

# Water and Education

General Guide for Teachers of  
Latin America and the Caribbean



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# Forward

During the IV World Water Forum, celebrated during March 2006 in Mexico City, a Memorandum of Understanding (MOU) was signed between the International Hydrological Programme (IHP) of UNESCO and the Project WET (Water Education for Teachers) Foundation. The goal of this MOU is to increase cooperation between the two programmes and develop water education programmes for Latin America and the Caribbean. As a result of this agreement, the two organizations have developed the Water and Education joint programme, of which *Water and Education: General Guide for Teachers of Latin America and the Caribbean* is a part.

This guide includes 32 educational activities, selected and adapted by an international group of specialists from the Project WET Foundation and the UNESCO-IHP, Latin America and Caribbean office. The selection was undertaken with the help of a team of educators and members of the national committees of UNESCO-IHP and Project WET from the Bahamas, Barbados, Jamaica, Mexico, St. Lucia, Trinidad and Tobago, and the United States.

The primary objective of this publication is to facilitate the work of educators and to promote the appreciation of, knowledge about, and respect for water. This joint programme represents a major contribution toward the UN decades “Water, Fountain of Life,” and “Education for Sustainable Development.” This guide also places special emphasis on the Education Resolution of the UNESCO Intergovernmental Council, which is included at the end of this guide.

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# Activity Format



Icon indicates the activity's placement within the conceptual framework.

## ■ **Recommended Age:**

Suggests appropriate age-level for students. Activities are designed for flexibility and can be adapted for any age level.

## ■ **Subject Areas:**

Disciplines to which the activity applies.

## ■ **Duration:**

*Preparation time:* The approximate time needed to prepare for the activity. **NOTE:** Estimates are based on first-time use. Preparation times for subsequent uses should be less.

*Activity time:* The approximate time needed to complete the activity.

## ■ **Setting:**

Suggested site.

## ■ **Skills:**

Skills applied in the activity.

## ■ **Related Activities**

Concepts and related Project WET activities that could be performed prior to, in conjunction with, and after the activity.

## ■ **Vocabulary**

Significant terms used in the activity.

*The essential question or a snappy, thought-provoking, teaser to introduce the activity. This can be presented as an ice breaker.*

## ▼ **Summary**

A brief description of the concepts, skills, and affective dimensions of the activity.

## **Objectives**

The qualities or skills students should possess after participating in the activity.

**NOTE:** Learning objectives, rather than behavioral objectives, were established for Project WET activities. To measure student achievement, see **Assessment**.

## **Materials**

• *Supplies needed to conduct the activity.*  
Describes how to prepare materials prior to engaging in the activity.

## **Making Connections**

Describes the relevance of the activity to students and presents the rationale for the activity.

## **Background**

Relevant information about activity concepts or teaching strategies.

## **Procedure**

### ▼ **Warm Up**

Prepares everyone for the activity and introduces concepts to be addressed. Provides the instructor with pre-assessment strategies.

### ▼ **The Activity**

Provides step-by-step directions to address concepts. The primary component of each step is presented in bold-faced type.

**NOTE:** Some activities are organized into "parts," "rounds," or "options." This divides extensive activities into logical segments. All or some of the parts may

be used, depending on the objectives of instruction. In addition, a few activities provide **Options**. These consist of alternative methods for conducting the activity.

### ▼ **Wrap Up and Action**

Brings closure to the lesson and includes questions and activities to assess student learning.

**NOTE:** Action moves learners beyond the classroom and involves friends, family, community, state, national, and/or international audiences.

## **Assessment**

Presents diverse assessment strategies that relate to the objectives of the activity, noting the part of the activity during which each assessment occurs. Ideas for assessment opportunities that follow the activity are often suggested.

## **Extensions**

Provides additional activities for continued investigation into concepts addressed in the activity. Extensions can also be used for further assessment.

## **For Younger Students**

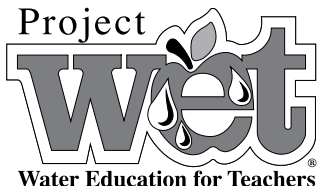
Describes more concrete approaches to illustrate specific concepts for kindergarten through second-grade levels. This option is included in selected activities.

