GLOBAL VERSION / MODULE 8

DROPS OF KNOWLEDGE FOR RIVERS OF CHANGE

GLOBAL TEACHING AND LEARNING MATERIAL

A hands-on guide to teaching
and learning about
water, sanitation, hygiene,
and the environment

SWAROVSKI
WATERSCHOOL

BACKGROUND INFORMATION

All of the water on our planet is connected to all forms of life in one way or another, as we have experienced throughout the activities and information presented in this teaching and learning resource.

This module focuses on bringing the elements of water on Earth together as a catalyst for cooperation. Two-thirds of the world's major rivers are shared by several countries. In the past hundred years, the world population has tripled, while demand for water has increased sevenfold. The signs of a looming water crisis are showing in many parts of the world. Since water is essential to every aspect of life, this crisis affects everything—from health to human rights, the environment to the economy, poverty to politics, and culture to conflict. Just as water defies political boundaries, the crisis is also well beyond the scope of any individual country or sector and cannot be dealt with in isolation.

The need for integrated, cooperative solutions is particularly urgent in the 261 river basins that are shared by two or more countries. Whether we live upstream or downstream, in cities or in rural areas, water issues link us in a common effort to protect and share this resource equitably, sustainably, and peacefully. The concept of "sustainable consumption"—living within our means and sharing water and other global common resources—can lead to a better quality of life for everyone, for both the present and future generations.

DID YOU KNOW? Worldwide, an estimated 768 million people do not have access to an improved source of water. [1]

In 2014, UN Water stated: "Water scarcity already affects almost every continent and more than 40 percent of the people on our planet. By 2025, 1.8 billion people will be living in countries or regions with absolute water scarcity, and two-thirds of the world's population could be living under water stressed conditions." [2]

The economic benefits of achieving universal access to sanitation and drinking water have been estimated at US$171 billion per year. [3]

SOURCE: **(1)** United Nations, "Millennium Development Goals and Beyond 2015: Goal 7 – Ensure Environmental Sustainability," 2015, www.un.org/millenniumgoals/environ.shtml.

(2) United Nations, October 7, 2014, www.unwater.org/statistics/statistics-detail/en/c/211807.

(3) Hutton, Guy, Laurence Haller and Jamie Bartram, "Economic and Health Effects of increasing Coverage of Low Cost Household Drinking-Water Supply and Sanitation Interventions to Countries Off-Track to Meet MDG Target 10," Geneva: World Health Organization, 2007, p. viii.

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Challenges related to widespread misuse and pollution of our waterways are formidable, and every country in the world needs to improve its stewardship of water resources. Swarovski is supporting development and implementation of Swarovski Waterschool programs with and for children (representing nearly one-third of the population worldwide) in the belief that these children—who are learning about, exploring, and respecting water in themselves, in one another, and in their local environments today—are best positioned to achieve these goals.

As a fundamental determinant for life, water, even a small drop or mist, is the most sought-after element that scientists and astronauts are trying to find in their exploration of other planets, including Mars, and of the Earth's moon.

"Water is needed in all aspects of life. The general objective is to make certain that adequate supplies of water of good quality are maintained for the entire population of this planet, while preserving the hydrological, biological and chemical functions of ecosystems, adapting human activities within the capacity limits of nature and combating vectors of water-related diseases."

— UNITED NATIONS EARTH SUMMIT, 1992[41]

41 United Nations Conference on Environment & Development, "Agenda 21," Rio de Janeiro: United Nations, June 1992, Article 18.2. Available at: https://sustainabledevelopment.un.org/index.php?page=view&nr=23&type=400.

THEMATIC CONCEPTS

Climate change – The Earth is getting warmer because human activities are adding heat-trapping gases to the atmosphere, mainly through the burning of fossil fuels. These gases are called "greenhouse" gases. Warmer temperatures are causing other changes around the world, such as glacial melting and stronger storms. These changes are happening because the Earth's air, water, and land are all linked to the changing climate.

