

# GLOBE Shines in Indian Schools

By GIRIRAJ AGARWAL

Simple tasks such as observing clouds and measuring rainfall by Indian school kids is helping NASA scientists learn about climate change.



*Students taking measurements for the GLOBE-CloudSat project on the terrace of the Police D.A.V. Public School in Jalandhar, Punjab, in April 2009.*

Courtesy, Police D.A.V. Public School, Jalandhar

**N**ishant Dania and his schoolmates at MGN Public School in Jalandhar, Punjab, had dreamed of someday working with NASA scientists. The achievements of astronauts Kalpana Chawla and Sunita Williams inspired them. The students got their chance a lot sooner than they expected when their school became a partner in NASA's GLOBE-CloudSat project in 2006.

As part of the environmental science and education program, the students are performing simple tasks such as observing clouds, measuring rainfall and recording air temperatures. The data they have collected are being used by NASA researchers as a reference in analyzing satellite images to develop a better under-

standing of changing climate patterns.

At the same time, Dania and his friends have learned a lot about clouds and how pollution affects them. "Now I can immediately recognize the nature of any cloud without looking at a cloud chart. My friends call me a cloud expert," says Dania. His teacher and program coordinator, Rajnish Kaur, is very happy. "It makes me feel great that I am working on a project which provides us an opportunity to connect our students to renowned U.S. scientists."

The CloudSat project at MGN Public School is part of a worldwide program called Global Learning and Observations to Benefit the Environment (GLOBE). It is funded by NASA, the U.S. National Science Foundation and the U.S. Department of

State and is implemented through a cooperative agreement between NASA and the University Corporation for Atmospheric Research in Boulder, Colorado. The 14-year-old program connects students, teachers and scientists in 110 countries through projects that require gathering information on local weather and environment.

Teachers receive training and materials to help them guide their students in learning the skills of scientific investigation, such as careful observation, accurate recording of data and the necessity of faithful repetition to observe patterns. The main objectives of the program are to promote the teaching and learning of science and to enhance environmental literacy and stewardship.



Photographs courtesy: GLOBE India/Indian Environmental Society

“There are more than 50,000 GLOBE trained teachers representing over 22,000 schools around the world. GLOBE students have contributed more than 20 million scientific measurements to the GLOBE database for use in inquiry-based science projects,” says Teresa Kennedy, GLOBE’s international division director.

When an agreement was signed between the U.S. Embassy and the Indian Ministry of Environment and Forests in August 2000, a group of 50 Indian schools were the first partners. “The program picked up momentum after an international ‘train the trainers’ workshop was organized in January 2002 to train teachers about the procedures that need to be adopted while collecting scientific data,” says Rajinder Mehta. He is the GLOBE India coordinator, chairman of its international advisory committee and an adviser to India’s Ministry of Environment and Forests.

Since 2002, the program has been administered by the Indian Environmental Society. “We have now partnered with about 2,000 schools all over India and more than 1,800 teachers have been trained in

*Above: Soil expert R.K. Garg explains GLOBE soil protocols to GLOBE teachers in Udaipur. Above right: Comparison of soil colors using soil color charts. Right: A soil chart is used to study properties like texture, particle size, density, etc. Far right: Jaishree Deshpande (center), GLOBE trainer, with the students of Central Academy School in Udaipur, Rajasthan discussing hydrological investigations.*

GLOBE procedures,” says Desh Bandhu, the society’s president and director of the GLOBE Asia-Pacific regional office.

The training covers four investigation areas:

- Atmosphere, which involves observing clouds, monitoring the amount and acidity levels of rainfall, and recording air temperature;
- Hydrology, which involves observing bodies of water and measuring their transparency, amount of dissolved oxygen, temperature, electrical conductivity, salinity, alkalinity and nitrate levels;
- Soil, which involves recording color and texture, density, particle size, pH value, moisture content, infiltration, temperature and fertility;
- Biology, which involves mapping of vegetation, species identification, measuring tree circumference, tree height, canopy cover, ground cover and grass biomass.

