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CASE STUDY

Spreading Climate Change Literacy on Wheels: The Science Express Climate Action Special

Ahmedabad, India

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GEEP is a partnership of the U.S. Environmental Protection Agency, the Environmental Protection Administration of Taiwan, and the North American Association for Environmental Education.



Spreading Climate Change Literacy on Wheels: The Science Express Climate Action Special



Overview

The Science Express Climate Action Special (SECAS) is a one-of-a-kind mobile science exhibition led by the Government of India's Department of Science & Technology (DST) and managed by the Vikram A. Sarabhai Community Science Centre (VASCSC). The exhibition was sponsored by the Ministry of Environment, Forest, and Climate Change and designed by the Centre for Environment Education (CEE).

SECAS is the third major configuration of the Science Express, a 16-coach train that has been traveling across India since 2007, exploring a variety of environmentally-themed topics. It has covered 1.5 million kilometers and has been featured at 483 locations, reaching over 18.2 million visitors. The Science Express has become the largest, longest running, and most visited mobile science exhibition in India, according to the *Limca Book of Records*.

In 2015, to coincide with the Paris Accord on Climate Change, the traveling exhibition was redesigned as the Science Express Climate Action Special with the aim of creating awareness about climate change mitigation and adaptation. The train, along with a group of science communicators, has travelled through the country bringing climate change education programming to communities. The exhibits were designed to inspire learners by engaging them in a variety of interactive activities that begin while the students are waiting on the train platform and then go beyond their visit with activities extending to their classrooms.

Through a comprehensive evaluation, research has shown that participation in Science Express Climate Action Special led to an increased understanding of scientific facts, impacts of and solutions to climate change, and actions individuals can take to tackle climate change, as well as an increase in willingness to act.

Background

The Science Express, a 16-car train, was developed in 2007 to bring environmental education exhibitions to audiences across India. By taking advantage of the country's extensive rail network, the train presented a cost-effective, efficient way to reach millions of middle and high school students, including those in remote areas with little access to innovative learning opportunities. The original project was a joint Indo-German initiative with exhibits designed by Nobel laureates from Germany's Max Planck Society. The Science Express has been riding India's rails ever since and, with 18.2 million visitors and twelve entries in India's famous *Limca Book of Records*, it has become the largest, longest running, and most visited science exhibition in India's history.



Photo: © VASCSC, Ahmedabad

Since its inception, this unique mobile exhibition has completed nine phases—four phases of the Science Express, three phases of the Biodiversity Special, and two phases of the Climate Action Special (SECAS). In its first configuration, from 2007 to 2011, the Science Express displayed the world of micro and macro cosmos, spreading awareness of science's ability to solve global problems, and highlighting the latest discoveries and innovations in the field of modern science. Visitors had the opportunity to learn through exhibits, models, and audio-visual displays.

In 2010, the United Nations declared 2011-2020 as the Decade on Biodiversity with India set to host the 11th Conference of Parties (COP 11) of the Convention on Biological Diversity. In response, the Science Express was redesigned to focus on biodiversity. Running from 2012 to 2014, this Biodiversity Special was a unique collaboration between the Department of Science & Technology and the Ministry of Environment, Forests & Climate Change.

Coinciding with the United Nations Climate Change Conference in Paris, France, in 2015, the traveling exhibition was again redesigned as the Science Express Climate Action Special (SECAS). India initiated SECAS to increase understanding of climate change science, the observed and anticipated impacts, and different possible responses. The new exhibition aimed to create awareness among various sectors of society about how to combat climate change through mitigation and adaptation. The displays were designed by the Centre for Environmental Education (CEE). According to Kartikeya Sarabhai, founder and director of CEE, two factors were integral to maximizing the SECAS's effectiveness: the exhibits had to be interactive and they had to provoke ideas that students could follow up on after the train departed. With almost 4.5 million visitors, mostly students and teachers, SECAS has become the largest climate change awareness program in the country.



Photo: © VASCSC, Ahmedabad

Approach

Climate change is a global, complex, and interconnected challenge. India is faced with the challenge of sustaining its rapid growth while also improving living standards and reducing vulnerability to the impacts of climate change. However, as a developing country, India also has a unique opportunity to avoid the errors of following a conventional, carbon-intensive path towards development.

Climate action is not just about mitigation of greenhouse gas emissions, but also about adaptation and disaster resilience. India has a history of following a moderate lifestyle that relies on adapting to a changing climate. Because of these values, India's national plan includes working toward an alternative development path that is less carbon intensive than that of developed countries. India is working with other nations to address this challenge in a positive, constructive, and forward-thinking manner. Education and awareness are essential drivers for climate action, so SECAS is an effort to raise awareness of climate change and actions that are being taken at local, national, and international levels. It inspires people to become a part of the solution by offering ideas on how to lessen the impact of climate change and contribute to climate resilience.

According to Kartikeya Sarabhai, founder and director of CEE, several factors were integrated into the SECAS design to maximize its effectiveness. Primary among them, the exhibits had to be interactive and they had to provoke ideas that students could follow up on after the train departed. In addition, a team of qualified, trained, and motivated Science Communicators travel with the train to explain and interpret the exhibition, answer questions, and conduct activities. While the exhibition is open to all, it primarily targets middle and high school students and their teachers.

