



Curriculum Review- WASH in Municipal Schools of Ahmedabad

Ahmedabad Sanitation Action lab

Under the
Urban Water and Sanitation for Health (Urban WASH Alliance)

Prepared by
Urban Management Centre

Ahmedabad Sanitation Action Lab (ASAL)

The Ahmedabad Sanitation Action Lab (ASAL) is a three year action research (2014-2017) for implementing innovative solutions to school sanitation and sanitation problems in slums and slum-like settlements of Ahmedabad, in coordination with the government, NGOs and corporate partners. ASAL is led by the Urban Management Centre (UMC) in partnership with Government of Gujarat (GoG) and the Ahmedabad Municipal Corporation (AMC). The program is supported by the United States Agency for International Development (USAID). ASAL's resource partners include Sintex Industries Ltd. (Sintex) and its associate partners include Mahila Housing Trust (MHT), MICA and Theatre Media Centre (TMC).

The program will provide technical assistance to the AMC for strengthening community engagement, improving operational and management processes for provision of water-sanitation services, and designing a targeted behavior change communication campaign.

Urban Management Centre

The Urban Management Centre (UMC) is a women promoted not-for-profit organization, that works towards professionalizing urban management in India and worldwide. UMC provides technical assistance and support to city governments and facilitates change through peer-to-peer learning processes. It enhances the capacity of city governments by providing expertise and ready access to innovations on good governance implemented in India and abroad. It facilitates city governments to design, implement and evaluate municipal development and management projects. UMC extensively works in the areas of urban water and sanitation, heritage management, urban planning, urban health, municipal finance, urban management, urban transportation and institutional restructuring.

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1. Introduction

Introducing WASH (water, sanitation and hygiene) in schools” aims to improve the health and learning performance of school children– and therefore extending the safe WASH practices to their families as well. “WASH in schools” also strives for reducing the incidence of water and sanitation-related diseases. Introducing WASH in schools has been recognized to have significantly contributed to achieving the MDGs of primary education, reducing child mortality, improving water and sanitation, and promoting gender equality.

The extent of cleanliness of the school campus and the environments where children spend a long time during the day can significantly affect the health and well-being of students (UNICEF, 2012).

Introducing WASH in schools not only ensures the health of students directly impacted, but children carry back the messages learnt at school to their homes and neighborhoods. Children thus become message multipliers and extend their learning to their families and neighborhoods.

The Government of India and state governments have realized the importance of WASH and therefore, WASH has been made an integral part of the course curriculum for primary and upper primary classes. Every state has incorporated WASH in their school curriculum and has customizing the content as per the state requirement.

Making WASH improvements in municipal schools is at the core of the Ahmedabad Sanitation Action Lab (ASAL)¹. One of the determinants identified by ASAL is to improve the course curriculum pertaining to WASH. This report reviews the WASH curriculum as incorporated by GCERT for primary and upper classes. The report also presents a comparison of WASH inclusion under NCERT and other states such as Tamil Nadu’s TCERT. The aim of this report is to identify areas for improvements in the existing WASH curriculum for GCERT.

¹ ASAL is a 3 year action research (2014-2017) for implementing innovative solutions to school sanitation and sanitation problems in slums and slum-like settlements of Ahmedabad, in coordination with the government, NGOs and corporate partners. The program provides technical assistance to AMC for strengthening community engagement, improving operational and management processes for provision of water-sanitation services, and designing a targeted behavior change communication campaign. ASAL will align its activities with the recently announced Swachh Bharat Mission by the Government of India and the Mahatma Gandhi Swachhta Mission of the Government of Gujarat. Municipal schools will be at the core of the intervention by introducing students to concepts of water-sanitation and hygiene (WASH). Students will become the ambassadors of change and will bring WASH learning to their homes and neighborhoods. Lessons from the program will be disseminated to other cities across India.

2. WASH in School Curriculum

There are several means to influence the hygiene behavior of a school going child - through school water, sanitation and health education, peer learning etc.; and families and the local community can also influence the hygiene behavior of a child. It is always possible to achieve the desired change in children's behavior through school sanitation and hygiene education.

The integration of WASH education in school curriculum facilitates speedy learning and improvement in safe hygiene behavior and practices in children. It not only changes their current hygiene behavior, but ensures that they continue better hygiene practices in the future as well.

The recent baseline study of WASH facilities and services in municipal schools of Ahmedabad city conducted by ASAL depicts that in majority of school children are deprived of basic WASH facilities and services and the children are not practicing safe hygiene behavior. The water and sanitation facilities in these municipal schools are inadequate, inappropriate and poorly managed.

Along with improvements to WASH infrastructure, this report highlights the positive aspects the in WASH curriculum and the areas that need improvements.

The school WASH curriculum of Gujarat board has been reviewed and compared with the content and quality of central and other state boards for instance NCERT (National Council of Educational Research and Training) and TCERT (Tamil Nadu Council of Educational Research and Training). The review parameters include:

Content

- WASH Topics covered
- Activities and Type of Activities

Quality of the content

- Concept of WASH
- Clarity
- Accuracy
- Presentation
- Relevance
- Language

2.1 Gujarat Council of Educational Research and Training (GCERT)

The GCERT has developed the curriculum following the principals of the National Curriculum Framework (NCF) 2005 and the Right to Education Act (RTE) 2009 which recommends connecting knowledge that is provided in school to the life outside the school. The GCERT has brought a considerable change in the textbooks, teaching - learning methods, approaches, etc.

The GCERT has attempted to provide a scope where in the students to learn individually, in pair, in group and as a whole class and provide self- learning, improve the application and consolidation abilities. As per new curriculum the teacher is just an initiator, facilitator and guide who creates learner dominant classes. The highlights of GCERT curriculum are:

- Construction of Curriculum in accordance with National Curriculum Framework.
- Concept of ‘Learning without Burden’
- Learner – centered curriculum at the focus
- Competency based curriculum
- Activity centered and joyful approach
- Ample opportunities for self-experience
- Learning opportunity through action
- Flexibility in relation to local needs
- Scope for local dialect
- Project based Learning
- Responsiveness to change
- Inclusion of Front-line Curriculum
- Responding to social and cultural scenario
- Fulfilling learners’ social, cultural, emotional and economic needs.
- Based on relevance, equity and excellence
- Comprehensive and integrated approach
- Value-oriented approach
- Based on development of life skills
- In conformity with geographical environment
- Fulfilling the needs of disadvantaged learners
- Free from discriminations like rural – urban, rich – poor, caste – color... gender and ideologies
- Spirit of universal brother-hood (*Vasudhaiv – Kutumbakam*)

The GCERT has also developed a separate version of textbook for teachers & guardian to facilitate them to teach children at school and home.

2.1.1 WASH Curriculum in GCERT

WASH is considered to be one of the most important learning components of the GCERT curriculum and has attempted to incorporate WASH education in all primary and upper-primary classes. The WASH related topics are covered under environmental science in primary classes while in upper primary it is covered under Science.

Table 1: Subjects that cover WASH

Class	Subject	Semester
Std-1	None	
Std-2	Kalol	1
Std-3	Mari Aaspass	1
Std-4	Amari Aaspass	1 and 2
Std-5	Sauni Aaspass	1 and 2
Std-6	Science & Technology	1 and 2
Std-7	Science & Technology	1 and 2
Std-8	Science & Technology	1 and 2

1.1.1 Teaching methodology of GCERT

The GCERT has ensured that the text books are child friendly and “learner-centered” so that children have ample learning opportunity through activities.

1. For primary classes the attempt has been to make children learn through fourteen (14) various types of fun activities that include indoor as well as outdoor games, storytelling, discussions, and puzzle solving.
2. In upper- primary classes, children learn through seven types of fun activities including activities, group discussions, project work and exercises.
3. The GCERT has designed and developed separate textbooks for teachers / parents for each subject. The textbook teacher edition facilitates teachers to learn “how to teach children”. The teacher edition provides following details for each chapter
 - Objective of the chapter
 - Past learning of students
 - Prepare the required materials for learning activities
 - Details of all the activities which teachers have to follow
4. The curriculum has been spread in two semesters (1st and 2nd) and therefore the textbooks have been designed likewise.
5. There is a “Revision chapter” after every 3-4 chapters to ensure quality learning by students.

2.1.2 WASH content in GCERT Curriculum

The GCERT curriculum has covered several topics on water, sanitation and hygiene in primary as well as upper primary classes. The details are as under;

Primary classes (Std-1 to Std-5)

1. The WASH related topics have been covered under “**Environmental Science**” in primary classes.
2. The names of the GCERT textbooks for primary classes is ***Mari Aaspaas (my surroundings)***, ***Amari Aaspaas (our surroundings)*** and ***Sauni Aaspass (everyone’s surroundings)*** depict that similar topics of WASH have been covered in primary classes however, it has been scaled up from **personal to household and to the community level**.
3. Textbooks for primary classes cover topics on personal hygiene, safe drinking water, use and conservation of water, disposal of solid waste disposal of liquid waste.
4. Learning on hand washing practices is covered in all the primary classes.

INDEX		
No.	Chapter Name	Page no.
1.	Animal World	1
2.	Night Sky	12
3.	States of Matter	19
4.	Heat	26
Revision-1		42
5.	Changes Around us	46
6.	Air	54
7.	Energy	63
8.	Conservation of Environment	69
Revision-2		82

Identification of signs used in this textbook.



Figure 1: Typical contents of a GCERT textbook

Upper- primary classes (Std-6 to Std-8)

1. The GCERT has ensured that the text book is child friendly and learner centered so that children have ample learning opportunity through activities. An attempt has been to make children learn through seven types of fun methods such as activities, group discussions, project works, and exercises.
2. The WASH related topics have been covered under “Science & Technology” in upper- primary classes.
3. Textbook for upper-primary classes covers topics on sources and importance of safe drinking water, use and conservation of water, treatment of drinking water, solid waste and safe disposal of solid waste etc.

2.2 National Council of Educational Research and Training (NCERT)**2.2.1 Curriculum Highlights**

- The child looks at the environment around him in a holistic manner and does not compartmentalize any topic into 'science' and 'social science'; the same integration has been aimed within the book.
- Instead of proceeding with list of 'topics', the syllabus itself has proposed themes that allowed a connected and inter-related understanding to develop.
- An attempt has been made in the book to locate every theme in physical, social and cultural contexts critically so that the child can make informed choices.
- The challenge, when writing at a national level, is to reflect the multicultural dimensions of diverse classrooms. It is necessary that all children feel important: everyone's community, culture and way of life should be given equal importance. One also needs to tackle the differences of gender, class, culture, religion, language, geographical location, etc. These are some of the issues addressed in the book, which the teachers will also have to handle sensitively in their own way.
- The syllabus is broadly divided into six themes - family and friends, food, water, shelter, travel and things we make and do.
- There is a conscious effort to discourage rote learning and hence descriptions and definitions have been totally avoided.
- The language used in the book is not 'formal' but colloquial English.

2.2.2 Teaching Methodology

- In order that the child is happy to engage with the book, a variety of formats have been used – narratives, poems, stories, puzzles, jigsaw, comic strips, etc. Stories and narratives have been used as a tool for sensitizing the child since a child can probably more easily empathize with characters in a story/narrative.
- Active participation of children is very important in constructing knowledge. Activities in the book that demand that children be taken for observations to the parks, fields, water bodies, into the community, etc., reiterate that EVS learning primarily occurs outside the walls of the classrooms.
- An effort has been made to relate the child's local knowledge to the school knowledge. Both the activities and the materials are generally modified by the teacher according to the local contexts.

