

LETTERS TO THE EDITOR

Sir,

I was interested to read the editorial by C. Toebes on water resources and the population explosion in Volume 11, No. 2.

The claim is made that New Zealand has more water per unit area or per capita than any other country. Recently I have been closely associated with a number of investigations of the hydrology of Papua New Guinea and in the course of these, estimates have been made of the runoff from the country (Aitken *et al.*, 1972). The average annual runoff from the mainland areas of Papua New Guinea was estimated to be 2100 mm, which is equivalent to 816 km³. This runoff is from an area of 405 000 km²; assuming that the runoff from New Britain, New Ireland, Bougainville and the smaller islands is the same per unit area as that from the mainland which is a conservative assumption – the total runoff from the whole of Papua New Guinea is probably about 930 km³.

Comparative figures for the two countries are:

	Area (km ²)	Population	Runoff (km ³)
New Zealand:	269 000	2 821 000	393
Papua New Guinea:	462 000	2 332 000	930

While these figures show that both the per capita runoff and runoff per unit area are appreciably higher in Papua New Guinea than in New Zealand, there could be other countries with higher figures – for example, in such relatively sparsely populated countries as Surinam and Guyana in the wet tropical regions of South America.

I would also query the figure of 17.2 km³ quoted for the runoff of the Ganges basin. The average annual runoff from the three main Himalayan tributaries of the Ganges – the Karnali (Gogra), Gandak and Kosi – is alone equal to 153 km³ at or near the Nepalese border (Indian Central Board of Irrigation and Power, 1957, and unpublished data). Although these rivers rise in Nepal, practically all of their runoff would be available for use in India. The average annual discharge of the Ganges River at Hardinge Bridge (catchment area 976 000 km²) is quoted as 11 610 m³/s, that is 366 km³, by ECAFE (1966). If the Brahmaputra is included, the average runoff is more than doubled to 775 km³ (Kolupaila, 1955).

With regard to the re-distribution of water from areas of surplus to areas of deficit, it is of interest that proposals have been

advanced for the transfer of water from the Ganges basin to other less favoured parts of India as part of an overall national water grid (ECAFE, 1972).

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Sir,

I was aware of the paper by Aitken *et al.* (1972) which gave an estimate of the runoff from Papua New Guinea. Although the question of which country has the most water per unit area or per capita is an academic one, if statements of this kind are to be made some geographical or political zoning has to be adopted, and at the time of publication Papua New Guinea was a dependent territory. The same applies to Surinam, which is a part of the Kingdom of the Netherlands. Guyana is an independent country and could have a very high runoff, although the only reference I have been able to trace gives a runoff of between 1000 and 1500 mm per annum (Lvovich, 1973).

If dependent territories, islands or similar geographical entities are taken into account some very high runoff figures per unit area and per capita can be shown to occur, and I would agree with Mr Brown that, for instance, New Britain and New Ireland are likely to be considerably wetter than the mainland of Papua New Guinea.

I am grateful for the information on the Ganges basin supplied by Mr Brown.

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