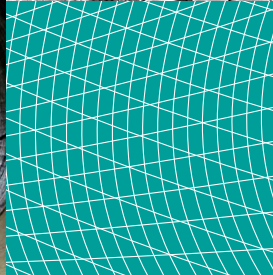
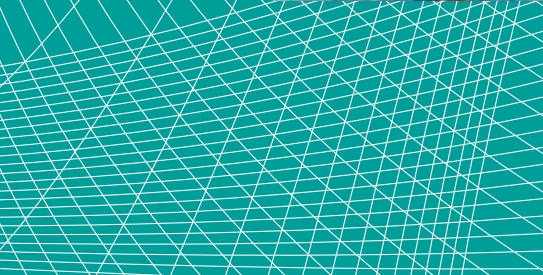
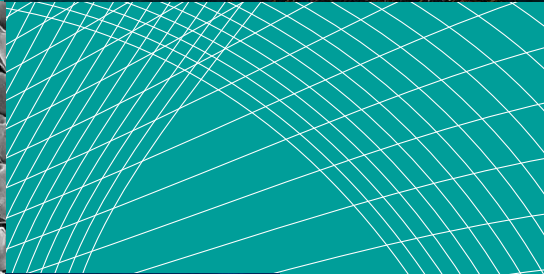
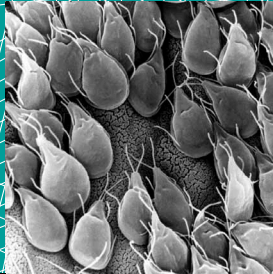
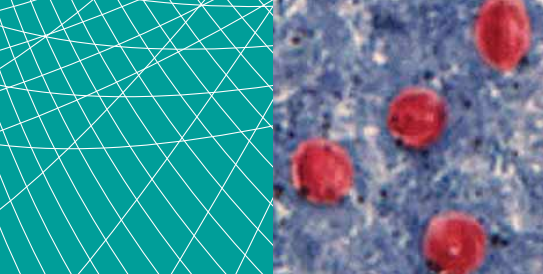
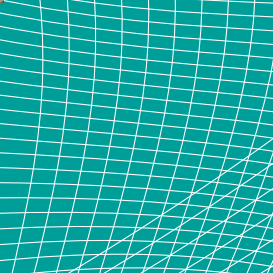
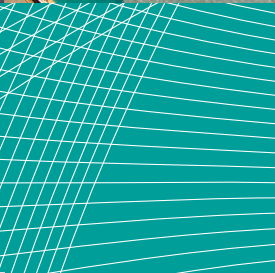
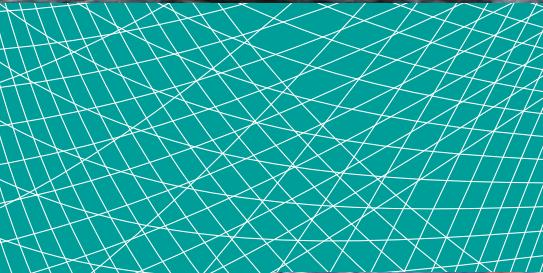
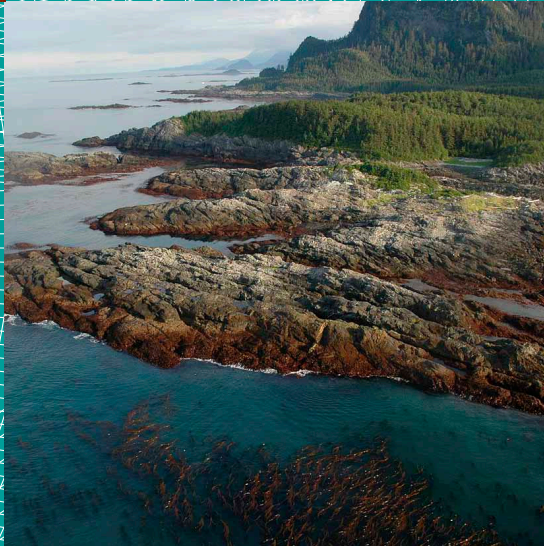
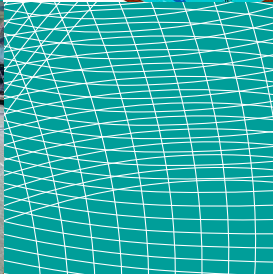
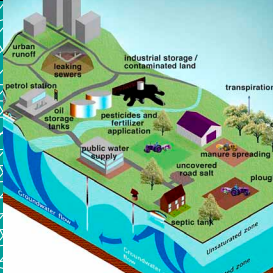
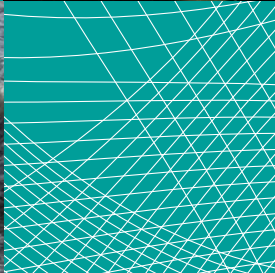
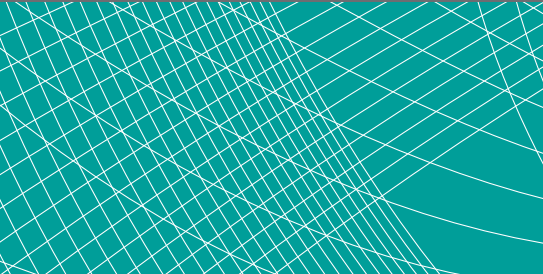




