

551.312.3:551.35

## RIVER EFFECT ON SEA

The Bay of Bengal offers a good experimental ground for study of the effect of river discharges on the sea water, as several big rivers like the Ganga, Brahmaputra, Godavari, Krishna etc empty into it. As a result of the admixture of river and sea waters the physical as well as biological properties of the sea water are affected. The sea floor is also changed by the great amount of sediments brought in by the rivers. Study of physical properties of the Bay waters between Visakhapatnam and Madras was taken up, using the temperature, salinity, transparency etc data of sea water collected during ocean cruise No. 3, arranged by the Andhra University for 19 to 26 November 1952. As the data at different locations were taken at different times they have been reduced to the common hour, 0500 IST wherever practicable, applying the diurnal corrections derived from the hourly data collected 20 days earlier in a limited locality 55 miles off Visakhapatnam coast. The reduced data facilitate a synoptic study of the area under consideration.

Examination of the sea surface temperature, salinity and density data and dry bulb temperature data of the air over the sea (at 10 ft above sea level) at 0500 IST brought out the following features in November. The values of all the above elements increased generally with distance from the coast. Sea temperature was higher than that of the

overlying air, on an average by 1°F, which in turn was higher than that of the air over the coastal area north of Madras by more than 10°F.

The spatial temperature ranges of the sea water, air over the sea and air over the coastal strip were about 4°, 7° and 17°F respectively. In respect of the surface salinity and density ( $\sigma_t$ ) the observed ranges were 10 ‰ and 7 respectively. The inshore waters, influenced most by the inland conditions and the river discharges, generally had a temperature of less than 78°·5 F and a salinity of less than 24 ‰. The air temperature over these inshore waters was less than 77°·5 F. Northeast of Godavari, where the inshore waters were not affected by the river discharges, the waters were warmer and more saline than were the rest of the inshore waters.

The transparency of sea water (measured by a Secchi Disk) was low near rivers. The lowest value of 12 ft was recorded near Krishna. The highest value of 75 ft was observed 120 miles off Pennar.

At this time of the year when nearshore sinking occurs, the shallow waters less than 200 ft in depth have almost uniform temperature; only a slight increase of 2°F in 200 ft was noticed. In deeper waters a subsurface warm layer of about 83°F was present, and this was due to the colder river discharge and winter cooling in the surface layers (La Fond and Rao). Though warmer, this layer was in equilibrium as the overlying waters had a lower salinity due to the admixture of river-rain water and sea water. The thermocline in the area was below the lower 82°F isotherm and was deeper inshore than offshore. This might have been due to sinking and river discharge water near the coast.

The surface waters near rivers were warmer than the other waters and the layer depth near rivers was greater than that farther away. The temperature of sea water at rivers decreased from north to south and this might be attributed to the amount of discharge by the different rivers. The

greater the river discharge the higher the subsurface temperature of the sea water.

According to the vertical variation of salinity the top waters can be divided into three strata, *viz*, the top, intermediate and deep strata. The vertical gradient of salinity was small in the top and deep strata while it was large in the intermediate stratum. The top stratum appears to be absent in waters well beyond the shelf. The influence of the river water near the coast appears to extend as far as the bottom limit of the intermediate stratum (about 200 ft). At sub-

surface levels the salinity decreased from north to south due to the increasing dilution towards the south. Details will be published later.

The author wishes to express his thanks to Prof. E. C. La Fond and to Col. R. B. Seymour Sewell for offering valuable comments on the note.

C. POORNACHANDRA RAO

*Meteorological Office,  
Madras 27,  
July 22, 1957.*

#### REFERENCES

- |                                       |   |  |
|---------------------------------------|---|--|
| La Fond, E. C. and Borreswara Rao, C. | — | Vertical temperature structure of the upper layers of the sea off the east coast of India (to be published).   |
| Satyanarayana Rao, T. S.              | — | Studies on the penetration of light in the Bay of Bengal—Part I. Transparency of the waters on the east coast of India and its significance (unpublished). |