

# 24th National Children's Science Congress 2016



## Activity Guide

**Focal Theme for 2016 & 2017**

**SCIENCE, TECHNOLOGY & INNOVATION  
FOR SUSTAINABLE DEVELOPMENT**



**State Co-ordinating Agency**



**Karnataka Rajya Vijnana Parishat**

Vijnana Bhavana, No. 24/2, 21 Main Road, Banashankari II Stage Bengaluru-560 070



# 23rd State Level Children's Science Congress 2015-Gokak





# 23rd State Level Children's Science Congress 2015-Gokak





# 23rd National Level Children's Science Congress 2015-Chandigarh







24th National Children's Science Congress 2016-2017

## ACTIVITY GUIDE

**Focal Theme:**

**Science, Technology and Innovation for**

**SUSTAINABLE DEVELOPMENT :**

**A focus on Accessibility for persons with disabilities**

State Co-ordinator : Shri Pandit K Balure  
State Academic Co-ordinator : Shri H.G. Huddar

**State Co-ordinating Agency**



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## 24th NCSC Activity Guide – 2016

This resource material compiled in this publication was developed during the Brainstorming Workshop held at Gujarat Science City, Ahmedabad during 21st – 24<sup>th</sup> Nov, 2015.

The Soft copy of the NCSC 2016 Activity Guide is available at [www.ncstc-network.org](http://www.ncstc-network.org) and [www.krvp.org](http://www.krvp.org).

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## NCSTC-Network

The NCSTC-Network, a voluntary network of over 70 voluntary and government organizations, is a unique organization for science popularization and for stimulation of scientific temperament among the people. It was registered in 1991 under Societies Registration Act-1860 of Delhi as an autonomous society.

The NCSTC-Network was formed through the effort of the National Council for Science and Technology Communication (NCSTC) under the Department of Science and Technology, Government of India to give a common platform to like minded organizations in science communication, with an objective to strengthen the science communication movement in the country.

What followed has watched by all. The Network remains a unique and successful experiment in science popularization, bringing the government and non-government sectors together in nation building exercise. It publishes books, co-ordinates and organises National Children's Science Congress (NCSC), arranges science programmes, organizes trainings / workshops and in short, bridges science and the common person.

### Major Activities:

1. The most visible activity of the Network is the National Children's Science Congress (NCSC) which is being catalyzed and supported by NCSTC. It is a unique programme for children in the age group 10 - 17. NCSC gives a common platform for the children of the country to present their scientific realization through small research project on given focal theme. It records participation of around five lakh children every year.
2. National Teachers' Science Conference (NTSC): It is a nationwide activity. Network has been entrusted to organize this activity since the year 2005 by NCSTC. It organized the 3rd NTSC at Mysore during 27-30 January 2006 and would continue to provide this platform for the teaching community for sharing their experience of innovation in teaching - learning process.
3. Appreciating Physics in Everyday Life: the year 2005 was celebrated as the International Year of Physics. During the celebration the necessity of a nationwide campaign was felt to take applications and concepts of physics to a large number of young people through some intensive science communication activities. Network has taken up the challenge, which is being catalyzed and supported by NCSTC, and has already organised a series of activities through its member organizations throughout the country.
4. Apart from all these activities Network was an active component in the Bharat Jan Gyan Vigyan Jatha 1992 and the Year of Scientific Awareness (YSA) 2004. In both these activities most of the Network members took active part at state and regional level. In YSA-2004 the network played a crucial role in printing and dissemination of the software.

The NCSTC-Network is now ready to take some more challenges like popularizing the concept of donation of body after death, science communication programme for girl child, etc.

To know more about the NCSTC Network you may visit its website [www.ncstc-network.org](http://www.ncstc-network.org)

### Address for communication:

NCSTC-Network, E-56, 1st Floor, Samaspur Road Pandav Nagar, Delhi-110 091,  
Telefax: 011-22799236 E-mail: [ncstcnet@hotmail.com](mailto:ncstcnet@hotmail.com)





## **Rashtriya Vigyan Evam Prodyogiki Sanchar Parishad**

Rastriya Vigyan Evam Prodyogiki Sanchar Parishad (RVPSP), New Delhi, Department of Science and Technology, is an apex body set up with the objectives of communication of science and technology (S&T) and stimulation of scientific and technological temper among the people. Among other things RVPSP:

- Catalyzes and supports research and development in the area of S&T communication and devising more effective communication methods, tools and technologies;
- develops software in different languages in the form of films, websites, radio and television programmes and magazines in different languages;
- helps prepare competent science communicators, through short and long-term courses in selected S&T based voluntary organizations, Universities, etc.
- encourages and recognizes outstanding, communicators and institutions involved in S&T communication through national awards.
- Organizes state / country wide field projects for fulfilling its objectives by involving other agencies and network of science based voluntary organizations, etc. These can be in the form of Jathas, melas, science exhibitions, science conferences, seminars, etc.
- It also orchestrates and coordinates S&T communication programmes and activities nationally. RVPSP is initiating process to encourage creativity among youth and invites suggestions and inputs for this.

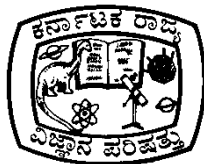
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## **KARNATAKA RAJYA VIJNANA PARISHAT**

Karnataka Rajya Vijnana Parishat (KRVP) was established as a voluntary organization in the year 1980 with a few units at various places in Karnataka. Committed to the task of popularizing S & T through various channels of activities and communications, KRVP today is a federal structure of a network of more than 300 units spread all over Karnataka. The Head office is located at the Vijnana Bhavana, Banashankari 2nd Stage , Bangalore. Karnataka Rajya Vijnana Parishat is a member of All India People's Science Network and NCSTC- Network.

### **OBJECTIVES**

- Advancement of science, scientific attitude and science education (both formal and non-formal) in Karnataka, especially in rural areas.
- Propagation of scientific knowledge among the people of the state by organizing lectures, seminars, symposia, forums, excursions, exhibitions, publication and distribution of books and journals on science, especially in Kannada.
- Publication of science periodicals, books in Kannada, production of scientific films and audio visual aids, science kits and toys, organizing environment camps, seminars, workshops, training for science teachers in science communication and camps regarding health and hygiene are some of the major programmes. Organizing Children's Science Congress at State level and participating at National level Congress is another important event coordinated by KRVP. The National Children's Science Congress was organized twice in Karnataka; As at Mysore in 2002 and at Bengaluru in 2014.

The Parishat organizes a science conference at the State level once in every three years. Science writer's workshops, telescope making, balotsavas, environment awareness programmes, birth centenaries of scientists, exploring myths of blind beliefs, helping the State to set up eco- clubs, Student and Scientist Interaction Programme, science centres in schools and special Environment projects are many of the programmes handled by KRVP.





## **MESSAGE**

Karnataka Rajya Vijnana Parishath (KRVP) has been rendering yeoman service in the field of science popularization for more than three decades with emphasis on preparing the younger generation and widening the horizons of their knowledge.

The KRVP is the nodal agency for the NCSTC's Children's Science Congress (CSC) at the state level. The CSC provides a platform to spread the method of science among children. The 2016 CSC focuses on the theme "Science Technology and Innovation for sustainable development" which is very vital to the modern day society.

It is gratifying to note that KRVP is consistently endeavoring to contribute to the development of society through such science based activities.

I convey my best wishes to all the child scientists participating in the district, state and the national level competitions of Children's Science Congress 2016.

**16.08.2016**  
Bengaluru

A handwritten signature in black ink, consisting of stylized initials and a long horizontal stroke.

**Shri S.V. Sankanur**  
President, KRVP  
and Member of Legislative Council,  
Govt. of Karnataka



**FROM THE SECRETARY'S DESK...**

The theme for this year's National Children's Science Congress is '**Science, Technology and Innovation for Sustainable Development**'. ' This is a vital knowledge for existence. The entire biosphere is dependent on weather and climate for its sustainability. Basic things like water, food are totally dictated by conditions like wind, cloud, rain, temperature levels etc. Sustainable Development (SD) is a process for meeting human development goals while maintaining the ability of natural systems to continue to provide the natural resources and ecosystem services upon which the economy and society depend. All the Scientific Research need to be aimed at developing the country on par with international standards. Every village, town, megacity and whole world has to raise to the occasion. Young scientists have to work on the theme mentioned to understand the developments in the field of science and technology around them. This forms the core strategy of the Science Congress.

KRVP has been undertaking the National Children's Science Congress programme for more than 2 decades, We are bringing out this activity guide book as a reference source for project identification and working methodology. KRVP is grateful for the National Council for Science and Technology Communication, DST, GOI and Dept. of IT, BT & S&T, Govt. of Karnataka..

A handwritten signature in black ink, appearing to be 'Vasundhara Bhupathi'.

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16-08-2016  
Bangalore

**Dr. Vasundhara Bhupathi**  
Honorary Secretary, KRVP



## **FOREWORD**

National Children Science Congress (NCSC) prompts children to ponder upon some significant societal problem, think over its causes and subsequently try and solve the same using the scientific process. This involve close and keen observation, raising pertinent questions, building models, predicting solutions on basis of models, trying out various possible alternatives and arriving at an optimum solution using experimentation, field work, research and innovative ideas. NCSC encourages a sense of discovery of child scientists.

National Council for Science and Technology Communication (NCSTC) aspire to popularize S&T among school students by exhibitions and demonstrations, training of resource persons particularly teachers, field projects etc. NCSC encourages children to observe, explore, experiment and wonder through a project activity and its associated ways of participation and evaluation rightly takes care of the guiding principles of next generation science learning.

The NCSC is unique programme that motivates children in the age group of 10-17 years, to take-up scientific research on local specific issues of their choice under broad themes, instead of imposing issues on them. NCSC programme is an activity towards promoting congenial team work, correlating science with everyday life situations.

The focal theme of NCSC for the year 2016 and 2017 has been finalized as "Science, Technology & Innovation for Sustainable Development". This has been very inspiring and engaging among children and the community, linking the socially relevant current research issue with the Sustainable Development Goals (SDG). The Activity Guide Book on this broad theme and sub-themes will be distributed widely among the organising and technical coordinators and guide teachers which will help them throughout the programme. Competition and recognition of merit is introduced at district, state and national level.

My best wishes to all of the Child Scientists and the teachers.

New Delhi

**(Dr. Bhanu Pratap Singh)**  
Scientist 'G'/ Head (NCSTC)

## **A Note from National Programme Coordinator**

**Ms. Ujjwala Tripti Tirkey**

Scientist 'F/ Director, NCSTC & National Programme Coordinator.

The National Children's Science Congress (NCSC) is flagship programme initiated in 1993 has reached to 23 years with its great success. It is organised nationally every year from December 27-31. It is forum for 10-17 years age children from urban/ rural area of different state. NCSC programme is not necessarily a school-based programme but it is open to all non-formal systems of education besides out of school and disabled children. NCSC programme is not only limited to Government, Private and Public school but also extended to Kendriya Vidhyalaya Sangathan and Navodaya Vidhyalaya Samiti. All over the country about a million children take part in this unique event every year, from which about 650 projects come to national level. This programme is become popular in ASEAN countries with their participation by delegates.

NCSC programme has covered the topics like Environment, Nutrition, Clean-up India, Water Resources, Biodiversity, Land Resources, Energy, Weather and Climate during its 23 years of great success and also grow up with innovative ideas of Child scientist through their innovative Project work on a variety of highly relevant local issues of above topics.

NCSC has announced "Science, Technology & Innovation for Sustainable Development" as a focal theme for the year 2016 & 2017 with an expectation that the child scientist will be introduced to inquiry based learning approaches in project mode. Sustainable development (SD) is a process for meeting human development goals while maintaining the ability of natural systems to continue to provide the natural resources and ecosystem services upon which the economy and society depend. We are planning to engage child scientist and our teachers to work on Sustainable development goals to become change maker and to change their future.

The Activity Guide Book on (Science, Technology & Innovation for Sustainable Development as a focal theme for the year 2016 & 2017) is brought out with the great efforts of the Experts, Resource Persons, State Academic Coordinator and further involvement State Resource Person involved in the brainstorming session and participated in the National Orientation Workshop.

We hope that the Activity Guide Book will help the State and District Coordinators, Resource Persons, Teachers Guide and Evaluators to carry out the activity, resulting the valuable and potential project ideas that come up in different level of NCSC. Any suggestion with regard to improvement in the Activity Guide Book is always welcome.

My best compliments to all child scientists and heir guide teachers.

New Delhi

**(Ms. Ujjwala Tripti Tirkey)**  
Scientist 'F/ Director  
National Programme Coordinator



## **ACKNOWLEDGEMENT**

On behalf of Core Working Group for design and development of the Activity Guide Book for the National Children Science Congress 2016 and 2017, I am thankful to NCSTC, DST, Govt of India for considering the theme Science, Technology, Innovation for Sustainable Development, which is very inspiring and engaging.

I am extremely thankful to Dr. B. P. Singh, Head, NCSTC, DST, Govt of India and Mrs. Ujjwala Tripti Tirkey, Scientist F, and National Coordinator, NCSC Programme for their trust and confidence on GUJCOST for the design and development of the Activity Guide Book.

I express my sincere thanks and regards to the esteemed members of the Core Working Group who had attended the brainstorming session at Gujarat Science City during 21-24 November 2015 and contributed a lot in elaborating the focal theme and subthemes in terms of possible projects and activities.

My special thanks are due to NCSTC, DST for the catalytic support and guidance in making this activity guide book.

Last but not least, I express my sincere thanks and gratitude to DST, Govt of Gujarat, GUJCOST and Gujarat Science City for their constant support and encouragement in this programme.

\

**On Behalf of National Academic Core Group**  
Dr. Narottam Sahoo Coordinator, NAC

**National Council for Science & Technology  
Communication (NCSTC) Department of Science and  
Technology (DST) Government of India**

NCSTC is an apex Organization of the Department of Science and Technology of Government of India that endeavours to

- Communicate Science and Technology
- Stimulate Scientific and Technological temper
- Coordinate and orchestrate such efforts

**Goals :::: :**

- to create excitement concerning advances in Science & Technology
- to enable informed decision-making at the grass roots level
- to encourage intelligent debate on developmental issues Important Activities
- Research in thrust areas of science and technology communication;
- Development of scripts, films, video and radio programmes, books, slide sets, etc., on selected areas of science and technology;
- Training (short term) for school teachers and activists of science & technology based voluntary organisations in science communication;
- Development of science journalists through University Courses in Science and Technology Communication ;
- Awards and recognition for outstanding science communicators;
- Coordination with state councils and networks of S& T based organisations;
- Developing capacity through science communication
- Field programmes for demonstrating innovative ideas of science popularisation, outreach and extension activities including National Children's Science Congress, Science Day celebrations, promotion of voluntary blood donation programmes, environmental awareness and positive action, etc., and Promoting International Cooperation for mutual benefit.

**For further details please contact**

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## Part -1

**About National Children's Science Congress ( NCSC )****1. NCSC-The beginning**

The seeds of the programme of National children's science congress (NNCSC), in the way of an exercise to carry out small research activities at micro-level were planned in Madhya Pradesh by an NGO called Gwalior Science Center. It was later adopted by National Council for Science and Technology Communication (NCSTC), Department of Science & Technology (DST), Government of India for carrying out national level activities through NCSTC-Network (a network of Non-Government and Government organizations working in the field of science popularization) as national organizer.

It was a time when many of the country's crusaders of science communication were experienced with massive science exercise of Bharat Jana Bigyan Jatha and Jana Gyan Bigyan Jatha. It was felt that the large scale activities for developing science awareness among the masses are to be continued as regular activity, so, this programme was launched nationwide in 1993, under nomenclature National Children's Science Congress (NNCSC), with an expectation that it would generate scientific temperament among the teachers and students, and spread among the various stakeholders of the society. The programme of NNCSC has been fruitfully conducted for the last 23 years.

