

**Advanced Environmental Systems Analysis**  
**Academic Year 2020-21**  
**July 19, 2021**  
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**POLITECNICO**  
MILANO 1863

## 1<sup>st</sup> Module

Name: \_\_\_\_\_

ID number: \_\_\_\_\_

Signature: \_\_\_\_\_

### **IMPORTANT**

- The duration of this part is **60 min.**
- Books, notes, handouts and any other material **cannot be** used.
- Use **only these sheets**, including back. Any additional submitted sheet will not be considered in the assessment.

## QUESTION 1

15/30

The Environmental Authority of the Blue River suspects that an industrial plant illegally discharges into the river a BOD load of about 300g/s. This load mixes with the clean river water, which arrives in the area with a flow of 3 m<sup>3</sup>/s at a velocity of 2 km/h.

The river joins with a tributary just before the point where the authority measures the water quality. The tributary is 30 km long and with a flow rate of 2 m<sup>3</sup>/s and a speed of 1.6 km/h. It flows through an agricultural valley that produces a continuous BOD discharge of 10 g/km.

The authority measured a BOD concentration of 30 mg/L at the junction and a BOD degradation rate of 0.3 h<sup>-1</sup> valid for the entire river system.

How many kilometers upstream from the junction should the authority investigate to find the illegal discharge?

If the water temperature increases, is the BOD concentration going to change? Why?