Climate change is expected to bring more droughts and floods, and to continue raising sea levels around the world, which will make finding clean, nonsaline water more difficult. Droughts and flooding affect water quality by damaging sanitation pipes and causing human waste to leak into water supplies, and by increasing the salinity of groundwater. Dirty water and poor sanitation can lead to disease, and when less freshwater is available, people are likely to save it to drink and use less of it to wash their hands and keep clean. Water shortages also have the potential to cause conflicts when people try to protect their supplies, and can increase migration if people must move to find places where water is available.

Sustainable consumption – The concept of sustainable consumption has emerged to address the growing concern that rapid population expansion and human activities have an impact on the Earth's natural systems, causing damage to ecosystems that places human survival in danger. Sustainable consumption can lead to a better quality of life for everyone, for both the present and future generations.

Ecological footprint – This is a measure of how fast we consume resources and generate waste compared to how fast nature can absorb our waste and regenerate ecosystems. To avoid irreversible damage, our rate of consumption must be reduced to balance the Earth's capacity to absorb waste.

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"The quality of water and the quality of life in all its infinite forms are critical parts of the overall, ongoing health of this planet of ours, not just here in the Amazon, but everywhere. ... The hardest part of any big project is to begin. We have begun. We are underway. We have a passion. We want to make a difference."

— SIR PETER BLAKE[42]

The three "Rs" – Reduce, Reuse, Recycle – Reduction, and particularly waste avoidance, is a great alternative to overuse of the Earth's limited resources. For example, adding less packaging to products reduces the demand for raw materials. Reuse of products and materials prevents the return of the carbon within the materials to the environment for as long as possible. Recycling reduces the need for raw materials, and keeps valuable resources from being disposed of and further contributing to greenhouse gas emissions. What can be recycled? Glass, aluminum, some types of plastic, and most types of paper and cardboard.

42 Sir Peter Blake (1948–2001), last journal entry before being murdered by pirates on the Amazon River.

ACTIVITY 8.1: WATER WITHIN AND AROUND US (Adapted from Swarovski Waterschool Brazil)

This planet has no passengers. We all are the crew. Environmental awareness and sustainability are our common concerns. We need local actions for environmental and global awareness in order to establish and nurture better understanding and dialogue between people in different parts of the world.

If there is a pond or lake nearby, this activity can be conducted outdoors. If not, use a deep bowl, birdbath, or small pool to represent the body of water.

Time: 20 minutes / **Thematic Areas:** Language Arts, Social Studies / **Goal for Learning:** Introduce a cultural perspective of water as a shared global resource that connects us all, both inside and out, through ceremony and language.

Materials: ☐ Small bottle of water (each student to bring from home) / ☐ Crayons or colored markers / ☐ Paper

ACTIVITY STEPS:

1. Begin with this simple ceremony that demonstrates the way in which we are all deeply connected to one another and to the water of the Earth. Gather at a pond or set up your "pond" indoors, and create a very special atmosphere for this water ceremony. If you are indoors, you might want to play music that has the feeling of water in the background.

2. Ask students to sit in a circle and think about this question as they feel gratitude for the water: "What would your life be like without clean water?"

3. Ask each student to come up and add her or his water to the pond. As the students add their water, ask them to share one word that represents what water means to them personally. You might also want to join in singing a traditional song about water.

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4. Once all of the students have finished and are seated, ask them if they can say the word for water in any other languages. Some suggestions are included in the table below. Writing in some languages, such as Chinese, is based on pictograms (pictures that represent a word, phrase, or idea) instead of the letters of an alphabet. Share the table of words for "water" and show students the Chinese character for "three drops of water":

5. Distribute the crayons or markers and paper and ask students to draw a picture of what water means to them that could be understood by people living in a country where a different language is spoken.