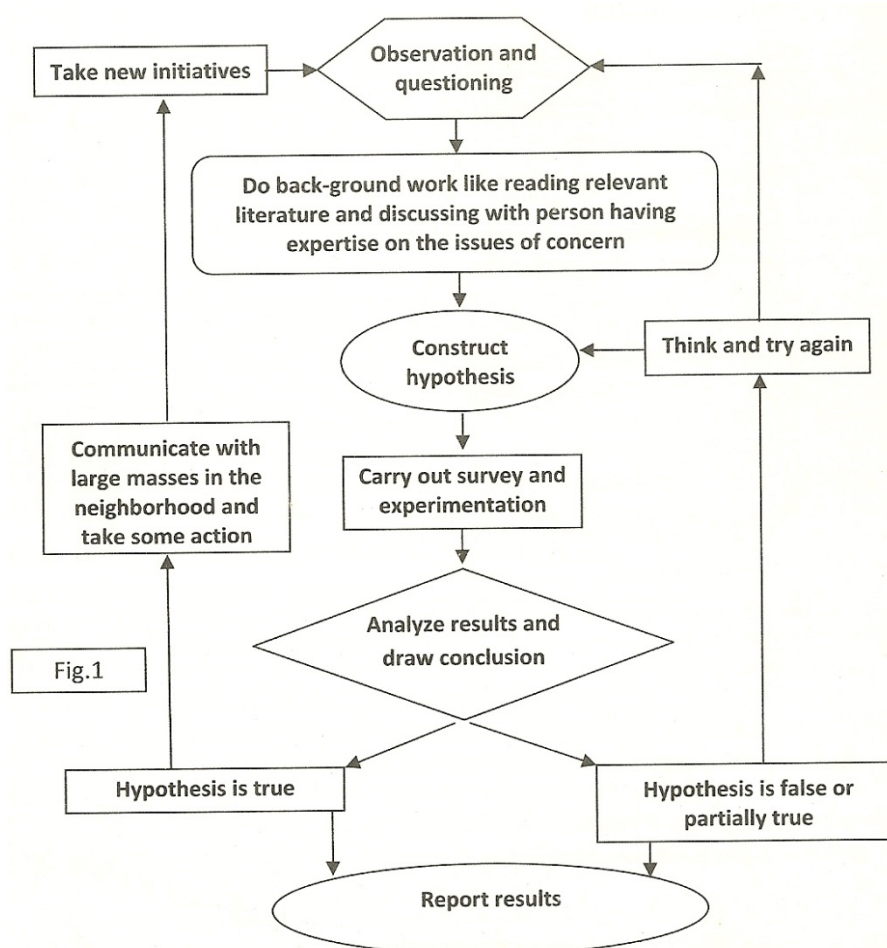
**2. NCSC: An overview**

Children's Science Congress is targeted to spread the concept of the method of science among the children their project activities adopting the principle of **learning through doing**. The mandate of participation is that, the children will carry out a project on a particular topic in relation to theme and sub-theme decided for the year. The study is to be carried out in the neighborhood of the children where they live. For this, the students form a group with their like-minded friends/classmates and the study is carried out under the supervision of a guide. It is noteworthy that, NCSC programme is not only for the school going children but is also open for the children outside the formal boundary of schools, in the age group of 10 to 17 years (where 10 to 14 years is considered as junior group and 14 + to 17 years as senior group). Further, it is not mandatory that a guide must be a school teacher; any persons with fair knowledge of dealing with children and method of science are considered eligible to guide the children, but should not be direct relative of any of the children.

The exercise of project activities, as thumb rule, encourages the children to explore, **think, serve and wonder**. It is capable to imbibe the following temperament/quality/skill of the children:

- **Observation**
- **Making measurement**
- **Making comparison and contrasts,**
- **Classification,**
- **Estimation,**

- **Prediction,**
- **Interpretation,**
- **Critical thinking,**
- **Creative thinking,**
- **Drawing conclusion and**
- **Cooperative skill**



Therefore it is ideally expected that any group of children will undertake a project work with a perspective of continuous effort of questioning and experimentation as shown in Fig-1. Here, observation incorporates anything the children observe in their daily life in the locality, in relation to the theme defined for the year.

The observation should be followed by relevant questioning such as ***“What? Where? When? Why? How? Whom?”***. In the search for finding out the answer to the question (s) one is required to ***review different literature*** concerning the issues in the study. Review of such literature basically and ideally helps in framing the steps towards the study and experimentation. In the process, one may also discuss ***with experts of the relevant fields to get information and advice***. Initiatives for such activities must be encouraged by the guide associated with the project. These steps will help to frame assumption/ hypothesis.

Hypothesis is an assumption of some cause and its impact on the basic of observation, information collected from different literature and emerged from discussion with experts.



After these phases, actual study through survey or experimentation or survey followed by experimentation would start. In the case of survey-based work, identification of respondent, their unit of observation, sample coverage, design of survey in relation to designing of interview schedule or questionnaire is supposed to be the most critical steps. Such decisions may vary with the issues of study. On the other hand, in case of experimentation, setting the objective of experimentation, defining different parameters, identification of ideal instruments, framing of procedures/ steps and control along with repetitive observation of the experiments are critical decisions, which will determine the path towards the result. Again in relation to issues of study, such experiment may be either laboratory experiments or field experiments.

It is expected that in course of time, the children's project will bring in lots of new information about problems and prospects of their locality along with innovative ideas to address these issues. Moreover, in the course of project work, the children may develop different new approaches of study along with the development of different instruments for their experiments. Such tools/instruments may be developed with the material in their access/available to them nearby. Another expectation was that the outcome of different studies will be communicated among the local populace, which in turn, helps in generating scientific temperament among the general mass.

In a nutshell, the NCSC projects are simple, innovative, concerned with local issues related with day to day life and are carried out with very nominal cost, where the focus is more on logical interpretation and analysis of issues, and finding out pragmatic solutions of generic nature to the possible extent, and not merely confined to the study topic and corresponding model making.

### **3. Objectives of NCSC**

The primary objective of the Children's Science Congress is to make a forum available to children of the age-group of 10-17 years, both from formal school system as well as from out of school, to exhibit their creativity and innovativeness and more particularly their ability to solve a societal problem experienced locally using the method of science.

By implication, the NCSC prompts children to think of some significant societal problems, ponder over its causes and subsequently try and solve the same using the scientific process. This involves close and keen observation, raising pertinent questions, building models, predicting solutions on the basis of a model, trying out various possible alternatives and arriving at an optimum solution using experimentation, field work, research and innovative ideas. The Children's Science Congress encourages a sense of discovery. It emboldens the participants to question many aspects of our progress and development and express their findings in their vernacular.

### **4. Relevance of NCSC in the light of contemporary educational Initiatives**

The basic approach of NCSC is the principle of learning through doing on the issues of children's immediate environment significantly carries the spirit and mandate of education for sustainable development (ESD) of UNESCO, National Curriculum Framework (NCF, 2005) and Right to Education (RTE, 2009).

The modalities and approaches of NCSC cater to the five pillars of learning of education for Sustainable Development vividly, viz. Learning to know, learning; to do, learning to live together and learning to be, learning to transform one self and society (Declaration of I SI) in the 57th meeting of the United Nations General Assembly in December 2002, which proclaimed the UN Decade Education for sustainable Development, 2005- 2014, refer

[www.desd.org](http://www.desd.org) and [www.unesco.org](http://www.unesco.org))

The mandate of NCSC which encourages children to observe, explore, experiment and wonder through a project activity and its associated ways of participation and evaluation rightly takes care of the guiding principles of the NCF, 2005. Therefore, example of children's Science Congress has been rightly cited in the NCF documents under executive summary section, page ix ([http://www.teindia.nic.in/Files/NCF\\_2005.pdf](http://www.teindia.nic.in/Files/NCF_2005.pdf)). Similarly NCSC activities also helps in materializing the approach of learning as framed in the Right of Children of Free and Compulsory Education (RTE)Act, 2005 particularly in relation to article 6.1, section C (ii, iii, iv, v)].

More over the NCSC activities, since 1993, has catered to many of the approaches and priorities of Science education visualized in the National Programme of Sarva Shiksha Abhiyan (SSA) (Ref: SSA framework, [http://ssakarnataka.gov.in/pdfs/aboutus/ssa\\_framework%20.pdf](http://ssakarnataka.gov.in/pdfs/aboutus/ssa_framework%20.pdf)) and Rashtriya Madhyamik Shiksha Abhijan (RMSA) (Ref:<http://www.educationfor-allindia.com/rastriya-madhyamic-shiksha-mission-RMSM.pdf>).

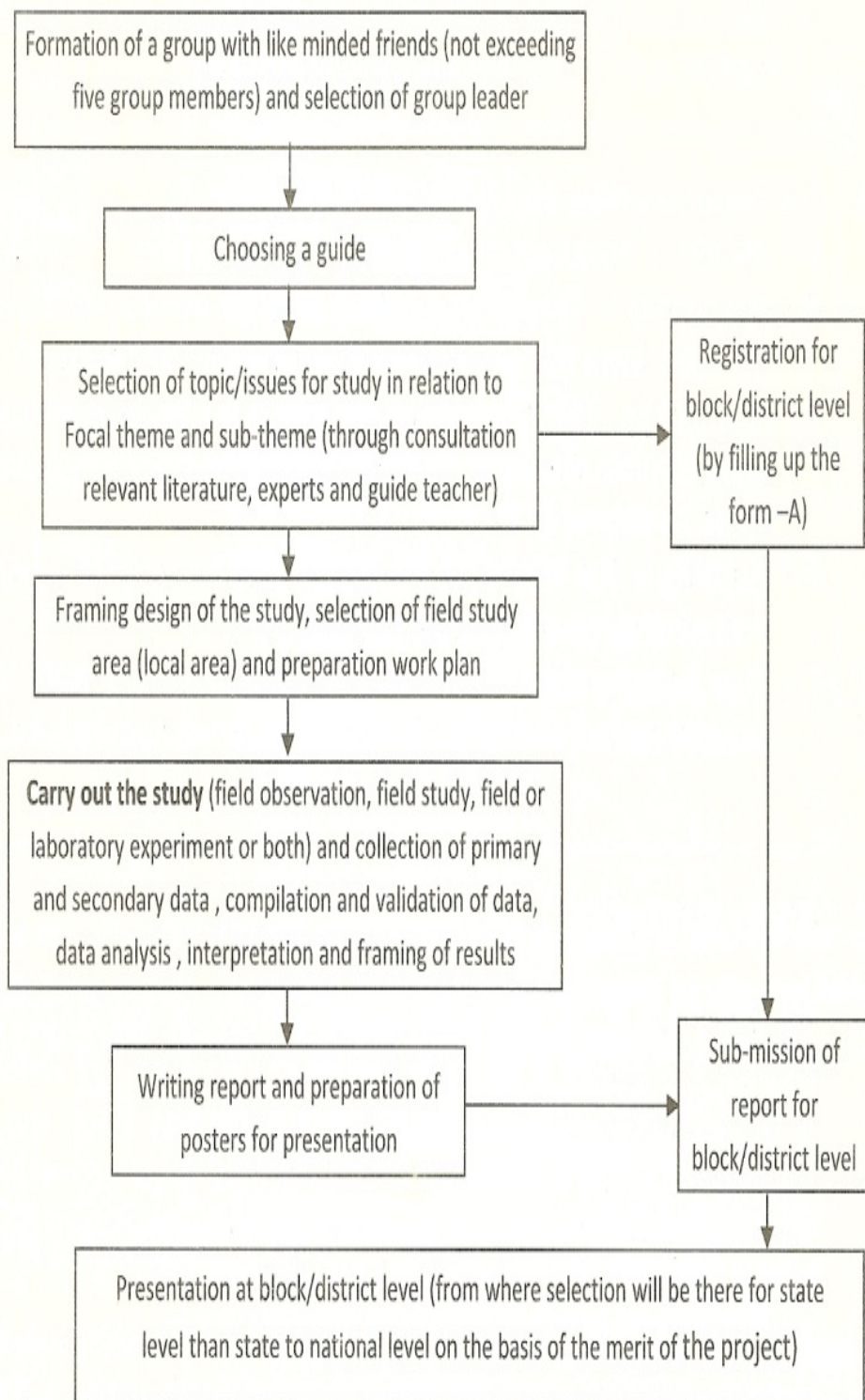
## **5. Eligibility Criteria for Participants**

- It is open for children in the age of 10 years to14 years (lower age group) and from 14+ years to 17 years (upper age group) as on December 31 of the calendar year.
- A group of children not exceeding five can do the project study under a guide teacher.
- A child scientist, who had already presented as a Group Leader at the National Level in one age- group can act as a co-worker in the subsequent year, in the same age group (lower / upper).
- Parents, whose child would participate in the Children's Science Congress in the ensuing year, should not hold any portfolio in the organizing committee of the NCSC conducted at any level.

## **6. Modalities of Participation**

Following are major steps involved for participations in the NCSC:





## 7. Nature of NCSC Project

### **NCSC projects are:**

- Innovative, simple and practical;
- Representing teamwork;
- Based on exploration of everyday life-situations;
- Involving field based data collection;
- Having definite outputs, arrived through scientific methodology;
- Related directly to community work in the local community;
- Having follow-up plans.

## 8. Criteria of Good Projects

As per past experience it has been found that projects rated very good had the following elements while implementing and documenting the project:

- Proper understanding and definition of the problem undertaken.
- Quality and quantity of work, including team work, learning process, subject understanding and efforts to validate the data collected.
- Relevance of the proposal to the community/school problem and impact of project on schoolmates, neighbourhood community.
- Originality, innovation and creativity shown to understand the problem and find solution i.e. in methodology and experiment design.

## The Project may follow the steps of SMART approach

- S:** **Specific:** The subject/issues of study must be specific.
- M:** **Measurable:** The issues of study must be measurable in quantitative /qualitative forms so that component of comparability is maintained.
- A:** **Appropriate:** The topic must be appropriate to the focal theme and sub themes, along with field study area, methodology must be appropriate to nature of the issues considered for the study.
- R:** **Realistic:** The issues of the study must be realistic along with the methodology adopted for the purpose.
- T:** **Time bound:** Study must be carried out in a limited time frame. The project activities may not destabilize normal activity /schedule of the child.

## 9. Points to remember

The project work of NCSC must be carried out in a systematic way so that it can rightly reflect the method of science in the works. The issue of the study may demand experimental survey works or both. In case of experimental works design and principle of the experiments are very important factors which may help to get a better result in a rational way. In such case parameters of observation and verification through the experiment and its logical selection must be reflected vividly along with sets of control and approached of data



validation. Similarly, in case of survey based projects universe of the study, criteria of selection, sample coverage, design of questionnaire or interview schedule are very important along with approached of data compilation, validation, analysis and interpretation. Prototype model or functional models are only encouraged to be used in project presentation if issues and methods of study demands for it.

**Log-Book.** Proper work diary has to be maintained while carrying out the project works. The day to day activity has to be neatly noted in the form of a log-book and should be submitted with the project report at the time of submission. All the details, such as project title, name of the group leader etc. should be written clearly on the cover.