# CleanTech

Inspiring High School Students in STEM, Sustainability, and Careers in the Emerging Green Economy

## WATER







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## WATER

# ACKNOWLEDGMENTS

## ABOUT SOLAR ONE

“Green Energy, Arts, and Education Center.” We inspire New Yorkers to become environmentally responsible city dwellers. Solar One offers innovative programming to K-12 students throughout all 5 boroughs of New York City in the areas of renewable energy, sustainable design, estuarine ecology and environmental art.

The mission of Solar One’s education program is to facilitate applied experiential learning opportunities through science, design, art and entrepreneurship. Our staff of educators are here to help you make the Green Design Lab an integral part of your school’s curriculum and learning objectives.

Cleantech is Solar One’s High School curriculum that engages students in sustainable design, problem solving, and innovation in the emerging green sector. Cleantech was made possible through generous funding provided by the National Science Foundation under Grant No. DRL-1139308.

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Any opinions, findings, and conclusions or recommendations expressed in this material are those of Solar One and do not necessarily reflect the views of the National Science Foundation.

# TABLE OF CONTENTS

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<b>Page</b>	<b>vi</b>	<b>INTRODUCTION</b>
	<b>vii</b>	<b>CURRICULUM MAP</b>
<hr/>		
	<b>01</b>	<b>Lesson 1: Water Availability</b>
	<b>16</b>	<b>Lesson 2: Water Quality</b>
	<b>34</b>	<b>Lesson 3: Bottled Water vs. Tap Water</b>
	<b>49</b>	<b>Lesson 4: Aquatic Ecosystems</b>
	<b>55</b>	<b>Lesson 5: Water and Climate Change</b>
	<b>64</b>	<b>Lesson 6: Water Conservation</b>
	<b>73</b>	<b>Lesson 7: Wastewater Treatment</b>
	<b>84</b>	<b>Lesson 8: Stormwater Management</b>
	<b>88</b>	<b>Glossary</b>

# INTRODUCTION

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**CLEANTECH WATER** is an innovative high school curriculum that uses a multidisciplinary approach to integrate study across the complex field of water. Designed to increase student awareness and knowledge of the science, issues and emerging technologies in areas such as water availability, water quality and green infrastructure, CleanTech Water contains the most current information and research available along with relevant and engaging student-led activities. The Unit begins with a survey of global and national water supply issues and trends. Equipped with this understanding of water's significance, students then examine water systems through a series of water quality assessments and investigations of the environmental, social and economic impacts of climate change. The focus of the curriculum then shifts to a more local study of water, in which students conduct a water audit of the school building, examine strategies and methods of water treatment and design a storm-water management system for the school. Providing a template for career exploration, the field studies and hand-on activities allow students apply classroom concepts to real-world problem-solving in civil and environmental engineering, and water resources management. CleanTech's unique holistic approach supports Science, Technology Engineering and Math (STEM) skills, while encouraging student interest and participation in a sustainable and green future.

