Research Interests – Dini Adyasari

My primary research interest is interdisciplinary studies of the hydrosphere (water flux, aquatic geochemistry), biosphere (microbial community, biological contamination), and anthroposphere (anthropogenic pollutants, land use pattern). Water is a very dynamic field of study, due to its multiple associations with human life (e.g. drinking water source, ecosystem provider, or even recreational purpose), as well as its correlation to other scientific disciplines, such as social or economic component. In the past, my bachelor and master theses were related to water quality research in an engineered system, i.e. organic and nutrient removal using microbial consortium in a wastewater treatment reactor. However, during my doctoral study, I have developed a deep interest in the natural water system and hydrological processes, especially in coastal water ecosystem. This environment is complex by nature due to its role as a transition point between subjects of different characteristics, e.g. groundwater-surface water, land-ocean, or fresh water-saline water. Furthermore, the coastal environment also faces a high level of anthropogenic stress due to the urbanisation and human modification on its land use pattern; which makes water quality research in the coastal environment is a very stimulating field to study.

Specific areas of my research interests are geochemistry and microbiology aspects of a pollutant in an aquatic environment. This cross-disciplinary study may provide a full illustration of origin, fate, transformation, or transport of pollutant from land to ocean, especially anthropogenic pollutant (e.g. nutrient). For example, the application of natural tracer (e.g. radon and radium) and direct discharge equipment (e.g. seepage meter) to estimate the spatial and temporal variability of fresh groundwater flux to the coastal area, (i.e. submarine groundwater discharge (SGD)). The utilisation of isotopic tracers, e.g. stable nitrate isotopes, may be advantageous in identifying area prone to nitrate contamination or determining the contribution of atmospheric and soil-derived source in a given aquifer. Furthermore, analysing microbial community structure and its functional genes may determine the dominant transformation process of nitrogen in a given water body, whether it is biological (e.g. nitrification and denitrification) or physical (e.g. dilution) attenuation. Together, the result of this interdisciplinary study may facilitate a proper risk assessment that promotes sustainable water resources in a given area.

For my doctoral research, I applied a combination of field study (radon as a SGD tracer, 16S rRNA gene sequencing for microbial identification, and photochemical methods for nutrient measurement) with land use analysis based on GIS data to answer *what*, *where*, *when*, and *how many* chemical and biological pollutants are delivered via SGD into the coastal water. The

result of this study shows that SGD delivered a notable amount of nutrient and potential fecal contamination into the nearshore water due to the combination of geology, climate, and human activities. I also participated in field research stay at the University of Alabama (USA) and Interuniversity Institutes of Marine Sciences (Israel) to conduct SGD studies in a subtropical estuary and arid coastal region, respectively. These two types of research, in addition to my own doctoral research (i.e., at a tropical volcanic environment in Indonesia) have provided me with a different perspective on the water system in different climate and geology, as well as the impact of the economic level of a country (i.e. developed or developing nations) to the water quality status.

In the future, I am keen to continue conducting interdisciplinary approaches in hydrology, geochemistry, and microbiology, particularly focusing on different kind of coastal geology around the world, including underrepresented area such as part of Asia, Africa, and South America.