## 10. Structure of the Project Report

The structure of the project report of NCSC shall be as follows:

i. Cover page – must incorporate

- Title of the project
- Name and address of Group leader and coworkers
- Name and address of guide

ii. Form – A ( Registration Form)

iii. Abstract – in 250 words for lower age group and 300 words upper age group (one copy in English) Please see Annexure VI for the Format for writing the Abstract.

iv. Contents- list of chapter with detail heading and sub-heading, list of table, chart, maps, etc. along with references against page numbers.

v. Introduction- description on background of the study

vi. Aims and objectives of the study

vii. Hypothesis

viii. Need statement & Relevance.

ix. Methodology:

### **Experimentation**

Survey (if related to the project, neatly describe Survey methodology followed, sampling procedure, Sample size etc.) Remember that projects having only a Survey component do not qualify to be an NNCSC project and would be rejected. Survey can be an additional component of the methodology, to strengthen the project outcomes, to understand the Knowledge, Aptitude and Practices of the population).

x. **Observations:** By this we mean what we observe during the experiment, what outcomes are seen etc. Observation can be both qualitative as well as quantitative, but in NNCSC, we mean quantitative mode where we end up having specific data from the experiments. Please note that observing some phenomenon is different in scientific parlance where every observation leads us to better understanding of the phenomenon, where we generate specific information as to when something happened, why, under what conditions and what /how much the change occurred.

xi. **Data analysis and interpretation:** From the data that we generate /obtained

from the experiments/observations, the data is processed for better understanding of the phenomenon in a more structured manner. We can use many tools and methods to analyze the data where we try to understand the patterns that emerge from it to form results and later conclusions. We need to remember that the raw data that is generated is not the Results, rather we use the raw data and interpret the data using tools /methods (eg. Statistical methods).

xii. **Results:** Results are the output of our compilation of the data into meaningful outcomes /interpretations and sometimes, we may need to redo the experiments to get consistent results. If in case, we are not able to “repeat the experiments”, we need to have adequate replicates so that adequate data is available for interpretation, and arriving at results.

xiii. **Conclusions:** This is the logical end of the project where the experimenter tries to arrive at specific conclusions from the observed phenomena. In a way, the whole objective of the project was to arrive at some conclusion, either positive or negative which would lead to a better understanding of the problem.

xiv. **Solution to the problem:** Once the problem is understood using the above steps, then we can attend searching for solutions to the problems. Most often, the correct understanding of the problem would lead us to one or many solutions.

xv. **Future plan (Including any follow up plans):** We can chalk out a future plan of action for taking the problem further, studying it deeper with more intensity and with more observations (replications, repeatations etc.)

#### **xvi. Acknowledgement**

#### **xvii. References**

The word limit for the written report for the lower age group is 2500 and that for the upper age group is 3500. The written report can be substantiated by including limited number of photographs, sketches, illustrations and / or drawings, etc.

### **11. Oral Presentation:**

Oral presentation at the technical sessions of the congress is a very important component of the entire process. Effective communication during the briefing of the issues of study, its objectives, methodology adopted for the study, important observation and findings, vital aspects on the way and approach to solve the problem or addressing the problem is a very critical part of the exercise, since only 8 minutes' time is allotted for the purpose. Therefore, one has to plan pragmatically for this purpose. Children can use 4 different posters (which is mandatory) to make their presentation easier, clearer and richer. Posters must be prepared on 55 cm x 70 cm (21.6" x 27.5") drawing sheets (i.e. chart papers). If needed power point presentation may be used.

Your posters should contain bulleted points information on (1) The project title, (2) Names of the group members, (3) Objectives, (4) Map of the area, if any, (5) Methodology, (6) Results, (7) Conclusion, (8) Solution to the problem. Depending upon the nature of the project the poster may or may not have a map and/ or results.

### **12. Different levels of Congress**

Children's Science Congress is organized in three levels where the child scientists and their project works are screened under common evaluation criteria. The evaluation of the project is done for its innovativeness, simplicity and practicality. On the basis of the merit of the project is selected for the next level. The three levels are as follows:

- Block /district level
- State level
- National level.

The District/Block level Congress is the first level in which projects compete with one another and are screened for presentation at the State level Congress, which is the second level. Projects as per State-wise quota (indicated at Annexure- I) are selected from the State level for the Grand Finale – the National Children's Science Congress. Seven to eight lakh child scientists participate at various levels from the States and the Union Territories.

### **13. Screening**

(i) The selection ratio at District/State Level and at State/National Level should be as follows:

State: District = 1: 15

(Out of 15 projects presented at District 1 will be screened for State Level.)

(ii) State to National As per State-wise quota indicated at Annexure-I. Projects qualified to take part in the National level are further divided in the ratio of 1:5, where the best projects at the State level are qualified for Oral Presentation at the National level, whereas the rest of the projects that come to the National level are qualified for Poster Presentations. (See Annexure I for details).

(iii) The selection ratio of Lower age group (10 to 14 years of age) to Upper age group (14+ to 17 years) should be 40:60. For National level, the State Academic Committee can decide which is the best project that would qualify for Oral Presentation irrespective of age group or Rural/ Urban.

### **14. Tentative Activity Schedule**

- Selection of subjects and activity for registration of teams : June-July
- Working on the project: Minimum two months
- District level Congress: By September-October
- State level Congress: By November
- National level Congress: 27-31 December
- Indian Science Congress – 3 to 7th January.
- 'Kishore VaigyanikSammelan' (at Indian Science Congress) from 3rd to 6th January.

### **15. Approaches of Project Evaluation**

The innovative ideas and scientific methodology are the basis of a good project but one has to prove his communication skills also to make others listen and understand his findings. For doing this, a total cooperation in the group is a must. Accept positive criticism within the group or even from outside and improve the work plan. This will bring award and recognition.

#### **15.1. Evaluation Criteria**

- Originality of idea and concept:** A unique or novel project idea which attempts to answer a specific question - (a hypothesis driven by curiosity to understand any concept related to focal theme). The idea should not be an exact replication of model project as printed in the Activity Guide. A proper explanation of origin of the idea may be demanded by the evaluator.
- Relevance of the project to the theme:** This section focuses on how the project is relevant to the focal theme/sub-theme.
- Scientific understanding of the issue:** Refers to the extent of knowledge the child



scientist has in relation to the project idea.

- iv. **Data collection:** Systematic collection of information using relevant tools/interviews/questionnaire. Sample size should be sufficient to support the issues under study.
- v. **Analysis:** This includes tabulation, categorization/classification, and simple statistics as applicable to the study.
- vi. **Experimentation/Scientific study/validation:** Conducting of experiments/field study and validation applying simple methods of science. Experiment need not be every sophisticated or lab based, they could be simple, self developed and inexpensive too.
- vii. **Interpretation and Problem solving attempt:** To what extent the team has addressed the proposed hypothesis and the issue of the locality through the project.
- viii. **Team work:** It refers to work division, cooperation and sharing among and beyond the team members (the child scientists).
- ix. **Background correction (Only for District level):** In this case the background of the children is verified like geographical location of their school, village, town etc. in relation to infrastructure, information and other input related facilities available with them. The logic is that children from difficult geographical situation must get some weightage in comparison to the children from advantageous geographical location. Non-school going children should also get some weightage in this criterion.
- x. **Report and Presentation:** Written Report and Oral Presentation are evaluated separately. Reports are evaluated for its systematic presentation, tabulation of data in support of the project idea and the clarity with which the study is documented and explained. A Log Book (actually a Daily Diary) is mandatory and should be authenticated over the signature of the guide teacher daily. The cover page of the Log Book should carry the names of the child scientists, the district and the State, in English. Marks awarded for the presentation covers question and answer with evaluators, presentation of charts/posters, illustrations and other visuals.
- xi. **Follow up Action Plan (Only for State level):** The child scientists should try to find out scientific solution to the bothering problem. Has the team conveyed the message to the community? How it was communicated? Will effort continue to involve more people till the problem is solved? Was any action plan suggested? Credit shall be given for similar efforts.
- xii. **Improvement from the previous level (Only for State level):** This is to encourage the child scientists towards their continuous involvement with the project for its improvement. Improvements on the work from District to state level and then from State level to the national level will be given marks separately. The evaluators shall specify the areas of improvement on a separate sheet of paper.
- xiii. **Additional page(s):** These must be there in the Project Report with detail description of works of improvement done after the previous level (particularly on the basis of the evaluators' suggestion in the previous level).

## 15.2. Evaluators

- i. Evaluators may please note that the participating children are budding scientists from the age group of 10 to 17 years with limited access to knowledge centers and therefore require encouragement. Having understood their capabilities and capacities, the

evaluators provide them with constructive inputs and positive feed-back.

- ii. Evaluators appreciate and value the efforts, innovativeness and confidence of the participating child scientists and ensure that their honest assessment work as a guiding light for future endeavors of the child scientists and each one goes back motivated, intellectually rich and more confident.
- iii. Evaluators should evaluate the projects on the basis of subject matter and scientific content and are not influenced by the gadgetry or models used or oratory skills of the participants. They avoid unwarranted comments and also avoid comparing the works of the child scientists with those carried out by senior members or scientists.
- iv. Evaluators should avoid being any source of distraction to the child scientists while presentation is going on and do not take the interactions with the participants as a test what the participating child does not know, rather, they make efforts to know what the child scientist know about the subject area.

**15.3. Model consolidated Evaluation Sheet (For District level)**

Sl. No.	Criteria	Max. mark	Written Report	Oral Presentation	Total
1	Originality of idea and concept	10			
2	Relevance of the project to the theme	10			
3	Understanding of the issue	15			
4	Data collection & analysis	15			
5	Experimentation/validation	10			
6	Interpretation and Problem solving attempt	10			
7	Team work	10			
8	Background correction	10			
9	Oral presentation/ written report (as applicable)	10			

**Model consolidated Evaluation Sheet (For State level)**

Sl. No.	Criteria	Max. marks	Written Report	Oral Presentation	Total
1	Originality of idea and concept	05			
2	Relevance of the project to the theme	05			
3	Understanding of the issue	15			
4	Data collection & analysis	15			
5	Experimentation/validation	10			
6	Interpretation and Problem solving attempt	15			
7	Team work	05			
8	Background correction	10			
9	Oral presentation/ written report (as applicable)	10			
10	Improvement over the previous level suggested	10			
<b>Total</b>		100			

**Model consolidated Evaluation Sheet (National level) with effect from 2014 onwards**

1. The same team of evaluators will evaluate each project for Oral, Written and Poster presentations at one stretch.
2. More time would be allotted for the project evaluation – roughly 20 to 25 minutes – including 8 minutes for Oral Presentation, evaluation of the written report and the posters followed by interaction with the Team leader. With increased time available, the entire screening process would be in a relaxed manner and also in a child-friendly environ.
3. The parameters and attributes under each parameter for the national level evaluation are given below.

Sl. No.	Criteria	Max. Points
A	Oral Presentation	
1	Originality of idea and concept	05
2	Relevance of the project to the theme	05
3	Understanding of the issue	05
4	Data collection & analysis	10
5	Experimentation/validation	10
6	Interpretation and Problem solving attempt	05
7	Oral Presentation	10
	Sub Total – A	50

Sl. No.	Criteria	Max. Points
B	Written Report	
1	Data Collection /Analysis, Graphical Representation etc	15
2	Methodology/Experimental design	15
3	Discussion /Conclusion	10
	Sub Total – B	40
C	Poster Presentation	10
1	Lay out	05
2	Logical Framework	05
	Sub Total – C	10
	Grand Total (A + B + C )	100

Thus each project would have total points of 100, out of which 50% would be for Oral presentation, 40% for Written Report and 10% for Poster presentation.

**15.4 Modified Evaluation Criteria for national level NCSC**

- a. Every State Academic Committee need to be more proactive in the evaluation process at state level NCSC and for this all SACs need to take appropriate action to strengthen their State Academic Committees with subject related persons and also having experience of the programme much more in advance. The SACs will be responsible for proper orientation of the experts, state level evaluators and mentors.



- b. Every project selected by the State Academic Committee for national will go through a quality mentoring process following which the State Academic Committee will evaluate the projects and grades to be awarded to each of the mentored projects. The grade sheet authenticated by State Academic Coordinator and State Coordinator is to be sent/ submitted to the National Academic Committee in a sealed confidential envelope. (sample of grade sheet is given in Annexure VII)
- c. Out of the projects which will be selected/ recommended from the state to take part in the National event, each state should recommend the best projects in the ratio of 1:5 of their respective state quota, which will be evaluated at the national level for Oral Presentation. Projects selected to the national level should be mentored by the State Academic Committee and the Post Mentoring Score Card for selected projects should be sent to the National Academic Committee (or submitted in person at the NNCSC venue) at the time of the National evaluation process. (See Annexure VII for format). The rest of the projects would be qualified for Poster Presentations as is normally followed in professional scientific conferences /seminar.
- d. The selected projects from the states should be endorsed by the State Academic Coordinator and the State Coordinator so that the responsibility of projects being selected to the national level does not rest with the national academic core group. (National Academic Core group would not be responsible in any way for any selection that is done by the respective State Academic Committee (SAC) or District Academic Committee (DAC) or Coordinators at the district or state level. Any query in this regard, would be attended by respective SAC or DAC).
- e. Projects selected for oral presentation will be given certificate for Oral Presentation and the projects selected for poster presentation will be given certificate for Poster Presentation. Children who will qualify as outstanding after oral presentation will be given a 'Certificate of Merit'. However, all children irrespective of categories will be handed over medals/ mementos as has been done in the past.
- f. The objective of this modified evaluation process is to identify the most 'outstanding' projects. Hence, it is to be noted that this system will be followed at National Level only. At district and state levels the existing methods of evaluation has to be followed.

It is MANDATORY for the projects selected for Oral Presentations at National Level to have the following;

- i. The cover page of the project should be either in Hindi or English.
- ii. Each project to have one page Abstract in English.
- iii. Four numbers of Posters as per the instructions provided in the activity guidebook.
- iv. Properly maintained Log book along with written report and posters.
- v. Post mentoring Score sheet for all the projects selected for Oral Presentation at the national level with the scores/ grades awarded by the State Academic Committee. (See Annexure VII for details).

These instructions are to be followed strictly else the project would not be evaluated at national level.

## **16. Organizers**

NCSC is organized by National Council for Science and Technology Communication (NCSTC), Department of Science & Technology, Government of India, with active support from NCSTC-Network, as a National Coordinating Agency.

NCSTC-Network is registered Society, comprising a network of 79 organizations, Governmental and Non-governmental, spread over all the States and Union Territories of India, who are working for science popularization.

To organize NCSC at the State Level, each State/Union Territory has a coordinating body viz. State Coordinating Agency, which is a member of the NCSTC-Network.

### **16.1. Role of District Coordinating Agency, District Coordinators and District Academic Coordinators**

- i. To agree in writing, on being selected, to act as a District Coordinating Agency and abide by rules and regulations prescribed in this Activity Guide Book and also by the State Coordinating Agency;
- ii. To constitute a District Organizing Committee and a District Academic Committee consisting of not less than 7 (seven) teachers, activists, exchild scientists, government officials, officials of the local bodies etc. and send the lists to the State Coordinator by the date specified. The District Coordinators shall act as the Member Secretary of both the Committees;
- iii. To register groups of children (not more than 5 in one group) in Form A (Annexure V) and provide them with necessary reference materials, kits and guidance. No. of group registered to be intimated to the State Coordinator by the date specified;
- iv. While registering the District Coordinator should be assured that the age of the child scientist falls within the age as on 31st December of the calendar year. If need be a copy of the age certificate may be retained by the District Coordinator, to avoid any confusion at the later stages. Even while participating at the National Congress, the State Coordinator may also keep a copy of the certificate.
- v. To select schools from rural and urban area in an equal ratio;
- vi. To organize District level Teachers' Orientation Workshops with the help of the State Coordinators;
- vii. To interact with local scientist and arrange for their periodic interaction with the registered group of children, if required;
- viii. Try to involve at least 50 schools and 250 numbers of project in the district including those from informal education system;
- ix. Organize District level Congress, Orientation of Evaluators in consultation with the State Coordinators;
- x. To submit Feed-back Reports on all activities, containing names of schools and number of projects at district level and follow up action taken on projects likely to become part of community action, photocopies of all Registration/Attendance Sheets for all Workshops/Meetings, Evaluation Sheets in original, samples of certificates issued, mementos presented to child scientists, photo documentation etc. related to CSC at the District level to the State Coordinator in the manner and by the date specified;

- xi. To maintain a Bank Account and maintain Accounts at the District level and submit an audited Receipts & Payment Account to the State Coordinators by the date and in the manner specified;
- xii. To maintain infrastructural facilities, including electronic communication facility, such as internet connectivity, fax etc.
- xiii. To arrange review and mentoring of the projects selected for presentation at the State level NCSC.