THE WORD FOR "WATER" FROM AROUND THE WORLD:

Arabic – ma'a	French – eau	Icelandic – vtan	Russian – voda
Chinese – sounei	German – wasser	Korean – mul	Spanish – agua
English – water	Hebrew – maim	Maori – wai	Swahili – maji
Finnish – vesi	Hindi – paani	Portuguese – agua	Swedish – vatten

OBSERVATION AND DISCUSSION:

Discuss and brainstorm the importance of water around the world. How does water allow people to connect to one another?

Have students discuss the cultural importance of rivers, such as the Ganges River in India, to the people who live near them.

GANGES RIVER, INDIA

"The ocean has become a global repository for much of the waste we generate. Marine debris includes timber, glass, metal and plastic from many different sources. Recently, the accumulation and possible impacts of microplastic particles in the ocean have been recognized as an emerging environmental issue. ... Despite international efforts to stem the flow of plastic debris, it continues to accumulate and impact the marine environment."

— UNEP YEAR BOOK 2011[43]

43 Kershaw, Peter, et al., "Plastic Debris in the Ocean," UNEP Yearbook 2011, Nairobi: United Nations Environment Programme, 2011, p. 21. Available at: http://hqweb.unep.org/yearbook/2011.

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ACTIVITY 8.2: WATER AND THE PROBLEM WITH TOO MUCH PLASTIC

"Waste" is any unwanted material—rubbish, trash, garbage, or junk. Solid waste material that has found its way to the marine environment is called "marine debris." It is known to cause the injury and death of numerous animals and birds, because they either become entangled in it or mistake it for food and eat it. In many places, uncollected waste is often mixed with human and animal excreta and dumped in the streets indiscriminately, causing drains to clog. This contributes to flooding, the breeding of insects and rodents, and the spread of diseases.

To rethink overconsumption, we must stop thinking of the Earth's natural resources—fossil fuels, water, and trees—as a never-ending supply. Recycling plays a crucial role. If we do not want to exhaust our supply of natural resources, the three "Rs", Reduce, Reuse, Recycle—need to become second nature to us in daily life. This will help us minimize and prevent further environmental damage, avoid unnecessary use of our natural resources, conserve energy, and lower pollution levels.

DID YOU KNOW? Plastic can be recycled and reused; for example, you can wash plastic forks and plates to use them again. Some countries have programs to recycle plastic by melting it down and making new things out of it. But less than 3% of plastic bags around the world get recycled today. [1]

In Austria alone, researchers estimate that 4.2 tons of plastic are washed into the Black Sea by the Danube River every day. [2]

SOURCE: **(1)** Douglis, Carole, "Theo and the Giant Plastic Ball," United Nations Environment Programme, December 2004. Open PDF from: http://wedocs.unep.org/handle/20.500.11822/8466.

(2) Lechner, et al., "The Danube So Colourful: A Potpourri of Plastic Litter Outnumbers Fish Larvae in Europe's Second Largest River," Environmental Pollution, May 2014, vol. 188, no. 100, pp. 177–181.

Time: 60 minutes **/ Thematic Areas:** Environmental Education **/ Goal for Learning:** Understand sustainable consumption and explore ways to avoid waste.

Materials: None

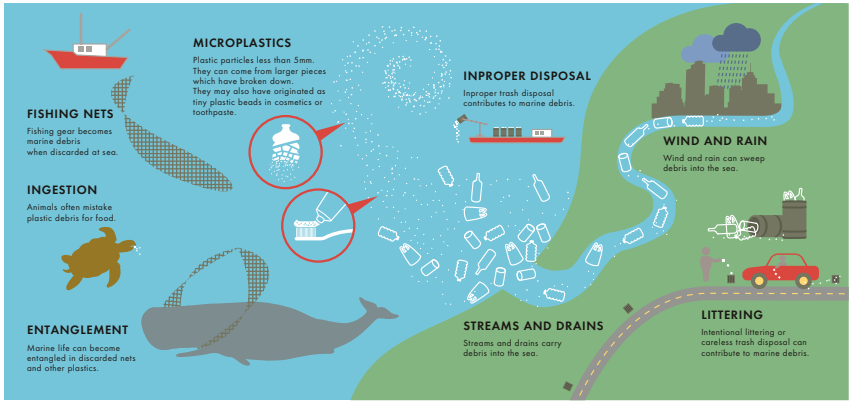
ACTIVITY STEPS:

1 Explain some of the challenges related to plastics and water to the students

2 Ask them to look around their homes and communities and notice items made from plastic, then bring a list of these items back to school to be shared with the class.

