Green Schools Network

Gobartimes

ACTIVITY SHEET

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Why talk about Irrigation?

With India's vast population of 1.22 billion and growing, have you stopped to think… how many mouths do we need to feed? This staggering question puts immense pressure on the agricultural sector to produce sufficient crops for us. But can we meet the burgeoning demand by relying on traditional agrarian practices? This is where experts turn to irrigation.

In fact, way back, in the early 1960s, India decided to take on the challenge of becoming self-sufficient in foodgrains. And introduced hybrid, high-yielding varieties (HYV) of wheat, and other seeds. Lo and behold, it was the onset of our Green Revolution. But can you guess the other ingredients of the revolutionary recipe? Fertilisers, yes. And…you guessed right, irrigation! But…where did the water come from? And how effective exactly was the 'revolution'? Did it actually harm our environment in some way? **Let's dig a little deeper!**

Name.....

School Name .....

Class..... **Date** .....

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So what exactly is irrigation? Simply put, it is the artificial process used by farmers for the application of water to soil. But more significantly, in a country where monsoons are known to play truant, it assists the growing of crops in dry areas and during periods of inadequate rainfall.

Every crop in a farm needs water and irrigation serves to provide this need. But the quantity of water required by each crop varies. For example, a paddy field would need a lot of water to grow, whereas crops such as cucumber usually need a very minimal amount of water for the same rate of growth. But the farmer growing both must ensure a uniformly high yield. So while he may rest easy for irrigating the cucumber, the paddy would require flood irrigation.

Can you identify Rajasthan on a states' map? The arid state has the least rainfall in all of India, ranging from as little as 0-61 mm. Yet it boasts a rich agricultural harvest of crops like barley, wheat, gram, pulses, oil seeds, bajra, pulses, jowar, maize and groundnuts. So where does the water to grow all these crops come from?

Actually, the answer is quiet simple. It is the Indira Gandhi Canal that irrigates Rajasthan. The water traverses seven districts: Bikaner, Barmer, Churu, Hanumangargh, Jaisalmer, Jodhpur and Sriganganagar, irrigating them through electric pumps.

The Indira Gandhi Canal meets the agrarian water needs of the state right from the barren deserts to lush fields that produce mustard, cotton and wheat. And it does even more. So now you are a little better acquainted with the power of irrigation. But here is when it truly swings into action. India's annual rainfall is a critical factor that determines our food supply for the rest of the year. And insufficient rain can lead to a deficit in food supply, the way it did in 2010, when onion prices soared by 33.5% from 2009. How can the markets be protected from the vagaries of climate? No prizes for guessing…irrigation!

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Comparative analysis and pressure on water sector- role of irrigation.

Visit 2-3 farms and fill in the table by asking the farmers these questions. Remember to observe the farms carefully and add any observations you may have found interesting.

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S. No	Area where farm is located	Crops grown best	Type of irrigation	Where does the water for irrigation come from
1				
2				
3				
4				

Was there anything common that you noticed between the farms that you visited? If yes share your observations.

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_____

Was there any correlation between the crop that was grown and the irrigation method that was used?

_____

_____

Did you notice that farms that produce certain crops use the same kind of irrigation methods, for instance, cash crops or fruits such as grapes or oranges? Wheareas crops like wheat and barley are grown easily and they do not require need-specific irrigation methods.

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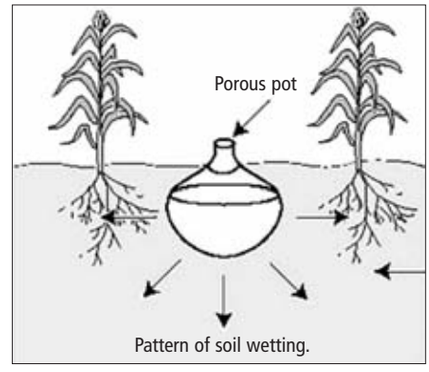

Pattern of soil wetting.

Irrigation is not a new process. Even though it was re-introduced during the Green Revolution, farmers have commonly used it since the 1800s! In fact, archaeologists have found irrigation canals that date back to the 2600 BC – built by stalwarts of the Indus Valley civilization – and even before that, storage systems and reservoirs built in 3000 BC at Girnar.