## **16.2. Role of State Coordinating Agency, State Coordinators and State Academic Coordinators**

The State Coordinating Agency shall have the overall responsibility for the implementation of NCSC at the State level. The specific responsibilities shall be –

- i. Constitute a State Organizing Committee (SOC) and a State Academic Committee (SAC) where minimum 7 (seven) members to be selected from teachers, activists, ex-child scientists, government officials, officials of the local bodies, Network members in the State and other nonNetwork organizations specifically active in a region in the State, where the State Coordinating Agency does not have a reach. Submit the list of SOC, SAC, DOC and DAC along with Project Proposal for districts and state. The State Coordinators shall act as the Member-Secretary of both the Committees;
- ii. To constitute Regional Coordinators, if found necessary in case of big States and to involve SCERT, DIET, IRIS and organizations working with bhandicapped children/elder citizens and media representatives. Distribution of geographical area for organizational purposes etc. will be the prerogative of the State Coordinators;
- iii. To locate individuals, schools specially interested in other curricular activities;
- iv. To select District Coordinating Agencies and obtain consent letter from the respective organization, where they have to agree to abide by the guideline of CSC and willing to follow the guidelines of NCSTC-DST, NCSTC-Network and State Coordinating Agency of the State;
- v. Organize Orientation Workshops of District Coordinators and teachers with the help of subject experts;
- vi. To coordinate translation of the Activity Guide Book to be used by the children, in local language and make them available to the District Coordinators. To separately print/photocopy Activity Guide Book for participating child scientists and give them on cost to cost basis;
- vii. To maintain a Bank Account and maintain Accounts at the State level and submit an audited Receipts & Payment Account to the funding agencies within three months of the date of event with a Project Completion Report and a Utilization Certificate in the manner prescribed;
- viii. To submit Feed-back Reports on all activities, samples of certificates issued, mementos presented to child scientists, photo documentation etc. related to CSC



- at the State level to the funding agency in the manner and by the date specified;
- ix. To remit funds to District Coordinating Agencies by account payee cheques;
  - x. To form linkages with Testing and Monitoring facilities available in the State (with NGOs as well as Government), Municipal Corporations and other local bodies etc. to help children in better implementation (information collection/sample testing) of their activities (Identity Cards may be issued to children registered for activities) through District Coordinators/State Coordinators;
  - xi. To arrange review and monitoring of the projects selected for presentation at the NCSC.
  - xii. To ensure that Evaluation sheets, both written and oral are forwarded to the next higher level, i.e. from district to State and from State to National level, else the district / State contingent might not be registered during State/National level CSC.
  - xiii. State Academic Coordinators should work in close association with the district/State Coordinators for arranging evaluation process and shall make an effort to send one member from State Academic Committee as an Observer to the district level CSC. His/her signature on the selection list is mandatory. The entire process of evaluation is to be supervised by the Observer. Decision of the State Academic Committee shall be final word on the selection.

### **16.3. Note for State Coordinators and District Coordinators**

- i. The age limits for participation must not be less than 10 years and more than 17 years on December 31 of the year.
- ii. Relatives of District Coordinators, District Academic Coordinators, State Coordinators and State Academic Coordinators will not be selected for National CSC. They may leave the post for the year if participation of the ward is desired.
- iii. A child will not participate more than twice in national CSC as Group Leader – once from each age group.
- iv. Two selected projects (one from lower age group and the other one from upper age group) from each State are to be selected to participate in 'Kishore Vaigyanik Sammelan' of the Indian Science Congress session held every year during 3rd to 7th of January.
- v. CSC projects meeting the following criteria may apply Technology Entrepreneurship Promotion Program selected for support–
  - The idea should be new / novel,
  - The idea should have potentiality for translating it into working model / prototype / process,
  - The idea should be based on known scientific principle,
  - The idea should have commercial feasibility/ technical viability.
- vi. Proposals from individual innovators to convert an original idea / invention / know-how into working prototype / processes. These proposals can be made by individuals or jointly with any sponsoring organizations.

- vii. Selected projects will be provided by financial support to undertake the above developments, patent support and guidance, scientific/technical consultancy, fabrication assistance, market information and networking with related research lab/ institutes as required.

**For detailed information you may contact:**

Techno-entrepreneur Promotion Programme,  
Ministry of Science & Technology, Post Bag No. 66,  
HauzKhas, New Delhi 110016.

For further details please contact :  
State Coordinator of your respective State / Union Territory. (See Annexure II)

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**Some important points for Participation in the Indian Science Congress's'  
Kishore Vaigyanik Sammelan'**

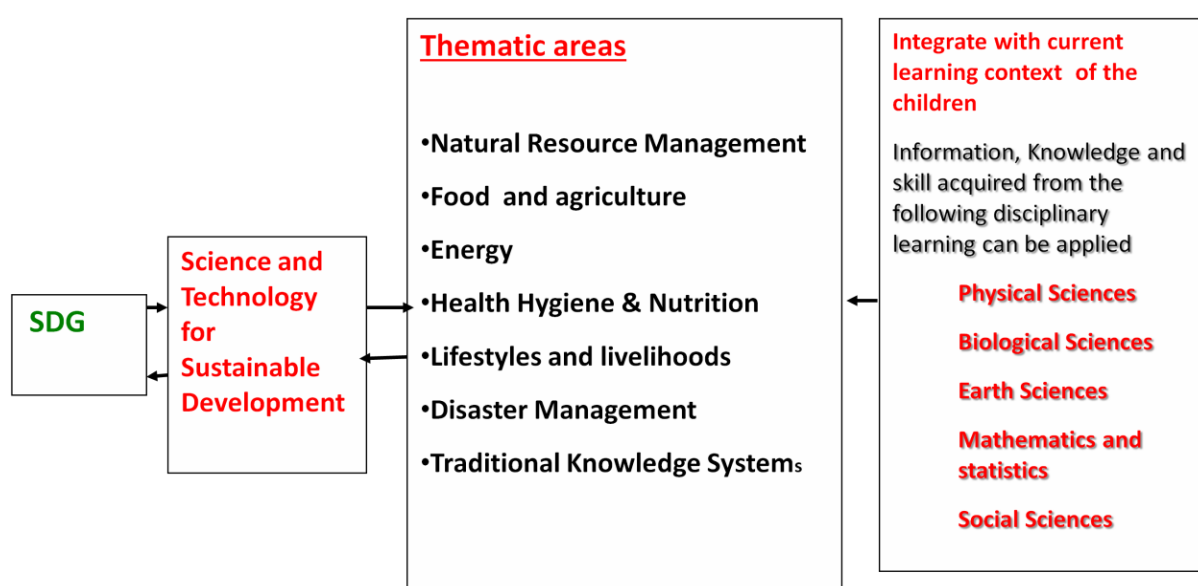
Any one of the co-workers (preferably the second in the team) of the selected two best projects of the State level Congress (one from lower age group and the other one from upper age group) will participate in this programme.

## PART 2

### Focal Theme: SCIENCE, TECHNOLOGY & INNOVATION FOR SUSTAINABLE DEVELOPMENT

#### Introduction

In usual parlance, development stands for the situation where everyone gets food, shelter, clothing along with sound state of health and mind, gets opportunities for livelihood, having adequate energy to use, has good education, transportation and communication in a better environmental situation where cleaner air, water and soil exists.



In defining the concept of sustainable development Brunt land commission in 'Our common Future' (1997), mentioned that "Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs", which not only raises the question of fulfilling the need for present, but also to cater to the need for the future. So, it pleads for rational and wiser uses of our natural resources, redesigning our different economic operations like production, transport and communication systems through optimum use of available resources and reducing its wastage. At the same time, it also demands for equal opportunities for everyone at present and for future. Moreover, it focuses on economic sustenance. Thus the entire principles of sustainable development insist upon environmental, economic and social balances and their inter-linkages.

In this context exploration and inquiry using Science and Technology approaches can help us to understand the dynamics of our planet as well as different components of its environment, ecosystems and resources that help one to look for the best means of optimum use without disturbing the functioning of the component ecosystems. Rather, this makes one able to achieve economic sustenance and cater intra and inter-generational equality and



Equity in society. Besides, in every aspect of the exploration and inquiry, innovative thinking and approaches helps one to find out solutions to address different problems or harnessing hidden opportunities.

In this perspective “Science, Technology and Innovation (STI) for Sustainable Development” has been decided as the focal theme for 24th and 25th National Children's Science Congress, with an expectation that our Child Scientists will be introduced to inquiry based learning approaches in project mode exploring something from “known to unknown or ‘from unknown to known’. They will thereby come up with different new knowledge in relation to the focal theme following sub-themes ;

1. Natural Resource Management
2. Food and Agriculture
3. Energy
4. Health, Hygiene & Nutrition.
5. Lifestyles and Livelihoods
6. Disaster Management
7. Traditional Knowledge Systems
8. Accessibility for disabilities

## Sub Theme I

## Natural Resource Management

**Sub-theme : I**  
**Science Technology and Innovation for**  
**Natural Resource Management**

Resource is function of living and nonliving components of the biosphere which may perform an operation or be a part of a process leading to human welfare without disturbing the ecology and ecosystems from which it is sourced. Resources include all material and non material means that helps in satisfying human's social, ecological and social needs. We should appreciate and be sensitive to fact that Earth's resources are meant not only for mankind but also for all life forms, i.e. biological diversity. Resources have two essential attributes: Utility and Function ability. Nature provides us with resources which are inimical for our survival. We called these as Ecosystem services and they can be regulatory, provisional and cultural.

Man's dependence on natural resources is as old as the history of civilization. He has since time immemorial extracted biotic and abiotic resources from terrestrial or aquatic ecosystems. The biotic comprises of the flora and fauna and abiotic constitutes the rocks, mineral, soil and water. Geo-environmental, socio-cultural and economic conditions plays a role in their abundance or rarity, availability, and use or misuse. Today, our demands for development put immense pressures on natural resources beyond the nature's capacity to restore and replenish. We understand that development is inevitable, for our economic and social wellbeing, however, we must insist on and contribute towards a planned development that emphasizes sustainable use of resources so that we have enough of these left for generations to come.

In the present parlance of environmental economics, the major utility of natural resources is interpreted as follows:

**Direct use/benefits:** like, **i.** minerals, **ii.** fuel, **iii.** food & medicine, **iv.** means/base of transport and communication, **v.** cultural uses

**Indirect benefits:** like, **i.** environmental regulating services: as sink, circulation, heat exchange, etc.; **ii.** aesthetic values and recreation

The natural resources can be also be classified as renewable and non-renewable

**Non-renewable** are those which have a limited stock. Once the stocks are exhausted it may take thousands of years to be renewed or replenished. In case of such resources regeneration is lower than the rate of consumption. Coal and Petroleum are examples of non-renewable resources. S&T and innovative initiatives and interventions can help develop appropriate management practices to control/curtail resource consumption wiser and efficient.

**Renewable** are those which get renewed or replenished.. Some of these are unlimited and are lesser by human activities, like solar and wind energy. But careless use of certain renewable resources like water, soil and forest can affect their stocks.

With increase in population there has been substantial increase on pressures on natural resources. In India we had a population density of 77 person / Km<sup>2</sup> in 1901, it was 117 in 1951, 216 in 1981 and 382 in 2011. Similarly arable land (hectares per person) in India also declined from 0.3hectres in 2009 to 0.13 in 2011. We had a forest cover of 70% in 1947 which reduced to 49.32% in 1992 and 21.23% in 2013. Resource scarcity leads to environmental, economic, soil and political crisis of different intensities. The scaffold of Sustainable Development, therefore, demands environmentally, economically and socially defensible practices through the principle of Reduce, Reuse and Recycle; where sustainability represents sufficiency, safety, security, self-reliance in present as well as in future context too.

To achieve the aforementioned goal there is an urgent need of innovative S&T interventions to frame suitable management practices, where management practices covers exercises related to planning, depiction of future, decision making processes, quick response mechanism, crisis management, inventory management for alternative solutions, monitoring and impact assessment and corrective measures.

**Coverage:**

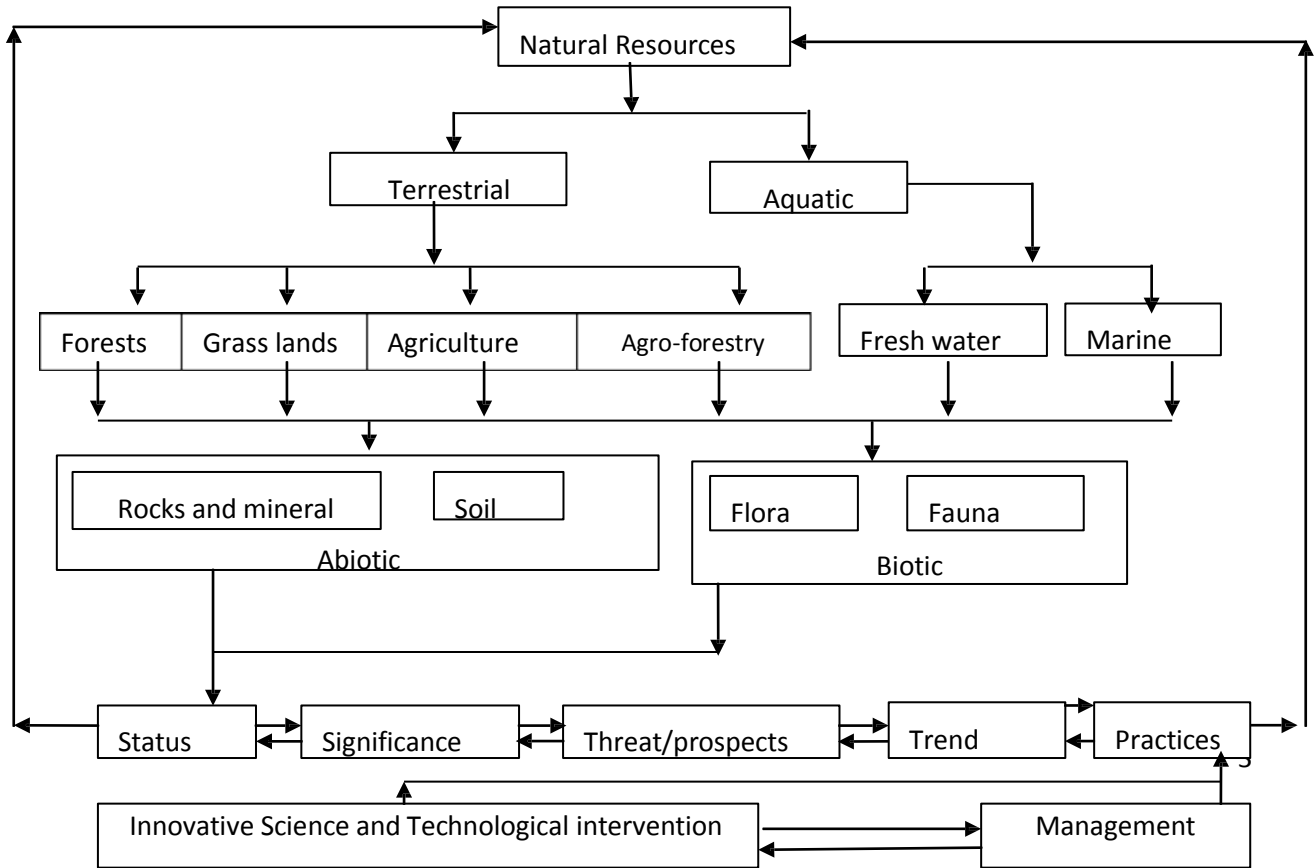
This sub-theme shall cover all the aspects of natural resource extraction, processing, value addition, or any other activity that leads to optimization of natural resource uses for different purposes. It also includes broadening of natural resources base or new/better uses of already available natural resources for betterment of environment and human welfare. One can review an impact assessment of the existing technologies to address the negative impacts of resource management by suggesting appropriate modification in technology or developing alternative technology. Natural resource mapping and management planning, like watershed/micro-watershed planning, land use and land cover mapping, land use planning, mapping of biodiversity richness, undertaking population studies and developing conservation and management planning are also included under this sub-theme.