## **HOW TO USE THE CURRICULUM MAP**

CleanTech Water offers a wide array of activities and resources, covering topics ranging from water scarcity to quality and climate resiliency. Each lesson is designed to work independently or as part of a larger course of study, allowing teachers to tailor CleanTech Water to meet the individual needs of their classroom. Curriculum activities are grouped into three categories:

**GENERAL ACTIVITIES** emphasize foundational knowledge and broad concepts in the field of water. Hands-on projects and investigations stress comprehension and application of classroom knowledge. These activities are appropriate for all grades as an introduction to the topic.

**ACCELERATOR ACTIVITIES** center on policy, economics, and technology, with the purpose of introducing students to the complexities of water and the diverse array of fields it encompasses. These activities are research-oriented in nature and stress analytical thinking, encouraging students to synthesize and evaluate information from a variety of sources. Accelerator activities involve data analysis, complex math and may be appropriate for older grades. Computer access is strongly advised for certain activities.

**GREEN SKILLS ACTIVITIES** are modeled on career and technical training for careers in the green industry. They focus on developing hard skills and the knowledge base required for real-world application.

The Curriculum Map is intended as a guide to help schools and teachers navigate the curriculum to develop dynamic and engaging study for their students. For all participating classes, it is encouraged to try as many activities as possible.

## CLEANTECH WATER CURRICULUM MAP

<b>WATER LESSONS AND ACTIVITIES</b>	<b>General</b>	<b>Accelerator</b>	<b>Green Skills</b>
Lesson 1: Water Availability			
Activity 1A: Analyzing Water Use and Drought	•	•	
Activity 1B: Rainfall Patterns		•	
Lesson 2: Water Quality			
Activity 2A: Water Quality Testing	•	•	
Activity 2B: Groundwater Contamination and Remediation	•	•	
Lesson 3: Bottled Water vs. Tap Water			
Activity 3A: Water Taste Test	•		
Activity 3B: Reusable Water Bottle Sale	•		
Lesson 4: Aquatic Ecosystems			
Activity 4A: Biological Indicators and Water Health	•	•	•
Lesson 5: Water and Climate Change			
Activity 5A: Topographical Mapping of Sea Level Rise	•		
Lesson 6: Water Conservation			
Activity 6A: School Water Audit	•		•
Lesson 7: Wastewater Treatment			
Activity 7A: Down the Drain	•		
Lesson 8: Wastewater Management			
Activity 8A: Stormwater on My Street	•	•	
Activity 8B: Stormwater Management System Design		•	•

## **CLEANTECH, SOLAR ONE'S HIGH SCHOOL CURRICULUM,**

engages students in sustainable design, problem solving, and innovation. Through hands-on learning, students explore emerging clean technologies and sustainability-related policy and economic issues at the local, national and global level. Cleantech is designed to inspire the next generation of green engineers, scientists, architects, building system managers, energy auditors, economists and entrepreneurs.

Cleantech is an integral part of Solar One's Green Design Lab™, the only curricular blueprint of its kind that looks at the school building as both a laboratory for learning and a tool for environmental change. CleanTech expands on the core concepts of the existing Green Design Lab interactive curriculum with more advanced and technical content. It introduces students to the Cleantech industry through STEM (Science, Technology, Engineering & Math) focused reading material, research projects and hands-on labs. Through four units – Energy, Materials, Water and Food – students learn about topics like electric grid transmission, renewable energy, battery storage, demand management water technologies, biomimicry, stormwater management, and hydroponics, to name a few. In addition to addressing the foundational aspects of these four subjects, CleanTech offers Accelerator activities that cover a broad range of science, economic and policy research topics, and Green Skills activities that focus on developing hard skills in such areas as building performance and renewables.

The Water Unit introduces students to the intricate and diverse field of water. Designed to increase student awareness and knowledge of the science, issues and emerging trends and technologies affecting water supplies both locally and globally, the Water Unit contains the most current information and research available along with relevant and engaging student-led activities. From investigating water availability and quality to exploring methods of stormwater management, the Water Unit takes a comprehensive look at this fundamental yet complex topic.

