Greater Bombay Science Teachers' Association

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ACTION RESEARCH PROJECT INFORMATION

2025 - 2026

STD. VI

INTRODUCTION :

Dr. Homi Bhabha Bal Vaidnyanik Competition is a prestigious event conducted by Greater Bombay Science Teachers' Association. In the year 25-26, 1,04,085 students from all over Maharashtra and states other than Maharashtra participated in this Competition.

This Competition is conducted in four stages - written Competition, practical Competition, action research project and viva - voce.

Action research :

It is an attempt of scientific study of the problem in the surrounding in order to guide, correct and evaluate the actions and decisions about it. Action research is based on small research project correlating scientific knowledge and day to day experiences which encourages development of scientific attitude among children.

Steps of action research : These are based on the method of science and involves the following :

- ✤ Keen observation of the surrounding
- ✤ Identification of the problem
- ✤ Analysis of the problem
- ✤ Collection of relevant information
- ✤ Suggesting plan of action
- ✤ Conducting experiments
- ✤ To draw conclusion
- ✤ To find possible solution to rectify the problem

Note : Execute experiments and remedial measures wherever possible.

Importance of Action research :

It gives an opportunity to make a difference in the experience of education in its own way.

Guidance :

Students can seek guidance from teachers, other experts and make effective use of other sources of information available around them.

If one has never done action research before, it is better to start small. Ensure that the problem to be solved is managable. **Not to be afraid of mistakes. We all know, we learn through our mistakes.**

Where can your research question come from ?

- ✤ A problem or difficulty which you are facing
- ✤ By observing the surrounding
- ✤ Something you have read
- ✤ Previous research

Note that, 'Problem' in research means topic under study. It need not be always a difficulty.

In leading pupils to think for themselves :

Following teaching principles need to be remembered.

- ✤ Make pupils confront problem solving.
- ✤ Develop methods and techniques of handling problems. Teach how to use the methods and not how to solve the problems.
- ✤ Emphasize positive thinking.
- ✤ Lead the pupils to the peak of their powers for improvement of better learning

Objectives of the Action Research :-

1) To make students sensitive towards environment and it's conservation and to inculcate ecofriendly attitude within them.
2) To learn scientific principles from day-to-day experiences.
3) To develop psychotechnological skills through observation, classification, statement of hypothesis etc.
4) Development of organisational skills and maturity through discussion, presentation etc.
5) To develop ability to correlate science, society and environment.

Types of Project :-

1) Experiment based.
2) Observation and evaluation based.
3) Survey based.

Criteria of a good project :-

1) Appropriate idea, clear understanding and proper presentation of the concept.
2) Quality of work.
3) Project Plan.
4) Credibility of the work.
5) Probable impact of the work on the attitude of the students, society and environment.
6) Scientific attitude, creativity and novelty reflected in project work and analysis of the situation.
7) Utility and innovation of the remedial measures.
8) Efforts taken towards implementation of remedial measures.
9) Feasibility.

Project Report :-

Project Report should be written on A-4 (8.5' x 11.8 inch) size ruled sheets in **one's own handwriting** and on both sides of the paper. Do not use glitter pen. Project Report should be of 20 to 25 pages only.

First Half :-

1) **Page 1 : Front Page :** Title of the project should be written on top in block letters. After that exam number alongwith date of the interview should be written. **Name of the student should be seen only on page 2 ie. on the certificate page and no where else in the report.**
2) **Page 2 : Certificate :** Certificate issued by the head of the institution stating that the work done for the project is student's own.
3) **Page 3: Acknowledgments :** Gratitude towards people and institutions who have extended helping hand.
4) **Page 4 :** Abstract of the project in around 500 words. Explanation of all aspects of the project in effective words can help in rational evaluation of the project.
5) **Page 5 :** Index.

Second Half :

1) **Introduction :** Title of the project should be written on top followed by brief explanation of the objectives, relative importance of the work and project plan.

2) **Statement of necessity :** Correlation between selected project and it's social aspects should be explained in around 50-100 words.