**Design your project:**

The first step in designing a project is to identify an area of your interest and concern; you need to do a situation analysis first before framing your project. Do not hesitate take help from your teachers or experts. Run through the flow diagram (framework) given below to identify the ecosystem(s) , issue(s) you would like to cover/include and highlight in your project. You must have clarity on what you want to work on, the intensity of the problem and rationale for your research. Develop your study following the above mentioned framework and exercise based on the table given below:



Framework



**Image to ponder**

For an example observe the following situations and identify the subject/issues you need to study under this subtheme







All the photographs from A to R are some example where resources have an intricate linkage to local environment, economy and society. You need to observe and analyze the situation carefully, critically and completely with respect to its present status, ecological

significance,trends, threats/prospects. This will give you ideas for your involvement in sustainable management of natural resources..

**Some project ideas are placed herewith:**

### **1. Resource Mapping and Management Planning**

Mapping of a region for the resources it provides, the pressures and threats it faces. Changes the area has been subjected to can help you with a situation analysis and designing an intervention for sustainable management of its resources:

**Proposed activities could be:**

- Identification of resources of the study area
- Understanding and analyzing its status, significance, threats/potentialities, trends and associated practices and their subsequent ranking
- Identification of the spatial pattern of the aforementioned and
- Preparation of a management plan

**Methodological approaches:**

- Specify /focus your study – identify Area of focus (AOI) to one resource, e.g. Surface water, wet land, soil quality, grass land, ground water, land use –land cover, etc
- Make transect walk in your study area ,identify sources, mark their location on the base map;
- Make thorough observations
- Undertake field base measurements- for assessing quality and quantity
- Hold discussions with relevant stakeholder
- Design a questionnaire and interview of the stake holders
- Develop a database, analyze and interpret

**Expected out come**

- Resource Map
- Resource Appraisal
- Identification of threat/potentialities
- Management plan



**Box No. 1****How to prepare a map**

A map is a systematic representation of location and associated features of a place in a diagrammatic form of a picture or drawing. It follows certain norms. Major elements of a map are – its scale, symbol, boundary, direction. Map scale is the ratio between the distance on a map and corresponding actual distance on Earth's surface.

Boundary is the limit of the area represented in a map, usually line is draw to represent the boundary and size or pattern of line will change to represent different type of boundary. Every features of the area are represented in a map through some symbol; usually symbol can be a point, line and area. Usually residential location, pond etc are shown as point ( but it may change with map scale ), river, road, stream etc are represent as line symbol and information like area under forest, agricultural uses etc are shown as area with the help of shading or through colour. Some important steps to prepare a map of a study area

- I. You can prepare base map of your area from Topographical map. Identify the area in the topographical map and trace out the area where you carry out the study.

If access to internet is there go for Google map, put name of the area in Google map search option, it will show you the area (as in fig.1). Take a print out of the image. Then click to Google Earth shown in the left hand bottom corner of monitor screen, you will get the Google Earth Image (as in fig.2), take a print out of the image. Note down the year of the image as shown in the bottom of the image.



Fig.1



Fig.2

These maps, either from topographical map or from Google map and earth can be used as base map.

- II. Now with reference to the base map you can observed the situation on ground in the area, marked the situation on the map using symbol or colour index. Based this new information, you can develop a new map to show the current situation.
- III. Now in reference to scale of the map, you can calculate the length, area, density etc of different features, in the base map and current map. Based on this information able identify changes over the area over the period of time.

(For detail one can consult the followings:

- <http://www.planetware.com/cartography-and-maps-for-beginners.htm>
- <http://www.walkingandhiking.co.uk/beginners-guide-map-reading-grid-references.html>
- [http://sseaep.org/reports/project\\_on\\_map\\_learning.pdf](http://sseaep.org/reports/project_on_map_learning.pdf)
- <https://www.nh.gov/oep/resource-library/planning/documents/preparing-master-plan-existing-map.pdf>
- <http://www.wikihow.com/Make-a-Map>
- "Introduction to Map Learning", SSEEPA, Nagaon, Assam and ASTEC, Guwhati, Assam,

**Box-2****How to prepare a management and conservation plan**

Management and conservation planning is an exercise through which goal of conservation/protection is identify along with agenda for action. The normal practices of planning includes different phases of works like situation analysis, identification of problem and prospects, identification of alternatives, setting goal and objectives, preparation of action plan and implementation, monitoring and impact assessment ( fig-3)

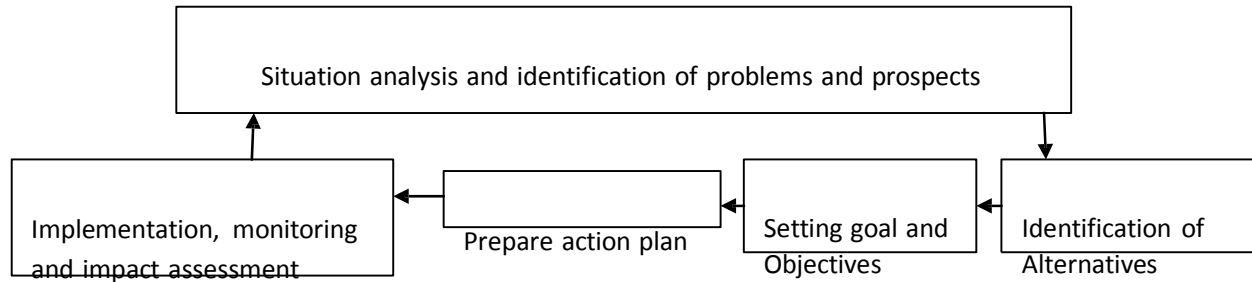


Fig3.

But in relation to natural resource management and conservation planning following process can be followed (fig.4.)

**(for detail one can consult the followings-**

Natural Resource Management Tools for participatory planning and implementation,

<http://www.crs.org/sites/default/files/tools-research/natural-resource-management-tools-for-participatory-nrm-projects.pdf>; <http://www.fao.org/nr/kagera/tools-and-methods/en/>; <http://www.fao.org/nr/kagera/tools-and-methods/community-active-planning/en/>;  
[http://www.fao.org/fileadmin/templates/nr/kagera/Documents/local\\_tools.pdf](http://www.fao.org/fileadmin/templates/nr/kagera/Documents/local_tools.pdf)

[http://www.fs.fed.us/psw/publications/documents/psw\\_gtr191/psw\\_gtr191\\_1213-1223\\_korschgen.pdf](http://www.fs.fed.us/psw/publications/documents/psw_gtr191/psw_gtr191_1213-1223_korschgen.pdf);  
<http://www.ifad.org/pub/enviorn/EnvironENG.pdf>

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=52&ArticleID=58>

<http://www.ecologyandsociety.org/vol5/iss2/art17/figure2.gif>

<https://www.cbd.int/doc/meetings/mar/mcbem-2014-04/other/mcbem-2014-04-integrated-planning-decision-support-en.pdf>

**Box-3**

**Focused group discussion (FGD)**

FGD is method of data collection through a semi-structured group interview processes. Usually one or two person moderate the discussion, a homogenous group (may be by occupation, age, sex etc) participated in the discussion. Usually the data which cannot be collected directly through a face to face focused interview with individual are collected through FGD. Through FGD one can able discussed on "What? When? Why and How?" of any aspects which influences community life. Some of the important techniques used for the Purpose are as follows

- Standard question put forwarded for group responses, followed by discussion on linked question for in-depth situation analysis; like which are the important natural resources available within the village which have direct link to livelihood activities of the villagers; responses to such question may emerged with list of resources; then next step will be as follows
- Filled up the table given below through more discussion
- 

Sl no	Name of the natural resource	Depending livelihood practices ( like animal rearing, fishing, paddy cultivation, horticultural practices)	Seasonality (is there any specific months or season of use of respective resources)	Present status (Good, Bad, Threaten, etc)	Any serious incidences group remember take place in the village due to uses of natural resources (like landslide, wild animal threat, conflict among the people)	Make ranking of resources (like 1,2,3, .....etc ; where 1 indicate most important for their livelihood , gradually importance reduces with 2,3, ..... so on)

- Now, one can go for next step to gather their opinion in the following aspects

Sl no	Name of the natural resource	Probable risk	Strategy for mitigation/ conservation/ protection

These are the example only; with variation of issues of study similarly strategy can be developed.

- In case of documentation of such information it is better to use chart paper and note down the every information with the help of marker pen or sketch pen with large letter, so that everyone can get the information. Along with this one can go for audio recording of the discussion (use mobile phone recording facilities) and after discussion transcript the recorded discussion.
- Usually qualitative information is emerged through FGD, so classification of such information using appropriate coding through set of words is very important; which will help in analysis.

**Methodological approaches:**

- Specify /focus your study – identify Aol – focus to one resource, e.g. Surface water, wet land, Soil quality, Grass land, Ground water, Land use –land cover, etc
- Make transect walk in your study area ,identify sources, marked its location on the base map;
- Source base observation
- Field base measurement to assess quality and quantity ( one can able to adopt quadrant method for quantification, particularly for identification distribution, but in such case better to select a small area like School campus. Homestead area, )
- Focused group discussion with stakeholder
- Interview of the stake holder based on predesigned questionnaire
- Data base development
- Data analysis and interpretation

**Expected out come**

- Biodiversity Map
- Biodiversity Appraisal
- Identification of threat/potentialities
- Management and conservation plan

**3. Project title: Study of soil quality and mapping**

Soil is an important resource which determines floral diversity to a large extent along with agricultural potentialities. So, soil quality analysis and mapping can help in agricultural planning, forest cover management planning, etc. Soil quality can be accessed through its texture, composition, chemical properties like acidity or alkalinity, etc. One can go for assessing soil quality through analysis of soil texture also. Many of the important soil properties are determined by its texture. Soil having high amount of sand is coarser or lighter in texture. On the other hand, soil having higher amount of clay is finer or heavy in texture. Coarse-textured soil (sand, loamy sand) is very permeable and less erosive. They can hold lesser amount of water and nutrients and as such they need to be irrigated and fertilized frequently. The fine-textured soil types (clay, sandy clay, silty clay) are less permeable and more erosive. They can hold large amounts of nutrients and water. The properties of medium-textured soil (loam, clay loam, sandy loam, silt loam) range between the above two categories.

Soil can be classified in the field on the basis of texture by its feeling on our fingers. The method is based on the differential feeling of moist soil. Sand particles feel gritty when the soil is rubbed in between fingers. Silt particles feel smooth and powdery. Clay particles feel smooth, sticky and plastic when the soil is moist. Different soil particles and textural class exhibit different degree of ball formation and ribbon formation. Based on observation on can identify soil textural variation in a locality, prepare a map and develop a plan for soil quality management. Such exercise is very much important for developing sustainable development plan for an area/locality.

**Objective:**

- To know about soil texture in different land use condition;
- Prepare a soil quality map in relation to its textural composition;
- Development of soil quality management plan.

**Methodology:**

- A. Divide the area of your study in certain section /grid and perform following steps of works and records your final observation against each of the grid,



B. Feel the soil with fingers- follow the steps given bellow:

Step 1: Collect soil samples from different from each of the grid and keep the record of the land use of respective grid,

Step 2: Take about 5 g of each soil sample in your hand.

Step 3: Moist the soil with few drops of water.

Step 4: Feel the grittiness or smoothness of the soil by rubbing it in between fingers.

Step 5: Press the moist soil in between your thumb and forefinger.

Step 6: Observe whether it stains the fingers.

Step 7: Observe whether balls or ribbons can be formed by rolling the moist soil in between thumb and fingers.

Step 8: Name the soil textural class from the observations as given in the following table.

Step 9: Write your interpretation.

Step 10: Repeat the same procedure for other samples also.

Step 11: Draw your inferences about the characteristics of land based on your observation.

Table: Observations for soil textures by feel method.

Textural class	Feel of finger	Ribbon formation	Ball formation	Stickiness	Classify the grid into textural class
and	Very gritty	Does not form ball	Does not stain finger	No	
Loamy sand	Very gritty	Forms ball but breaks very easily	Stains finger slightly	No	
Sandy loam	Moderately gritty	Forms firm ball but breaks easily	Stains finger vividly	No	
Loam	Neither very gritty nor smooth	Forms firm ball	Stains finger vividly	No	
Silt loam	Smooth or sticky buttery feel	Forms firm ball	Stains finger vividly	Slight ribbon forms with flaky surface. On squeezing ribbon forms but breaks easily.	
Clay	Slightly gritty feel	Moderately hard ball when dry	Stains finger vividly	On squeezing ribbon forms with some flakes.	
Silty clay loam	Very smooth	Moderately hard ball when dry	Stains finger vividly	On squeezing forms long ribbons (2-5 cm)	
Clay	Very smooth	Hard ball, cannot be crushed by fingers when dry			

Based on the information gathered from the table mentioned above prepare the table given bellow.

Table to showing grid wise soil textural quality, land uses, evolving problem and tools and techniques address the issues			
Grid no	Textural class	Observed problem and potentiality ( take interview of owner of land of the particular land area under the grid)	tools and techniques to address the problem or harnessing potentialities (discussed with local experts, farmer and solution suggested by them are tried yourself and based on your observation put the suggestion here, kept the records of your own experimentation/trail )

**4. Developing a good harvesting and management plan of Non timber forest products**

May be you have studied and heard of many plants which are of high medicinal or commercial value. These are traded and often extractions from the wild are beyond the nature's ability to replenish. If you have observed, any such plant are being heavily collected from your region and you are also aware that that these species are declining rapidly from the wild. You feel that you should do a project for the Children's Science Congress with the support of your teachers and experts available in your region.

A good example of such a situation is the overharvest of lichens from the mountains of Uttarakhand. There is a diversity of lichens , which love to grow in pristine environments, are very good indicators of air quality. Some of the lichens are preferred in trade for preparation of *itra*, natural perfumes. The perfumes are exported to many countries.

Use of Rhodendrons in Himalayas is an another interesting example in Himalaya. In western Himalaya, *Rhododendron arboreum* is used for preparation of squashes while in Eastern Himalaya, in the state of Arunachal Pradesh for fuel wood. Conservation efforts are being directed to sustainable use of Rhododendrons. Your efforts in research in their distribution, usage, growth, abundance and other scientific studies can be huge contribution to S&T for Sustainable Development.

**Methodology:**

Data will have to be collated from available publications and websites that provide trade related data. You will work very closely with local communities who are engaged in harvesting of NTFPs. Local communities are most often very knowledgeable on the growth patterns of these and help you in formulating a plan. You may like to design a restoration plan and a long term monitoring programme at your school that could make valuable contribution to the sustainable use of natural resources in the long run.

