Proposal Details

Project Title:	Harnessing Rain Water: Rain Water Harvesting (RWH): Study,
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Team Members	
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School/Organisation:	New Guwahati Adarsha High School
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Abstract: Our school New Guwahati Adarsha High School is in North East India. We have heavy rains starting from June till October during the monsoon months. This causes severe floods and water logging. Our school needs water to drink, clean our toilets, maintain our garden and for cooking the daily mid-day meals. Our water supply comes from the nearby railway colony.

When we see heavy rain during the monsoon months, we discuss in our class that a lot of water gets wasted. We have noticed that our school and nearby houses have sloping roofs. We have done some studies to understand

historical data of rainfall in our area. Through this project we want to come up with an idea on how to use the rain water to meet the needs of our school.

Rain water harvesting (RWH) is an important method of storing and using water. In this project we will: 1. Understand the rain pattern in our school through systematic measurements. 2. Identify the possible areas for harvesting rain water through drawings and surveys 3. Classify the surfaces of the school into categories of water absorption 4. Conduct a water audit of the school 5. Calculate the Rainwater Harvesting potential of the whole school 6. Do a prototype and test it 7. Publish the results

We are confident of good results. Through the project, we will discuss with our headmaster as well as with the neigbourhood to use our ideas and help in the conservation of water in our city.

Scientific writing involves language expert:

Yes

If Yes, Specify:

We discussed the proposal in Assamese language (the medium of instruction in our school) and we took the help of our school

mentor to get it translated to English. We did not understand the meaning of some words and terms. We took help of our teacher to explain the meanings in Assamese.

1. **Project Title**:

Harnessing Rain Water

Rain Water Harvesting (RWH): Study, Design and implementation of prototype in our School.

New Guwahati Adarsha High School
Railway Colony,
Guwahati 781 021
INDIA

2. Abstract: (250 words)

Our school New Guwahati Adarsha High School is in North East India. We have heavy rains starting from June till October during the monsoon months. This causes severe floods and water logging. Our school needs water to drink, clean our toilets, maintain our garden and for cooking the daily mid-day meals. Our water supply comes from the nearby railway colony.
When we see heavy rain during the monsoon months, we discuss in our class that a lot of water gets wasted. We have noticed that our school and nearby houses have sloping roofs. We have done some studies to understand historical data of rainfall in our area. Through this project we want to come up with an idea on how to use the rain water to meet the needs of our school.
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Our school when it rains.

3. Team Member details

SN	Name	Class	Age		Skills and Hobbies
1	Barasa Nath	8	14		Dancing, singing, craftwork from waste.
2	Asraful Uddin	8	13		Reading, Football, puzzles
3	Bhaswati Patgiri	8	12		Painting ,traveling
4	Bhumijyoti Nath	8	13		Science puzzles, Carrom

5	Nikita Das	8	13		Painting, drawing, cooking
6	Dibyajyoti Sarania	8	13		Craft making, making toy weapons from waste.
7	Rinki Kalita	8	13		Singing, paper craft
8	Gagan Rai	8	13		Music, play guitar.
9	Anushka Sharma	8	13		Solving puzzles and music
10	Amirul Islam	8	13		Making artwork, playing, reading science books

4. Research Strategy

a. Background

Our school is situated in Guwahati in the state of Assam. Assam is in the north east of India. During the months of monsoon, from June to September, rain clouds from the Bay of Bengal and the Indian Ocean travel northwards and get trapped in the foothills of Himalayas. So, it rains very heavily in our region. The river Brahmaputra which flows through our city causes massive floods in the region. In spite of so much of rain and water around us, we have water scarcity. This is because most of the rain

happens during a few months. And that water rushes away through the drains to the Brahmaputra river.

Our school has 480 students and 20 teachers. All of us need drinking water during the day. In our school, we have a mid-day meal scheme. We have our own kitchen which requires water for cleaning, cooking and washing. We have separate boys' and girls' toilets and water is needed for washing and flushing. We have made a garden in our school for flowers and small medicinal shrubs. All of them need regular water for maintenance.

Water is used for cooking Mid-day meals

Water is used for cleaning vegetables before cooking Mid-day meals

Water is collected from tap into buckets to be used in kitchen and for other purposes.

We, the students of Class 8, want to do a project where we can study how to use the rain falling in our school campus and not let it go wasted. The volume of rain is very high and it falls only during a few months. So we need to find an efficient way of utilizing that water.