3) **Objective :** Should be maximum 2 - 3 clear statements.

4) **Hypothesis :** Should be in the form of a possibility. Example 'If I do..... then I may get.....'.

5) **Project Plan :** Action Plan of the project.

6) **Procedure :** Detailed explanation of execution of the project. It should include time table, actual experimentation, methodology, survey (Selection of subject/s and questionnaire) as per the action plan.

7) **Observations if applicable / Speculation / Application**

8) **Analysis.**

9) **Conclusion :** Conclusion drawn after critical analysis of the data obtained, probable remedial measures and suggestions for future plan.

10) **Remedial Measures :** Remedial measures undertaken to solve the problem and observed effects of the same.

11) **References :** Arrangement of references used as per alphabetical order.

Order of writing a particular reference should be Author, Book/Article/Publishing House/Page Nos./Publication No. / Edition / Publisher / Place / Year of Publication.

Students should note that they need to send a scanned PDF copy of their action research project report on the following email ID

dhbbvcpdf@gmail.com

on or before

Monday, 8th March 2026.

Evaluation :-

Project report will be evaluated on the day of the interview. Student participant should bring with him **TWO** copies of the report. **One original and other black & white xerox.** The xerox copy will be kept with the office.

Each student will get around five minutes for interaction with the interviewers.

Student is expected to explain the summary in one minute which will be followed by viva-voce based on the project report.

Note :-

1) While explaining the project the student should emphasize on the aim, observation, conclusion and outstanding aspects related to the project. Student participant should be calm and confident. Answers should be clear.
2) No models/charts/exhibits should be brought along with the report.
3) Students may use photographs in the report wherever necessary.
4) Orientation lecture would be arranged for the students regarding action research theme and doubts will be solved if any at the time of practical examination, so please come prepared.
5) Students should note that they have to face TWO interviews on the date of interview. One general interview based on science and other based only on the action research project report.

DR. HOMI BHABHA BALVAIDNYANIK COMPETITION 2025-25

STD. VI

ACTION RESEARCH PROJECT TOPIC FOR 2025-26

Earth System Interactions and Human Actions

Introduction

"Anthropocene" may not be the official but often used term to refer to the most recent years in Earth's current geological epoch - the time when human activity has been the main influence on Earth's climate and the environment. It is considered to start from 1950. Why 1950? This year is consistent with the early detection of

impacts from nuclear fallout due to atomic weapon tests. It is also when industrialism and changes in the environment began to increase at a very rapid rate. We all have at least heard of Rachel Carson and her book 'Silent Spring'. Sad to say, continue to ignore it too. We must understand that the Earth is a dynamic system where different parts (atmosphere, hydrosphere, biosphere, etc.) are interconnected and influence each other. Hence our approach towards understanding the current environmental issues should be holistic and our actions should be rational. Ecological balance and sustainability should be our priority.

Why this topic?

It is high time we understand that smallest of our action can have varied effects. Though we are divided through borders, nature does not follow it. Local actions can have global effects. From ecology point of view, we all are residents of this planet and are answerable for its well being. We need to keep monitoring our own choices and actions whether they are the best possible for environmental safety.

As soon as we wake up and before going to bed, we brush our teeth. The contents of the toothpaste, material used for making the tube, the box, location of the manufacturing unit, water consumed for brushing has its own impact on earth. We have not considered the toothbrush! Between these two brushing times we do several activities and use several products directly or indirectly! We need to select wisely indeed!

What is meant by earth systems:

The term "Earth system" refers to Earth's interacting physical, chemical, and biological processes that make up our planet.

The system consists of the land, oceans, atmosphere and poles. It includes the planet's natural cycles - the carbon, water, mineral etc. Life too is an integral part of the Earth system. It affects the biogeochemical cycles and many other processes. The Earth system now includes human society; our social and economic systems are now embedded within the Earth system. In many cases, the human systems are now the main drivers of change in the Earth system.