3 Work with students to collectively plan local action. This could include:

- Organizing a cleanup of your school, neighborhood, or local waterway (a river, stream, pond, or lake).
- Keeping a basket or canvas bag at home, on your bicycle, or in the car so it is always available if you go shopping; consolidating purchases from different stores into one bag; and reusing bags for subsequent shopping trips.
- Asking your favorite local shops to stop giving out plastic bags for free or to offer money back for not using them, and encouraging the shops to provide recycling drop-off bins and to stock products made from recycled bags.
- If your town has a recycling program, making sure you recycle your waste plastic. If not, you could encourage your family to dispose of waste properly. If you do not have garbage collection services, bury plastics deep in the ground (burning plastic creates toxic fumes).
- Joining an environmental club to learn more about the plastic menace and how you can make a difference.



Source: http://www.oneworldoneocean.com/blog/entry/plastics-breakdown-an-infographic

DEAD ALBATROSS

OBSERVATION AND DISCUSSION:

Have students brainstorm ways to reuse material found in their homes and schools. Share these ideas, and the importance of reusing and reducing as a whole, with the community.

Discuss how plastic is hazardous to wildlife and ways improper disposal can be avoided to help protect animals living in the ecosystem.

TURTLE

DISENTANGLING ALBATROSS

ACTIVITY 8.3: CLIMATE CHANGE INTERGENERATIONAL SURVEY

Accessing freshwater is essential for life, health, and livelihoods, and understanding the past and present gives us a vision into the future. In the case of climate change, the future is expected to bring more droughts and floods, and rising sea levels, which will make finding clean, nonsaline water more difficult for many people.

In its technical paper on water and climate change, the Intergovernmental Panel on Climate Change predicts with high confidence that "higher water temperatures and changes in extremes, including floods and droughts, are projected to affect water quality and exacerbate many forms of water pollution. ... Changes in water quantity and quality due to climate change are expected to affect food availability, stability, access and utilisation." [44]

DID YOU KNOW? In 2030, 47% of all people in the world will be living in areas of high water stress, and most population growth will take place in areas that already have limited access to safe drinking water and adequate sanitation.

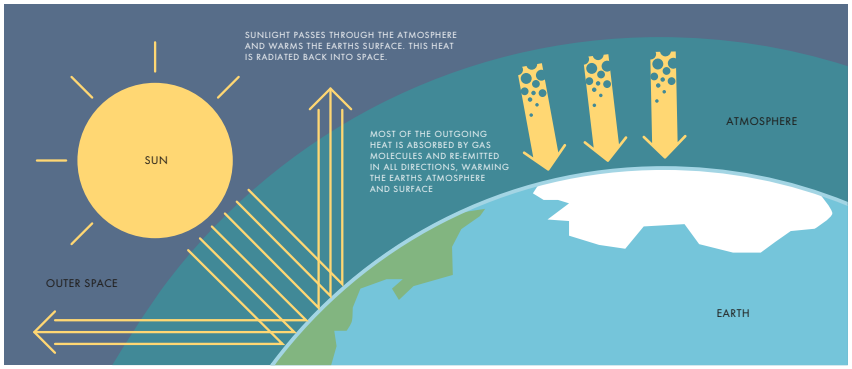
SOURCE: World Water Assessment Programme, "Facts and Figures: Demographics and Consumption Are the Main Pressure on Water," UNESCO, www.unesco.org/new/en/natural-sciences/environment/water/wwap/facts-and-figures/all-facts-wwdr3/fact1-demographics-consumption.