Rainwater harvesting (RWH) is a method of collecting, storing, and using rainwater for many uses. As there are two types of RWH, roof top and surface, we have to study which type will give better benefit. We will also study the direct and indirect ways to use the water. Some of the water has to be used directly and some of it will have to be stored for usage later.

Once we complete the studies, we will do a design and proper implementation of a prototype system.
There are many advantages of RWH

a) It will help us to provide for clean water and reduce our dependency on external sources
b) It will help us during the peak months of heat and high humidity
c) It will help us to recharge the underground water table

With these advantages in mind, we want to proceed with project. The project will involve different activities.

1. Exploration of data from books and internet
2. Study of weather and rain pattern
3. Field measurements
4. Analysis and recording of Data
5. Mathematical calculations
6. Actual construction of prototype
7. Physical and chemical analysis
8. Report making
9. Reaching out to common people

b. Specific Aims

- To measure water requirement for the school
- To classify the water requirements of the school into categories (drinking, cleaning, cooking, gardening, etc.)
- To calculate the surface area for rainwater harvesting
- To calculate Rainwater Harvesting Potential of the school
- To study and try to find a relation between demand of water (hot months) and supply of rain water (rainy months). If there is a good match, our project will be more effective
- To design a prototype RWH and implement
- To test the function and utility
- To prepare a report on water utilization and how the meet can be addressed by rainwater
- To spread the idea and results in our community and neighbourhood.

c. Significance

Water is a scarce commodity in our city. With growing population and expansion of the city, water supply is not regular. And if we need clean and potable water, it is even more

difficult to get. But we live in an area that get very high rainfall. All the water comes down very fast and just goes off fast into the drains and the Brahmaputra river. Once we implement our project, we will showcase how we can utilize the rainwater for use. This will motivate all the schools to implement similar programs with their students. We will try to publish our results in local press and social media so that more and more people will become aware and implement such schemes