## **Other Resources**

Lists references providing additional background information.

**NOTE:** This is a limited list. Several titles are suggested, but many other resources on similar topics will serve equally well.





# Project WET International Foundation

The Project WET (Water Education for Teachers) International Foundation is an award-winning international, non-profit water science education programme and publisher located in Bozeman, Montana, USA. The organization has more than 20 years of experience in water education. It works with funders, educators, water resource specialists, businesses, agencies, and citizens to develop water education programmes around the world. Project WET has an extensive set of water education materials for teachers, children, and communities and has a growing network of country-level programmes.

Project WET envisions a world in which there is water for all to thrive. Its mission is to promote water stewardship by educating children, educators, and communities around the world. Project WET accomplishes this by facilitating and promoting the awareness, appreciation, knowledge, and stewardship of water resources through the development and dissemination of classroom-ready teaching aids and through the establishment of state and internationally sponsored Project WET programmes.

Project WET is committed to global water education that is implemented at the community level.

For more information, visit [www.projectwet.org](http://www.projectwet.org) or contact the Project WET International Foundation:

Project WET is:

- A publisher of materials and lesson plans for teachers, children, and communities.
- A source of leadership training and capacity-building courses, seminars, and workshops for water education providers.
- A global water education delivery network designed to reach children through educators.
- A provider of information, support services, and consultation for people that have questions regarding water education for teachers and children.

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# International Hydrological Programme (IHP) of UNESCO

The International Hydrological Programme of UNESCO is an intergovernmental programme of scientific cooperation, with the purpose of promoting, through member states, better conservation and rational use of hydrologic resources, better understanding of the water cycle, increased capacity to administer and use water resources. The objective of the IHP is to improve scientific understanding and technology with the goal of developing methods for rational use of water resources, including environmental protection.

The principal objective of UNESCO's International Hydrological Programme (IHP) in Latin America and Caribbean Region is to improve the quality of life of people in the region. It does this through scientific and technical development in water sciences using a holistic, multiobjective, and multidimensional focus. It is based on the Dublin Principles, Agenda 21 – Chapter 18, Science for the XXI Century – Budapest (Chapter 2.2), the Santa Cruz de la Sierra Declaration (initiatives 47 to 57), and the declarations of the III World Water Forum held in Kyoto, Japan.

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Freeport Primary School  
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The Bahamas

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# Background and Previous Programmes

The UNESCO/Project WET joint initiative, Water and Education for the Americas and the Caribbean is comprised of educational initiatives previously developed at UNESCO-IHP and the Project WET Foundation. The programmes were developed in collaboration with diverse institutions and individuals, including the Mexican Institute of Water Technology (IMTA) and the Council for Environmental Education (CEE).

As part of their efforts to meet goals of the International Year of Fresh Water, the Argentine National Committee for UNESCO-IHP developed a programme to increase consciousness about and understanding of the importance of water resources. The programme focused on the development of educational activities and was implemented with the cooperation of UNESCO-IHP, Latin America and Caribbean Regional Science office. The result of this work was an educational packet entitled, *Water and Education: From Argentina for the Americas*, which was comprised of teaching material for teachers and designed for use with children in the first six years of their education.

On March 12, 2004, the programme “Water and Education: From Argentina for the Americas” was presented to the diplomatic core of Argentina, Brazil, Colombia, Costa Rica, Cuba, Ecuador, the United States of America, Honduras, Mexico, Panama, Paraguay, the Dominican Republic, Uruguay, and Venezuela. Since that time, the programme has been introduced in several countries in the region with the goal of developing educational material that results in the interaction of education and water resource specialists from the region.

The Project WET Foundation is an award-winning, nonprofit water science education programme and publisher located in Bozeman, Montana, USA. The organization has more than 20 years of experience in water education and more than 50 publications and products for teachers, students, and communities. Publication topics include: water quality, watersheds, wetlands, water history, surface and ground water, the water cycle, and more.

The Project WET Foundation works with funders, educators, water resource specialists, businesses, politicians, and citizens to develop

water education programmes around the world. At present, Project WET has programmes active in Canada, Mexico, the Philippines, Japan, Togo, Cameroon, Uganda, South Africa, Italy, Hungary, Vietnam, Argentina, Costa Rica, Dominican Republic, Fiji, American Samoa, Lebanon, Nigeria, N. Marianas Islands, Palau, United Arab Emirates, France and the United States of America.

