Dissolved carbon dynamics in rivers and coastal areas of the Philippines: evaluation of terrestrial inputs using dissolved inorganic carbon stable isotopic composition

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River load of anthropogenic materials is one of key sources for degradation of coastal habitats as with aquacultures. They change coastal water quality directly and indirectly, and local multiple organic sources such as mariculture fish feeds/feces, resuspended sediment and coral mucus complicate those influences. To assess the effect of allochthonous inputs, isotope signatures of dissolved inorganic carbon (DIC) and particulate organic matter (POM) were examined to identify sources and their loading processes. In Bolinao, where mariculture is densely deployed in semi-closed embayment, δ^{13}C-DIC and δ^{13}C-POC values of river water were almost similar between the wet and dry seasons, and were decreased as decreasing salinity. However, the relationship between δ^{13}C-DIC and δ^{13}C-POC was unclear. In the coastal area, large decrease of salinity was observed in the wet season. The negative correlation between salinity and each parameter suggests that river inputs mainly decreased δ^{13}C-DIC (−5.8‰ ~) and δ^{13}C-POC (−28.5‰ ~) in the wet season. In the dry season, mariculture, maybe fish feeds/feces, was mainly attributed to the decrease of δ^{13}C-DIC values especially in the surface layer through their decomposition. In contrast, in Iloilo, where some rivers input to the strait among islands, the character of river δ^{13}C-DIC and δ^{13}C-POC was similar as Bolinao. In coastal area, the decrease of δ^{13}C-DIC was not so serious in the wet season (−1.4‰ ~) compared to Bolinao, however low δ^{13}C-POC value was observed in the bottom layer (−27.7‰ ~). It may be ascribed to resuspension of settled materials which was originated from river inputs. We try to unravel their underlying multiple processes and discuss the relationship between river and coastal area in terms of dissolved carbon dynamics in those areas.

Keywords: terrestrial inputs, stable isotopic composition, dissolved inorganic carbon, particulate organic matter, tropical coastal area