**Expected outcome:**

1. You have mapped your location which are rich in NTFPs and the locations from where harvesting is more intensive
2. You will be able to prepare a baseline on the extent of extraction of select NTFPs of your region.
3. You will be able to come out with conservation plans and restoration strategy with

local communities

**Reference:**

*Community based Biodiversity Conservation in the Himalayas, Gokhale Y and Negi.A.K, 2011, The Energy and Resources Institute (TERI)*

**5. Assessing the status, usage and conservation of wild relatives of crop plants and underutilized plants and wild relatives of domesticated animals in India**

**Introduction and Rationale:**

The staple crops that we enjoy as food and see being cultivated by the farmers often have their wild relatives surviving in the forests. These wild relatives are very important for us, for they possess many useful genes for traits and characters which we may need to have the same incorporated to deal with situations like infestation of a disease or adaptations to climate change. Rice that we eat in *Oryza nivara*, has its wild relatives in the forests. It is often difficult to preserve these species outside their natural habitats. There are wild relatives of other categories of food plants like vegetables, fruits, pulses and spices. There are 365 such wild relatives of crop plants documented in India. Murali maize (Sikkim Primitive !) is a primitive variety of maize reported from selected locations from Sikkim. On similar lines there are wild relatives of domestic animals too. You must have heard about Charles Darwin and his famous book 'Origin of Species'. He talks about the Red Jungle Fowl of India as a progenitor of the domesticated chicken

You will realize that there are many plants which could be valuable source of nutrition but remain unutilized. These could be promoted for broadening our food base and nutritional security. You can plan with farmers and experiment on their cultivation and nutritional value

**Methodology:**

You have to go to the local farmers to get more information about such plants. Further you have to get in touch with an agriculture scientist. If you have decided to work on the Wild relatives of crop plants of India, you will have to visit a regional centre of the National Bureau of Plant Genetic Resources (NBPGR) of India. There are 5 such centres in India in addition to the Central NBPGR station New Delhi. You can learn referring to the herbarium and passport data sheets available at the herbariums of the NBPGR. You can get similar and relevant information from the offices of the National Bureau of Animal Genetic Resources at Karnal, Wildlife and Tree Genetic Resources at Coimbatore. Further you may need to consult and visit the National Bureau of Agriculturally Important Microorganisms near Varanasi in Uttar Pradesh.

**Expected outcome:**

1. You have mapped the distribution of wild relatives of crop plant and domesticated animals.
2. You will be able to come out with conservation plans of such species.
3. You have worked on the cultivation potential of some underutilized plants of India.

*Some references*

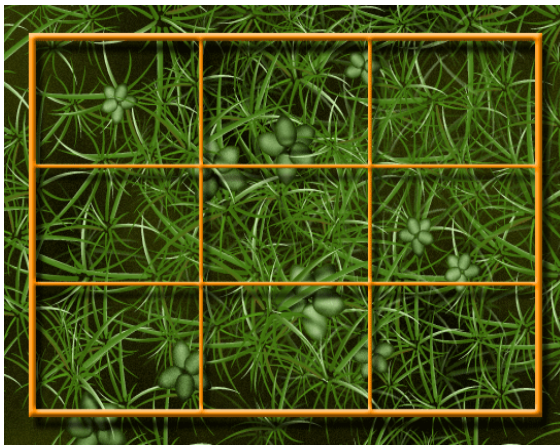
- Setting Biodiversity Conservation Priorities for India : Summary of the Findings and Conclusions of the Biodiversity Conservation Proritisation Project, Volume 2 (2000), World Wide Fund for Nature.
- Wild relative of Crop Plants by R S Paroda and RoshniNayar. National Bureau of Plant Genetic Resources. New Delhi.



**Box. 4.****Quadrat method**

Quadrat is method of sampling; it is use to measure coverage and abundance of plants or animals.

A grid of known size is laid out and all the organisms within each square are counted (fig.5) .The usual sampling unit is a quadrat. Quadrats normally consist of a square frame, the most frequently used size being  $1\text{m}^2$  , but size varies with purpose of survey. Usually frequency, density, biomass, diversity, rareness can be assess through this method.



**Box. 5. Example from the field – ‘Converting agricultural waste to a craft product’**

Jute stick, the remaining part after extraction of jute fiber is an agricultural waste. It is used for cooking as fuel but its thermal efficiency is very low. A group of children way back in 1995 take an initiative to use this waste to create wealth out of it. This sticks having a hole at its centre, which make it a cylinder. They utilize this property and made some pen putting riffle in to it, design accordingly. Now it is becoming a craft product and produces it under the banner of Nandanik. Later on they produce other product also from the waste generated from their pen production processes.



**Box-6. Story from field – “Community initiatives for water resource management”**

it is near the Sitabakow village of East Khasi Hills of Meghalaya, people designed and constructed a new water harvesting structure with community contribution (plate-10). These structures have been designed in such a way that it is maintained by vegetative covers at an altitude of around 1064 metres. Water reservoirs have been built at an altitude of around 962 metres with outlets to release water in a controlled way to the down slope areas. Village darbars (village council) play an important role in building consensus among the villagers to maintain the land use in the up slope so that the watershed principles are maintained. The water reservoirs are also used to rear fish. The water is also used for domestic purposes. Every individual of the village have the right to fish there but they have to pay a fee of Rs. 25 to the community each time they make a catch. The fee is deposited in the community corpus fund and used for maintenance of the structure, and also for other community related work if required.

Plate -10



**List of project idea:**

1. Population counts of select groups of species and collating information on trends
2. Ecological requirements of migratory species that come to your locality from distant locations for wintering/breeding.
3. Biological corridors which are essential for movement and passage of wildlife
4. Sustainable harvest of any plant species presently being collected unsustainably
5. Observing Social behaviour studies of wildlife and their interpretation
6. Wild relatives of crop plants Landraces and varieties and their status in your area and analyzing farmers approaches to preserve them
7. Changes in flowering and fruiting patterns
8. Understanding the ecological role of lesser known flora and fauna
9. Minimizing human wild life conflicts
10. Securing sacred groves, community conservation areas
11. A plan with the State Forest Department
12. Role of pollinators and their role in maintaining our ecosystems.
13. Role of aquatic plants and animals in maintenance of water bodies in your locality.
14. Water quality of fresh water lakes/wetland and its impact on fish
15. Ground water mapping of a locality ( aquifer level identification and showing in map through iso-line preparation management plan)
16. Household water audit and management plan
17. Study the soil thickness in different terrain condition, mapping and development of land use plan
18. Study the land cover and its impact on soil quality and planning
19. Study impact of rainfall on soil erosion, mapping, identification of vulnerable location and management planning
20. Study traditional method of soil quality identification in your locality
21. Study the tilling practices and its impact on soil texture in the agricultural field
22. Study the impact of manure and fertiliser on soil organism and management planning
23. Study impact of harvesting practices of paddy and its impact on soil quality of paddy field and management planning
24. Study the impact of field bund on soil quality of agricultural field and management planning
25. Study impact of solid waste on soil quality and management planning
26. Study the impact of soil moisture on soil organisms and management planning
27. Document the traditional land use practices of your locality and preparation land use plan
28. Water audit in household sector
29. Water audit in agricultural sector
30. Water audit in cottage industries
31. Water audit in schools/colleges
32. Water audit in offices
33. Water audit in hotels and restaurants, etc
34. Comparative assessment of traditional vs modern water conservation techniques
35. Study the settlement pattern (spatial arrangement) its impact on transportation cost (including energy used for transportation);
36. Study the man-made drainage pattern of locality and its association with water logging or similar problems of the locality and management planning
37. Study the impact of wildlife on the settlement area and management planning
38. Study the home garden practices in the locality and management planning
39. study on environmental impact on settlement
40. Assess diversity of flora and fauna in your home garden
41. Assess diversity of wild edibles in local market.
42. Assess status of birds in your locality and prepare a check list



43. Assess the diversity of animal domesticated in your locality
44. Assess the diversity of medicinal plant of your locality.
45. Assess the diversity rice cultivated in your locality.
46. Assess the diversity of insects in your house.
47. Assess the status of scavenging birds of your locality and their role in waste management.
48. Assess the diversity of fish of your locality
49. Assess the diversity of pulses cultivated in your locality and their status.
50. Assess the diversity of butterflies and moths of your locality.
51. Assess the status of nocturnal animals of your locality.
52. Assess the diversity of reptiles in your locality and their status.
53. Assess the diversity of life found in soil of different land categories.
54. Assess the diversity of minor forest product of your locality.
55. Assess the nesting sites of migratory birds in your locality and prepare protection action plan
56. To determine amounts for healthy nutrition, health, science and technology since it involves? Find it
57. Comparative Study about hygiene and health
58. Study malnutrition or diseases caused by food contamination
59. Solutions to the study of the diseases / damages on the basis of economic / cleanliness of the different areas of nutrition, in order to prevent it? If no mapping is available to implement the following suggestions into the world of modern methods / efforts for its dissemination
60. Various communities, tribes, allowing an average combined / nuclear family diet studies, who called balanced diet, what diet system diseases including diseases that evidence-two groups? The study
61. Diseases of the water quality, water purification, water-borne diseases and to study ways of preventing them
62. Preservation of health (diet) for costs and expenses arising from the disease, as well as ways of preventing them
63. What nutrients are found in a variety of diets of fruits, vegetables, herbs, meat, fish, milk, beans, grains, etc.? And how much food is needed per capita family? Etc. Practice
64. According to the study of traditional food from a particular region or community, family and study of diseases typical of the territory of the community
65. MDM or fortified foods given to study in private schools
66. Health check-up interval of information and awareness effort and health survey / study
67. to assess the needs of the poor, in particular, about their problems in daily life
68. to increase the awareness and sensitivity of the specialists involved in the project and also those responsible for programs designed to improve the basic need situation of the poor
69. Planning and preparation of the nutrition survey
70. Implementation of the nutrition survey

**References**

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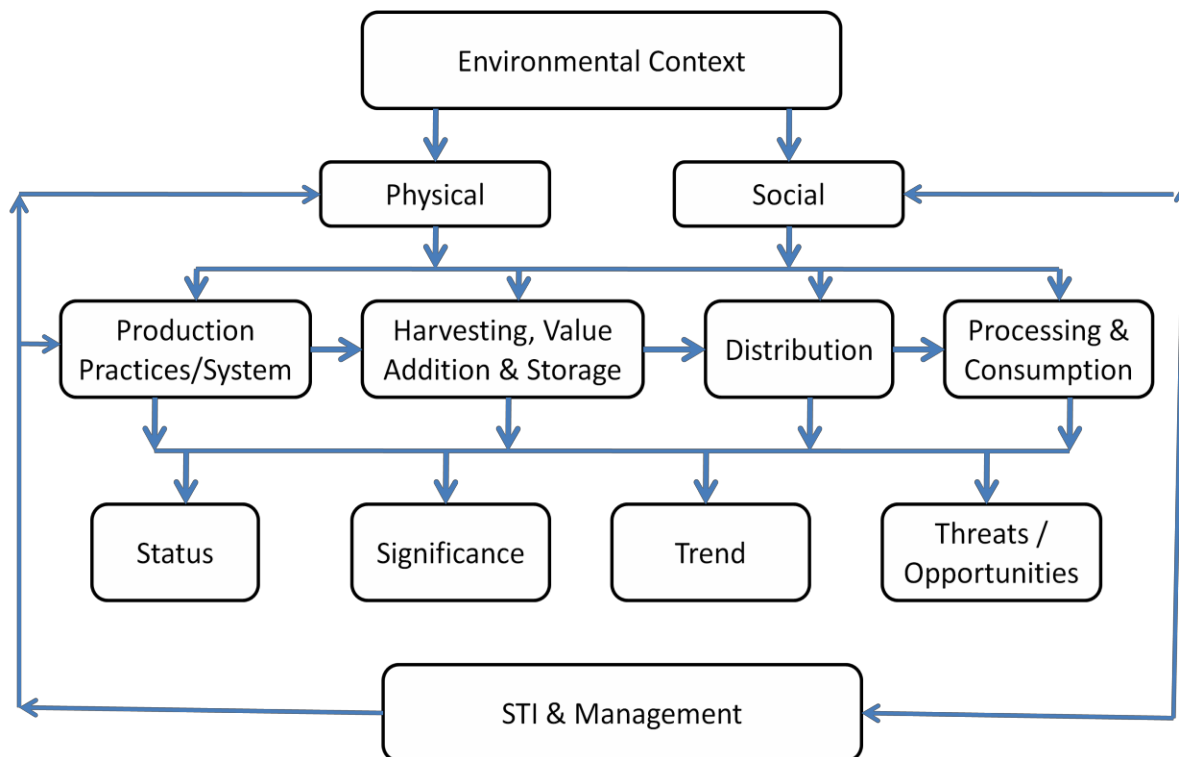
[http://envfor.nic.in/divisions/csurv/WWD\\_Booklet.pdf](http://envfor.nic.in/divisions/csurv/WWD_Booklet.pdf)

**Sub Theme II**  
**Food & Agriculture**

**Sub-theme - II:  
FOOD & AGRICULTURE**

Food and agriculture go hand to hand indeed, but are rooted in ecosystems which is the interaction of living organisms (biotic) and non living (abiotic) factors, where innumerable number of organisms, including humans, crop plants, livestock, insects, bacteria and fungi, are essential to our food supply.

**Proposed Framework**



**Food and Food Web**

Food is edible or potable substance (usually of animal or plant origin), consisting of nourishing and nutritive components such as carbohydrates, fats, proteins, essential mineral and vitamins, which when ingested and assimilated through digestion helps in sustaining life, generates energy and provides growth, maintenance, and health of the body. Its production, consumption and conservation mechanisms are very important while considering overall development of any country. The type, nature, variability and abundance of food of all organisms, including human being, is primarily determined by the existing food- web as well as functions of the specific ecosystem. In fact, food-web consists of a number of food chains meshed together and each food chain represents the flow of food energy from one feeding group of organisms to another.

Fundamentally, the feeding groups are referred as trophic levels. Basal species occupy the lowest trophic level as primary producer, the plants, which convert inorganic chemicals to generate chemical energy using solar energy. The second trophic level consists of herbivores, the first consumers who feed on plants. The remaining trophic levels include carnivores that consume animals at trophic levels below them. So, it is clear that the place of the primary producer, the plant, in the food web is at bottom i.e. on the ground level. In other words, soil is the place of habitation of plants, where many other organisms live and survive maintaining



food chains and webs, know as soil food web. The plants in general, however, interact with both above and below ground ecosystems; it not only survives on the functions but also regulates the services of eco-system. In above ground, energy moves from producers (plants) to primary consumers (herbivores) and then to secondary consumers (predators). In other words, the producers, consumers, and decomposers are the main trophic levels. This chain of energy transferring from one species to another can continue several times, but eventually ends. At the end of the food chain, decomposers such as bacteria and fungi break down dead plant and animal material into simple nutrients. In an ecosystem indirect interaction also occurs when two species do not interact with each other directly, but influenced by a third species.

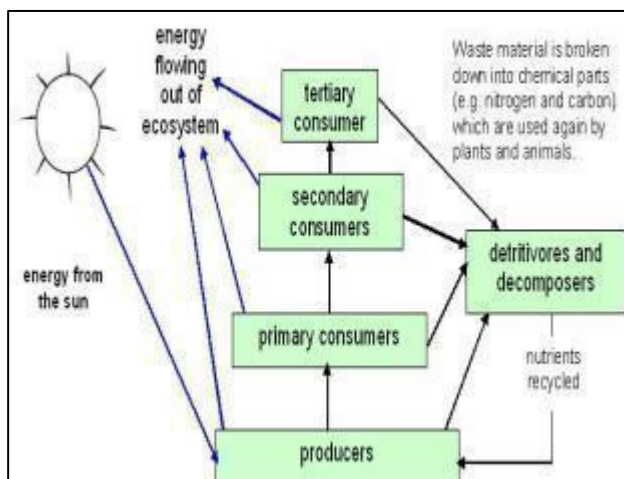


Fig-1: Flow of food energy at various levels

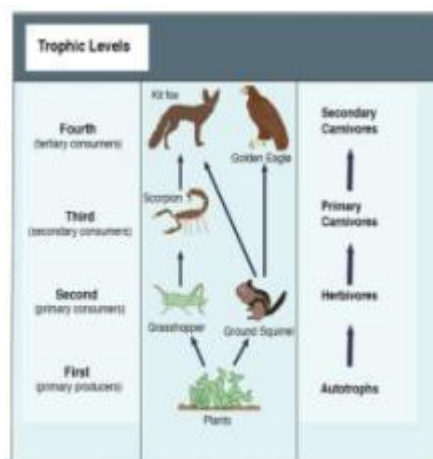


Figure 1: A simple six-member food web for representative desert grassland

### Ecosystem Services

*Ecosystem services* are the benefits people obtain from ecosystems. The Millennium Ecosystem Assessment of the United Nations divides *ecosystem services* into four categories (MA 2005):

1. **Provisioning services** are the *products* obtained from ecosystems. Those are among others the production of food, timber, fibre and water.
2. **Regulating services** encompass benefits obtained from the regulation of ecosystem processes. Those are among others the control of climate, floods, wastes, water quality and disease. With regard to water and *sanitation*, the purification of water through the *decomposition of organic waste* introduced into inland waters as well as coastal and marine ecosystems is an important regulating service.
3. **Cultural services** describe among others spiritual and recreational benefits obtained from an ecosystem.
4. **Supporting services** are for example [water cycles](#), [nutrient cycles](#), *photosynthesis*, soil formation and crop *pollination*. These services are required to maintain the other three mentioned services.

