

C.3: Proposed Rocky River Power Plant Performance Assessment Task

Proposed Rocky River Power Plant

Trout and black bass are freshwater fish that normally require at least 8 parts per million (ppm) of dissolved oxygen (O_2) in the water for survival. Other freshwater fish, such as carp, may be able to live in water that has an O_2 level of 5 ppm. No freshwater fish species are able to survive when the O_2 level in water is 2 ppm or less.

Some factories or power plants are built along rivers so that they can use the water to cool their equipment. They then release the water (sometimes as much as 8°C warmer) back into the same river.

The Rocky River presently has an average summer temperature of about 25°C and contains populations of trout, bass, and carp. A proposal has been made to build a new power plant on the

banks of the Rocky River. Some people are concerned that this will affect the river ecosystem in a negative way.

The data table below shows the amount of oxygen that will dissolve in fresh water at different temperatures. The amount of oxygen is expressed in parts per million (ppm).

Dissolved Oxygen Content and Temperature

Temperature ($^\circ\text{C}$)	Fresh Water Oxygen Content (ppm)
1	14.24
10	11.29
15	10.10
20	9.11
25	8.27
30	7.56

Your Task

1. Review the information about water temperature and dissolved oxygen provided in the passage and table.
2. State one effect of temperature change on the dissolved oxygen content of fresh water. Support your answer using specific information from the data table.
3. Explain how a new power plant built on the banks of the Rocky River could have an environmental impact on the Rocky River ecosystem downstream from the plant. Be sure to include the effects of the power plant on:
 - water temperature
 - dissolved oxygen
 - fish
4. Describe one positive and one negative economic impact this power plant could have on the area.

Please write your response in paragraph form.

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Scoring Rubric

4 POINTS	3 POINTS	2 POINTS	1 POINT
<ul style="list-style-type: none"> • States and explains one effect of temperature change on dissolved oxygen content and uses extensive data from the table to support statement. • Without any misconceptions, uses extensive data from the table and passage to explain how the power plant could affect the river's water temperature, dissolved oxygen content, and fish species. • Shows strong evidence of evaluating multiple economic consequences. • All statements are strongly based on scientific evidence and/or principles. 	<ul style="list-style-type: none"> • States one effect of temperature change on dissolved oxygen content and uses extensive data from the table to support statement. • Without any misconceptions, uses data from the table and passage to explain how the power plant could affect the river's water temperature, dissolved oxygen content, and fish species. • Shows some evidence of evaluating economic consequences. • Most statements are based on scientific evidence and/or principles. 	<ul style="list-style-type: none"> • States one effect of temperature change on dissolved oxygen content and uses data from the table to support statement. • With minor misconceptions, uses some data from the table and passage to explain how the power plant could affect the river's water temperature, dissolved oxygen content, and fish species. • Does not show evidence of evaluating economic consequences. • Some statements are based on scientific evidence and/or principles. 	<ul style="list-style-type: none"> • Does not state one effect of temperature change on dissolved oxygen content and uses data from the table to support statement. • Does not use data from the table and passage to explain how the power plant could affect the river's water temperature, dissolved oxygen content, and fish species. • Does not show evidence of evaluating economic consequences. • Few to no statements are based on scientific evidence and/or principles.