- Activities and Exercises have been inbuilt into the chapters instead of being pushed to the end. These activities are of various kinds so that the children get opportunities to explore, observe, draw, categorize, speak, question, write, list, etc. Several activities allow them to manipulate things with their hands so that their psychomotor skills are developed. Some of them explore their creativity and design skills as well as hone their aesthetic sense.
- Children are encouraged to tap sources other than the textbook and teachers, such as family members, members of the community, newspapers, books, etc. This stresses the fact that textbooks are not the only sources of information.
- To develop a sense of history the children are encouraged to question the elderly about the past. These activities also promote the parents' and community's involvement in the school and the teacher gets an opportunity to know a child's background.
- Illustrations form an important component of children's books and they reflect the ethos of the written material. The illustrations that have been used complement the writing style fully and they provide joy and also a challenge to the child. Icons have been used to differentiate activities. A list of these has been included in the book.
- The book provides varied kind of opportunities for the child to work – individually, in small groups or even in larger groups. Group learning promotes peer learning and improves social interactions. Children particularly enjoy learning crafts and arts while working in groups.
- The objective of the activities and questions in the book is not only to evaluate the child's knowledge but also to provide an opportunity to the children to express themselves.
- For better understanding on assessment practices and evaluation procedures in EVS, NCERT has developed a source book (for teachers) in this area for the primary stage.
- The child is evaluated primarily on the competencies/skills she/he has acquired while working in class or outside.
- In order to follow continuous and comprehensive evaluation in the classroom, teaching-learning activities and questions have been inbuilt into the text.

2.2.3 WASH Curriculum in NCERT

WASH comprises a decent component of the NCERT curriculum. It is covered in bits and pieces (with direct and indirect reference on a larger canvas) at Standard III and V; and in slightly more detail at Standard VI, VII and VIII.

2.3 Tamil Nadu Council of Educational Research and Training (TCERT)

The Tamil Nadu Council of Educational Research and Training acts as a state level apex organization for designing and executing training programs, revising curriculum and syllabus. This State level institute is the academic authority for the implementation of RTE act within the state. It promotes co-ordination and linkages amongst various institutes involved in Teacher Education and Training. It facilitates and promotes the development of professional skills of various stakeholders of education. It offers academic support to other agencies in organizing training programs for teachers and trainers. It also organizes evaluation programs and undertakes research activities in the field of teacher training and quality elementary education.

2.3.1 Curriculum Highlights

- Children enjoy nature around them- the trees, the plants, the animals, the birds and the rain. The textbooks start with their life experiences i.e. what they have seen and enjoyed. The activities are based on their own experiences, about the people and the world around.
- Children may know a few songs and stories when they come to school. Quite naturally they enjoy listening to stories, singing songs and playing games. So the books include pleasant songs, enjoyable stories, thought provoking activities and games.
- Several opportunities have been provided to kindle the imagination of the children. They can make up stories, act them out, sing and dance joyfully. Children love to draw. This natural ability to draw and be creative has scope in simple line drawing, imaginative drawing and coloring activities.
- Every chapter has "I can" activities that provide a scope for self-evaluation.
- Every child has different life experiences so time needs to be provided for discussions so that children share their thoughts, ideas and observations. An atmosphere conducive to raise questions needs to be provided in the classroom.
- Learning does not only take place in the classroom. Learning should be extended to the outdoors where children will learn happily.
- Many people help us in our daily life. If children can interact with them, it will widen their understanding and build respect for their work.
- Science is part of everyday life and can be understood by observation. A love and caring for nature can be inculcated in children through these activities

2.3.2 Teaching Methodology

To maximize retention and to ensure that the child is happy to engage with the book, a variety of formats have been used – narratives, poems, stories, puzzles, jigsaw, comic strips, etc. Stories and narratives have been used as a tool for sensitizing the child since a child can probably more easily empathize with characters in a story/narrative.

Sections like –observe and speak, let us discuss, let us know, let us play, let us do, let us print, do you know, projects etc. make the books more attractive and engaging. And the engagement continues as most of the chapters have sections like – More to Know; Fact File; and Further Referencing (Books/Websites/Places to Visit)

2.3.3 WASH Curriculum in TCERT

WASH comprises a major component of the TCERT curriculum. It starts right from Standard I and continues till Standard VIII - although the way in which it is dealt with varies at each grade

3. Review of the GCERT curriculum

The GCERT school curriculum has been reviewed from the WASH perspective and simultaneously a comparative study has been done amongst GCERT, National Council of Educational and Research Training (NCERT) and Tamil Nadu Council of Educational and Research Training (TCERT) curriculum. The review of curriculum and the inter-state board curriculum comparative study will facilitate the requirement of improvement in GCERT curriculum.

At the first instance the content in the curriculum has been reviewed with respect to several aspects of WASH for schools. The relevant subject dealing with WASH has been reviewed for the content which are mentioned below.

Subsequently a comparative table has been derived covering all the aspects of WASH in respective curriculum. The attempt has been made to highlight the WASH content and the extent of its coverage in the curriculum. An analysis has been made on the detailed topics and coverage in the subsequent tables. Annex 1 shows some of the gaps in the GCERT curriculum while Annex 2 and 3 depict some of the positive aspects of NCERT and TCERT respectively.

 <p>(personal Hygiene)</p>	 <p>सुरक्षित पानी (Safe Water)</p>	 <p>उत्तम शौचालय (Better Sanitation)</p>	 <p>घोबरमैला व्यवस्थापन (Solid Waste Management)</p>	
<p>Hygiene</p> <ul style="list-style-type: none"> • Personal hygiene (Daily hygiene) • Hand washing practices (especially before eating and after visiting toilet) • Hygiene maintenance with others • Menstrual Hygiene (Women and girls have sanitary materials for 	<p>Drinking water</p> <ul style="list-style-type: none"> • Source of drinking water • Importance of safe drinking water • Treatment and safe storage of drinking water • Usage and conservation of water • Importance of keeping sources of drinking water clean (pollution free) • Water borne 	<p>Toilet</p> <ul style="list-style-type: none"> • What is toilet and urinal • How to use and maintain toilet and urinal • Problems due to open defecation 	<p>Solid waste management</p> <ul style="list-style-type: none"> • What is solid waste and Its sources • Collection of waste • Disposal of solid waste • Waste management at household and community level • Impact of solid waste on health • E- waste, bio-medical waste 	<p>Liquid waste management</p> <ul style="list-style-type: none"> • Type of liquid waste • Treatment and safe disposal of waste water

3.1 WASH components covered in National, Gujarat and Tamil Nadu state curriculum

WASH Component	Sub components	GCERT								NCERT								TCERT								
		Std-1	Std-2	Std-3	Std-4	Std-5	Std-6	Std-7	Std-8	Std-1	Std-2	Std-3	Std-4	Std-5	Std-6	Std-7	Std-8	Std-1	Std-2	Std-3	Std-4	Std-5	Std-6	Std-7	Std-8	
Hygiene	Personal hygiene (Daily hygiene)		✓	✓		✓												✓	✓	✓						
	Hand washing practices (especially before eating and after visiting toilet)		✓	✓		✓			✓										✓							
	Menstrual Hygiene (Women and girls have sanitary materials for menstruation)																								✓	
	Risk Practices (Wash Hand, cover food and drinking water, sharing soaps, towel, handkerchief, glass, food)									✓		✓							✓		✓					
	Household Hygiene					✓																				
	Community Hygiene			✓	✓	✓																				
Food Hygiene	Food Hygiene														✓			✓		✓	✓	✓	✓	✓	✓	
Diseases	Diseases in general											✓		✓				✓	✓		✓	✓				
Drinking water	Source of drinking water	✓					✓							✓	✓	✓									✓	
	Importance of safe drinking water		✓				✓													✓						
	Treatment of drinking water							✓											✓			✓				
	Safe Storage of drinking water																									
	Usage and conservation of water	✓				✓	✓								✓	✓									✓	
	Importance of keeping sources of drinking water clean (pollution free)						✓												✓	✓					✓	
	Water borne disease Inequalities in access of Drinking water																									
Sanitation	What is toilet																									
	How to use toilet																		✓							
	Keeping a toilet clean													✓						✓		✓				

WASH Component	Sub components	GCERT								NCERT								TCERT								
		Std-1	Std-2	Std-3	Std-4	Std-5	Std-6	Std-7	Std-8	Std-1	Std-2	Std-3	Std-4	Std-5	Std-6	Std-7	Std-8	Std-1	Std-2	Std-3	Std-4	Std-5	Std-6	Std-7	Std-8	
	Problems due to Open Defecation									✓							✓								✓	
	Use of urinal																									✓
	Inequalities in access of sanitation facilities																									
Solid waste management	What is solid waste and Its sources									✓					✓		✓		✓		✓			✓	✓	
	Collection of waste									✓					✓		✓		✓		✓			✓	✓	
	Disposal of solid waste		✓	✓	✓										✓		✓		✓		✓			✓	✓	
	Waste management at Household and community level									✓					✓				✓		✓			✓	✓	
	Impact of solid waste on health									✓					✓				✓		✓			✓	✓	
	E- waste, Bio-Medical Waste									✓					✓				✓		✓			✓	✓	
Liquid waste management	Importance of Safe disposal of waste water and technics					✓											✓	✓						✓	✓	

3.2 WASH components covered in National, Gujarat and Tamil Nadu state curriculum

WASH	Topic	Std-1			Std-2			Std-3			Std-4			Std-5			Std-6			Std-7			Std-8				
		G	N	T	G	N	T	G	N	T	G	N	T	G	N	T	G	N	T	G	N	T	G	N	T		
Hygiene	Personal hygiene (Daily hygiene)																										
	Hand washing practices (especially before eating and after visiting toilet)																										
	Menstrual Hygiene																										
	Risk Practices (Wash Hand, cover food and drinking water, sharing soaps, towel, handkerchief, glass, food)																										
	Household Hygiene																										
	Community Hygiene																										
	Food Hygiene																										
Diseases	Diseases in general																										
Drinking water	Source of drinking water																										
	Importance of safe drinking water																										
	Treatment of drinking water																										
	Safe Storage of drinking water																										
	Usage and conservation of water																										
	Importance of keeping sources of drinking water clean (pollution free)																										
	Water borne disease																										
	Inequalities in access of Drinking water																										
Sanitation	What is toilet																										
	How to use toilet																										
	Keeping a toilet clean																										
	Problems due to Open Defecation																										
	Use of urinal																										
	Inequalities in access of sanitation facilities																										
SWM	What is solid waste and Its sources																										
	Collection of waste																										
	Disposal of solid waste																										
	Waste management at Household and community level																										
	Impact of solid waste on health																										
	E- waste, Bio-Medical Waste																										
LWM	Importance of Safe disposal of waste water and technics																										