The five systems of Earth (geosphere,biosphere, cryosphere, hydrosphere, and atmosphere) interact to produce the environments we are familiar with. No single system is more significant than the others-each one plays a vital role in the function and sustainability of Earth's system. All five enormous and complex systems interact with one another to maintain the Earth as we know it.

- **The Atmosphere:** is a mix of gases, mostly nitrogen and oxygen along with less abundant gases like water vapour, ozone, carbon dioxide, and argon. This envelope of gases

keeps the planet warm and provides oxygen for breathing and carbon dioxide for photosynthesis. It also shields the surface of Earth from harmful ultraviolet radiation from the Sun. Human actions like emission of green house gases and burning of fossil fuels etc. are proving harmful for the atmosphere. Delhi's severe air pollution during winters is a result of crop burning, vehicular emissions and geography.

- **The Geosphere :** It consists of the interior and surface of Earth, the solid part made of mountains, rocks and soil etc. Construction of all types including dams and reservoirs as well as mining result in shifting of rocks and topsoil. For a few grams of minerals loads of ore is utilised. Also mining and utilisation of fossil fuels ultimately leads to emission of greenhouse gases. Eg. Degradation of riverbanks due to illegal sand mining.
- **The Hydrosphere:** All of the liquid water on Earth, both fresh and salt, makes up the hydrosphere, but it is also a part of other spheres. For instance, water vapour in the atmosphere is also considered to be the part of the hydrosphere. The ocean provides an important food source for humans and other species and also helps regulate the climate and generates the oxygen we breathe. But the ocean is being overfished, becoming warm, and more acidic due to human-caused climate change. We are exploring ocean-bed for mining activities and are dumping waste as if oceans are bottomless pits. Fresh water resources are essential for living beings as well as for agriculture and industrial purposes. These are becoming scarce and unfit for consumption due to pollution. Rivers like Yamuna are suffering from industrial pollution and untreated sewage.
- **The Cryosphere:** It contains huge quantities of ice at the poles and elsewhere. Ice, being frozen water, is part of the hydrosphere, but it is given its own name, the cryosphere. Rivers and lakes may appear to be more common than are glaciers and icebergs, but around three-quarters of all the fresh water on Earth is locked up in the cryosphere. The cryosphere is melting due to global warming. Reduction in snow-caps at midlatitudes results in reduction of water supply during spring and summer. Melting glaciers, can result in sea level rise, affecting coastlines. As permafrost melts, it releases stored carbon dioxide into the atmosphere, further increasing the warming issue. Himalayan glaciers are retreating at an alarming rate.
- **The Biosphere:** The biosphere refers to the relatively small part of Earth's environment in which living things can survive. It contains a wide range of organisms, including bacteria, fungi, plants, and animals, that live together as a community. Humans are a part of the biosphere. Exponential increase in human population has affected the biosphere by putting other

living beings under the threat of extinction! We must try and reduce our overall footprint to safeguard earth rights! Biodiversity hotspots like the Western Ghats are losing native species due to urban sprawl and invasive plants like Lantana.

Not only do the Earth systems overlap, they are also interconnected; what affects one can affect another. It is clear that all of Earth's systems are deeply intertwined, but sometimes this connection can lead to harmful, yet unintended, consequences. One specific example of interaction between all the spheres is human fossil fuel consumption. Deposits of these fuels formed millions of years ago, by compression of the dead remains of the then living beings within the Earth to form coal, oil, and natural gas, thus becoming part of the geosphere. Now, humans—members of the biosphere—burn these materials as fuel to release the energy they contain. The combustion byproducts, such as carbon dioxide, end up in the atmosphere. There, they contribute to global warming, changing and stressing the cryosphere, hydrosphere, and biosphere.