While droughts and flooding affect water quality by damaging sanitation pipes, causing human waste to leak into water supplies, and by increasing the salinity of groundwater, climate change will also have an impact on the world's forests. Warmer conditions and higher levels of carbon dioxide in the air will cause trees to grow more quickly. However, byw growing faster, trees will use the stocks of nutrients in the soil more quickly and may eventually deplete them. [45] With fewer trees, more places will be prone to flooding, causing sedimentation and erosion.

This activity is designed to gather personal knowledge and reflections on climate change from adults, particularly those who are older and have been living in the community for many years.

Time: 50 minutes introduction (Conducting this survey may span a few days) / **Thematic Areas:** Social Studies, Language Arts, Science **/ Goal for Learning:** Facilitate dialogue between children and elders about the environment in which we live, how it has changed, what this means, and why it matters.

Materials: ☐ Paper and pencils for drafting the interview worksheet / ☐ Printouts of the final interview



The greenhouse effect is a phenomenon that occurs when the heat from the sun gets trapped in Earth's lower atmosphere. The heat gets trapped in by gasses such as methane, carbon dioxide, and water vapor, which then makes both the atmosphere and the Earth's surface warmer.
Source: http://climate.nasa.gov/causes/

ACTIVITY STEPS:

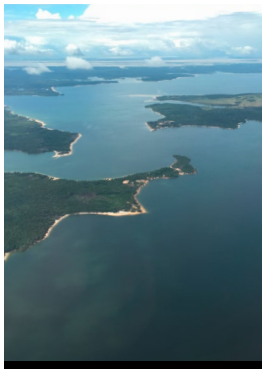
1. Work with the students to develop an interview form. A draft format is suggested below. Alternatively, you could divide the students into groups of four or five and have them make up their own interview questions, providing guidance on the purpose of the interview.

2. Plan for each student to interview an adult in the community and record the responses on a sheet such as the draft shown here. The guidance that is offered by teachers or facilitators should include practical tips on selecting the person to be interviewed, such as a neighbor or family member, and should always consider students' safety.

3. After students have completed their interviews, gather the responses for discussion and analysis.

44 Bates, Bryson, et al., editors, Climate Change and Water: IPPC Technical Paper IV, Geneva: Intergovernmental Panel on Climate Change, 2008, p. 3. **45** United Nations Framework Convention on Climate Change, Report on the technical workshop on water and climate change impacts and adaptation strategies http://unfccc.int/resource/docs/2012/sbsta/eng/04.pdf.

CLIMATE CHANGE AFFECTING WATER AVAILABILITY



OBSERVATION AND DISCUSSION:

How will climate change affect the future? Engage students in a discussion of the short- and long-term effects, and how we can act now to help alleviate some of these changes.

Also consider ways that students can help prepare their community to withstand the effects of climate change.

ADDITIONAL RESOURCES:

NASA, "Climate Kids," http://climatekids.nasa.gov/menu/teach

Scholastic News Kids Press Corps, "Lesson Plan: How to Conduct an Interview," 2015, www.scholastic.com/teachers/lesson-plan/how-conduct-interview

UNDP, Human Development Report 2014: Sustaining Human Progress – Reducing Vulnerabilities and Building Resilience, New York: United Nations Development Programme, 2014.