G= GCERT, N= NCERT, T= TCERT

3.3 WASH content in GCERT curriculum

Sr. No	Content	Description	Curriculum content
1	Personal Hygiene	Teaching kids to keep their body clean is an important part of building their self-esteem - if they care about the way they present themselves and feel good about their body then they'll feel pretty good about themselves. It is important to instill good hygiene practices early to prevent infections and other health problems. Topics which may be covered under personal hygiene are: Daily bathing, dental care, weekly nail cutting, oiling of hair, wearing neat and clean clothes etc.	The Class III textbook (<i>Book-Maari Aas pass,chapter1 Aatlu Kariye J, page no-1-6</i>) starts with a daily schedule for a student where it details all personal hygiene related activities like – waking up early, taking a bath, washing your hands before eating, keeping the water vessel clean, chewing food properly etc.
2	Hand washing practice	Over 1.5 million children under five die each year as a result of diarrhea. It is the second most common cause of child deaths worldwide. Hand-washing with soap at critical times - including before eating and after using the toilet - can reduce diarrhea rates by more than 40 per cent. Hand washing promotion in schools can play a role in reducing absenteeism among primary school children. The curriculum should impart following to improve the hand washing practice amongst children. <ul style="list-style-type: none"> • Importance of hand washing with soap. • Diseases cause and impact on kids' health due to non-practice of proper hand washing. • Illustration of hand washing through live pictures. • Games and demonstration on hand washing 	Hand washing practice is one of the vital components of WASH and is required to be explained to the kids in the primary classes 1-5. The hand washing practices have been explained in the curriculum in the primary section. In std-5 th it has been explained through live pictures. <i>(Book-Sauni Aas Pas, Chapter1-Aa Kaun Karshe?, page no-5)</i>
3	Food Hygiene	Most of the diseases occur/ transmitted in children through intake of stale and unhygienic food and unsafe drinking water, which adversely affect their physical and mental health. The curriculum should have syllabus on food hygiene covering the hygiene practices before intake of food, methods of maintaining cleanliness while cooking and after; household vectors causing ill health, nutritional value of food, food conservation, food poisoning, etc	The Standard IV Textbook (<i>Book-Amari Aas Pas, Chapter-2 Khada bina na chale, page no- 7-13</i>) has a section on food wherein proper washing vegetables and cleaning grains prior to consumption is advised. Cooking food properly is also mentioned as being mandatory
4	General Diseases	Children should be aware of common diseases, cause of diseases, preventive measures etc.	No specific mention
5	Water	There is a famous saying -“ <i>water is life</i> ”. Water is very precious now a days and so judicious use of water is always advisable.	An entire chapter on water Standard VI Textbook, (<i>Book-Vigyan Ane Technology, Chapter-8 Maintenance of environment, page no 69-81</i>), mentions– sources, uses, water cycle, water harvesting, water pollution etc. There is a picture of a river highlighting various activities like – people bathing, animals being cleaned, clothes being washed and drinking water being filled in earthen pots. Students are asked to point out which of these activities pollute the water.
6	Sanitation	Sanitation is the most important component of WASH and children must be acquainted with the fundamentals of sanitation. For instance, <ul style="list-style-type: none"> • Importance of toilet in our day to day life. • Compulsory use and how to use of toilet. • Basic structure of toilet and types of toilets. • Cleanliness of toilet at school household level. 	The curriculum does not incorporate any specific topic pertaining to sanitation in any primary class.
7	Solid waste management	Waste is a common phenomenon and generation of waste cannot be stopped but it can be reduced by reuse and recycle of waste. Topics under the solid waste management are: <ul style="list-style-type: none"> • Type of solid waste • 3 “Rs” of waste management (Reduce, Reuse and Recycle) • Collection of waste and segregation for safe disposal • Technical options of solid waste disposals • Importance of solid waste management in day to day life 	The curriculum elaborates the different aspects of solid waste management in the upper primary classes especially in standard VIII, (<i>Book-Vigyan Ane Technology, Chapter-9 Maintenance of Environment, page no 80-88</i>). It focuses on all aspects of solid waste management. <ul style="list-style-type: none"> • Type of waste- Plastic, E- waste, Bio- Medical Waste, segregation and disposal of Bio- medical waste. • Reuse of waste is also explained thoroughly with examples e.g. plastic e.g. paper waste • Live photographs have been used for the demonstrations which make it easy for students to learn. • The subject has also been dealt in the primary

8	Liquid waste management	<p>Topics under solid waste management are:</p> <ul style="list-style-type: none"> Types of liquid waste- Grey and Black Importance of liquid waste management Different Technical options for liquid waste management 	<p>classes as well which is very indicative and as a part of teaching good practice.</p> <p>The subject remained untouched in both primary and upper primary curriculum. Except for one illustration in Std. V, (<i>Book-Sauni Aas Pass, Chapter-1 Aa Kaun Karshe?, page no 2-3</i>), the subject has not been discussed anywhere in the whole curriculum.</p>
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3.4 WASH content in NCERT curriculum

Sr. No	Content	Description	Curriculum content
1	Personal Hygiene	<p>Teaching kids to keep their body clean is an important part of building their self-esteem - if they care about the way they present themselves and feel good about their body then they'll feel pretty good about themselves.</p> <p>It is important to instill good hygiene practices early to prevent infections and other health problems.</p> <p>Topics which may be covered under personal hygiene are: Daily bathing, dental care, weekly nail cutting, oiling of hair, wearing neat and clean clothes etc.</p>	<p>Personal Hygiene has been covered in detail in Standard VIII (<i>Book- Science, Chapter-10 Reaching the age of adolescence, page no:113- 126</i>) by emphasizing on the need for taking bath daily (and perhaps more than once in case of adolescents) and the dire need for girls to maintain menstrual hygiene.</p>
2	Hand washing practice	<p>Over 1.5 million children under five die each year as a result of diarrhea. It is the second most common cause of child deaths worldwide. Hand-washing with soap at critical times - including before eating and after using the toilet - can reduce diarrhea rates by more than 40 per cent. Hand washing promotion in schools can play a role in reducing absenteeism among primary school children.</p> <p>The curriculum should impart following to improve the hand washing practice amongst children.</p> <ul style="list-style-type: none"> Importance of hand washing with soap. Diseases cause and impact on kids' health due to non-practice of proper hand washing. Illustration of hand washing through live pictures. Games and demonstration on hand washing 	<p>There is a vague reference to hand washing in Standard III (<i>Book- Science, Chapter-6 Food we eat, page no: 38</i>) where Vipul "washed his hands and lifted Chutki"</p> <p>The Mid-Day Meal Chapter in the Standard IV textbook (<i>Book- Science, Chapter-20 Eating together, page no: 171-173</i>) advises washing hands before eating. Another chapter has a mention of washing hands before helping out in cooking a meal at the Gurudwara.</p>
3	Food Hygiene	<p>Most of the diseases occur/ transmitted in children through intake of stale and unhygienic food and unsafe drinking water, which adversely affect their physical and mental health. The curriculum should have syllabus on food hygiene covering the hygiene practices before intake of food, methods of maintaining cleanliness while cooking and after; household vectors causing ill health, nutritional value of food, food conservation, food poisoning, etc.</p>	<p>Food Hygiene has been included in Standard VI (<i>Book- Science, Chapter-2 Components of Food, page no:8- 17</i>), wherein there is a mention of washing sprouted seeds before consuming them. There is also a focus on the nutritional value of food.</p>
4	General Diseases	<p>Children should be aware of common diseases, cause of diseases, preventive measures etc.</p>	<p>At Standard V (<i>Book- Science, Chapter-8 A treat for mosquito, page no:67-75</i>) there is a mention about diseases like malaria and anemia – how they are caused and how can they be prevented</p> <p>The Standard VI textbook (<i>Book- Science, Chapter-2 Components of food, page no: 16</i>) tabulates various vitamins and the foods that we can get them from.</p> <p>The Standard VIII textbook (<i>Book- Science, Chapter-2 Microorganisms: Friends and Foe, page no: 17- 31</i>) mentions communicable diseases like cholera, common cold, chicken pox and TB. It also talks about carriers of diseases like mosquitoes. And tabulates diseases, causative micro-organism, mode of transmission and preventive measures</p>
5	Water	<p>There is a famous saying - "water is life". Water is very precious now a days and so judicious use of water is always advisable.</p>	<p>Water seems very crucial part of the NCERT syllabus right from Standard III up to Standard VIII. At the primary level the focus is on explaining the importance of water through a poem and pictures of various utensils used at home for storing water; activities where more water is used and vice versa; keeping water tanks clean; tips for saving water; water harvesting; options on re-using water etc.</p> <p>At Standard VII (<i>Book- Science, Chapter-16 Water: A precious Resource, page no:193-205</i>) and VIII (<i>Book-</i></p>

			<i>Science, Chapter-18 Pollution of Air and water, page no:239-252</i>) the topics include – how much pure water is available; who is responsible for the depletion of the water table; water management through water harvesting, bawris and drip irrigation; the role students can play in minimizing water wastage; sewage, waste water treatment plant; better housekeeping practices; sanitation and water borne diseases
6	Sanitation	Sanitation is the most important component of WASH and children must be acquainted with the fundamentals of sanitation. For instance, <ul style="list-style-type: none"> • Importance of toilet in our day to day life. • Compulsory use and how to use of toilet. • Basic structure of toilet and types of toilets. • Cleanliness of toilet at school household level. 	The Standard VII (<i>Book- Science, Chapter-16 Water: A precious Resource, page no:193-205</i>) textbook discusses alternate arrangement for sewage disposal and sanitation at public places In Standard IV textbook (<i>Book- Science, Chapter-18 Too much water Too little water, page no:151:155</i>) students are given an exercise on toilet hygiene as part of a project “Water Survey in Your School” but there is no proper background build up for the same
7	Solid waste management	Waste is a common phenomenon and generation of waste cannot be stopped but it can be reduced by reuse and recycle of waste. Topics under the solid waste management are: <ul style="list-style-type: none"> • Type of solid waste • 3 “Rs” of waste management (Reduce, Reuse and Recycle) • Collection of waste and segregation for safe disposal • Technical options of solid waste disposals • Importance of solid waste management in day to day life 	Waste Management comes into the limelight at Standard VI (<i>Book- Science, Chapter-16 Garbage in, Garbage out, page no:155 -165</i>) through a project given to Paheli and Boojho on ‘Dealing with Garbage’. It includes an interesting exercise on sorting the garbage in your home and suggests methods of disposing of the same to ensure that some of this can be converted into useful compost. Other projects given are – Landfill, Vermicomposting and Paper Recycling
8	Liquid waste management	Topics under solid waste management are: <ul style="list-style-type: none"> • Types of liquid waste- Grey and Black • Importance of liquid waste management • Different Technical options for liquid waste management 	At Standard VII there is a detailed note on waste water treatment plant (<i>Book- Science, Chapter-18 Waste water story, page no:220-230</i>)

3.5 WASH content in TCERT curriculum

Sr. No	Content	Description	Curriculum
1	Personal Hygiene	Teaching kids to keep their body clean is an important part of building their self-esteem - if they care about the way they presents themselves and feel good about their body then they'll feel pretty good about themselves. It is important to instill good hygiene practices early to prevent infections and other health problems. Topics which may be covered under personal hygiene are: Daily bathing, Dental care, weekly nail cutting, oiling of hair, wearing neat and clean clothes. etc.	The Standard I Textbook (<i>Book: MES-II, ES- chapter 2, we are healthy, what about you?, page no: 49-56</i>) talks about personal hygiene in detail with photographs of a child bathing, brushing, combing his hair and visiting the toilet. There is also a word maze with words related to cleanliness. And pictures depicting acts children should/ should not do – picking their nose, washing hands, cutting nails etc. At Standard VIII (<i>Book: MESS-I, Science- chapter 2, Reaching the age of adolescence, page no: 146-160</i>) the textbook focuses on menstrual hygiene (taking a bath daily, changing sanitary pads, washing the cloth with soap and hot water in case a cloth is used, wearing cotton undergarments and changing them daily)
2	Hand washing practice	Over 1.5 million children under five die each year as a result of diarrhea. It is the second most common cause of child deaths worldwide. Hand-washing with soap at critical times - including before eating and after using the toilet - can reduce diarrhea rates by more than 40 per cent. Hand washing promotion in schools can play a role in reducing absenteeism among primary school children. The curriculum should impart following to improve the hand washing practice amongst children. <ul style="list-style-type: none"> • Importance of hand washing with soap. • Diseases cause and impact on kids' health due to non-practice of proper hand washing. • Illustration of hand washing through live pictures. • Games and demonstration on hand washing 	At Standard I (<i>Book: MES-II, ES- chapter 2, we are healthy, what about you?, page no: 51</i>) there is a pictorial chart mentioning the step-by-step correct method of washing hands The Standard III textbook (<i>Book: MESS-II, EM-2, chapter 3, Healthy Food Habits, page no: 90</i>) again mentions washing one's hands before eating The Standard VIII textbook (<i>Book: MESS-I, EM-2, chapter 3, Reaching the age of adolescence, page no: 153</i>) gives clear instructions on washing hands before and after meals; keeping finger nails clean and avoiding nail paint and jewelry
3	Food Hygiene	Most of the diseases occur/ transmitted in children through intake of stale and unhygienic food and unsafe drinking water, which adversely affect their physical and mental health. The curriculum should have syllabus on food hygiene covering the hygiene practices before intake of food, methods of maintaining cleanliness while cooking and after; household vectors causing ill health, nutritional value of food, food conservation, food poisoning, etc.	At Standard I Textbook (<i>Book: MES-II, ES- chapter 2, we are healthy, what about you?, page no: 49-56</i>) there are detailed instructions about food hygiene – wash your hands; wash fruits and vegetables; keep them covered; do not eat uncovered food; drink plenty of water and eat lots of fruits and greens The Standard III textbook (<i>Book: MSSS-II, EM-2, chapter 3, Healthy Food Habits, Page no: 80-91</i>) gives food hygiene tips like – don't overcook; don't fry; avoid polished rice; wash fruits and vegetables thoroughly; buy only covered fruits and vegetables. The Standard IV textbook (<i>Book: MSSS-II, EM-2, chapter 3, Healthy Food Habits, Page no: 80-91</i>) advises against eating decayed and spoilt food. There is also a mention about eating cooked food only when it is warm At Standard V (<i>Book: MSSS-II, EM-2, chapter1, Food, page no: 49-55</i>) the focus is on ensuring that food is prepared, preserved and handled in the correct way; methods of food storage and preservation. Tips on food hygiene also are shared – keep the cooking area clean and dry; keep the utensils clean; and the person who cooks the food needs to clean his hands before cooking The Standard VI textbook (<i>Book: MSSS-II, EM-1, chapte2, Separation of substance, page no: 59-60</i>) shares the following tips for removing unwanted substances which are harmful to our body – rice should be cleaned with water before being cooked; rava and wheat should be purified by sieving; clean rice and pulses by winnowing. At Standard VIII the textbook (<i>Book: MSSS-I, EM-3, chapter2 Microorganism, page no: 183-191</i>) talks about how bacteria may enter food causing it to go bad if it is not stored properly e.g. how butter milk gets spoilt if kept in a brass vessel etc.
4	General	Children should be aware of common diseases, cause of diseases,	In the Standard II textbook there is a mention about