Astonishingly, some of those ancient methods of irrigation still continue to be in use in parts of rural India, particularly where there is a dearth of finance to buy fancy equipment. These include the use of the 'picottah', the 'raha' and clay pot irrigation. The picottah method allows you to raise water from deeps wells or low-lying streams and ditches. In this method a leathern bucket is suspended at the end of a long rope or thin pole, which is attached to a wooden counter, or weighted beam on a pivot. To get water you need to apply pressure on one side of the rope. On the other hand, the raha – also known as the Persian wheel – is used to lift water from a depth of up to 20 m. The device consists of an endless chain of buckets with a capacity of 8-15 litres. The chain of buckets is mounted on a drum and then submerged in the water. The drum is connected to a toothed wheel held in place by a vertical plane, which is usually kept below ground level. Another horizontal plane is attached to a pair of load-bearing animals. The animals move in rotation, thus rotating the buckets carrying water, through a gear system. Water is released once the buckets reach the top. And finally, clay pot irrigation is a method, seen in extreme rural areas even today, using porous clay pots. Basically they have small holes in them, which allow water to seep through slowly. A crop is planted next to a buried clay pot that is filled with water. Water in the pot seeps out when required. In this way, the pot feeds exactly the right amount of water to the plant when it is needed. The farmer checks the pot regularly and tops them up as required.

These methods are affordable, sufficient and of course, time-tested! For farmers in western Uttar Pradesh and Haryana, 'picottah', 'raha' and clay pot irrigation are also more viable as they are less expensive than water pumps and a lot of other modern agricultural equipment.

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List the different types of irrigation and describe them – you can take help from your school gardener. One type is noted for you, in the table below. You may also find the following books helpful for reference:

Irrigation by A.M. Michael

Irrigation and Water Power Engineering by BC Punmia, PandeBrijBasiLal, Arun Kumar Jain and Ashok Kumar Jain.

Type of Irrigation	Descriptions	Crops (the system is used for)
Trickle drip	**Water falls drop by drop just at the position of roots. Water is delivered at or near the root of the plant, drop by drop**	**Grapes, apples, sugar canes, tea coffee and mango.**
Sprinkler Irrigation		**Wheat, grams, pulses and cotton.**
Central Pivot Irrigation		**Soybeans, beets, beans and sunflower**
Surface Irrigation		**All kinds of crops**
Flood Irrigation		**Rice**

Through this activity you have now understood how the water requirement for each crop differs and how different types of irrigation are suited for different types of crops. Note that if you were to grow a crop that has a low water requirement such as grapes, flood irrigation would lead to insufficient yield.

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Irrigation by now seems like one of the most helpful techniques used by farmers now does it not? But hold on to that hosepipe! Why? Because there are also many ways in which it actually harms farmlands.

In some areas of high evaporation, salts in the soil are drawn up to the surface as irrigation water sits in channels. This eventually makes the soil too salty to grow plants. Additionally as the irrigation in the water sits in the irrigation channel it may give birth to water borne diseases such as malaria and dengue.

In 2000, irrigation programs were streamlined in Ethiopia to restore the fertility of the drought stricken country. But the stagnant water from irrigation caused a seven fold increase in the rate of malaria.

At times, undammed rivers flood and deposit silt along the riverbank, which provides fertile topsoil to the land. If the silt is not deposited at the riverbanks farmers may need to use artificial fertilisers. This may get into the rivers and cause eutrophication – excess nutrients in the water stimulating excessive plant growth. Then there is the problem of evaporation of the water meant for irrigation. A lot of water stored in reservoirs and water channels is lost through this phenomenon. Indeed, 30 to 50 per cent of the water that is used on an average by a farm, for irrigation, tends to evaporate.

Last but not the least are the huge ecological issues surrounding dam-building itself. The Sardar Sarovar Project is supposed to irrigate 1.8 million hectares of land in Gujarat and Rajasthan that are especially water deprived. But this will not happen, warn ecologists, without immense effect on ecosystems. The project, they estimate, would displace more than 320,000 people and destroy the habitat of the local flora-fauna, submerging 91348 hectares of land.

Are the economic advantages of such development good enough reason to displace so many people of their homes and drastically change natural systems? What do you think?

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Modern techniques of irrigation require a lot of raw material. Irrigation may be good for enhancing crop yields but once the irrigation systems stop working what is done with all the equipment. Your job is to find out…

Make a list of irrigation equipment that may be generated as waste on a farm.

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-

How are pipes that bring water to farms reused?

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How often are they changed and why?

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How do farmers reuse them and how many additional resources do they use to make a new product with the old equipment?

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Now that you have learnt that there are so many aspects to irrigation, would you like to share your thoughts/ideas? Do you believe it goes more harm than good? Feel free to tell us, we will not get 'bored'.

_____

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