The many interactions between Earth's systems are complex, and they are happening constantly, though their effects are not always obvious. There are some extremely dramatic examples of Earth's systems interacting, like volcanic eruptions and tsunamis, but there are also slow, nearly undetectable changes that alter ocean chemistry, the content of our atmosphere, and the microbial biodiversity in soil. Each part of this planet, from Earth's inner core to the top of the atmosphere, has a role in making Earth home to billions of life forms. Lay people's actions, even seemingly minor ones, can significantly impact Earth's systems through various interactions and feedback loops. Let's try to understand how…

- **Land-Atmosphere Interactions :** Human activities on land, such as agriculture, deforestation, and urbanization, alter the land surface and its capacity to interact with the atmosphere. For example, deforestation reduces the capacity of land to absorb carbon dioxide, contributing to the greenhouse effect.
- **Anthropogenic Emissions :** Burning fossil fuels, industrial processes, and transportation release pollutants into the atmosphere, altering its chemical composition and affecting the radiative balance of the planet. These emissions can lead to climate change, air pollution, and acid rain.
- **Biogeochemical Cycles:** Human activities can disrupt natural biogeochemical cycles of nutrients and trace gases, affecting the availability of resources and the balance of ecosystems. For instance, excessive fertilizer use can lead to nutrient runoff into waterways, causing algal blooms and harming aquatic life.

- **Water Cycle:** Human activities like deforestation, irrigation, and dam construction can alter the water cycle, affecting precipitation patterns, groundwater levels, and river flow.
  Feedback Loops: The Earth's systems are interconnected, and human actions can create feedback loops that amplify the initial impact. For example, deforestation can lead to increased temperatures, which in turn can aggravate wildfires and further deforestation.
  Changes in the Earth System:
  These interactions can lead to various changes in the Earth system, including rising temperatures, changes in precipitation patterns, sea-level rise, and increased frequency and intensity of extreme weather events.
- **Impact on Human Systems:** Changes in the Earth system can have significant impacts on human systems, including agriculture, energy production, water availability, and human health.
  Some examples of human Actions that affect earth systems:
- **Energy Consumption:** Using electricity, driving cars, and cooling or heating homes etc. contribute to greenhouse gas emissions. Human activity increases the amount of carbon dioxide and other greenhouse gases in the atmosphere. These gases warm the planet, directly affecting the hydrosphere, cryosphere, and biosphere. Even if the amounts of greenhouse gases are small in proportion to the total atmosphere, their relative increases are significant.
- **Food Choices:** Veg or nonveg, locally grown or transported from far off places, processed or raw etc. affect individual's footprints.
- **Waste Disposal:** Landfills release greenhouse gases and contribute to pollution, while reduce, reuse and recycling help in decreasing the impact on the environment.
- **Land Use:** Increasing urbanisation can lead to habitat destruction and erosion.
- **Consumerism:** The choice between ecofriendly and goods that are not sustainable or have a high carbon footprint as well as the quantity we buy: bare minimum or extravagant, can have impact on environment.
- **Water Usage:** Judicious use of water is essential for sustainability. Wastage, daily decanting of stored water etc. are harmful practices.
  Plastic Usage: The use of plastic contributes to waste accumulation and pollution. This includes plastic used for packaging as well as household use like dabbas, bottle, tiffin box, pencil box, covers etc.
- **Deforestation:** Cutting down trees reduces the capacity of

earth to absorb carbon dioxide, leads to soil erosion and affects ground water level.

- **Fertilizer and Pesticide Use:** Overuse and use of chemical fertilizers and pesticides can contaminate soil and water.

How can we bring about change? Some options can be:

- **Avoiding alien species:** Ex. Selecting local varieties for plantation in the gardens or along walkways to support biodiversity. Alien species destroy local biodiversity.
- **Making mindful choices:** Cleaners, clothes, food items, gadgets, mode of transport etc.
- **Conservation activities:** Support and participate in conservation activities is essential.
- **Being conscious about energy consumption:** Can be brought about by using energy efficient gadgets, avoiding power wastage, minimising exterior illumination etc.
- **By adapting to sustainable solutions or alternatives for any of the personal, commercial use products:** One can develop his or her own products depending on available resources or by following traditional practices. Also, by inculcating sustainable habits, making DIY articles to repurpose the waste, volunteering for conservation/cleaning activities etc. can help reduce human impact on earth systems.

