

## Seasonality and diversity of culturable vibrios in tropical coastal waters

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**ABSTRACT.**—Seasonal changes in culturable vibrio abundance and diversity were monitored at two stations off the west coast of Peninsular Malaysia (Port Klang and Port Dickson) over a 2-yr period. Both vibrio abundance and diversity were higher at Port Dickson [160 (SD 21) colony forming unit (cfu) ml<sup>-1</sup>, Shannon's diversity of 1.62 (SD 0.08)] than Port Klang [101 (SD 32) cfu ml<sup>-1</sup>, Shannon's diversity of 1.11 (SD 0.09)]. In total, 16 *Vibrio* spp. were identified in the present study, of which *Vibrio alginolyticus* (Miyamoto et al., 1961) Sakazaki, 1968 was the predominant species at both stations. Univariate analysis revealed that both vibrio abundance and diversity were higher in waters with higher dissolved oxygen and lower nutrient concentrations. Although both stations were very different, we observed a recurring vibrio “bloom” during the rainy season. This seasonality brings important implications to the management of coastal resources and activities, primarily due to the fact that some *Vibrio* spp. are pathogenic to both humans and aquatic organisms.

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Vibrios form the most important bacterial groups among marine biota, and are ubiquitous in aquatic settings like estuaries. They are part of the normal biota of marine coastal waters (Thompson et al. 2004). Vibrios are important in nutrient cycling and biogeochemical cycles, and play a role in the degradation of organic matter. They are one of the major links that transfers dissolved organic carbon to higher trophic levels in the marine food web (Mouriño-Pérez et al. 2003). There are more than 63 described *Vibrio* species, of which at least 12 are important pathogens of humans and marine organisms (Thomas et al. 2004).

Some of the well-known human pathogens are *Vibrio cholera* (see Online Table 1 for species authorities), *Vibrio parahaemolyticus*, and *Vibrio vulnificus*. *Vibrio cholerae* is associated with worldwide epidemics of cholera (Colwell 1984), whereas *V. parahaemolyticus* is an important agent for seafood-associated gastroenteritis. By contrast, *V. vulnificus* is an emerging foodborne pathogen that causes most of the mortality in food-associated bacterial infections (Center for Disease Control and Prevention 1996). These human pathogens and other vibrios also can cause infections in marine organisms (Jones and Oliver 2009). Vibrios are most critical as seafood-associated pathogens, and some are capable of killing coral tissues (Vandenberghe et