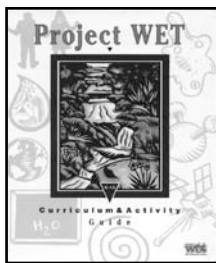
*Water and Education: General Guide for Teachers of the Americas and the Caribbean* integrates activities from both programmes. These activities were selected for inclusion and adapted for use in this guide by an international group of specialists.

Educators and members of the IHP National Committees of Mexico, Argentina, Costa Rica, and Dominican Republic and specialists from the Project WET Foundation and Project WET country coordinators conducted the selection process. Juan Carlos Fallas, member of the Costa Rican UNESCO-IHP National Committee, also developed a new activity about weather and climate.

Previous publications from this these materials were adapted are listed on the following page.



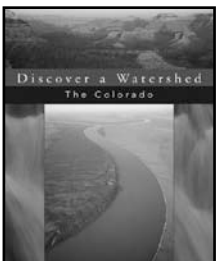
1. *Water and Education: From Argentina for the Americas* was developed by the Argentine UNESCO-IHP National Committee to increase consciousness and understanding of the importance of water resources. The programme focuses on development of educational was implemented with the cooperation of the UNESCO-IHP, Latin America and Caribbean Regional Science office. The programme is centered on three thematic axes: 1) recognizing water, 2) water and society, 3) water and the Millennium Development Goals. It uses graphic arts, geographically specific information, and suggested lesson plans to aid teachers in communicating information.



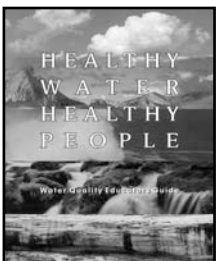
2. The *Project WET Curriculum and Activity Guide* is the flagship publication of the Project WET Foundation. It is a collection of over 90 science-based, interdisciplinary activities and lesson plans that are teacher-tested, classroom ready, and easy to use with students 5-18 years old. The programme promotes responsible water use, critical thinking, problem solving, knowledge building, and experimentation.



3. The *¡Encaucemos el Agua!* educator's guide was published in the year 2000 by the Project WET Foundation and the Mexican Institute for Water Technology (IMTA). IMTA developed this publication specifically for use in Mexico. The publication is an adaptation of the *Project WET Curriculum and Activity Guide*.



4. The *Discover a Watershed: The Colorado Educator's Guide* is part of Project WET's Discover a Watershed Series, which has the goal of promoting understanding and appreciation of water resources as well as understanding of how water binds water users together through their common need for water. The Discover a Watershed Series includes educator's guides, KIDS (Kids in Discovery Series) activity booklets, maps, and learning expeditions. *Discover a Watershed: The Colorado* was developed in collaboration with educators and water resource managers from the United States and Mexico and is available in both countries.



5. *Healthy Water, Healthy People* is the Project WET Foundation's water quality education programme and was designed for teachers of 13-18 year-old students. Initially developed in the United States, it has been translated into Spanish by the Mexican Institute for Water Technology. The Healthy Water, Healthy People programme includes a test kit manual, a 200-page educator's guide, several water quality test kits, a macroinvertebrate investigation kit, and a KIDS (Kids in Discovery Series) activity booklet.



# Objectives

## General Objective

- To promote water stewardship and encourage sustainable water management through education.

## Specific Objectives

- Promote understanding, appreciation, recognition, and care of water resources through the development of teaching methods.
- Improve student understanding of water, including best management practices and integrated water management, through ongoing education.
- Increase understanding of the role played by the water cycle in supporting water management and the preservation of water resources.
- Expand recognition of the relationship between water demand and availability, including the support or natural processes.
- Educate about the different ways water is used.
- Encourage positive attitudes about water resources to help mitigate the impact of extreme water situations that affect society.