In order to broaden the reach of SECAS, activities are planned at every station to engage visitors across different age groups. An exciting and much sought-after activity—the Outreach Program—is conducted in local schools and institutions to meet the needs of students unable to visit the train. Depending on celestial events, astro-nights are conducted at some stations.

A series of activities were designed to be conducted on the train platform to engage students waiting to board the exhibition coaches. Important national and international days related to science, mathematics, and the environment, like World Ozone Day, World Environment Day, etc., are also celebrated on the platform to generate awareness among students and the public.

The SECAS exhibition covers various aspects of climate change in a manner that is both interesting and easy to understand. Teachers are provided with a curriculum that is translated into all spoken languages in India. Because educators often feel intimidated by lessons related to climate change, the curriculum was designed to support their learning and their ability to teach.

The education team begins working with students on the train platform during their wait to board the train, which at times is lengthy given the volume of students. Once on the train, students are introduced to the following themes:



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- **Coach 1: Understanding Climate Change**—Insights into the climate as a system, the greenhouse gas effect, and the underlying reasons for climate change, with a key message that climate change is the result of human activities
- **Coach 2: Impacts of Climate Change**—How temperature rise, monsoon variations, and sea level rise are predicted to affect vital sectors such as water, agriculture, forests, biodiversity, and human health
- **Coaches 3 & 4: Adaptation**—Strategies for adapting to climate change with examples from everyday life, options for urban and rural contexts, and India’s adaptation actions
- **Coaches 5 & 6: Mitigation**—Methods for reducing the impacts of climate change, with an emphasis on restoring balance, enhancing sinks, and reducing emissions through renewable energy
- **Coach 7: International Negotiations for Climate Change**—Introduction to the United Nations Framework Convention on Climate Change (UNFCCC), Intergovernmental Panel on Climate Change (IPCC), Kyoto Protocol, Conference of the Parties (COP), and internationally agreed-upon actions and targets; explanation of common but differential responsibility
- **Coach 8: Positive Actions**—Recommendations for individual lifestyle changes with the key message of “Increase Your Handprint, Decrease Your Footprint”
- **Coaches 9 & 10: Exhibition by the Department of Biotechnology, Government of India**, covering biotechnology for bio-resources and nature conservation, with emphasis on tiger conservation and chemical ecology
- **Coach 11: Exhibition by the National Innovation Foundation** showcasing select innovations in science and technology, science education, and technological solutions for societal development, including a project that uses augmented reality techniques
- **Coach 12: Kids Zone** for children from Std. 5 (age 11 years) and below to participate in activities, games, and puzzles focused on science, mathematics, and the environment
- **Coach 13: Joy of Science (JOS) Hands-on Lab**—AA space for students from Std. 6 to 10 (age 12 to 16 years) to perform experiments and activities that teach concepts in science, mathematics, and the environment in an interesting manner, as well as a training facility for teachers

Evaluation

Research was conducted to determine if the level of climate change awareness had increased among school children who had visited the Science Express, and to what degree it was attributed to SECAS. The research also examined whether learning about the “Handprint” message (the theme of Coach 8 discussed above) during SECAS triggered Handprint actions in their school, homes, or community.

The study was carried out four months after the train had stopped at a station in 20 schools and five colleges in Lalkuan (Uttarakhand), Barrackpore (West Bengal), Agra Cantt (Uttar Pradesh), and New Bongaigaon (Assam). At each school, the team selected one class that had visited the train and another class of the same level at the same institution that had not visited the train. The study was conducted through personal visits to the schools and colleges, and through phone calls to teachers.

Outcomes

- The research conducted showed that participation in SECAS led to an increased understanding of scientific facts, impacts of and solutions to climate change, and options for personal actions for tackling climate change, as well as an increase in willingness to act.
- Students who visited SECAS had significantly higher climate change awareness than those who did not visit SECAS.
- Students studying in Regional Language schools had significantly higher climate change awareness than students studying in English and Hindi medium schools.
- Climate change awareness was high when the number of Science Express visitors per day was between 10,000 and 15,000. When crowds were much larger, students felt rushed.

Lessons Learned

Partnerships and political buy-in is critical. SECAS built several partnerships that were crucial to its success. In addition, VASCSC set up a test train so stakeholders could see the exhibit in sketch form. India’s Minister of the Environment at the time also went through and provided feedback on the exhibits. This hands-on involvement was key to building buy-in and interest.

Educate to inspire. SECAS is an innovative method to educate people, and especially students, about the effects of climate change and how small steps can help mitigate them. The exhibits, models, and audio visuals in SECAS are nicely designed and easy to understand. The approach of using a train as an exhibition space is something that can capture a young person’s imagination.

Learning can be extended and enriched beyond the train itself. The train exhibits can inspire learners and be a stepping off point for further engagement. VASCSC found that it is critical to provide lesson plans for teachers to continue learning beyond the train visit itself. Activities at the stations along with the take-away kit of materials make a difference—climate change awareness is higher for students who received materials than for students who did not.

Go to the community. The pedagogy behind Science Express is the idea that education should be accessible. To reach out to as many students as possible, CEE arranged buses to bring students to the train. This helped to accommodate more students, many of whom would not have otherwise had access to the exhibit. This type of adaptation can be replicated in many ways; the overarching idea is to take mobile education programs to the community.

Resources

- <https://www.ceeindia.org/programmes/sec.php>
- <https://www.youtube.com/watch?v=BvCIZO0pp6w>
- <https://www.youtube.com/watch?v=dHGLJ89JhKE>

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