DRAFT INTERVIEW WORKSHEET

NAME: _____ GENDER: _____

AGE: _____ How long have you lived in this area? _____

What was the environment like when you moved here or when you were a child? _____

What, if anything, has changed in the natural environment since you have lived here? _____

Are there more or fewer people in the village/community now than there were when you came here or when you were a child? Why do you think this is happening? _____

Which of the following items have you noticed during the past 25 years in our region? Please explain or give examples:

- ☐ Less water available _____
- ☐ Higher cost of water _____
- ☐ Fewer trees _____
- ☐ Harder to get fuel for cooking and heating _____
- ☐ Hotter temperatures _____
- ☐ Changing weather _____
- ☐ More natural disasters _____
- ☐ More traffic _____
- ☐ More pollution _____
- ☐ More mosquitoes or other insects _____
- ☐ Less rainfall in certain seasons _____
- ☐ More people getting sick _____
- ☐ Harder to grow crops _____
- ☐ More people moving somewhere else to live _____
- ☐ Less soil (because it has been washed or blown away) _____
- ☐ Colder temperatures _____
- ☐ Other _____

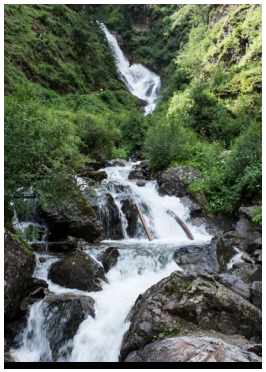
ADDITIONAL RESOURCES:

Available at: http://hdr.undp.org/en/reports/global/hdr2006

UNICEF and the Alliance of Youth CEOs, Climate Change: Take Action Now! Available at: www.climatecentre.org/news/322/climate-change-take-action-now

ACTIVITY 8.4: WATER AVAILABILITY

In many countries, young children, especially girls, are responsible for collecting water, and often carry large amounts in a pot or bucket on their head. Pots can weigh up to 20 kilograms (44 pounds). Carrying water is not only hard work, but also takes a lot of time. One of the most serious effects is that girls who have to fetch water may not have time to attend school. As noted in UNESCO's 2015 report, "Long distances to travel and the lack of good water and sanitation in schools disproportionately impact girls' chances of staying and completing their education. A one hour reduction in the time spent walking to a water source increases girls' enrolment by eighteen to nineteen per cent (18–19%) in Pakistan and eight to nine per cent (8–9%) in Yemen."[46]



WATER

This activity is designed to help students in industrialized countries understand the value of access to safe water for family use and help them understand, through role-play, the importance of water in our lives. In the activity steps, the questions for teachers to ask appear in quote marks, and answers or stage directions are enclosed in brackets.

Time: 50 minutes / **Thematic Areas:** Mathematics, Drama, Environmental Education / **Goal for Learning:** Gain an understanding of the value of water and be able to act accordingly.

Materials: ☐ One 3.8-liter (1-gallon) water jug / ☐ A sink with taps

ACTIVITY STEPS:

1 Begin by asking the following questions: "Have you used any water today? If so, how did you use the water?" Make a list of the responses. Remember to include all water use, including water used for pets and plants.

46 UNESCO, EFA Global Monitoring Report: Gender and EFA 2000–2015 – Achievements and Challenges (Gender Summary), Paris: United Nations Educational, Scientific and Cultural Organization, 2015, p. 4. Available at: http://unesdoc.unesco.org/images/0023/002348/234809E.pdf.

2 Hold up the filled water jug and ask, "How many liters (or gallons) of water do you think you use each day?" Let students guess, and note what figures they come up with for their total daily water use.

3 Discuss how much water each activity actually uses. For example, a 10-minute shower uses about 189 liters (50 gallons), one flush of the toilet averages 11–18 liters (3–5 gallons), and brushing teeth with the water running uses about 57 liters (15 gallons). Review with the group their estimates of personal water use. If the numbers are close to 380 liters (100 gallons) a day, they are correct.

4 "How do we get our water at home?" [Turn the tap.] Demonstrate the simplicity of this action. Ask your students to imagine living in a place where people cannot simply turn on the tap and get clean water. Where would their water come from? [From a local well or a stream.]

5 Pretend to go outside to a local well for water. "What is a well?" Use the example of digging a hole in the sand at the beach and having it fill with water as an illustration of a well. "What will you need to bring with you?" [A bucket, a lantern at night, and warm clothing during the winter.] "Now, we get ready to go fetch water!" [The role-play begins. All students can participate or one or two students can act it out in front of the class.]