## Educational Framework

### ▼ *Teaching and learning: a global and integrated vision*

The development of new cultural patterns that promote harmony between society and water resources requires educational strategies that develop understanding of the dynamic relationship between natu-

ral and cultural processes from a young age. Education is critical to developing responsible water use and future water leaders. It is our belief that education must be based on a global and integrated vision that addresses natural phenomena, technology, and cultural norms that impact and are impacted by water. In an effort to ensure that this curriculum addresses these and other issues, *Water and Education: General Guide for Teachers of the Americas and the Caribbean* has been organized around several premises. According to these premises, the curriculum must be: crosscutting, interdisciplinary, hands on, and adaptable. A description of each of these concepts is presented below.

**Crosscutting:** The need for water to support life is a crosscutting need and this concept is presented throughout this educator’s guide. The material in this publication focuses on the development of water-related concepts and educational procedures as well as positive cultural values, attitudes, and norms. Each activity encourages students and teachers to evaluate their own water demands as well as how they relate to other water users. It is our belief that developing knowledge among children—tomorrow’s water leaders—is critical for developing water stewardship.

**Interdisciplinary:** Activities in this guide focus on the integration of water resources in many disciplines (social science, natural science, mathematics, art, language, etc.). In this sense, water becomes a unifying theme, applicable to many aspects

of life and the educational process. In this way, the guide becomes flexible and ready for use in specific subjects or in an integrated approach to education.

**Hands on:** Activities in this guide focus on the teacher’s ability to make learning situations and develop lessons that meet the specific needs of his or her classroom. The activities are designed to use whole-body exercises combined with formal teaching strategies. In addition, they focus on participation in activities to increase skills necessary for living together and cooperatively managing water resources. Many activities include family and community as agents in the learning process.

**Adaptable:** Every classroom, community, and group of learners is unique. Similarly, water education needs for any given region will differ. For this reason, activities in this guide have been selected for their adaptability.

## Environmental Education

Environmental education is, “The process of recognizing values and clarifying concepts to develop habits and attitudes necessary to understand and appreciate the mutual relationship between humans, culture, and the environment<sup>1</sup>.” Through environmental education, we gain knowledge, values, attitudes and habits that help society to balance natural resource management and human development.

This guide is designed to develop understanding among today’s youth—tomorrow’s water leaders—

<sup>1</sup> Ecological Education in Everyday Life, editado por Jean-Paul Hautecoeur, UNESCO Institute for Education, 2002, University of Toronto Press, Toronto-Buffalo-London y UNESCO Institute for Education, en colaboración con la Canadian Commission for UNESCO.

promoting water stewardship and sustainable water management through the educational process. The processes presented in this guide support the norms presented by the North American Association for Environmental Education in their Excellence in Environmental Education Project, which may be viewed at <http://www.naaee.org/programmes-and-initiatives/guidelines-for-excellence>.

### ▼ *Components of Environmental Education*

- Awareness of and sensitivity to the environment and environmental challenges
- Knowledge and understanding of the environment and environmental challenges
- Attitudes of concern for the environment and motivation to improve or maintain environmental quality
- Skills to identify and help resolve environmental challenges
- Participation in activities that lead to the resolution of environmental challenges

### ▼ *Environmental Education and Integrated Water Resource Management*

The objective of Integrated Water Resource Management (IWRM) is to ensure the integrated management of natural, social, and cultural systems—maximizing economic benefits without compromising living systems<sup>1</sup>. In accordance with this vision, water education presents an opportunity to apply environmental education methods as a tool for encouraging sustainable water management.

Meeting the sometimes-conflicting water needs of water users will be a

major challenge of the 21st century. Education has the unique ability to help water users recognize the interconnected nature of water uses. By exposing learners to the concept of integrated water management starting at a young age, a new generation of responsible water leaders can be developed.

### **Educational Framework**

This guide presents a series of activities with diverse teaching methodologies that encourage critical thinking skills, active participation, problem solving, and conflict resolution, among other things. The material presented here is designed to compliment existing curriculum in classrooms with 3 to 18 year-old students. The curriculum is designed to connect learners with real-world scenarios, fieldwork, and investigations in a fun and interactive manner.

### **Assessment Strategies**

Pre and post evaluation is critical in sound educational methods. Evaluation strategies used in this guide include demonstration, experimentation oral Presentation, written essay or report, visual presentation, observation, final product, self evaluation, kinesthetic simulation, and class discussion.

