddev.2017.02.016

Information on Disaster Risk Reduction of the Member Countries. (n.d.). Retrieved January 17, 2020, from https://www.adrc.asia/nationinformation.php?NationCode=608&Lang=en&NationNum=14

INQUIRER.net. (2018, April 7). What went before: The K-12 program. Retrieved February 16, 2020, from https://newsinfo.inquirer.net/980733/what-went-before-the-k-12-program

Kahana, R., Daron, j, Abdon, R., & Scannel, C. (2016). Projections of mean sea level change for the Philippines. Met Office.

Kang, N.-Y., & Elsner, J. B. (2019). Influence of global warming on the rapid intensification of western North Pacific tropical cyclones. Environmental Research Letters, 14(4), 044027. doi: 10.1088/1748-9326/ab0b50

Landicho, C.J. (2020, March 2,). An Introduction to RA 10121 and Community Based DRRM. [Lecture]

NDRRMC. (2011). National Disaster Risk Reduction and Management Plan (NDRRMP) 2011-2028. Retrieved March 6, 2020, from http://www.ndrrmc.gov.ph/attachments/article/41/NDRRM_Plan_2011-2028.pdf

NDRRMC. (2013). Situational Report re Effects of Typhoon YOLANDA (HAIYAN). (2013, November). Retrieved January 17, 2020, from http://ndrrmc.gov.ph/21-disaster-events/1329-situational-report-re-effects-of-typhoon-yolanda-haiyan

RA 10121: An Act Strengthening The Philippine Disaster Risk Reduction And Management System, Providing For The National Disaster Risk Reduction And Management Framework And Institutionalizing The National Disaster Risk Reduction And Management Plan, Appropriating Funds Therefor And For Other Purposes. (2010, May 27). Retrieved from https://www.lawphil.net/statutes/repacts/ra2010/ra_10121_2010.html

Republic Act No. 10533: GOVPH. (2013, May 15). Retrieved February 16, 2020, from https://www.officialgazette.gov.ph/2013/05/15/republic-act-no-10533

PAG-ASA. (n.d.). Information about tropical cyclones. Retrieved February 23, 2020, from http://bagong.pagasa.dost.gov.ph/information/about-tropical-cyclone

PHIVOLCS. (n.d.). Volcanoes of the Philippines. Retrieved from https://www.phivolcs.dost.gov.ph/index.php/volcano-hazard/volcanoes-of-the-philippines

UNISDR Terminology on Disaster Risk Reduction. (2009). Retrieved February 23, 2020 from https://www.preventionweb.net/files/7817_UNISDRTerminologyEnglish.pdf

US Department of Commerce, & National Oceanic and Atmospheric Administration. (2009, March 26). What are El Nino and La Nina? Retrieved February 23, 2020, from https://oceanservice.noaa.gov/facts/ninonina.html

Wang, C., C. Deser, J.-Y. Yu, P. DiNezio, and A. Clement, 2016: El Niño-Southern Oscillation (ENSO): A review. In Coral Reefs of the Eastern Pacific, P. Glymn, D. Manzello, and I. Enochs, Eds., Springer Science Publisher, 85-106.

Yumul, G. P., Dimalanta, C. B., & Tamayo, R. A. (2005). Indenter-tectonics in the Philippines: Example from the Palawan Microcontinental Block - Philippine Mobile Belt Collision. Resource Geology, 55(3), 189–198. doi: 10.1111/j.1751-3928.2005.tb00240.x

Yumul, G. P., Dimalanta, C. B., Maglambayan, V. B., & Marquez, E. J. (2008). Tectonic setting of a composite terrane: A review of the Philippine island arc system. Geosciences Journal, 12(1). doi: 10.1007/s12303-008-0002-0