	Diseases	preventive measures etc.	<p>diseases spread by mosquitoes</p> <p>The Standard III textbook (Book: MSSS-I, EM-2, chapter1 Healthy Food, page no: 58-70) explains in brief about the medicinal value of spices and the minerals and vitamins which are present in fruits and vegetables. It also highlights the importance of having nutritious food every day.</p> <p>Standard V textbook (Book: MSSS-II, EM-2, chapter3 Hygiene and Prevention of Disease, page no: 65-74) focus is on diseases caused by consuming spoiled food - food poisoning, indigestion, diarrhea, amoebic dysentery, fever etc. Carriers, Symptoms and Prevention of diseases like – Chikunguniya, Dengue, Filariasis, Malaria etc. Some of the prevention tips suggested are – don't spit, drink only boiled and filtered water, cover your mouth while coughing and sneezing and avoid using open places for defecating</p> <p>The Standard VI Textbook (Book: MSSS-II, EM-2, chapter1 Diversity of organism, page no: 65-78) has a vitamin table along with the name of the food source, the disease which arises out of its deficiency and its symptoms. It also carries details regarding viruses which cause – common cold, polio, chicken pox, AIDS, rabies and TMV</p>
5	Water	There is a famous saying -“water is life”. Water is very precious now a days and so judicious use of water is always advisable.	<p>The Standard II textbook (Book: MSSS-I, EM-2, Chapter 3, Hygiene, Page no: 64) has an exercise where students are required to encircle right or wrong against various activities – watering plants, bathing in a lake where people have dumped waste etc.</p> <p>At Standard III (Book: MSSS-II, EM-2, Chapter 3, Healthy Food Habits, Page no: 113:125) there is a mention about drinking only boiled and filtered water</p> <p>At Standard VII the textbook (Book: MSSS-II, EM-2, Chapter 3, Water a precious resource, Page no:91) talks about water sources, forms, reasons for depletion of the water table; distribution of water; scarcity of water; water management through – rainwater harvesting, desalination of sea water through distillation and reverse osmosis</p>
6	Sanitation	<p>Sanitation is the most important component of WASH and children must be acquainted with the fundamentals of sanitation. For instance,</p> <ul style="list-style-type: none"> • Importance of toilet in our day to day life. • Compulsory use and how to use of toilet. • Basic structure of toilet and types of toilets. • Cleanliness of toilet at school household level. 	<p>At Standard II (Book: MSSS-II, EM2, Chapter 3, Hygiene , Page no: 62) there are pictorial instructions on basic sanitation – don't use open toilets; wash your hands; keep the toilet clean</p> <p>At Standard V there is a specific mention of washing bathrooms and toilets daily and having a good drainage system in place</p> <p>The Standard VI History Textbook(Book: MSSS-II, EM2, Chapter 3, Hygiene , Page no: 57-59) talks about buildings during the Indus Valley civilization and mentions that each house had a well, a bathroom and a dustbin</p> <p>The Standard VIII textbook (Book: MSSS-II, EM2, Chapter 3, Hygiene , Page no: 57-59) advises against defecating in the open</p>

7	Solid waste management	<p>Waste is a common phenomenon and generation of waste cannot be stopped but it can be reduced by reuse and recycle of waste. Topics under the solid waste management are:</p> <ul style="list-style-type: none"> • Type of solid waste • 3 “Rs” of waste management (Reduce, Reuse and Recycle) • Collection of waste and segregation for safe disposal • Technical options of solid waste disposals • Importance of solid waste management in day to day life 	<p>The Standard II textbook (Book: MSSS-I, EM-2, Chapter 3, Hygiene, Page no: 64) details the difference between biodegradable and non-biodegradable wastes</p> <p>The Standard III textbook has a section where it advises children to help sweepers by separating biodegradable and non-biodegradable waste; and not throwing garbage on the road/into gutters; not spitting etc.</p> <p>The Standard IV textbook (Book: MSSS-II, EM-3, Chapter 4, Use of natural resources, Page no: 86-91) talks about different types of waste and its category, vermi-culture and organic manure. It also highlights the multiple uses of husk (removed from paddy)-when earthworms are attached to husk vermi-compost is generated; it can also be used as fuel in homes and industries; bricks made from husk and cement help in building eco-friendly buildings; activated carbon from the ash of husk can be used to purify water. There is also a mention about the different types of waste – solid, liquid and gaseous</p> <p>At Standard VI the textbook (Book: MSSS-III, EM2, Chapter 2, Out Environment , Page no: 79-87) focuses on beneficial activities of bacteria – decomposition of organic wastes into manure; acting as a bio-fertilizer to increase the yield. Garbage disposal can be done through – landfilling, incineration, composting, reducing the usage, reusing and recycling. Fact file reveals that a new kind of plastic (Bio-plastic) is being made these days which is biodegradable in nature.</p>
8	Liquid waste management	<p>Topics under solid waste management are:</p> <ul style="list-style-type: none"> • Types of liquid waste- Grey and Black • Importance of liquid waste management • Different Technical options for liquid waste management 	<p>The Standard VII textbook (Book: MSSS-II, EM2, Chapter 3, Neutralization in everyday life , Page no: 110) highlights how factory wastes are neutralized by adding basic substances</p> <p>The Standard VIII Textbook (Book: MSSS-II, EM2, Chapter 3, Air, water and soil pollution , Page no: 93 -102) mentions – treating waste in effluent treatment plant before it is discharged into water bodies; washing clothes at a place away from the well; reusing treated water either for gardening or cooling purpose; avoiding over usage of water; sewage treatment; waste water treatment plant</p>

4. Major finding of WASH content review

The thorough review of curriculum of GCERT and other boards depicts various gaps in GCERT curriculum. Several important aspects of WASH are not discussed in GCERT curriculum. The details are mentioned below

Sr. No	WASH Content	WASH coverage under GCERT Curriculum	Gap in GCERT Curriculum	Comparison with NCERT	Comparison and TCERT
1	WASH-General	WASH is an integral part of education in GCERT curriculum and it covers several aspects of WASH in primary education.	Std. 1 curriculum does not cover anything about WASH. Similarly std.4 have very little input on WASH.	NCERT has good coverage on WASH in standard-1. The NCERT curriculum covers topic on personal hygiene, hand washing and risk behavior	While TCERT has also covered some topics of food hygiene in addition to topic covered under NCERT. Same for std. 4 in NCERT and TCERT.
2	Hygiene education	Topics on personal hygiene especially daily hygiene, hand washing, household and community level hygiene.	The risk behavior of personal hygiene and Menstrual Hygiene have not been covered	The risk behavior has been discussed in std. 1 and std.3 of NCERT. Menstrual Hygiene is not part of the primary education curriculum.	The risk behavior has been discussed in std. 1 and std.3 of TCERT. Menstrual Hygiene is not part of the primary education curriculum.
3	Food hygiene	No mention		NCERT curriculum has introduced food hygiene in std. 6 syllabus	The TCERT curriculum has given due importance to Food hygiene and in depth understanding about food hygiene has been discussed in primary and upper primary section.
4	General diseases	No mention		The NCERT curriculum has also covered this topic but limited to std.4 and std.6	The TCERT curriculum has covered different types of diseases, cause and symptoms of disease along with precautionary measures to prevent such diseases. This topic has been covered in std. 2, std.3, std.5 and std.6
5	Water	Water has been covered comprehensively in GCERT curriculum. The subject has covered everything aspect of water. Topics covered under GCERT curriculum are sources of water, Importance of safe drinking water, usage and conservation of water, treatment of water and water pollution. Std. 6 covers most of the topics on water while nothing has been discussed in std.8	GCERT curriculum does not cover anything about water borne diseases. Safe storage of drinking water. In equality in access of drinking water.	Water has been covered in NCERT curriculum in std.5, std.6, std. 7 and std.8 It talks about the sources of water, drinking water in city scarcity of water, water conservation methods like, rain water harvesting, drip irrigation	TCERT curriculum also has wide coverage on Water. It covers water related topics in std.2, std.3, std.6, std.7 and std.8. Topics covered under water are; treatment of water before drinking, means of treatment like RO, desalination etc., water scarcity, water management.
6	Sanitation	No specific mention about sanitation	Not covered anything about sanitation topic	NCERT has covered several aspects of sanitation for instance, importance of household toilet, problems of open defecation, water and soil pollution, and water borne diseases etc.	TCERT has better coverage on sanitation over NCERT and GCERT. The curriculum talks about the importance of toilet cleanliness and also covers the downsides of open defecation. Topics on sanitation have been covered in the std.2, std. 5 and std. 8.
7	Solid waste management	The GCERT curriculum has wide coverage on several topics of solid waste management. The GCERT curriculum covers topic like what is solid waste, type of solid waste, its collection, and disposal of solid waste, importance of solid waste disposal and different technics of solid waste disposal.	The GCERT curriculum covered the solid waste management topics. But in primary classes it is discussed as good hygiene practice and while in upper primary it is discussed only in std.	NCERT curriculum has similar coverage as the GCERT however, it has covered all the topics pertaining to solid waste management in std. 6 and also discussed comprehensively the hazardous effect of plastics waste over human body.	The TCERT curriculum has wide coverage of solid waste management (SWM) in primary and upper primary classes as well.
8	Liquid waste management	The subject remained untouched in both primary and upper primary curriculum. Except for one illustration in Std. V, the subject has not been discussed anywhere in the whole curriculum.	Type of liquid waste for instance black and grey water and safe disposal mechanism of waste water should have been taught to children in upper primary classes.	NCERT curriculum has incorporated liquid waste management coverage in upper primary classes	TCERT curriculum has incorporated liquid waste management coverage in upper primary classes. Waste water and effluents of factories and its treatment prior to disposal

5. Recommendations

1. The GCERT curriculum does not cover anything about WASH in standard-1 while in standard-2 the syllabus covers a little on personal hygiene and hand washing practices. Similarly the WASH is not discussed much in std.4 of GCERT syllabus. **Since WASH is an integral school curriculum and so it should be incorporated in the early stage of the primary education.**
2. WASH related subject should be explained through better illustrations so that students can correlate with the subject.
3. Sanitation is inevitable part of the WASH; it should be incorporated in the curriculum of primary education especially use of toilet, its maintenance and personal hygiene related to sanitation.
4. Instead of teaching WASH in different subjects like EVS, science, social science etc, it may be a separate subject / supplementary reading material for students in primary and upper primary classes for better insight and understanding.
5. Water, sanitation and hygiene behavior change communication activities should be part of the daily routine of all children and hygiene messages may be integrated into the textbook curriculum or may be imparted through supplementary reading materials.
6. Menstrual hygiene is very crucial for girls who are attaining puberty (upper primary schools) and, therefore, it is an integrated part of WASH curriculum. This should be incorporated in the curriculum for upper primary classes.
7. Due to lack of immunity and awareness students in primary schools are highly susceptible to general diseases, therefore, the curriculum should incorporate information of general diseases, symptoms and preventions.

