

R02 Geo-Bio-Hydrological aspects of the Southeast Atlantic Basin of Brazil

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As a student of sciences involving hydrology I prefer the division of my country in the eight basins shown in Fig. 1. Of these basins the Amazon Basin is very famous worldwide, due to the natural resources, biodiversity and possible roles of the Amazonian forest in the global climate. However, my interest is not in Amazon but in the Southeast part of Brazil's Atlantic Basin. This basin, which parallels the Atlantic Ocean, supports much of what remained of the exuberant Mata Atlântica and some spots of the Araucaria forest. The climate (Aw, Cfa and Cfb of Köppen system) in this basin ranges from tropical in the north part to temperate in the south part, where frost is frequent (minimum -4°C , about 1 to 5 days each year) and even snow in higher altitudes may occur. The topography is mountainous in most of its area, and landslide may take place when heavy rainfall occurs; causing urban hazards in Rio de Janeiro city, for example.

Overall, I think that the physiographic conditions and some hydrological or erosion issues in this basin well resemble those found or occurring in Japanese basins.

Biology: the forests. Primary spots of two forests occur in this basin: Mata Atlântica and Araucaria Forest. The remaining Mata Atlântica forest is 2.5% of the original area, which are protected in the National Parks, mainly in São Paulo ($11,540\text{ km}^2$) and Paraná (5160 km^2) states. The Mata Atlântica sustains around 13,000 angiosperm species. It is possible to find from 160 to 200 species of plants over 2.5 cm dbh, in a 0.1 ha plot of this forest. The araucaria forest is a vegetation formation where the coniferous specie *Araucaria angustifolia* solely dominates the upper layer. This formation have been very few studied and because of the valuable wood of the araucaria and its occurrence in fertile soil, this forest no long exist in its primary condition. **Hydrology: Watersheds' waterbudget studies and orographic enhancement of precipitation.** The most reliable hydrological observation carried in this basin are for the Cunha municipality (central part) where the Forestry and Forest Product Research Institute (FFPRI) of Japan set a paired catchment experiment [2]. The 10 years mean annual water balance of the two small catchments studied, shown that the mean 2150 mm rainfall was partitioned in 30% as evapotranspiration, half being interception loss and half transpiration, and 70% as streamflow. Also of hydrological interest in this basin is the orographic enhancement of precipitation, most probably by seed-feeder mechanism, which may cause the rainfall in some portions of the basin to be as much as 4000 mm in some years and create rainfall gradients that may intensify mass movements occurrence. **Geology: Landslides.** More than 35 catastrophic landslides have been reported since 1915 in the Atlantic coast of the Serra do Mar. In Rio de Janeiro city they occur almost every year. On second of January this year, for example, sixty-six people dead and nearly two thousand have been driven from their homes in 12 slums towns across Rio de Janeiro due to slides on several hills. The type of mass movement which generally occurs on the lower third of the slopes after heavy rain, are rotational slumping or planar slides [4]. Investigation of the organization of the soil mantle [1] have concluded that the occurrence of landslide is associated with the development of a Kaolinitic K horizon, by weathering and pedogenesis, which is less permeable. This horizon leads to increased lateral water flow downslope, and consequent increase in shear stresses in the lower third of the slopes triggers slides. Decrease of landslide disasters risk in Rio de Janeiro have been worked out by the GeoRio or Geotechnical agency of the City through elaboration of risk map, slope stabilization works and set of watching system or raingauge network which allows to issue alarms in the media when critical rainfall occurs.



FIGURE 1. Location of the Southeast Atlantic Basin in Brazil

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