

# Changing Oceans Module

**Product ID:** W35637 | **Type:** Education Units/Curriculum Titles

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## OVERVIEW

*Changing Oceans* first introduces students to general characteristics of oceans (such as salinity, depth, and layers) and to the variety of ocean organisms and their habitats. Then, students look at specific ocean-related problems and crises, including overfishing; ocean pollution; global warming; and exploitation of ocean minerals, metals, and energy. In addition to describing the problems, *Changing Oceans* concentrates on two factors: relating the problem directly to students and brainstorming current or potential solutions to the problem.

## STUDENT OBJECTIVES

- Identify Earth's oceans according to salinity, depth, and other characteristics.
- Explore major types of ocean habitats and ocean organisms.
- Review the history and current status of ocean fisheries and explain changes. Explore types of ocean pollution, including effects on ocean organisms, food webs, and people.
- Describe global warming and explain its effects on ocean temperature and acidity. Explain effects of global warming on ocean ecosystems and organisms.
- Use problem-solving techniques to brainstorm solutions to a chosen ocean problem.

## ACTIVITIES

Students complete three performance assessments: 1) Ocean Fisheries – explain changes in fisheries in the last 50 years, give reasons for the changes, and describe effects on human populations; 2) Ocean Pollution – list types of ocean pollution and their general locations and describe the Great Pacific Garbage Patch and where it came from; and 3) The Future of Oceans – list expected ocean-related changes in the next 50 years and explain how global warming is currently affecting oceans and the consequences to oceans if current trends continue.

# Water Management Module

**Product ID:** W32348 | **Type:** Education Units/Curriculum Titles

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## OVERVIEW

In *Water Management*, students explore the hydrologic cycle, the uses of water, types of water pollution, and the design and function of water treatment plants. They use a River Tank to estimate surface area and volume of water in a water body and to calculate flow rate. They use a watershed model to simulate runoff, groundwater activity, and pollution. They also calculate a water budget for a family, use a variety of graphs, and consider methods of water conservation.

## STUDENT OBJECTIVES

- Learn characteristics and uses of water and explore the hydrologic cycle.
- Use 2-D and 3-D figures, including geometric nets, to estimate surface area and volume.
- Measure flow rate in a River Tank and learn how water managers use flow rate.
- Use a watershed model to demonstrate flow of runoff and how pollution travels through an ecosystem.
- Make polluted water and clean it using primary and secondary treatment processes.
- Calculate a family water budget and learn types and effects of water pollution and methods of water conservation.

## ACTIVITIES

*Students complete three performance assessments: 1) Water Area and Volume – know 2-D and 3-D shapes, area equations, volume equations, and the process of estimating surface area and volume using geometric nets; 2) Flow Rate Calculations – explain and demonstrate how to calculate flow rates of running water; and 3) Calculating Water Budgets – explain the uses of graphs and show how to graph the results of a family water budget.*

# Environmental Issues Module

**Product ID:** W32300 | **Type:** Education Units/Curriculum Titles

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## OVERVIEW

In *Environmental Issues*, students use multimedia and hands-on activities and experiments to explore pollution, loss of habitats and biodiversity, resource use, waste management, global climate change, and human population growth. They learn statistics related to these issues and do activities relating to acid rain, paper recycling, resource use, oil-spill cleanup, and global warming.

## STUDENT OBJECTIVES

- Conduct and analyze an experiment on the effects of acid rain.
- Distinguish among nonrenewable, renewable, and perpetual resources.
- Do a mining activity to demonstrate depletion of a nonrenewable resource.
- Explore causes of pollution and do an oil-spill cleanup activity.
- Explore the solid waste problem and do a paper-recycling activity.
- Distinguish between the greenhouse effect and global warming.
- Demonstrate the greenhouse effect.
- Compare logistic and exponential growth and explore human population growth.
- Conduct a cost-benefit analysis of an environmental issue.

## ACTIVITIES

*Students complete three performance assessments: 1) Resource Use – demonstrate and explain the effects of mining on the availability of nonrenewable resources; 2) Paper Recycling – demonstrate and explain the process of paper recycling and discuss advantages of recycling; and 3) Population – explain the growth equation and create a concept map describing impacts of human population growth.*

# Aquaculture Module

**Product ID:** W32268 | **Type:** Education Units/Curriculum Titles

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## OVERVIEW

In *Aquaculture*, students learn fish biology, care, and management by maintaining their own goldfish tank. After an introduction to the history of aquaculture, they conduct chemical tests of tank water, learn fish anatomy and metabolism, calculate fish growth and productivity, and maintain records of their activities. Along the way, they learn the processes involved in a large-scale aquaculture operation and consider environmental impacts of aquaculture.

## STUDENT OBJECTIVES

- Use a spreadsheet to practice record keeping for an aquaculture operation.
- Conduct tests of tank water and learn appropriate levels for each chemical.
- Identify internal and external structures of fish.
- Understand fish life cycles and measure fish length and weight.
- Analyze fish growth curves and calculate appropriate stocking rates.
- Explore fish metabolic rates and calculate nutritional needs and productivity.
- Explore environmental impacts of aquaculture.
- Graph and analyze data from the classroom aquaculture tank.

