

Table 1. Nomenclature table

Term	Description	Typical value (Damodar River)
PAR	Photosynthetically Active Radiation (light intensity driving photosynthesis)	0–1000 W/m ²
<i>Chl – a</i>	Chlorophyll-a concentration (proxy for algal biomass in biofilms)	5–50 µg/L
α	Light-use efficiency coefficient	0.05 (calibrated)
β	Chlorophyll-a saturation coefficient	0.1 (calibrated)

Typical values for the Damodar River are based on field observations and literature data. Parameters α and β were obtained through model calibration to local conditions. Variations in *PAR* and *Chl – a* reflect diel and seasonal changes influenced by river turbidity, canopy cover, and algal growth dynamics.

Table 2. Damodar characteristics of Hydraulic Parameters

Parameter	Upstream	Downstream
Flow velocity (U)	0.3–1.2 m/s (monsoon: ↑, dry season: ↓)	0.3–0.8m/s
Depth (h)	1–2.5 m	0.5–1.2m
Slope (S)	0.0025	0.001(mainstem) / 0.005(effluent)
Suspended solids	100–300mg/L	800–1500mg/L
Gas transfer velocity (<i>k</i>)	3.5–4.2m/day	1.8–2.5m/day

Hydraulic parameters for the Damodar River were compiled from seasonal field measurements and existing hydrological studies. Upstream values generally represent less industrial influence and clearer water, while downstream values reflect increased pollution loads and reduced flow due to industrial effluents. Gas transfer velocity (*k*) varies with flow conditions, turbulence, and surface biofilm presence.

Table 3. Biofilm and Sediment Properties

Parameter	Dry season	Monsoon season
Biofilm thickness (δ)	0.3–1.2 m/s (monsoon: $\uparrow$, dry season: $\downarrow$)	0.3–0.8m/s
Porosity (ϕ)	1–2.5 m	0.5–1.2m
<i>Chl – a</i>	0.0025	0.001(mainstem) / 0.005(effluent)
Suspended sediments (C_{sed})	100–300mg/L	800–1500mg/L

During the dry season, slower flows promote thicker biofilms and higher porosity, while monsoon flows tend to shear biofilms and increase suspended sediment concentrations (C_{sed}). Chlorophyll-a (*Chl – a*) values serve as a proxy for biofilm productivity and reflect changes in light availability and nutrient loading.