6 Have students walk for about 5 or 10 minutes to the 'well.' "Walk to the well, set down your lantern and bucket, and lower the well bucket to get water. Hoist the full bucket and empty it into the bucket you will carry home. Carry the bucket carefully. Why?" [You do not want to spill any water.] Have students carry the full bucket back.

7 "Bring the bucket inside and lift it onto a table. How did that feel?" [Heavy, a lot of work.] "Imagine having to gather water that way all the time. Think about having to carry that water 2 miles or more. How would you feel about this water?" [That the water is valuable, important, needs protection.] "Would you be careful with the water you use at home, or would you waste it?" [Careful, because you would not want to have to gather more water unnecessarily.]

8 "How much does water weigh?" Pass around the jug of water, and ask students to estimate its weight. A liter of pure water, without any sediment that might come from a surface water source, weighs around 1 kilogram (a gallon of water weighs around 8 pounds). "How much would an 18-liter (5-gallon) bucket weigh?"

OBSERVATION AND DISCUSSION:

Lead a discussion about this activity, asking students how it relates to their own lives and the lives of girls and boys in other parts of the world.

As a group, research water use in different countries and how girls and boys in other parts of the world can help conserve the amount of freshwater found on the planet. Then brainstorm the different ways students can conserve the amount of water they use locally on a daily basis.

MOTHER CARRYING WATER, SWS UGANDA

ADDITIONAL RESOURCES:

For a lesson plan in which students investigate how water is reflected in various cultures in Africa and then write about their own impressions of how water permeates all aspects of life, see: World Wise Schools (Peace Corps), "A Sense of Water: Water in Africa," 2014, https://eric.ed.gov/?id=ED457077.

EDUCATIONAL OUTDOOR TRAINING, SWS AUSTRIA

CASE STUDY: SUPPORTING JAMES BALOG'S RESEARCH ON GLACIERS

With the help of unique images from time-lapse cameras, geoscientist, photographer, and mountaineer James Balog provides clear evidence of how glaciers across the globe are shrinking. From Mount Everest to Greenland to the Rocky Mountains, Balog and his team install cameras that capture a series of photographs from the same position for several years at a time. Vivid images from these installations were used in the award-winning documentary Chasing Ice to demonstrate the dramatic effects of global warming.

In July 2014, Swarovski supported the installation of two time-lapse cameras on Stubai Glacier, in Europe's Central Eastern Alps. As explained by Nadja Swarovski, Member of the Executive Board, "We are honored to support the installation of two cameras on Stubai Glacier, the first in the project to observe glacier melt in an Alpine setting. James told us that 50% of the rise in global sea levels is caused by Alpine glaciers melting, not by polar ice melt, and that the Stubai Glacier is retracting at the rate of at least two meters per year. This really brought home to me the impact of our actions on our immediate environment as well as the wider world."

The partnership is a project in the Extreme Ice Survey, a long-term photography program launched by Balog in 2007 that integrates art and science to give a “visual voice” to the planet’s changing ecosystems. Through 2017, Swarovski staff will regularly inspect the cameras at Stubai Glacier and send the images to the Extreme Ice Survey home site in Colorado.

The project is particularly relevant to Swarovski because the Stubai Glacier flows directly into the Inn River, which is the company’s water source and which generates 40% of the electricity used at its headquarters in Wattens, Austria, via hydropower. Swarovski’s support for the project is consistent with the company’s commitment to environmental sustainability and builds on its historically close relationship with, and respect for, the natural environment.

SWAROVSKI EMPLOYEES MAINTAINING EIS CAMERAS

EIS CAMERA INSTALLATION AT A GLACIER IN AUSTRIA

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GLOBAL NETWORK

ACKNOWLEDGMENTS

Swarovski Waterschool gratefully acknowledges the contribution of all partners that have led to the development of this global teaching material.

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