Annex 1- GCERT Curriculum

Illustration- 1

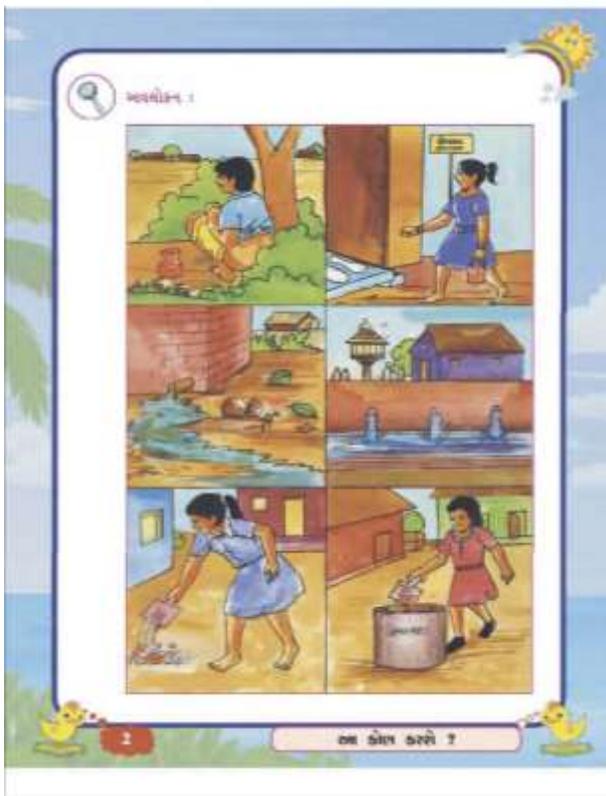


Illustration- 2

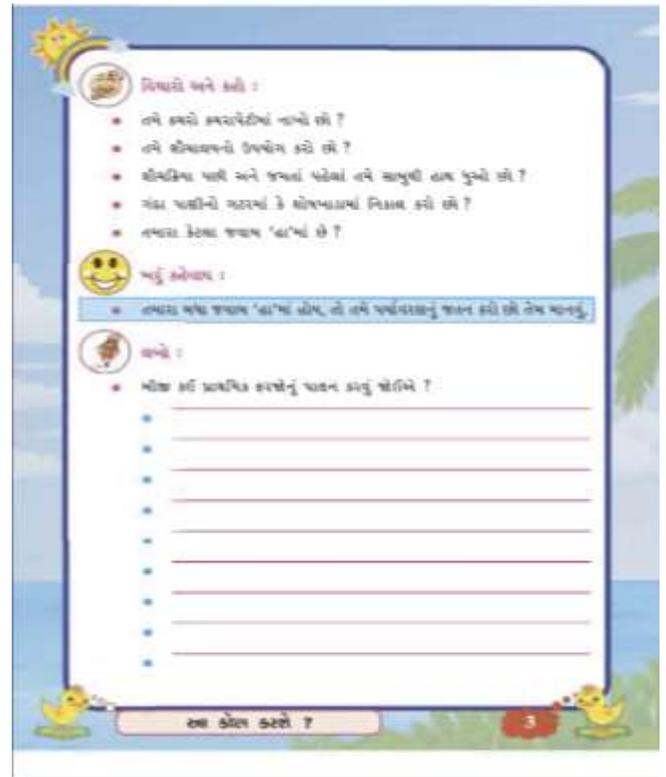


Illustration-1 (std. v, Book - Paryavaran, chapter- 2, page no.12, observation)- these images need to be accompanied with explanations to convey the right message. Text books should be gender neutral and hence should refrain from showing cleaning only by the girl child.

Illustration -2 (std. v, Book - Paryavaran, chapter- 2, page no.13, observation): the various actions have been depicted through pictures. needs to be accompanied with explanations and need to add an action with handwashing with soap.

Illustration- 3

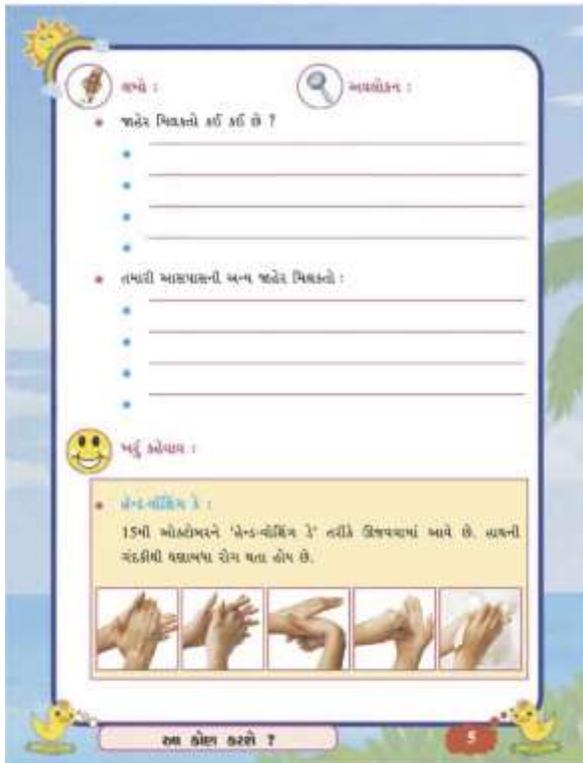


Illustration- 4

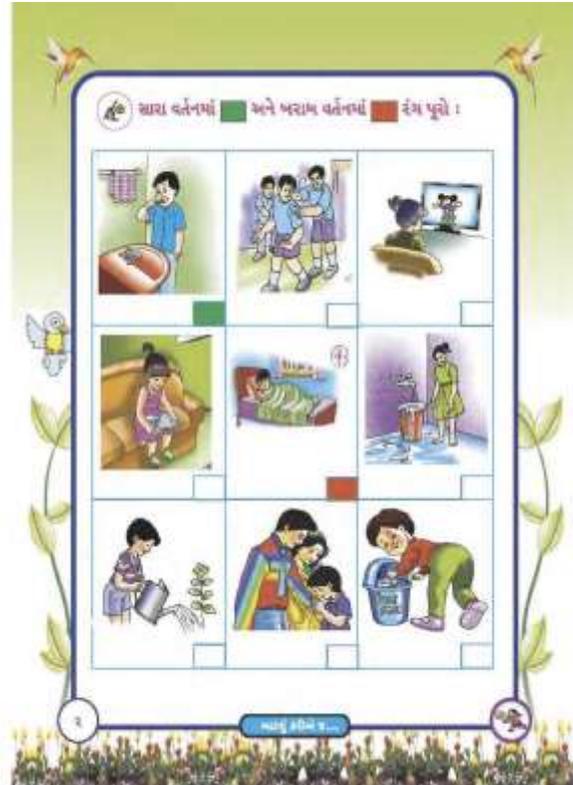


Illustration-3 (std. v, Book - Paryavaran, chapter- 2, page no.12, observation) demonstration of hand washing does not emphasize use of soap.

Illustration -4 (std. v, Book - Paryavaran, chapter- 1, page no.14, good and bad conduct) the accompanying images are not self-explanatory to judge good or bad conduct by students.

Annex 2- NCERT Curriculum

Annexure- NCERT- Std.3, Book, Environmental Science- looking around, chapter- 20 , Drop by Drop



Just think if a tap leaks even drop by drop, how much water would be wasted! These pictures show you something similar.



Can you think of ways of saving water?

Write your suggestions below :



Have you seen water flowing unnecessarily in your home, school or any other place? Where?



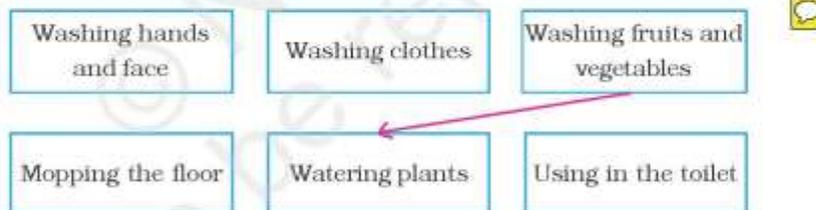
Look at the pictures on the next page and discuss – Can we use the water that has been used for one purpose for something else?



In places where there is a scarcity of water, people adopt different methods to save and reuse water. People do this out of necessity. Understanding this, if children adopt certain measures and save water then they can actually understand that 'Water is for all'.



Draw lines using different colours to show which work will be done after the other so that the same water can be re-used. One example has been given.



You have given some suggestions to re-use water. People use these methods only under conditions when there is a scarcity of water. Do you know, one of the reasons for the scarcity of water is because people waste it. Just think, how good it would be if everyone got water!



Discuss the re-use of water. This would help the children to understand the importance of saving water. It will be useful to listen and adopt suggestions given by the students in this regard.

Annexure- NCERT- Std.4, Book, Environmental Science- looking around, chapter- 18 , Too Much water, Too little water

Too Much Water, Too Little Water

Do and Discuss

- Look through the newspapers of the last one month. Look for all news-items related to water. Cut them out. Stick all the cuttings together on a big paper to make a big collage. Talk about what you have collected. Discuss in the class.

Have you ever suffered from diarrhoea and vomiting? How did you feel? When we have diarrhoea and vomiting, we lose a lot of water from our body. This can be dangerous, if we do not take care. It is important that we make up for the water that we lose from our body. We should drink a lot of water when this happens. We should also mix some salt and sugar in the water.

For this, mix one teaspoon sugar and a pinch of salt in one glass of boiled and cooled water. Taste it to make sure that there is not too much salt. The water should not taste more salty than our tears.

When a person has diarrhoea and vomiting, the water must be sipped slowly by them. Light food must be taken.

Babies should continue to take their mother's milk as this is good for them. It is also necessary to take some medicines – they can also be home-made remedies. If the diarrhoea does not stop, it is important to get the advise of a doctor.



Water Survey in School

Make three groups of students in your class.

- One group will find out about the arrangements of drinking water in the school.

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Looking Around

- The second group will find out about the arrangement of toilet in the school.
- The third group will find out about illness affecting children in the class.

The questions given below will help the groups to collect information.

Group 1

Observe and Note -

- Put a (✓) in right box or boxes
 - Where does the water in your school come from?

Tap	<input type="checkbox"/>	Tank	<input type="checkbox"/>	Handpump	<input type="checkbox"/>	Any other	<input type="checkbox"/>
-----	--------------------------	------	--------------------------	----------	--------------------------	-----------	--------------------------
 - In your school, from where do you take water to drink?

Tap	<input type="checkbox"/>	Tank	<input type="checkbox"/>	Handpump	<input type="checkbox"/>	Any other	<input type="checkbox"/>
-----	--------------------------	------	--------------------------	----------	--------------------------	-----------	--------------------------
- If there is no tap, *matka* or handpump, then how do you get drinking water?

- Is there water in all the taps or handpumps?

- Is there any tap which is leaking or dripping?

- Are all the *matkas* filled with water and are they covered?

- Are the *matkas* and other water containers cleaned regularly?

- How is water made safe for drinking?

Too Much Water, Too Little Water

- Is there a long-handled ladle to take water from the *matka* or container? How many ladles are there per container?

- Is the place around the drinking water-taps or *matkas* cleaned regularly?

Think and Discuss

- Why do the drinking water places get dirty?
- What can we do to keep these places clean?