What students have to do:

- Observe the activities/events or actions around you. May be at home/school/native place etc. Try to understand the effects of these on various earth systems.
- Select any one of the event / activity / actions and study its effects on ATLEAST TWO earth systems.
  Note down your observations in details.
- Suggest solution for decreasing the severity of the effect on the selected earth systems in an effective manner.
  See to it that the solution suggested is sustainable from ecological and economical angle.
  Materials needed for this activity should be easily available locally.
- Try to implement and study if the suggested remedy is really effective and economically viable.
- Write a report.

Example:

- **Title:** Study of Bartan Bank in my locality, an initiative to reduce utilisation of single use plates, glasses etc at the time of celebrations, meetings or large gatherings.

- **Objectives:**
  - To reduce waste.
  - To safeguard health of stray animals.
  - To reduce utilisation of resources.
  - To develop sense of sustainability and belongingness.

  Hypothesis: Initiatives like Bartan Bank can bring about reduction of waste and develop sense of sustainability and belongingness.

  Broad methodology:
- **General observation:** Large number of single use plates, bowls, glasses etc. are used during celebrations.
  Study the disposal methods. (Lanfills/ left along roadside or in open municipal bins) consider possible effects on the environment.
- Study the effects on stray animals. Through published data, news, observations around etc.
- **Solution:** Study the activity: Bartan Bank, how it works, what are the benefits, difficulties etc. To find out if there are any traditional practices of similar kind followed in our country.
- Volunteer for the Bartan bank and study the relevant data.
- To find out ways and means to reduce water consumption / recycle or reuse grey water produced during washing the plates etc borrowed from the Bartan Bank.

  Few more examples:
- Ecofriendly products like cleaners, manure, *durries*, *batuas* etc. of Ambabai Devasthan Trust, Goregaon, Mumbai; produced using offerings to the goddess like fresh flowers, *Chuneries, khan* (piece of coloured cotton cloth) etc.
- To study feasibility of Kangana method of fruit storage of Afghanistan in local conditions. Compare with local traditions, if any, benefits against modern cold storage etc. and create suitable version.

  These are a few examples. The candidate is free to select any topic that fits into the main theme suggested for the competition.

  Remedies suggested should be economically viable.

  Ref : www.google.com

Science Enrichment Programme (SEP)

Hello young aspirants, … Read on……

How would you like if you are allowed to do a lot of experiments on your own and learn concepts in science through those? How would you enjoy a picnic wherein you will understand morphology in plants or adaptations in plants etc. in nature's open classroom without chalk n board? Interesting, isn't it? Is all this really possible?

Yes it is possible with **GBSTA's Science Enrichment Programme (SEP).**

What is SEP? It is the joyful journey of GBSTA with motivated students like you since last ten years towards learning conceptual science through workshops, activities, field trips and discussions.

In this Three year integrated programme, students from different parts of Mumbai, Thane and even other parts of Maharashtra have been enjoying conceptual science. They start in 6th standard and are with us till 9th standard.

They make models, slides and do experiments etc. for better understanding of the topic. They are free to ask questions too!

Along with this, they appear for NSEJS i.e. 1st level of International Junior Science Olympiad. It gives us immense pleasure that till date 15 of our students were selected for level 2! **They were in top 1% at all India level!**

Want to know about our actvity ? Some details for you….

For whom : Standard 6th ignited minds who enjoy challenges !

Duration : Around 32 Sundays per academic year

Focus : Prepare for NSEJS.

Where :

At A.B.Goregaonkar School, Goregaon (W)	Balshikshan Mandir Mayur Colony, Kothrud, Pune
Time : 9 am to 1 pm	**Time : 11 am to 3 pm**

Batch strength : Maximum 25 / 30 students

Orientation programme for parents would be arranged by GBSTA in April 2026.

You may register your name with GBSTA through following email address: **mstasep@gmail.com**

Email should have following details

Name of child :..... School Name :.....

Mobile number for whats app communication :

Registered parents will get an invitation for orientation programme.

Looking forward to meet you,

Achutrao Mane	**Nilima Mulgund**	**Sandeep Shinde**
President	**Secretary**	**Treasurer**