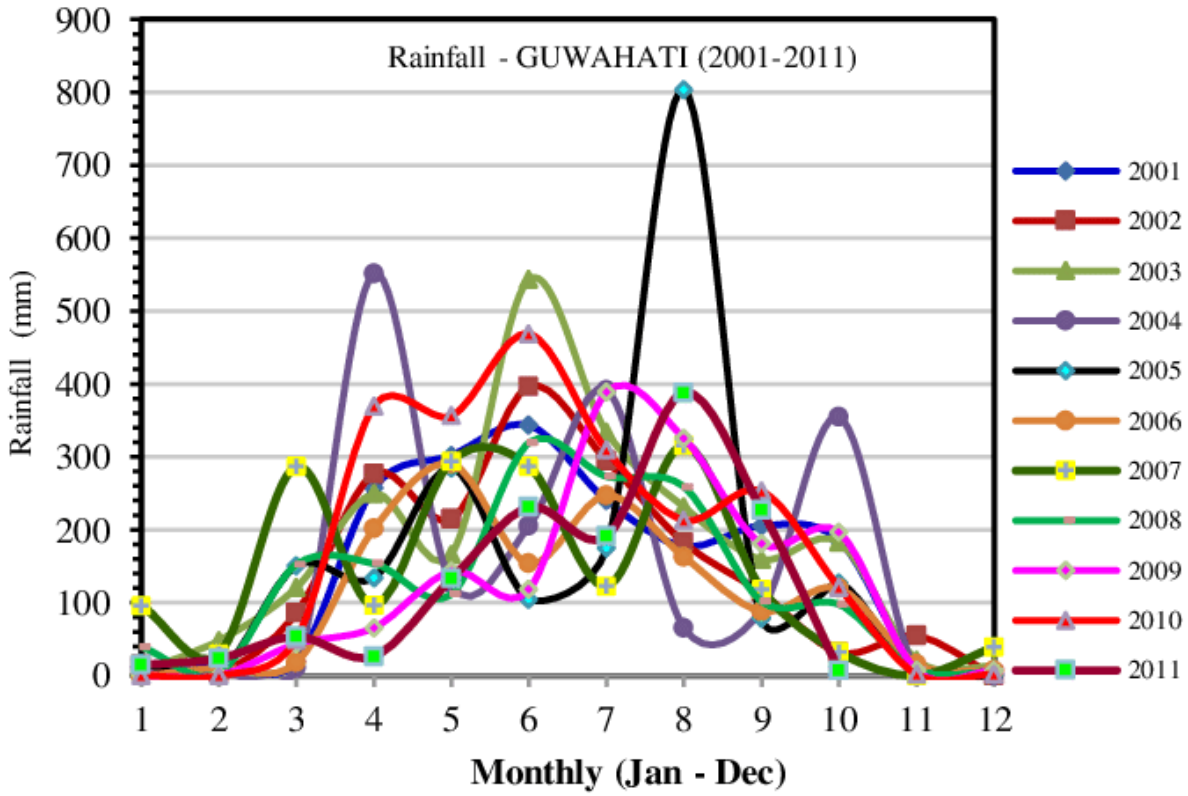
d. Innovation

The first rain carries down lot of mud and dry leaves from the roofs of our school. We will need an innovative method to clean the water before it is ready for use. We have done many discussions and have come up with one or two possible solutions. Depending on the budget available, we can implement
One more innovation that we are thinking is to find the match of requirement of water with the rainfall period. That way we can avoid storing water for a longer time. We plan to study the weather forecast and explore if we can use that information in making our system more efficient

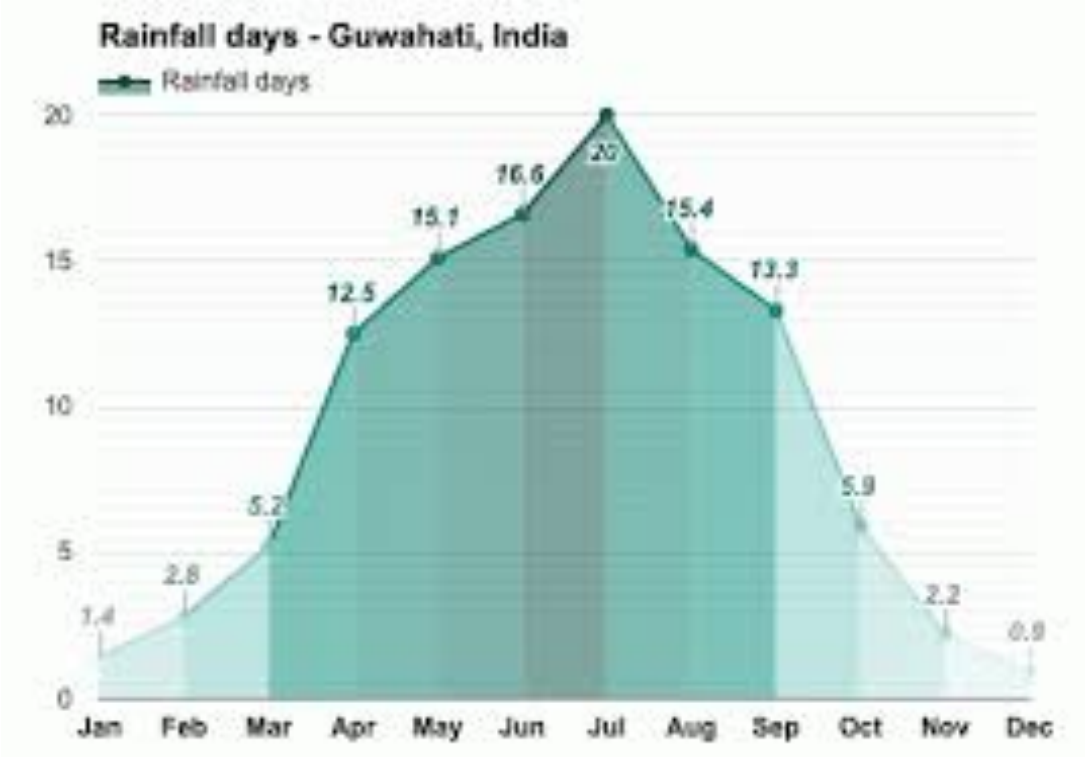
e. Preliminary Data

We have started gathering the rainfall details of the region. These will help us to plan our project correctly. The different kinds of data we have started to gather are:

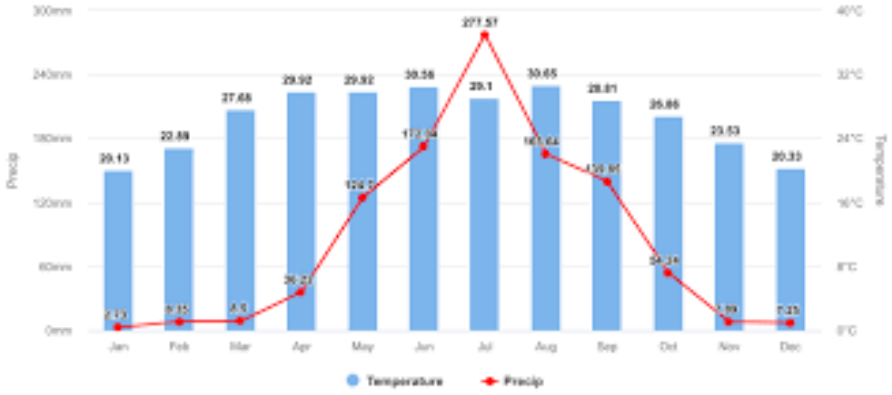
- Monthly variation of rainfall in Guwahati



- Number of days of rainfall:

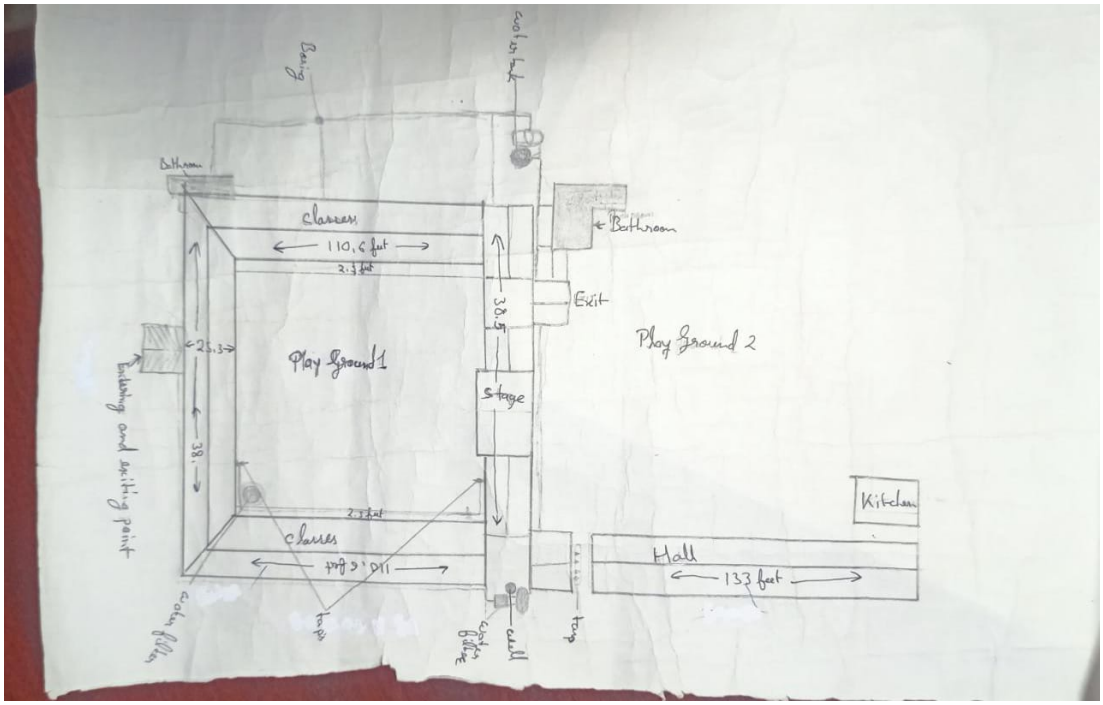


- Relation between temperature and rainfall in Guwahati



We have also started to collect data regarding water usage in our school. As there were exams in our school, regular classes are yet to start. Only then we will be able to get the complete data.

We have also done a rough sketch of our school from drawings. We will have to take actual measurements and verify. We will do that when we start having full classes.



f. Approach

These are the following steps planned for the project.