So, alike other organisms the sources of our food is the product of ecosystem functions and services, which has been described through figure -3.

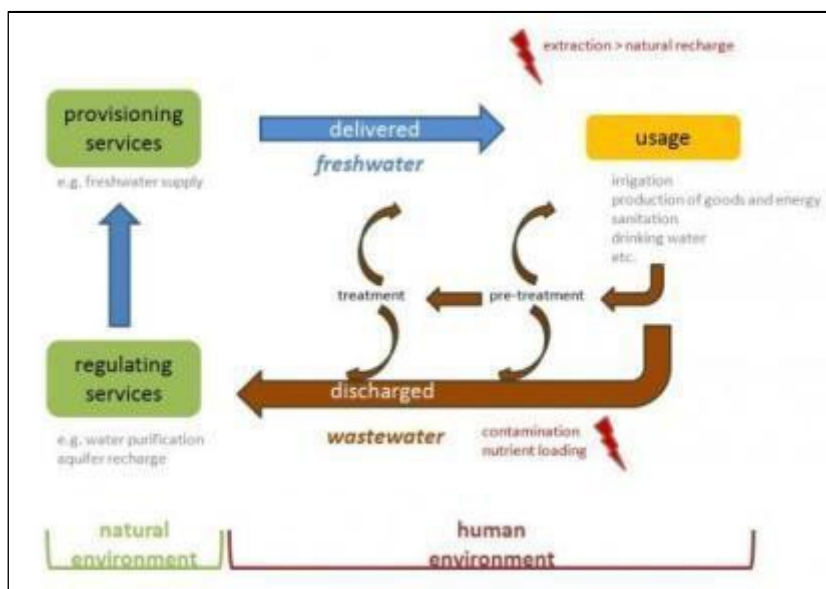


Fig.-3. Ecosystem functions and services

### Agriculture: Our food production system

Most of our food supply originates from agriculture—the production of food and goods through farming. This practice relies on soil, climate, freshwater and other facets of ecosystems to cradle crops from seed to harvest. Soil being the foundation of agricultural ecosystems, we depend on it for most of our food supply. Our fertile soil is actually teeming with living organisms. A single teaspoon of soil can contain as many as a billion of bacteria. Arthropods, earthworms, fungi, nematodes and protozoa also inhabit soil, sustained by the energy and nutrients contained in organic matter, such as decaying leaves and other plant and animal materials. The soil food web offers many services that promote an abundant food supply and human health. Organisms break down dead plant and animal materials, cycling nutrients into forms that crops can use. Earthworms, for example, eat decaying leaves and release valuable nutrients in their waste.

The soil food web stores nutrients, releasing them slowly over time. It also stores water, suppresses plant diseases and, in some cases, purifies water by breaking down certain pollutants. In addition to fertile soil, a region's climate—its temperature, precipitation, humidity and other weather conditions over a long period—contributes to the suitability of the land for agriculture.

The favorable climate is essential to the immense productivity of agriculture in any region. Freshwater Agriculture depends on a reliable supply of freshwater from streams, rivers, underground aquifers and other sources. Where rainfall is inadequate, farmers use irrigation to deliver water to fields. Moreover, biodiversity—the variety of organisms living in an ecosystem—plays a crucial role in agriculture. For example, farmers depend upon a varied assortment of bees, birds, butterflies and other pollinators that tend to 35 percent of the global food supply. Greater biodiversity within soil ecosystems may enhance the beneficial services offered by soil food webs. However, mankind is fundamentally dependent on the flow of *ecosystem services* to and from agriculture for their well-being (Fig.- 4).

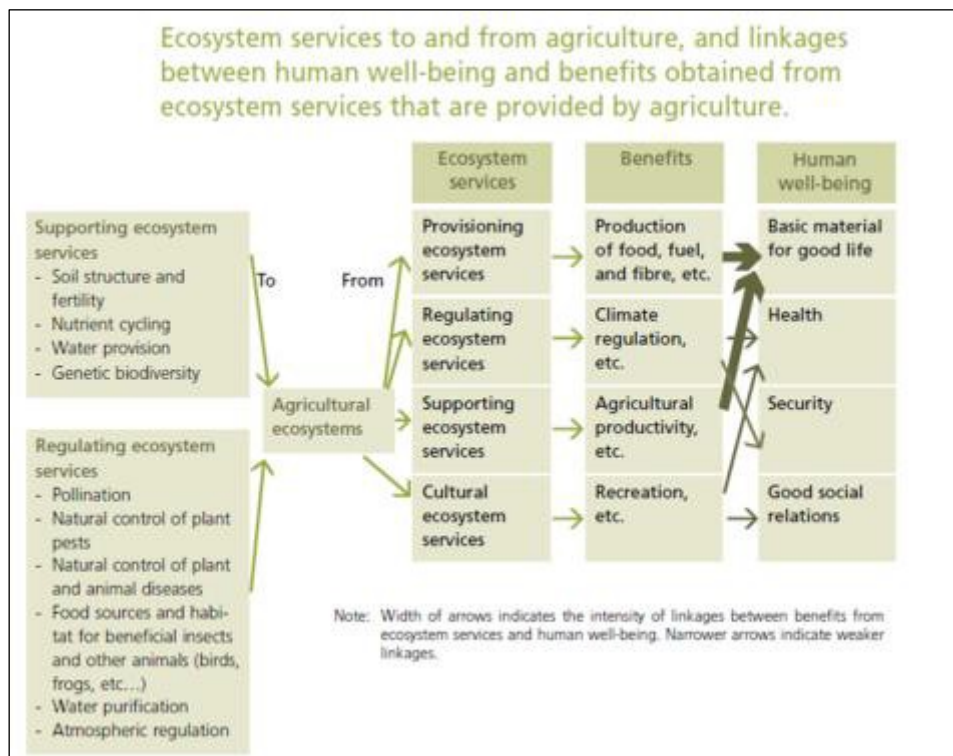


Fig.- 4. Ecosystem services to and from agriculture, and linkages between human well-being and benefits obtained from ecosystem services that are provided by agriculture.

### Impacts of Agriculture

The impacts of human activities on ecosystems have increased rapidly in the last few decades due to growing demand for these services. While the majority thereof can be considered beneficial to human well-being today, viz. the overexploitation of water for agricultural purposes, there is growing evidences of adverse effects (the lowering of groundwater levels and the resulting difficulty to secure water for crops in the future). Humans have especially enhanced production of three ecosystem services: crops, livestock and aquaculture through expansion of the area devoted to their production, and through technological inputs.

As agriculture remains a key sector in rural areas it continues to have great potential for reducing poverty and hunger in the rural sector. Through the update of modern agricultural technologies, India has moved from an era of chronic food shortages and “begging bowl” status up to 1960s to food self sufficiency and even food exports. The green revolution technologies along with several policy support measures adopted and implemented such as fertilizer subsidy and extension system helped to achieve self sufficiency in food grain production in staple crops such as rice and wheat. But the green revolution ensured food security at the macro level but not completely at the household level. Increase in population size, shrinking arable land resources, soil degradation and depletion of nutrients for the soil, poor water management and unsustainable use of the ground water, loss of momentum in the growth of food output, inefficient biological utilization of the nutrients consumed due to poor environment resulting in growth retardation and emergence of several diet related chronic diseases are some of the major problems the country may have to face in the long march towards human development.

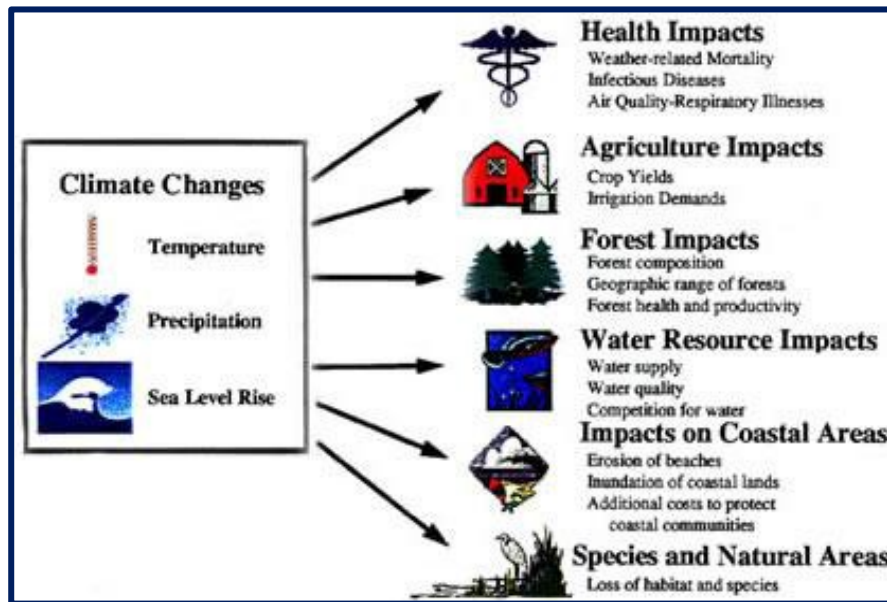
Nutrition security is best defined as “physical, economic, social and environmental access to balanced diet and clean drinking water for all and forever. In India, a significant proportion of the families consume food that may not have enough micronutrients and are unable to afford fruit, vegetables and animal foods needed to provide balanced diet. The result is a devastating public health problem, referred as 'hidden hunger'. The effects of intensive agricultural practices, increasing population pressure, climatic changes, environmental pollution, loss of biodiversity, soil erosion, salinisation and water depletion are all threatening the sustainability of agriculture. Development of high yielding input efficient, resistant to abiotic as well as biotic stresses and better quality breeds can offset the cost of production to be globally relevant. Dynamically evolving biotechnological tools are being deployed to realize high productivity, profitability, quality and ecological sustainability to meet social as well as economic aspirations of farming and related communities. The present thrust is on ecological and economic access to food through poverty alleviation, higher profit to the farmers, and sustainability of resources, import substitution, quality and production for export.

**Water contamination:** Water is an important component of our land resource. The water which sustains the human life in the planet may become a source of diseases and a root cause of calamities if contaminated chemically or biologically. The quality as well as quantity of available water resource is regulated to a great extent by anthropogenic activities like industrialization, urbanization as well as by crop and livestock farming through unscientific disposal of solid and liquid wastes. The concentrations of heavy metals like, arsenic, lead, chromium etc in drinking water are in pockets due to a combination of geological and anthropogenic reasons. On the other hand a huge amount of harmful organic and synthetic effluents are leached to the surface and ground and surface water as farm land and urban wastes. The interrelation of water pollution with land use change must be analyzed for detailed understanding.

**Biodiversity loss:** The heavy application of insecticides (a type of pesticide intended to control insect pests) and other agricultural chemicals can have unintended impacts on biodiversity. Insecticide use can have harmful impacts to beneficial organisms, including pollinators and predators of pests. Recently, bee populations have been in dramatic decline. In places where monocultures are grown in place of a variety of flowering plants, pollinators may be left without enough forage (nectar) to survive. The extent to which agriculture specializes in producing a narrow range of crops and animals has lessened the genetic diversity of our food supply (domestic biodiversity Globally, 90 percent of the food supply is derived from only 15 plant and eight animal species. With farmers relying on only a few crop varieties, the stability of our food supply is more susceptible to pest invasions and other shocks.

**Resource depletion:** Natural resources, including fertile soil, groundwater, fossil fuels and phosphate (a mineral used in the manufacture of some chemical fertilizers), are being depleted at rates faster than natural processes can restore them. Many of these resources are nearing or have passed the point at which their rate of extraction begins to decline. In its current form, agriculture is dependent on all of these resources and is a major contributor to their decline. The possibility that they may no longer be easily acquired raises concerns about the long-term price and availability of food, which may disproportionately impact the poor. Arable land is another natural resource that calls for conservation efforts. Every minute, more than an acre of Indian agricultural land is lost to sprawling suburbs and other developments. Paving over farmland diminishes natural ecosystems, local economies, scenic and cultural landscapes, and the nation's ability to supply ourselves and other nations with food. Well-managed agricultural land can offer many ecosystem services, including providing habitats for wildlife, helping to control flooding and maintaining air quality.



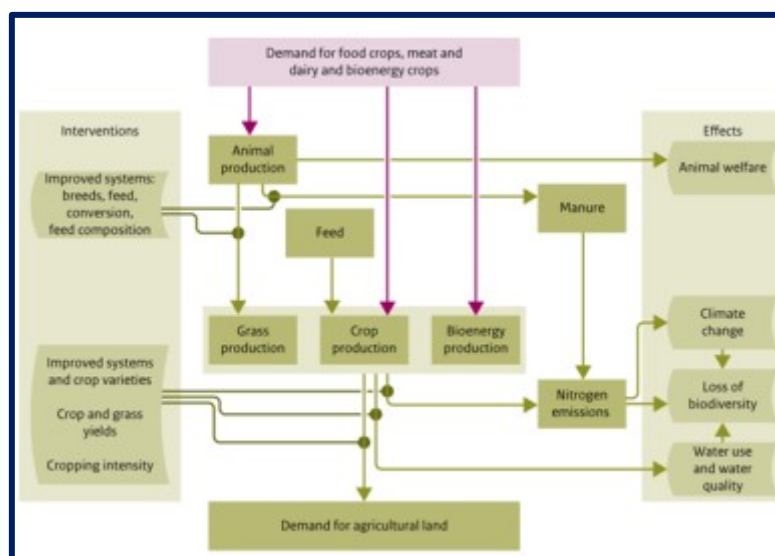


### Food Security

The World Food Summit of 1996 defined food security as existing “when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life”. Commonly, the concept of food security is defined as including both physical and economic access to food that meets people's dietary needs as well as their food preferences. In many countries, health problems related to dietary excess are an ever increasing threat, In fact, malnutrition and food-borne diarrhea are become double burden.

Food security is built on three pillars:

- Food availability: sufficient quantities of food available on a consistent basis.
- Food access: having sufficient resources to obtain appropriate foods for a nutritious diet.
- Food use: appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation.





**Pictures depict various components and functions of Food Security**

### **Sustainable agriculture:**

Sustainability has been described as “meeting the needs of the present generation without compromising the ability of future generations to meet their needs.” Literally, “to sustain” means “to maintain,” “to keep in existence” or “to keep on going. It has been argued that it must be ecologically sound, practiced in ways that minimize harms to the natural environment; economically viable, allowing farmers to make an adequate living and produce sufficient food supplies; and socially just. In practice, sustainable agriculture deals with the practices that sustain ecosystem functions vis-a-vis services of agro-ecosystem and in other words, gives due consideration to the importance of long-term interests, such as preserving

fertile soil, biodiversity, freshwater and other resources. Soil erosion, for example, can be minimized by protecting soil from wind and rain. Crop rotations, cover crops, mulching, no-till farming and rotational grazing are farming practices that can reduce erosion.