### **Thematic Units**

The activities in this guide have been divided into three thematic units. They are:

- 1. Reconnecting with Water**—Students will learn about water properties, the hydrologic cycle, water in the atmosphere, and water as a natural resource.
- 2. Water, Life, and Health**—Students will recognize the importance

of water in supporting ecosystems, biodiversity, food production, and health. In addition, students will gain historic perspective and learn about cultural, recreational, and aesthetic values of water.

**3. Water Management**—Students will learn about the complexities of water resource management, how water users are bound together by their common need for water, and the importance of participation from all water users in the management process.

### **What is included?**

This guide includes 32 fun and innovative activities that are easy to implement. Each activity includes background information and cross-references to assist the educator in teaching about the topic. The activities cover a broad range of topics and may be applied to many disciplines.

Detailed information about the implementation and preparation of each activity is included. These methods are based on experience and classroom testing and are written so that they may be adapted by the teacher to fit specific classroom needs and to match the availability of materials necessary to implement the activity.

In order to help the educator increase understanding of the material, five posters about the water cycle are included at the end of the guide. Posters 1, 2, and 3 are designed for use in the Americas. Posters 4 and 5 are designed to match the water situation in the Caribbean. In addition, reference tables help the educator match activities to the age of their students and subject area. A glossary of water-related terms is also provided at the end of the guide.

<sup>1</sup> Adapted from the Global Water Project, 2000, from the notes of the International Course on Integrated Water Resource Management, Universidad de Buenos Aires-Instituto Argentino de Recursos Hídricos.



## Use of the Posters

The posters included in this guide are intended to assist the educator by providing an additional teaching tool based on visual arts. Through the posters, students gain a picture of how we all affect and are affected by water and the water cycle. They may be used on their own, in conjunction with the activities, or to supplement other media such as videos and photographs. Illustrations show how water is used by humans and to support natural processes, as well as issues that can cause conflicts or environmental degradation. Each poster is designed to be applicable in a broad geographic range and do not represent specific geographic or cultural divisions.

A goal of these posters is to support the activities presented in this guide. They also strive to match the age level of students participating in the activities. To this end, they show increasingly complex spatial scales that match the age and learning level of students.

When using the posters, the teacher should guide student observations to match goals of the lesson. Posters can be used to determine prior understanding of the topic, stimulate interest in water issues and potential conflicts, and help students to achieve a deeper understanding of water issues.

## ▼ Useful Tips for Posters

The following information is helpful in the use of the posters in teaching activities:

- Posters may be downloaded in large format for your use and printing. Posters are available at [www.unesco.org.uy/phi/edu](http://www.unesco.org.uy/phi/edu) or you may request large format digital versions via email at [phi@unesco.org.uy](mailto:phi@unesco.org.uy).
- When using the posters it is useful to have them placed so students may observe each poster as a group the natural, technical, and sociocultural elements depicted in the illustrations.
- Locate the poster in a place that favors spontaneous observation.
- Consider a time to officially display the posters, as in a water festival.
- Encourage students to compare water use depicted in the posters with their own water reality.

**Posters 1 and 4:** (For activities: “Safe Water,” Kindergarten Cooking,” and “The Colour of Water”) Designed for preschool, the illustration is drawn to show natural and social elements that would normally be seen at a school or household level. Illustration shows local processes that form part of the water cycle and

distinct water uses that young children are familiar with (e.g. domestic water uses, irrigation, recreation, etc.).

**Poster 2 and 5:** (For the activity “Imitating the Landscape”) Designed for children 5-8 years old, this poster shows water use and the water cycle at a regional scale. Water-related themes such as water deliver, treatment, and irrigation as well as water for industrial uses, hydroelectricity, maintenance of ecosystems. Natural and social aspects of water are also depicted.

**Poster 3:** (For the activity “Seeking Solutions”) Appropriate for students 8-12 years old, this poster given a broad view of the water cycle, including the natural processes involved. Inset images provide concrete examples of some of the challenges associated with the interaction of natural processes and humans.

**Posters 4 and 5:** Designed to match the geographic context of the Caribbean. As described above, they may be applied to specific activities and are designed for specific age groups.