Find out and write in your notebook

- How often (once a day, once in two days, etc.) are the containers or *matkas* and ladles cleaned? Who cleans them?
- How many children are there in your school? How many taps, *matkas* or handpumps are there? Are these sufficient for children?
- Who cleans the places near the water?
- Where does the water that is spilt go?

Group 2

Observe and Note -

- Put (✓) in the box and write wherever it is required -

- What are the toilet arrangements in your school?

Built toilet

Open area

- How many toilets are there?





Looking Around

- Are there separate toilets for girls and boys? yes no
- Is there water in the toilets? yes no
- Where does the water come from?
 - the tap yes no
 - filled containers yes no
 - has to be brought from home yes no
- Is there water for washing hands near the toilet? yes no
- Do you wash your hands after using the toilet? yes no
- Is there any tap that is leaking or dripping? yes no
- Are the toilets kept clean? yes no

Find out and write

- How many boys and girls are there in your school?
Girls Boys
- How many toilets are there for girls, and how many for boys?
Girls Boys
- If there are no taps, who brings the water for the toilet? From where does the water have to be brought?

- Who keeps the place clean?

*Too Much Water, Too Little Water***Talk about it**

- What can be done to keep the toilets clean?
- What can each of us do for this?
- Have you seen toilets at bus stands or railway stations? How are they different from the toilets at home?

Group 3

Talk with the children in your class and fill in the table given below. In the last few months, how many children in the class have suffered from any of these? Write the names of the children in the correct columns.

S. No.	Diarrhoea Loose motions	Vomiting	Loose motion and vomiting	Yellow urine, Yellow skin, Fever	Stomach ache
1.					
2.					
3.					
4.					
5.					

Discuss with your teacher what you have found out from your survey. Now make a report with your findings and suggestions. Read your report in the assembly. Put it up on the notice board.

For the teacher: The table lists common symptoms that children may know about. If these are caused by cholera, then you can discuss them with reference to this. It is not important that children should know the names of all the diseases.



Annexure- NCERT- Std.5, Book, Environmental Science- looking around, chapter- 8 , A treat for mosquitos

- What was found out by the blood test?
- Have you had a health check up in your school?
What did the doctor tell you?



Find out

- Ask a doctor or elders about the food items which contain iron.

Baby mosquitoes



Jaskirat: There is a poster on malaria just outside our class.

(Everyone goes out to look.)



Are you inviting mosquitoes?

BEWARE!

They Spread Malaria, Dengue, Chikungunya!

- + Don't let water collect around you. Fill up the pits.
- + Keep the water pots, coolers and tanks clean. They should be dried every week.
- + Put fish in the ponds, so that they eat the mosquito larvae.
- + Use mosquito nets to protect yourself.
- + Spray oil if water has collected at some place.



Rajat: The poster says something about larvae. What are those?



Nancy: They are baby mosquitoes. But they don't look like mosquitoes at all.

A Treat for Mosquitoes

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Find out

- ♦ Which diseases are spread by flies and how?



Mosquito check

Divide your class into two or three groups. Each group will go around to check one area in school or around it. It must carefully note if water has collected anywhere, and mark ✓ where it finds stagnant water.

Pot Cooler Tank Any open space in the school ground Gutter Any other place _____

- ♦ Since how many days has water collected there?
- ♦ Has it caused any problem in the area?
- ♦ Who is responsible for keeping these places clean?
- ♦ Who is supposed to get the gutters and drains repaired?
- ♦ Can any larvae be seen in the collected water?

Make a poster

- ♦ In your group, make a poster with a message to keep the cooler, tank, drains and the area clean (wherever water collects). Put up your poster in and around your school.
- ♦ Find out who is responsible for keeping the area around your school clean. Write a letter from your class, reporting your findings and suggestions. Find out to whom the letter should be written and to which office it should be sent.



A Treat for Mosquitoes

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Survey report

Some children did this survey. Here are some of their reports.

Group 1

We found something green around the taps in our school which is called algae. It was also slippery there. The algae spreads a lot during the rainy season. We think that they are some kind of small plants that grow in water.

Group 2

There is a pond near the school. At first you cannot see the water in the pond as it is completely covered with plants. One aunty told us that these plants have grown themselves in water. Around the pond there are pits full of water. We also saw some larvae in the water. As we moved around, lots of mosquitoes flew from the plants growing around. Jaskirat feels that there are so many mosquitoes in her house because of this dirty pond nearby.



Tell

Is there a pond or river around your house or school? Go and look around and observe these things:

- ◆ Can you see algae in or around the water?
- ◆ Where else have you seen algae?
- ◆ Are there plants growing on the side or in water? Find out their names. Draw some of these in your note book.
- ◆ Do you think these were planted by someone or did they grow on their own?
- ◆ What else can you see in water? Make a list.



Ronald Ross

A scientist peeps into a mosquito's stomach

This interesting incident took place almost a hundred years ago. A scientist found out that mosquitoes spread malaria. Let's read about this discovery in his own words.

"My father was a general in the Indian Army. I studied to become a doctor, but what I really liked was reading stories, writing poetry, music and drama. In my free time I enjoyed doing all this.



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Looking Around

Annexure- NCERT- Std.5, Book, Environmental Science- looking around, chapter- 16, Who will do this work?

16. Who will do this Work?



Have you seen such scenes around you?





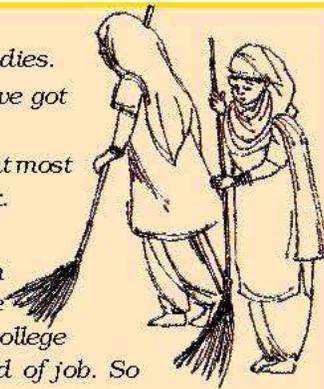

Have you ever thought of people who do this work? Can you imagine how they would feel?

Why do you think people need to do this kind of work?

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Our friends spoke to some staff who do cleaning jobs. Here are some of the things they told us.

- Q.** *Since when have you been doing this work?*
A. *About twenty years. Since I completed my studies.*
Q. *Why did you not study further? You could have got some other job?*
A. *You need money for studies. And even after that most of our people continue to do this kind of work.*
Q. *What do you mean?*
A. *Since our great grandfathers' times... or even before that, most people of our community have been doing this work. Even after getting a college degree, our people do not get any other kind of job. So they have to do this work.*
Q. *Why is that so?*
A. *That is the way it is. In the entire city, all the people who do this kind of work are from our community. It has always been so.*



Interview (adapted) from the documentary film 'India Untouched' by Stalin. K.



Write

Talk with people who do the cleaning job around your house and school.

- *Since when have they been doing this work?*
- *How much have they studied?*
- *Have they tried to look for some other work?*
- *Did the elders in their family also do this work?*
- *What kind of difficulties do they face in doing this work?*

Teacher's Note : *Before children talk with the staff which does cleaning , discuss the kinds of questions that could be asked. Sensitise children to be respectful during their interactions.*



Annexure- NCERT- Std.5, Book, Science-, chapter- 16, Garbage in , Garbage out

16

Garbage in, Garbage out

We throw out so much rubbish or garbage everyday from our homes, schools, shops and offices. The grains, pulses, biscuits, milk or oil purchased in shops, are packed in plastic bags or tins. All these wrapping material go out as garbage. We sometimes buy things that are rarely used and often thrown into the garbage.

We generate so much garbage in our day-to-day activities! We often throw groundnut shells on public places, in buses or trains, after eating the nuts. We throw away the ticket when we get off a bus. A child might go on sharpening pencils just for fun. If we make mistakes or spill ink on our notebook, we tear off the sheet and throw it away. And we also throw away many domestic wastes such as broken toys, old clothes, shoes and slippers.

What if the garbage is not removed from our homes and surroundings? How do you think, this will harm us? When *safai karamcharis* take the garbage from the bins, where does the garbage go and what happens to it? Is it possible for all of this garbage to be changed into something that will not harm us? Can we contribute towards this in any way? We will look for answers to these questions, in this chapter.

Children from Pahell and Boojho's school did a project called 'Dealing with Garbage'. We will learn about some of the things they learnt through this project.

16.1 DEALING WITH GARBAGE

Safai karamcharis collect the garbage in trucks and take it to a low lying open area, called a **landfill** (Fig. 16.1).

There the part of the garbage that can be reused is separated out from the one that cannot be used as such. Thus,



Fig. 16.1 A landfill

Annexure- NCERT- Std.8, Book, Science-, chapter- 2, Microorganism: Friend and Foe

microorganisms are called **pathogens**. Some microorganisms spoil food, clothing and leather. Let us study more about their harmful activities.

Disease— causing Microorganisms in Humans

Pathogens enter our body through the air we breathe, the water we drink or the food we eat. They can also get transmitted by direct contact with an infected person or carried through an animal. Microbial diseases that can spread from an infected person to a healthy person through air, water, food or physical contact are called **communicable diseases**. Examples of such diseases include cholera, common cold, chicken pox and tuberculosis.

When a person suffering from common cold sneezes, fine droplets of moisture carrying thousands of viruses are spread in the air. The virus may enter the body of a healthy person while breathing.

There are some insects and animals which act as **carriers** of disease-causing microbes. Housefly is one such carrier. The flies sit on the garbage and animal excreta. Pathogens stick to their bodies. When these flies sit on uncovered food they may transfer the pathogens. Whoever eats the contaminated food is likely to get sick. So, it is advisable to always keep food covered. Avoid consuming uncovered items of food. Another example of a carrier is the female *Anopheles* mosquito (Fig 2.8), which carries the parasite of malaria. Female *Aedes* mosquito acts as carrier of dengue virus. How can we control the spread of malaria or dengue?



Fig. 2.8 : Female *Anopheles* mosquito



Then how do you prevent the spread of communicable diseases?



Why does the teacher keep telling us not to let water collect anywhere in the neighbourhood?



We should keep a handkerchief on the nose and mouth while sneezing. It is better to keep a distance from infected persons.

All mosquitoes breed in water. Hence, one should not let water collect anywhere, in coolers, tyres, flower pot etc. By keeping the surroundings clean and dry we can prevent mosquitoes from breeding. Try to make a list of measures which help to avoid the spread of malaria.

Table 2.1: Some Common Human Diseases caused by Microorganisms

Human Disease	Causative Microorganism	Mode of Transmission	Preventive measures (General)
Tuberculosis	Bacteria	Air	Keep the patient in complete isolation. Keep the personal belongings of the patient away from those of the others. Vaccination to be given at suitable age.
Measles	Virus	Air	
Chicken Pox	Virus	Air/Contact	
Polio	Virus	Air/Water	
Cholera	Bacteria	Water/Food	Maintain personal hygiene and good sanitary habits. Consume properly cooked food and boiled drinking water. Vaccination.
Typhoid	Bacteria	Water	
Hepatitis B	Virus	Water	Drink boiled drinking water. Vaccination.
Malaria	Protozoa	Mosquito	Use mosquito net and repellents. Spray insecticides and control breeding of mosquitoes by not allowing water to collect in the surroundings.

Some of the common diseases affecting humans, their mode of transmission and few general methods of prevention are given in Table 2.1.

Disease—causing Microorganisms in Animals

Several microorganisms not only cause diseases in humans and plants, but also



Robert Koch (1876) discovered the bacterium (*Bacillus anthracis*) which causes anthrax disease.

in other animals. For example, anthrax is a dangerous human and cattle disease caused by a bacterium. Foot and mouth disease of cattle is caused by a virus.

Disease—causing Microorganisms in Plants

Several microorganisms cause diseases in plants like wheat, rice, potato, sugarcane, orange, apple and others. The diseases reduce the yield of crops. See Table 2.2 for some such plant diseases. They can be controlled by the

Annexure- NCERT- Std.8, Book, Science-, chapter- 10, Reaching the age of adolescence

cleanliness is not maintained there are chances of catching **bacterial** infection. Girls should take special care of cleanliness during the time of menstrual flow. They should keep track of their menstrual cycle and be prepared for the onset of menstruation.

Physical exercise

Walking and playing in fresh air keeps the body fit and healthy. All young boys and girls should take walks, exercise and play outdoor games.