## ACTIVITIES

*Students complete three performance assessments: 1) Water Chemistry – conduct water chemistry tests, define and explain expected values, and understand tank filtration; 2) Fish Biology – identify fish structures and properly manipulate live fish, including taking length and volume measurements; and 3) Fish Productivity – measure gill-opening rates, understand metabolism, and complete productivity calculations.*

# Hotel Management Module

**Product ID:** W32016 | **Type:** Education Units/Curriculum Titles

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## OVERVIEW

In *Hotel Management*, students explore the internal components of operating a hotel. They examine the functions of the five main hotel divisions – sales and marketing, rooms, engineering, housekeeping, and security. Students utilize math skills by calculating occupancy rates, RevPAR, ADR, room rates, and room discounts. Students are also responsible for the designing of a brochure advertising the grand opening of a new hotel.

## STUDENT OBJECTIVES

- Examine the classification methods of lodging properties.
- Examine the roles of hotel staff – management, marketing, housekeeping, and security.
- Examine the purpose of a night audit and two statements monitoring financial performance.
- Calculate RevPAR, occupancy rates, room discounts, and room rates.
- Design a brochure advertising the grand opening of a new hotel.
- Explore yield management as it relates to demand and price.
- Complete basic calculations based on housekeeping data.
- Review evacuation and emergency procedures.

## ACTIVITIES

*Students complete three performance assessments: 1) RevPAR/Occupancy Rates – list the formulas used for determining occupancy rates and RevPAR and calculate occupancy rates and RevPAR of a given hotel; 2) Forecasting/Room Rates – explain the process used in most hotels for forecasting, give examples of direct and indirect expenses, and calculate a modified room rate; and 3) Hotel Brochure – produce a brochure that includes room rates as well as safety information.*

CW Ruckel Middle School currently has a STEM (Science, Technology, Engineering, and Math) class where students work in groups of two on various computer based modules. These modules are designed to give them experience in STEM activities and explore various careers related to the module topic. As it is now, the students have no exposure to careers fields related specifically to Florida's unique coastal environment, fisheries, and tourism. Adding the Changing Oceans, Hotel Management, Environmental Issues, Water Management, and Aquaculture modules to the existing curriculum will allow the students to explore careers closer to home and hopefully entice them to choose Florida first.

In it's first year the Ruckel STEM class has seen great success. Students have been motivated as they built hot air balloons, water rockets, and learned to use CADD. Mrs. Brock was chosen by the Hurlburt Airforce Association as their middle school science/STEM teacher of the year and awarded a \$250 grant. In addition, similar programs at Davidson, Meigs, and Shoal River are also expanding. The requested curriculum modules will help enrich an already successful program as we move from having one section to possibly three.

The requested money will cover the purchase and shipping of the modules. Long term cost are minimal and related strictly to purchasing refills of consumable materials. The long term cost will be covered using lead teacher money, Ruckel's Adopt a Class program, and small grants like the previously mention Hurlburt Airforce Association grant.

The classroom teacher and the students are the only people that will be directly involved with the program, but the school principal and SAC (School Advisory Council) will help support the objectives. This program aims to continue the focus on STEM activities while exploring the 16 career clusters in Florida. Specifically, the new modules will engage students using content related to protecting Florida's precious coastline and water, hotel management, and fisheries. Students would also explore environmental issues that damage ecosystems and water management. Oil spills like Deep Water Horizon and its consequences are a main focus in one module. The curriculum, as is, currently has major gaps in these particular areas. By adding these modules we can engage students in Florida related careers.

With CW Ruckel Middle School being owned by the Okaloosa County School District, the program could be implemented as soon as funding is received. No land grants, leases, or purchases would need to be made. The curriculum is already designed and ready to be implemented. Next year alone, it could be used by sixty to ninety students. The full impact though, is unmeasurable. With continued support for STEM and career training the program can continue indefinitely and reach many more students. While this program does not specifically create job, it does offer training and career exploration. Students would spend two weeks working in each of the modules. For example, in the Aquaculture Module, students will maintain a healthy aquarium for the fish, learn about fish anatomy/life cycle, and calculate appropriate stocking rates. At the middle school level students have a hard time realizing that graduation is not that far away. These modules will expose students non traditional careers related to Florida's economy.

## Restore Grant

### Additional Information for School Board

1. Sustainability – This project is extremely sustainable. The bulk of the money spent will go towards non-consumable supplies. The small amount of consumable supplies can be replenished each year using lead teacher money and the Ruckel Adopt a Class program. In addition, because of the ease of sustainability, the curriculum will impact a large number of students.
2. Additional Taxpayer Funding – No additional tax payer funding will be needed.
3. Teacher Burden – In this instance, the burden on the teacher will actually be reduced. Currently the teacher has to create curriculum to ensure that there are enough stations for all students. With the addition of these modules, teacher work load will be decreased.
4. SAC – The SAC committee was informed of the grant opportunity. An electronic vote took place with all in favor of the submission of the grant.