# Letters to the Editor

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## A 'DRIVING RAIN INDEX' MAP OF INDIA

It is a matter of common observation that rain seldom falls vertically. The prevailing wind deflects it from the vertical and the rain is always carried along at an angle to the vertical. Rain, if it falls vertically, will not affect any exposed surface if its orientation is also vertical. But as stated earlier, rain almost always falls at an angle, with the result that vertical surfaces depending on their relative orientation to the direction of the wind are affected by such rain. If these vertical surfaces happen to be the exposed walls of buildings or other structures, considerable damage could be caused to them, to their decoration and even to their contents. Indirect damages are also caused by such rain water falling on the exposed walls of buildings and structures.

2. Such wind driven rain is called 'driving rain' and problems arising out of driving rain vary widely from place to place. Regions which experience heavy rainfall accompanied with strong winds are worst affected in this respect, and in such regions, if suitable precautionary measures are not taken, considerable damage to structures as well as to decorations will result. Such precautionary measures will be unnecessary in regions with little rainfall and light winds. It is, therefore, possible to effect some economy in construction in areas not liable to have severe driving rain by using simple methods of construction than those needed at other places, or by using cheaper materials which may not be quite suitable in more exposed regions.

3. As already stated, the severity of driving rain or the damage that driving rain causes to a surface depends on the amount of rain water that falls on the surface. This in turn depends on (1) the relative orientation of the surface to the direction of the wind, (2) the wind speed and (3) intensity of rain. It is thus seen that for the most favourably orientated surface, *i.e.*, for a surface always facing the wind, the severity of driving rain depends on (1) wind speed and (2) rainfall. Lacy and Shellard (1962) have found that the mean wind speed during rain bears a fairly constant ratio to the mean wind speed at all hours and have suggested that the product of the mean rainfall

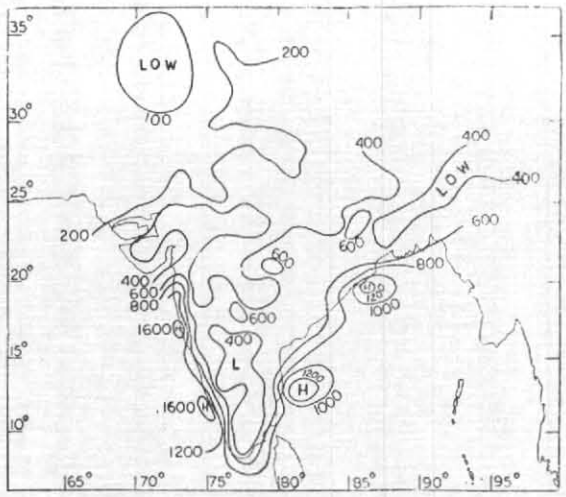


**Fig. 1. Isolines of mean annual 'Driving Rain Index'**
(Driving Rain Index defined as rainfall in cm × wind speed in mph)

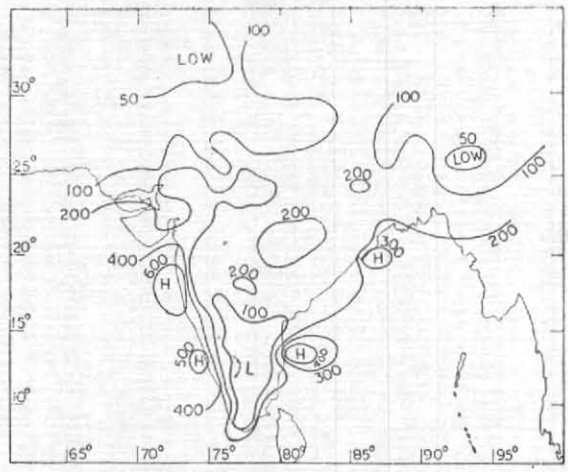


**Fig. 2. Isolines of maximum monthly 'Driving Rain Index'**

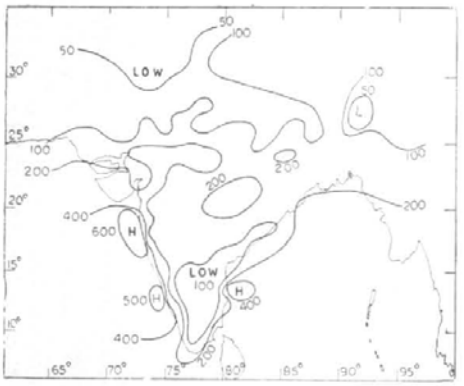


**Fig. 3. Isolines of 'Driving Rain Indices' for rainiest month**

and the mean wind speed may be taken as the driving rain index for the station. They have worked out this index at various points in Britain and have prepared a driving rain index map of Britain which gives an idea of the relative severity of this problem at various places in that country.

4. In the present note, a similar map of India has been prepared taking the mean annual rainfall and the mean annual wind speed of various stations for working out the driving index (Fig. 1). The monthly values of the index for each of these stations were also worked out and a map wherein the maximum monthly values are plotted is also presented (Fig. 2). A third map wherein the driving rain indices for the rainiest month are plotted is also prepared (Fig. 3). The mean rainfalls and mean wind speeds were taken from the departmental publications—Monthly and annual normals of rainfall and of rainy days [*Mem. India met. Dep.*, **23**, Pt. 7, (1934)] and Wind data for wind mills [*India met. Dep. Sci. Notes*, **6**,63 (1935)]. Isolines have been drawn on these maps, depicting areas with high and low values of these indices.

5. Fig. 1 shows two regions of very high driving rain index on the west coast, one in the Bombay—Ratnagiri area and the other in the Kozhikode—Mangalore area, which could be anticipated, as both these are regions of very heavy rainfall. Similarly there are two regions of high on the east coast, one near Puri and the other near Madras. In the interior of the Peninsula as well as on the north-western parts of the country, we get low values of the index thereby indicating that these areas are comparatively free from this problem of driving rain.

6. Features indicated in Figs. 2 and 3 are also broadly similar to these indicated in Fig. 1 except that the high in the Kozhikode—Mangalore region is not so prominent as in Fig. 1.

7. An interesting feature of all these maps is that there is a low over northeast India, even though this is a region of heavy rainfall. This may, perhaps, be due to the comparatively light winds that accompany the heavy rainfall in this area.

8. The following limitations will have to be borne in mind while consulting the maps for practical purposes. Firstly, the map does not give any indication as to how the index varies with the direction of the surface wind, as the values have been calculated on the assumption that the exposed surface always faces the wind. Secondly, the maps are based on mean values of rainfall and wind speed, whereas most serious damage due to driving rain may be experienced on few occasions of prolonged heavy rain accompanied with strong surface winds. Again, as the map is based on mean values, this does not take into consideration variation of both rainfall and surface wind speed caused by local features, for example a small hill may experience appreciably strong winds and heavy rainfall than the surrounding areas with the result that this place has a very high value of driving rain index compared to the surrounding regions. These local variations should be taken into account while using these maps.

S. NARAYANAN

*Regional Meteorological Centre,*
*Madras*
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*REFERENCE*

Lacy, R.E. and Shellard, H.C. 1962 *Met. Mag.*, **91**, 1080, p. 177.