Myths, Taboos, Do's and Don'ts

You have learnt here and from Chapter 9 the scientific facts related to human reproduction. There are many wrong notions which you should now be able to discard as informed adolescents. For example, there are myths and taboos regarding bodily changes that adolescents experience. Some of these are given below and you can now argue why these are myths and not facts.

1. A girl becomes pregnant if she looks at boys during menstruation.
2. The mother is responsible for the sex of her child.
3. A girl should not be allowed to work in the kitchen during menstruation.

You may come across many other myths and taboos. Discard them.

Adolescent Pregnancy

You might be knowing that in our country, the legal age for marriage is 18 years for girls and 21 years for boys. This is because teenage mothers are not prepared mentally or physically for motherhood. Early marriage and motherhood cause health problems in the mother and the child. It also curtails employment opportunities for the young woman and may cause mental agony as she is not ready for responsibilities of motherhood.

Activity 10.6

Collect data on the number of children in your class who exercise regularly and who do not exercise regularly. Did you notice any difference in their fitness and health? Prepare a report on the benefits of regular exercise.

Say "NO" to Drugs

Adolescence is a period of much activity in the body and mind which is a normal part of growing up. So do not feel confused or insecure. If anybody suggests that you will get relief if you take some drugs, just say "No" unless prescribed by the doctor. Drugs are addictive. If you take them once, you feel like taking them again and again. They harm the body in the long run. They ruin health and happiness.

You must have heard about AIDS which is caused by a dangerous virus, HIV. This virus can pass on to a normal person from an infected person by sharing the syringes used for injecting drugs. It can also be transmitted to an infant from the infected mother through her milk. The virus can also be transmitted through sexual contact with a person infected with HIV.

Annex 3- TCERT Curriculum

Annexure- TCERT- Std.1, Book, Environmental Studies, chapter- 1,Come let us eat

ENVIRONMENTAL STUDIES



Let us colour

We shall colour

Health-related habits to be practised daily ☺

- ▶ Wash hands before and after eating food.
- ▶ Wash fruits and vegetables before eating them.
- ▶ Cover the food items and drinking water .
- ▶ Do not eat food that is kept uncovered as flies sit on them.
- ▶ Drink plenty of water.
- ▶ Eat lots of greens as they are good for health.
- ▶ Do not eat fried food often.

Help the children with these health-related habits.

Project:

Help the children to make a garden of their own at school.

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Annexure- TCERT- Std.1, Book, Environmental Studies, chapter- 2, We are healthy, what about you?

2 We are healthy, what about you ?

My body is itching.
Can anybody scratch it ?

You should have a bath daily.

Oh ! I am dirty !
I should have a bath.

How is it that you have beautiful teeth ?

I don't eat too many sweets.

Help the children to know about personal hygiene.

ENVIRONMENTAL STUDIES

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ENVIRONMENTAL STUDIES



Let us talk

What do we do every day ? 








- * Note the actions in the pictures.
Do you do these activities daily ?
- 1. Brush your teeth twice a day.
- 2. Have a bath daily.
- 3. Wear clean clothes.
- 4. Apply oil and comb your hair properly.
- 5. Cut your nails once a week and keep them clean.
- * What did you do today, to keep yourself clean ?
- * What else will you do to keep yourself clean ?

ACTIVITY : Discuss in class the importance of personal cleanliness

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Urban Management Center; info@umcasia.org; www.umcasia.org

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Let us do it

Ask the children to bring their own toothbrush and show them the correct way of cleaning the teeth.



1 Up and down

2 Side to side.

3

4 Up

5 Down

6 Now it is sparkling

Information World hand wash day - October 15



1 2 3 4

5 6 7 8

Demonstrate the correct method of washing hands. Help the children to follow it.

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ENVIRONMENTAL STUDIES

Annexure- TCERT- Std.2, Book, Environmental Studies, chapter- 3, Hygiene

3. HYGIENE

Have you seen such scenes in your surroundings?



- If such activities do not take place in our surrounding, what will happen?
- Where do these activities take place?

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Look at the activities given below;
Write down if their activity is right or wrong.



ENVIRONMENTAL STUDIES

Can we discuss ?

A man swept the floor of a house. He happened to see many things in the garbage bin. He separated them. He took banana, orange skin and vegetable waste in one bin. He took the other items like plastic bags, broken glass bangles, used pens, covers in the other bin. Can you guess why?



Can we draw?

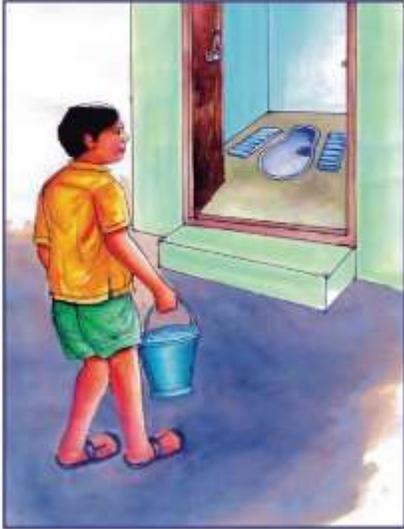
Read the sentences given below and draw  if it is

right and draw  if it is wrong.

- Using open space as toilet. 
- Eat after bathing. 
- Eat before bathing. 
- Brush before going to bed. 
- Before eating hand washing is not necessary. 

ENVIRONMENTAL STUDIES

Usage of Toilet



- It is a good habit to use the toilet early in the morning.
- We should not use open place as toilet. It will affect our surroundings and our health.
- After using the toilet we should wash our hands with soap.
- We should learn to use the toilet properly and keep it clean.

World Toilet day is celebrated on 19th November every year. This was started in the year 2009.

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Annexure- TCERT- Std.3, Book, Environmental Studies, chapter- 3, Healthy food habits

SCIENCE

3. HEALTHY FOOD HABITS



There was a tug-of-war in our school today. The third standard students were so excited. The Physical Education Teacher divided them into two groups. Xavier led one team and Barath led the other team. The Teacher blew the whistle. Both teams pulled the rope with their full strength. Xavier's team won the event. The teacher congratulated the team and said that they won the event because of regular practice.

Thanking the teacher Xavier said, "We won the match not only because of regular practice but also because of our healthy food habits. We drink milk every day. We also eat eggs, fish, meat and vegetables along with rice and wheat".



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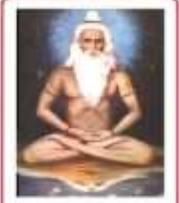
SCIENCE

- ◆ Take hands to your sides as shown in the picture.
- ◆ Eye should always be fixed on the thumb nails.
- ◆ During the exercise head can move slightly .

Eye protection

- ◆ Wash your eyes with clean water every morning.
- ◆ Do not look directly at the sun.
- ◆ Do not read in dim light.
- ◆ Do not lie down while reading.
- ◆ Do not read while travelling in a bus or train.
- ◆ When dust gets into the eyes, do not rub your eyes with hands. Wash them with clean water.
- ◆ Eating lot of greens, orange and yellow fruits and vegetables are good for your eyes.
- ◆ Sit atleast 2.5 meters away from TV while watching it.
- ◆ Watch TV with sufficient lighting.

Who is he?



The Father of Yoga

Pethanjali Munivar

**Donate blood until death!
Donate eyes after death!**



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d. Let us find!



Tick the right one and cross the wrong one.

1. We should wash our hands before eating.
2. We should eat our food very fast.
3. We should eat only at proper time.
4. We should eat lots of ice-creams and toffees.
5. We should use clean vessels for cooking.
6. We should eat food sold on the streets.
7. We should always keep the food closed.
8. We should drink boiled and filtered water.
9. We should not eat fruits.
10. We should eat greens along with our food everyday.



Annexure- TCERT- Std.4, Book, Science, chapter- 1, Food

SCIENCE

Requirements for a healthy life

For a healthy life, fresh air, clean water and nutritious food are necessary. Lack of any one of these may cause diseases. When we are sick, we cannot eat all types of food, can we?

When we are sick we should

- eat food that gets digested easily.
- take liquid food such as porridge, fruit juice and tender coconut.
- eat food that contains less fat.
- avoid eating pungent food.
- avoid eating food fried in oil.

Over eating is injurious to health

Activity

What sort of foods are to be avoided when sick?

What sort of foods can be eaten? Write in the Tabular column.

Bread, meat, milk,
Parotta, Biryani, Fish fry,
Porridge, Energy drinks,
Herbal decoction, Bajji.

When sick	
Foods to be avoided	Foods to be eaten

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Annexure- TCERT- Std.4, Book, Science, chapter- 4,Use of natural resources

TYPES OF WASTE

Biodegradable Waste

Bury the vegetable wastes under the soil. See after a month. You can see that they are decomposed with the soil. Aren't they? These are called **biodegradable waste**.

Non-Biodegradable Waste

Bury polythene cover under the soil. After a month it will be in the same form. The things which are non decomposable are called **non-biodegradable waste**.

Project:



Collect tomato, brinjal, banana leaves, glass, flowers, plastics, iron pieces, ceramic, wood, cotton cloth, a piece of brick and small aluminum vessels. Put them in a pit and cover with sand. After few weeks dig the pit and see.

Note down what you have observed in the given table.

S.No.	Things not found in the pit (Biodegradable)	Things found in the pit (Non-Biodegradable)
1.		
2.		
3.		
4.		
5.		
6.		

TYPES OF WASTES AND THEIR SOURCES

- Rotten fruits, broken gravels from building construction, bricks are the **solid wastes**.
- Waste water from factories, gutter water, wastages in liquid forms are the **liquid wastes**.
- Smoke from vehicles, industries and poisonous gases are the **gaseous wastes**.



Activity



List the waste produced from a house, a vegetable shop, a building construction site, a school, an automobile shop, a marriage hall, an electrical shop and a hospital.



Sl. No.	Solid Waste	Liquid Waste	Gaseous Waste
1.			
2.			
3.			
4.			
5.			



RECYCLING

Have you ever seen a person who buys old paper and old things from your house?

List the things taken by him.

How are these things changed and reused?

Changing the used products into new useful products is called **recycling**.

You can make papers and products out of pulp made from the waste papers. By doing so, the cutting down of trees will be reduced.

Iron, gold, silver, and copper could be melted and used again.

Things which are marked with  can be recycled.



Things that are not marked with  cannot undergo recycling. e.g. petrol, diesel, coal etc., They mostly pollute the environment.

Annexure- TCERT- Std.5, Book, Science (sem-ii), chapter- 1, Food

1. Food

SCIENCE

Dharani ate some fruits and drank the glass of milk given to her by her mother. Then she went upstairs to study. There was a foul smell in the room which was nauseating. She looked around the room to find the source of the bad smell. She found a glass of milk under the table. She realised that she had forgotten to drink the milk her mother had given her two days ago. The glass of milk had become spoilt and was responsible for the bad smell.

What caused bad odour from the milk? – examine.

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Food will be spoiled if it is not prepared, preserved and handled in the correct way.

We will learn in this lesson, the symptoms and causes of food spoilage, its prevention and also about the preservation of food.

Symptoms of food spoilage

All food items get spoiled over a period of time. We know that the food is spoiled if there is

- a change in the original state of the food item or
- a bad smell or
- the growth of **fungi**



Spoilt Pumpkin

Causes of food spoilage

Spoilage of food occurs due to the influence of air, moisture, heat and light which help in the growth of micro-organisms like fungi and bacteria. Food is also spoiled by the action of enzymes present in fruits and vegetables and insects like worms, fruit flies and bugs.



Bread with fungus

SCIENCE

FACT

Food items once refrigerated should not be kept outside the refrigerator for a long period of time. This is because at room temperature, growth of **bacteria** and **fungi** spoils the food.

If we consume spoiled food it will lead to a number of diseases. The fungi and bacteria that grow on spoiled food cause these diseases. Some of the diseases that are caused are as follows:

- | | |
|---------------------|-----------------|
| ● Food poisoning | ● Indigestion |
| ● Diarrhoea | ● Stomach ache. |
| ● Amoebic dysentery | ● Fever |

Prevention of food spoilage

Let us see whether the spoilage of food can be prevented. There are measures that can be taken to prevent the growth of fungi and bacteria which cause the food to spoil.