1. Water Audit
    a. Water input and sources
    b. Drinking water
    c. Water for washing and flushing
    d. Water for cooking
    e. Water for plants and garden
    f. Miscellaneous
2. Water quality measurement
3. Comparison of quality of rainwater and ground water
4. Study of Historical pattern of rainfall
    i. Study of Rainfall pattern in India and Assam
    ii. Study of local rainfall in Guwahati (the location of the school)
5. Study of Seasonal pattern of rainfall
6. Study of the school layout and construction
7. Measurement of roof surfaces
8. Measurement of retention and absorption surfaces
9. Calculation of Rainwater Harvesting Potential
10. Creation of Prototype
11. Water cleaner design
12. Water cleaner implementation and test
13. Creation of operation manual
14. Creation of report of Rain Water Harvesting
15. Reach out to community

g. Strength and Weakness

The strength of our proposal is that it addresses a very critical need of our people: clean water. Also we live in a place where there is more than adequate rain water. Our proposal tries to solve a critical problem with an important locally available resource: rain. Also the construction of our houses is such that we have sloped roofs and a long running verandah so that project has chance of success.
The weakness is that because of Climate Change, there is a shift in rainfall pattern. So the rain this year may get shifted by a few weeks. We need to be flexible in our project plan to ensure that we are able shift our tasks as per the schedule of the rain.

h. Alternative Strategy

There may not be a requirement for a completely new alternative strategy because of the shift in rain period. We will have to only change our project schedule. We are making an assumption that we will use the long building of the library for the prototype. But we need to study the construction and the roof in more detail. If we find that is not suitable, we will have to move to the smaller assembly hall.

i. Timeline

May, June, July (2023): Preparation and Study of the problems and possible solutions
July, August, Sept (2023): Survey, Measurements and Log-keeping (These are the months of intense rainfall)
Oct, Nov, Dec (2023): Prototype Implementation and Test (There are periods of intermediate rain which can be used for real-life testing)
Jan, Feb, Mar (2024): Report creation and community outreach

j. Bibliography

We went through many internet sites and read as a preparation for this project. Here is a list of internet sites we have found useful and relevant for our work.

- https://rainharvesting.co.uk/school-rainwater-harvesting/
- https://www.climatestotravel.com/climate/india/guwahati
- https://www.guwahati.climatemps.com/graph.php
- https://www.ultratechcement.com/hi/home-building-explained-single/steps-for-an-efficient-rainwater-harvesting-system?utm_source=Google_Search&utm_medium=CPC&utm_campaign=Chance_Na_Lo&utm_content=SEM&gclid=Cj0KCQjwxYOiBhC9ARIsANiEIfbzKq7OsGY0lMfwUylTyp8ibqTwkcsuAffqKXXQg4iu-YKugiJpv8UaAof1EALw_wcB
- https://www.facilitiesnet.com/green/article/How-Does-a-Water-Audit-Work--9363
- https://www.jpl.nasa.gov/edu/learn/project/make-a-water-filter/
- https://www.weather-atlas.com/en/india/guwahati-climate
- https://www.cart2india.com/ph-testing/16-in-1-drinking-water-test-kit-hard-water-quality-tester-for-aquarium-pool-spa-well-tap-water-high-sensitivity-test-strips-detect-ph-hardness-chlorine-lead-iron-copper-nitrate-nitrite/0000000004355060586?gclid=CjwKCAjwov6hBhBsEiwAvrvN6Pto5HtgCwVqluB-B5kc-yAnvAyqCUVS4XLLN0G5u2XbSMboqMk0mxoCnskQAvD_BwE

5. Budget

SN	Item	Why we need	Alternatives	Cost (RS)	US Dollars
1	Basic Weather Measurement kit	Rain gauge, Anemometer, Thermometer. These instruments are needed to calculate actual weather data in our school campus	We can take the report from the internet. But we will not have real school data	5000	
2	Cost of making a Water filter	We want to make a basic water filter to remove dry leaves and dirt from the first rain	We have to manually remove the dry leaves by a net. Removing mud will not be possible	2000	
3	Plumbing and digging Rainwater collector	This will be the prototype for out Rain Water Harvesting project and all measurement will be done here.	This is required as it the basic idea of the project	10,000	
4	Water Quality Tester	We want to test the quality of our water sources and classify them for use. Also during the implementation phase, we	We can use our science lab apparatus and ask our seniors to test for us. But they are saying that they cannot test all the values	5000	
5	Miscellaneous	We will need some budget for tools, scales, tapes and posters and placards	We can reuse or borrow a few of this items	2000	
			TOTAL	24,000	$292

6. Did scientific writing involve language experts? Yes

We discussed the proposal in Assamese language (the medium of instruction in our school) and we took the help of our school mentor to get it translated to English. We did not understand the meaning of some words and terms. We took help of our teacher to explain the meanings in Assamese.