Direct Loadings of Nutrients into Inland Coastal Area by Atmospheric Deposition

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The total nitrogen (T-N) and total phosphorus (T-P) concentrations in the wet depositions and total depositions were measured in an urban area (at Kobe) and a rural area (at Ikuno). The specific loadings of these parameters were then estimated in each water year from Nov. 1995 to Oct. 1999.
The ratios of the T-N and T-P loads for the wet depositions from every rainy event and the total depositions were 60 % and 70 %, respectively. Therefore, it was determined that the loads for the total depositions were better than the loads for the wet depositions from every event for estimating the total input of nutrients.

The specific loadings of T-N and T-P in the urban area were in the range of 8.9～25 kg/ha/year and 0.08～0.15 kg/ha/year, respectively. On the other hand, those in the rural area were 6.7～13 kg/ha/year and 0.10～0.33 kg/ha/year, respectively. Their means during the four-years study were 15 kg･T-N /ha/year and 0.11 kg･T-P/ha/year in the urban area, and 9.2 kg･T-N/ha/year and 0.16 kg･T-P/ha/year in the rural area, respectively. The T-P loadings for the total depositions in the urban area and in the rural area except for the one water year from Nov. 1996 to Oct. 1997 were the same. The T-P loadings in the inland urban areas (at Takarazuka and at Sanda), which we investigated in our other studies, showed almost the same values. Therefore, the T-P loadings by the atmospheric deposition were the same in every area. On the other hand, the T-N loadings changed due to the difference in land-use or human activity, which caused a difference in the nitrogen oxide concentration in the atmosphere around them. For example, the T-N loadings in the urban area were about 1.6 times greater than in the rural area. Furthermore, the T-N loadings increased as the yearly precipitations increased.

The direct input loadings of T-P into Osaka Bay and into the Harima Sea by the atmospheric deposition were estimated to be 16.8 ton/year and 37.7 ton/year, respectively. These values were about 0.3 % and 2.9 %of the input loadings into each area from the land. And T-N loadings by the deposition into each area were estimated to be 2290 ton/year and 5140 ton/year, when the loading in the urban area was used, and 1410 ton/year and 3150 ton/year, when the loading in the rural area was used, respectively. These values were 2.9 %, 19.9 %, 1.8 % and 12.2 % of the input loadings from the land.

It appeared that the nutrients loadings by the atmospheric deposition had a significant effect on the water environment of the Harima Sea.