- By refrigerating food - At low temperature bacteria and fungi do not grow.
- By preserving - Using of various preservation techniques prevent the growth of bacteria.

Annexure- TCERT- Std.5, Book, Science (sem-ii), chapter- 3, Hygiene and prevention of Diseases

3. Hygiene and Prevention of Diseases



The half yearly exams had just got over that day. That night Akalya and her brother Selvin were talking for a long time. They were thrilled because they were to visit their grandmother the next day. At last, they slept. The next day they went with the family to their native place. Akalya and Selvin went around the places of the village and happily played for two days. The third day dawned. Selvin was still sleeping. His mother tried to wake him up. She found his body terribly hot. They got worried and took him to a hospital. The doctor checked him and gave him some medication. But fever did not come down for the next two days. The doctor advised a blood test. The test confirmed that Selvin was suffering from **Malaria**.



The lakes and ponds we find in our places are highly useful for domestic use, agriculture, fishing and for creating natural environment. But the same water becomes the breeding places of mosquitoes which spread illnesses like **Malaria, Dengue and Chikungunya**. When water gets polluted by man, diseases increase.

Do you welcome mosquitoes?

Warning!

- Mosquitoes spread fever like Malaria, Dengue and Chikungunya.
- Do not allow water to stagnate around houses.
- Cover the vessels containing water.
- Breed fishes in all water sources.

Mosquitoes that spread diseases

Anopheles

Female Anopheles mosquitoes bite human beings and animals at night. They are the causes of spreading **Malarial fever**



Culex



Culex is another kind of mosquito that bites people at night. They spread filarial germs that cause a disease called Filariasis. They also spread **brain fever**.

Aedes

Aedes bites people during the day. They breed and lay eggs in stagnating water, in old tyres, coconut shells, etc., These mosquitoes spread **Dengue fever**.



Diseases spread by mosquitoes:

Name of Disease	Causative Agent	Disease carriers
Malaria	Plasmodium	Anopheles
Filariasis	Wuchereria bancrofti	Culex
Brain fever	Japanese encephalitis	Culex
Dengue fever	Flavi virus	Aedes
Chikungunya	Toga virus	Aedes

Dengue fever

This disease was identified nearly two hundred years ago. **Flavivirus** causes this fever and Aedis mosquito spreads this fever. These mosquitoes bite people generally during the day.

Symptoms of Dengue

1. High fever
2. Severe headache
3. Severe joint pain and muscular pain
4. Vomiting

Ways to control Dengue

1. Protect yourself from mosquito bites.
2. Keep the surroundings clean.

Filariasis

Causative Agent

Wuchereria bancrofti

Annexure- TCERT- Std.6, Book, Science, chapter- 2, Food Habits

Food Habits			
Vitamins			
Nutrient	Food source:	Deficiency disease	Symptoms
Vitamin A	Fish liver oil, egg, milk, ghee, butter, carrot, corn, yellow fruits, greens.	Night blindness	Defective vision, blindness in dim light
Vitamin B	Whole grains, pulses, unpolished rice, milk, fish, meat, peas, gram, raw vegetables	Beri-beri	Unhealthy nerve, muscle fatigue
Vitamin C	Orange, lemon, gooseberry, green chillies, tomato.	Scurvy	Bleeding gums
Vitamin D	Fish-liver oil, milk, egg. It is also synthesised by the skin with the help of sunlight.	Rickets	Weak and bow bones
Vitamin E	Vegetable oils, green vegetables, whole wheat, Mango, Apple, Greens	Infertility	Sterility and reduction of immunity
Vitamin K	Green vegetables, Tomato, Cabbage, Egg, Milk and milk products.	Haemorrhage (blood does not clot)	Loss of excessive blood even for a small wound
Minerals			
Calcium	Milk, Fish, Wheat, Green Gram	Disintegration of bones and teeth	Weak bones and teeth.
Iron	Meat, Apple, Greens, Dates	Anaemia	Body fatigue, Giddiness.
Iodine	Milk, Iodized Salt, Prawn, Crab	Goitre	Inflammation in neck

Annexure- TCERT- Std.6, Book, Science (sem-iii), chapter- 2, Our environment

Our Environment

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Air, light, land, soil, water bodies, plants and animals around us constitute our environment. Living organisms are not only inter-dependent on each other but also on the non-living components of the environment. Therefore, a small change in the environment causes a great impact on the living organisms.

Environment is polluted, due to industrial development, over population, modern life style and urbanization, which leads to undesirable and harmful effects.

2.1. Garbage



Garbage

A lot of waste is accumulated owing to our busy life style. Things like plastic bags, papers, water bottles, aluminium foils, chocolate wrappers, peels of fruits and vegetables are thrown away after use. Unwanted substances formed during a process or substances which cannot be reused are called wastes or effluents.

Garbage are generated in places like houses, classrooms, industries

and public places like streets, market and sea shore.

2.2. Types of garbage

Solid wastes which pollute environment are of two types, namely

- ▶ Bio degradable waste
- ▶ Non bio degradable waste

Bio-degradable waste

In nature, some wastes are gradually degraded by bacteria, fungi (micro-organisms) and earthworm. These are bio degradable waste. Leaves, agricultural wastes, animal wastes, vegetables, fruits and their peel, seed, nut are examples of bio degradable waste.

ACTIVITY 2.1
I DO

- ▶ I collect waste papers and make them into small bits.
- ▶ I soak them in water for some time in a container.
- ▶ I smash them with my hand.
- ▶ Likewise I collect polythene wastes and do as above. I observe if any change occurs.

I Observe

From this activity we observe that paper is converted into pulp, whereas the polythene waste is not.

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Degradable wastes

Non-biodegradable waste

Waste substances that are not degraded by micro-organisms are non-biodegradable wastes. Eg: plastics, industrial effluents, metals.



Non-biodegradable wastes

2.3. Disposal of garbage

If the wastes are not handled properly, they get accumulated and besides occupying the land, they even cause bad odour and become abode of micro-organisms that cause diseases. Thus, people living in such area are affected with various diseases. Therefore, it is a must to dispose the garbage properly. The following methods are used to dispose the wastes.

1. Landfilling
2. Incineration
3. Composting
4. Reducing the usage
5. Reusing
6. Recycling

1. Landfilling

Landfilling is a method in which wastes are dumped into naturally occurring or man-made pits and covered with soil. Garbage buried inside landfills remain here for a long time as they decompose very slowly and become manure. These places can be converted into parks, gardens, etc.



Landfill

2. Incineration

The burning of solid waste in incinerator is called Incineration.

Human anatomical wastes and bio-medical wastes (discarded medicines, toxic drugs, blood, pus) are disposed by means of incineration. During incineration, the enormous heat kills all contagious disease-causing germs.

Our Environment



Incineration



Compost pit

3. Composting

The process of degradation of organic wastes into manure by the action of microorganisms is

called **composting**. The manure thus obtained becomes natural fertilizer for the plants as well as increases the soil fertility.



Composting - schematic representation

4. Reducing the usage

The best way to manage wastes is not to produce them. This can be done by using durable goods that last longer instead of things that are used once

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and thrown away. Use of fountain pen in place of ballpoint pen is a good example of reduce.

5. Reusing

Reusing means using a thing again and again, rather than using and throwing it after a single use. Instead of using plastic bags for shopping, using cloth bags is the best example for reusing.

6. Recycling

The process by which waste materials are used to make new products is called recycling. Using old clothes to make paper and melting some plastics to make floor mats, plastic boards and hose pipes are example of recycling.



Though we use several methods, 3R - reducing, reusing and recycling play an important role in disposal of garbage.

Pyramid of solid waste management

The given diagram explains the hierarchy of the environmentally preferable ways to manage solid waste.



From this pyramid, we infer that reducing the utilisation of material is the best method of garbage disposal.

2.4. Benefits of garbage disposal

- ▶ Pollution of air, water and land is reduced.
- ▶ Natural resources such as trees and metals are protected.
- ▶ Clean and hygienic surrounding is made.
- ▶ Unnecessary expenses are avoided.

ACTIVITY 2.2

WE DO

- ▶ Let us collect waste papers and make them into small bits.
- ▶ Take a wide vessel containing water and put the bits of paper in it. Add some fenugreek and soak it for a day.
- ▶ Grind the soaked paper and make it into dough.
- ▶ With the help of this dough we can make some useful things like tumbler, plate, etc.

Our Environment

THINK.....!

- ▶ What happens if garbage is not removed frequently?
- ▶ How does it affect us?
- ▶ Can we convert these wastes into non hazardous substances?
- ▶ What should we do for that?



DO YOU KNOW ?

Garbage collectors sort out wastes from dustbins for recycling and reusing. They help us to lead a healthy life by disposing the garbage.



2.5. Vermicomposting

Vermicomposting is a type of composting where the organic wastes are degraded by using earthworms. The manure obtained by this process is called **vermicompost**.

Vermicompost pit in school campus

Make a pit of 30 cm or take a wooden box. Place a thin net on the base of the pit or wooden box. Fill it with sand for about 1-2 cms.

Spread some plant wastes (like dry leaf, flower) and biodegradable wastes on it.

Sprinkle some water. Add some earthworms to these substances and cover it with old cloth or dried coconut leaf.

We can find that vermicompost is formed after four weeks.

Create a garden in your school and use this vermicompost as manure for plants and conserve soil fertility.



Vermicomposting

Annexure- TCERT- Std.8, Book, Science (sem-ii), chapter- 2, Air water and soil pollution

Air, Water and Soil Pollution

What is sewage?

Sewage is waste water released by homes, industries, hospitals, offices and other users. It also includes rain water that runs down the streets during a storm or heavy rain.

2.4. LAND POLLUTION

Pollution of the earth's natural land surface by industrial, commercial, domestic and agricultural activities is called land pollution. Throwing waste things like plastics, animal wastage, dye effluent and wastage causes land pollution.

Waste Water Treatment Plant

Treatment of waste water involves physical, chemical and biological processes.

1. At first, waste water is passed through bar screens.
2. Large objects like sticks, cans and plastic packets are removed.
3. The water is then passed through a grit chamber in which sand is removed.
4. The water is then allowed to settle in a large tank.
5. Solid materials settle at the bottom.
6. Then the water is transferred to the next tank having a skimmer. This skimmer removes the floating solids like oil and grease.
7. Next, air is pumped through water in an aeration tank to help aerobic bacteria to grow. The bacteria consumes unwanted matters that still remain in water.
8. The treated water has a very low level of organic material and suspended matter. It is discharged into a river.



Waste water treatment plant

Air, Water and Soil Pollution

2.5. SOURCES OF LAND POLLUTION

Land is polluted by excessive usage of fertilisers, pesticides, sewage wastes and factory wastes. It is mainly polluted by garbage.

Some land pollutants, called hazardous wastes cannot be disposed easily. Chemicals used in dry cleaning are examples of such wastes. Proper disposal of hazardous wastes is vital to maintain a safe and healthy environment.

The use of excessive amounts of fertilizer may decrease the productivity of the soil. Pesticides destroy the insects that harm crops.

Garbage should never be allowed to accumulate either at home or on the roads especially during the rainy season.

But pesticides may also destroy other helpful organisms in the soil.

Much damage to soil is caused by erosion. Erosion is the withering away of soil. It can result from removal of trees and other plants that hold soil in place. Wind can then easily blow the soil away and rain can wash it away. Careless farming methods, clearing of land for construction projects such as road and real estate development also cause pollution.



2.6. SCIENCE TODAY- BIOPOL.

The trade name of the fully biodegradable plastic material naturally produced by the micro organism is Alcaligens. This plastic is homo polymer i.e. Poly Hydroxy Butyrate (PHB).

Bioplastics are a form of plastic derived from renewable biomass sources such as vegetable oils, corn starch, pea starch by the action of micro organisms.

The Eumycetes and Schizomycetes micro organism are responsible for degradation.

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