Kits distributed to the schools include the instruments the students need to col-

lect data for each type of study they select based on their research interests. They send reports of their observations to GLOBE’s Web site. “Teachers usually form a group of eight to 10 students for a particular study,” says Bandhu.

The GLOBE-CloudSat program is active in eight schools in Punjab, four in Jalandhar and four in Mohali. Both private and government schools are included. A group of students from classes 8 to 12 “took cloud observations from the school ground on the days when the CloudSat satellite would pass over their location, which they knew about in advance,” says Anuja Tighare, principal of Paragaon Senior Secondary School in Mohali.

Sharing her experiences of this program, Indian American Nandini McClurg, who is GLOBE’s international help desk coordinator, says, “When the teachers started to take an interest in GLOBE-CloudSat activities, the students really

**For more information:**

GLOBE India

<http://www.globeindia.org/>

CloudSat project

<http://cloudsat.atmos.colostate.edu/>

University Corporation for Atmospheric Research

<http://www.ucar.edu/>

National Science Foundation

<http://www.nsf.gov/>



started to excel. The more we supported the teachers, the more confidence was noticed in students of different age groups as well as different skill sets.” She has visited Punjab schools each year since the project began.

“Children really enjoy the CloudSat program. ...Visits by U.S. scientists Matt Rogers and Nandini McClurg motivated them to do more as they know they are a part of a real research project,” says Neelima Jerath, executive director of the Punjab State Council for Science and Technology.

And here is what happened to the data collected by the Punjab students. “I used two years of data from approximately 32 schools in the CloudSat Education Network...all over the world, including the eight schools located in Punjab, and compared the cloud type observations taken by those schools against what the satellite saw during school overpasses. I found a 65 percent agreement between the school data and the satellite data, which is an astonishing result, as a similar study using trained World Meteorological Organization meteorologists achieved only a 64 percent agreement,” says Rogers, a research scientist at Colorado State University in Fort Collins. “We are in the process of going through the satellite algorithm, and may make some changes

to the research product, based on the observations from the students.”

He says the data received from the schools in Punjab are “directly improving the global understanding of clouds and the role they play in climate change.” He is writing a paper for submission to a scientific journal and promises that the students and teachers who helped him will be given co-author credit for the research described.

The CloudSat project is an example of the impact the GLOBE Program can have throughout India. “The most important thing is that schools, teachers and students now know the importance of scientific inquiry-based projects,” says Bandhu. “This awareness is leading them to do many activities that benefit the environment.” He cites two cases in which GLOBE studies were directly linked to local environmental issues. “In Delhi, a hydrological study of the Yamuna River was done about two years back. Students of 40 Delhi schools regularly took measurements of various river parameters at 10 river sites. This made them aware about the Yamuna pollution and the need to conserve our water resources,” says Bandhu. “Similarly, students from eight Agra schools studied the impact of the changing environment on two heritage sites, the Taj Mahal and Agra Fort.” The GLOBE

program, UNESCO, the U.S. National Science Foundation, and India’s Ministry of Environment and Forests supported this initiative.

U.S. diplomats are distributing more GLOBE kits to 50 schools all over India, including Amritsar, Ludhiana, Jaipur, Raipur, Nanded, Mysore, Cuttack and Visakhapatnam, “reaching out to larger cities outside the five metros,” says Diane Brandt, a public diplomacy officer at the U.S. Embassy in New Delhi. “The idea is to make kids more active, linking the classroom to everyday life and current global issues,” she says.

Kennedy, at GLOBE, echoes similar views, “The primary objective of the GLOBE program is to facilitate students to form research questions based on their personal observations of the world around them, and use the tools of GLOBE, over 50 scientifically tested protocols, to gather data that could answer their research questions.”

Kennedy says that GLOBE India is also providing leadership to the Asia-Pacific region by providing funding to the Indian Environmental Society “to lead the regional office through December 2010, to work with all countries in the region to raise awareness of the program and to seek sponsors and funders in the region to ensure the continuity of the program....”