**What the children will do?**

Keeping these in view, children will look for identifying the problem(s) related to food and food production systems (processing, preservation, conservation and consumption) in and around their locality and studying them in the form of research project to come up with viable and sustainable solution(s). It is to be made clear to them that impact of science and technology on *ecosystem services* is the most apparent in the case of food production. Much of the increase in agricultural output over the last 40 years has come from an increase in yields per hectare rather than expansion of cultivated area. Moreover, habitat change, overexploitation, invasive species, pollution and climate change are the most important direct drivers of change in ecosystems. For each ecosystem, other direct drivers may play an important role:

- For **terrestrial ecosystems** and their services: land cover change, mainly to cropland, and the application of new technologies. Both land cover changes and the management practices and technologies used on land may cause major changes in *terrestrial ecosystem services*. For marine ecosystems and their services: fishing, both in coastal areas and in open ocean has led to an overexploitation of commercial fish stocks.
- For **freshwater ecosystems**: modification of water regimes, invasive species and pollution, especially *nutrient* overloading. The introduction of invasive species is one reason for species extinction in *freshwater*. *Nutrients* such as *phosphorus* and *nitrogen* at high levels can cause *eutrophication* in water bodies and lead to high levels of nitrate in *drinking water*.
- For **coastal ecosystems**: change of coastal habitats, such as forests, wetlands and coral reefs, through coastal urban sprawl, resort and port development, *aquaculture* and industrialisation.

**Framework**

Following diagram (Fig.-5) shows the conceptual framework for developing project.

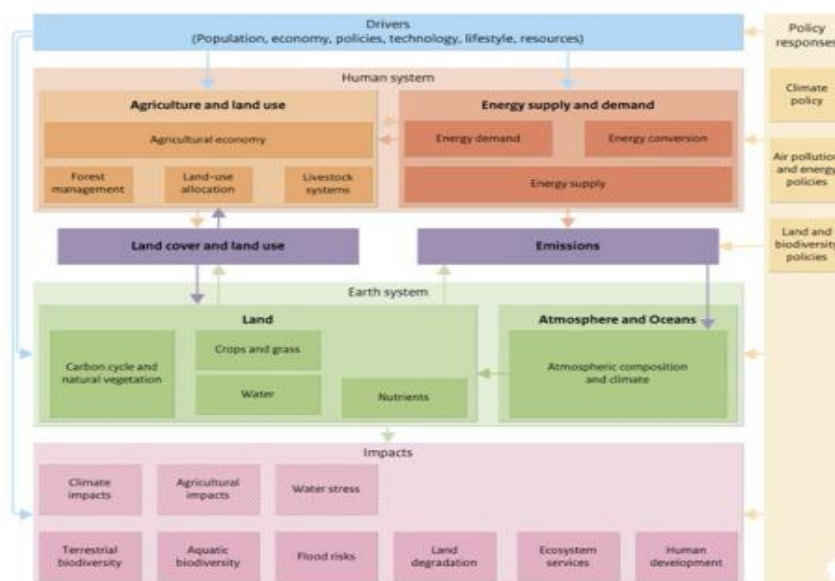




Fig. 5. Conceptual Framework

Ecosystem Function Categories and descriptions.	
Ecosystem Function Category	Description
Regulating Functions	Maintenance of essential ecological processes and life support systems.
Supporting Functions	Providing habitat (suitable living space) for wild plant and animal species at local and regional scales.

**Project Ideas**

**Project-1: Influence of vegetation cover on microclimate**

The microclimate in simple term refers to the modified climate of a small area which is different in temporal and spatial scale from the climate of the region. The microclimate is modified by vegetation cover, industrialization, development of human settlement and any other intervention in the land use pattern. Tree plantation restricts incoming radiation and has a cooling impact on the microclimate. Trees also act as shelterbelts and reduce desiccating effect of wind. Vegetation cover greatly modifies the soil environment in long run which is a vital component of the microclimate. Modification of microclimate is the perceptible and immediate effect of anthropogenic intervention in land use system. A basic understanding of microclimate will help the students to conceive the possible impact of land use change.

**Objective**

1. To understand the microclimate
2. To study the impact of vegetation cover on microclimate
3. To have a comparative study of microclimate under different land use system

The experiment may be divided in two components

- (A) Field study - monitoring microclimate of different land use system
- (B) Development of workable model to understand the concept of microclimate

**Part A: Field study - monitoring microclimate of different land use systems**  
**Methodology**

Select different land use systems in the surrounding locality

- a) Crop land
- b) Barren land
- c) Forest land/Orchard
- d) Settlement areas and any other typical land use system.

Two simply measurable parameters: temperature and evaporation are selected. This can be improvised by incorporating additional indicators.



- Keep circular leak proof open pan of ½ m diameter and 50 cm depth at the representative place of each land use system. Fill with water up to 30 cm depth. Cover it with wire net.
- Keep the thermometers in suitable places to measure soil temperature, water temperature (of the pan) and air temperature in these sites. Care should be taken to avoid direct radiation on the bulb of the thermometer.
- Record the temperature observations three times daily at early morning (say, 7 am), mid day (say at 12 to 2 pm) and during evening (say, 6 pm) over a period of 4 months at weekly interval.
- Record the depth of water from these pans at weekly interval and add water as per requirement during the period of study
- Collect the soil samples from each site at 10 cm depth 3 days after each rain event. Take the fresh weight (immediately after collection) and again by drying the same sample at 105 °C for 24 hours in an oven. Calculate the moisture content as below

**Soil moisture content = (Fresh soil weight – Dry soil weight)/Dry soil weight**

The impact on soil evaporation can only be perceptible if soil types are same because the soil type (textural class) is a major driving factor for water release from soil for evaporation

**Important note:** It is a group activity. Time synchrony has to be maintained for observations at different field sites. Each student may be assigned one site for diurnal observation.

**Relevance:**

Note the difference in temperature and evaporation rate from each observation site. These parameters are easily perceptible but important indicators to define a microclimate of a place. Mark, how human intervention changes the microclimate. This will give help the students to understand the microclimate and in broad sense demonstrate how anthropogenic intervention is responsible for modification of the climate on the earth surface.

**Part B: Understanding the concept of microclimatic**

**Materials required**

- Earthen pot (6 Nos)
- Seedlings (Fast growing plant depending local suitability)
- Card board & Ply board
- Thermometer (2 Nos)
- Open pan of 20 cm diameter and 5 cm depth

**Methodology:**

- Take 6 earthen pots. Make a hole at the bottom of each pot.
- Fill the pots with one thin layer of small stones at the bottom and the rest with soil
- Plant one seedling in each pot and water regularly.
- Make two model houses using card board / ply board
- Place one model house in the middle of 6 pots and one house in open area
- Measure the temperature of the roof top of each house (using thermometer) at 15 days interval starting from the date of planting.
- Place the open pan near each model house and keep 2 cm depth of water in each pan. Add water to each pan after drying.
- Note the temperature difference between the two situations
- Note the time required to dry up the water from each pan

**Relevance:**

This project will give a direct experience to the students about how plantation helps in ameliorating the microclimate. Maintaining the plants from sowing to subsequent growth will induce the association of students with the plants and will help in understanding the concept of microclimatic modification at the same time. Hands-on learning process will be an interesting and effective method.

**Note:** These two exercises (part-A & part-B) may be considered complimentary to each other

**Project 2: Soil is a Buffer Medium****Introduction**

Soil has considerable buffering capacity. It helps to overcome the problems associated with various acidic or alkaline inputs which are frequently being added to the soils. An idea about how this buffering activities help to sustain the soil condition may be obtained through a simple experimentation.

**Objectives**

1. To study buffering action of soil
- 2, To assess the efficiency of soil organic matter influencing buffering capacity of soil

**Methodology:**

- Study will carried out using soil-column preparing in waste plastic drinking water bottle, the bottom of which will have to be perforated carefully with sharp nail. Number of perforation of all the bottles should be equal
- Organic matter (Farm yard manure or vermin-compost or decomposed cow dung etc.) in different proportions will be mixed well with the finely grindedsoils.
- A piece of blotting paper or filter paper should carefully insert and placed at the bottom of the bottles, so that the perforations do not get plugged with the soil particles
- The plastic bottles are to be filled-up with the soil with occasional tapering to attain natural density.
- Artificially prepared acidic solutions (pH around 5.0) will be used
- Different amount of acidic solution of same pH will be added to different soil column and the pH of soils as well as filtrate from the soil column will be analysed after stabilization of pH

**Observation**

Variation in pH of soils with or without organic matter as well as filtrates will be recoded

**Relevance**

Results of this experiment will help the student to understand how soils can resist the abrupt pH changes and other stresses imposed on soil by anthropogenic activities. This will also help the students to realize the role of OM.

**Project 3: Land as a habitat of soil fauna**

**Introduction:**

Land is one of the most diverse habitats on earth and contains one of the numerous assemblages of living organisms. Soil biota includes bacteria, fungi, protozoa, nematodes, mites, collembolans (springtails), annelids (earthworms), macro arthropods (insects, woodlice) etc. The primary role of soil biota is to recycle organic matter that is derived from the above ground plant based food web.

**Objectives:**

1. To observe and document some visible life forms present in the land.
2. To record the seasonal variation and the type of biodiversity present in the soils of varying productivity levels.

**Methodology:**

**Soil sampling:**

Sample should be taken from the root zone of plants. Collect soil samples with specific quadrat . Take sample from different locations within the area and mix together. Collect the soil and place it in a ziploc bag. It should not be touched with hands. Separate soil samples will be collected for some physico-chemical analysis viz. texture (feel method), colour, pH etc.

***To see the organisms in the soil:***

1. Larger animals can be easily separated( Earthworms, beetles, etc)
2. To catch small arthropods, take a Tullgren funnel. Set a piece of ¼ inch rigid wire screen in the bottom of the funnel to support the soil. Half fill the funnel with soil, and suspend it over a cup with a bit of anti freeze or ethyl alcohol in the bottom as a preservative. Suspend a light bulb (25 W) for about 4-5 days over the soil to drive the organisms out of the soil. Animals will move away from the light and heat and fall down in the cup placed below.

**Observation:**

Date  
 Time:  
 Weather: Sunny/ Rainy /Cloudy etc.  
 Sampling area:  
 Characteristics of the soil:

Sample no.	Type of organism	No. of individual	Remarks
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**Sample size:**

**Analysis:**

1. Appropriate data sheet may be created for soil fauna.
2. Abundance of different species or relative density could be analyzed from the data collected using following formula.

$$\text{Abundance} = \frac{\text{Total no. of individuals of the species in all the sampling units}}{\text{No. of sampling units in which the species occurred}}$$

$$\text{Relative density} = \frac{\text{Total no. of individual species}}{\text{Total no. of individual in all species.}} \times 100$$

3. Seasonal variation of the animals could be noted under different soil conditions.

**Conclusion:**

1. Significance of habitat choice by the organism can be studied.
2. Dominant species and rare species can be shown.
3. Compare the result between or among the soils.

**Relevance of the project:**

A comparison of soil macro fauna in different types of soil like, forest, agricultural land, and urban, eroded, etc can be shown. The analysis of results may suggest remedies for eco-restoration of the degraded land.

**Project 4. Evaluating filtration capacity of soil**

**Introduction:**

Soil acts as a physical (sieving action), chemical (adsorption and precipitation) and biological filter (decomposition of organic waste materials). It has an important role in people's efforts to maintain a suitable environment, as a waste disposal site and to minimize pollution. In majority of area around cities and towns, municipal sewage water (which usually contains inorganic and organic pollutants) is used for irrigation to crops. In some situations, urban runoff and storm water carrying various chemical and pathogenic contaminants also finds its way into the land area. Unless filtered, these have the potential to contaminate water bodies.

**Objective:**

To estimate filtration capacity of soil

**Materials required:**

1. Industrial effluent and/or municipal sewage water
2. Copper sulphate
3. Nickel chloride
4. Empty mineral water bottle of one litre capacity
5. Note book
6. Soil from river bank, soil from dried pond bed, soil from cultivated land, and soil from forest area

**Methodology:**

1. Collect industrial effluent, domestic sewage from few sites of the city.
  - Prepare 16 soil columns: For this, cut one-third of the top portion of the bottle; make 3-4 fine holes with needle at the bottom of the bottle; put a thin cotton layer at the bottom. .
2. Pack the bottle with 500 g of soil and place it over a funnel.



3. Prepare solution of nickel chloride or copper sulphate (like: 10g salt/ 100 ml)
4. Add 200 ml of the salt solution, Industrial effluent and/or municipal sewage water in separate soil columns.
5. Collect the water leached through the soil column at the bottom of the funnel.
6. Note down the color of leached water

**Observations:**

Table:

Sl No	Name of the soil	Type of water added in the soil column	Colour of the leachate

**Interpretation:** If there is a colored leachate, the soil has poor filtration capacity. On the other hand, colorless leachate indicate high filtration capacity. In case, if a colored leachate is obtained for salt solution and colorless leachate is observed for industrial effluent or municipal sewage water, soil has good filtration capacity for particulate solids but poor filtration capacity for metals.

**Relevance:**

This experiment will help the student to understand which type of soil has good filtration capacity. By having information about the types of soil and industries in their area, they can predict the susceptibility of water bodies of their area from getting contaminated.

**Project-5: Mitigate soil and water loss through runoff with suitable control measures.**

Land degradation refers to the loss of inherent capacity of land to produce healthy and nutritious crops. It may occur with various forms – physical, chemical and biological. Soil erosion is the most important forms of land degradation as the vast area of our country suffers due to such process. It is, therefore, necessary to protect this shrinking valuable land resource to meet the demand of ever increasing population. Some of the common measures are practiced for preventing the loss of runoff water and soil particles from the sloppy land, which includes terracing, bunding, cover cropping, strip cropping, conservation tillage, cultivation along or across the slope etc.

**Objectives:**

- 1) Quantify loss of soil and water through runoff.
- 2) Implement control measure to check the loss of soil and water.
- 3) Sustainable land use practice in areas prone to erosion.

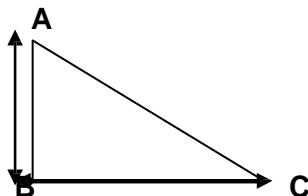
**Methodology:**

- 1) Selection of a suitable sloppy land.
- 2) Divide the land into at least 3 parts along with the slope.  
(Minimum width of each part shall be 3m)
- 3) Treatments
  - a) Keep fellow or undisturbed.
  - b) Grow cover crops.
  - c) Grow strip crop as per local practice.
- 4) Separate the adjoining parts by erecting suitable barriers with non porous inert materials

- 5) Place suitable notch at the middle part of the lower end through which runoff water and soil particle will pass.
- 6) Place a large bucket or suitable tank to collect the run off water and soil particles.

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**How to calculate slope of a land?**



Suppose BC is the length of a land and AB is the height of the land;  
So, **Slope, % = (BC/ AB)x 100**

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**Observation:**

- 1) Length of slope
- 2) Percent of slope
- 3) Amount of water added at the upper end to initiate the runoff process
- 4) Measure the amount of water and soil collected in the tanks at lower end.

**Follow-up:**

- 1) Transfer the results of the experiments to the farmers and local people.
- 2) Demonstrate the experiment to other students of your school or area.

**Project-6: Study of the influence of tillage on soil physical properties**

Fifty per cent of the soil's compositions is void (occupied by air and water) which can be modified by anthropogenic activities like tillage, farm mechanization, etc. The void space is formed by both micro (small) and macro (large) pores. Water is easily drained out from the macro pores and is retained more in micro pores. Roots require water and air from soil for the growth which depends on how much water and air the soil can hold. When the soil gets compacted by traffic load, the total pore space is decreased which affects water retention as well as root penetration. Bulk density is the index that measures the compaction of soil. High bulk density value indicates high compaction and less pore space. It also implies the closer contact of the soil particles that increases the heat conduction within the soil. Tillage disintegrates soil particles, modifies soil pore spaces and slows down soil conduction in soil as compared to untilled or compacted soil. The modification depends on the intensity or frequency and types of tillage use. As for example, a tractor drawn ploughing differs in depth with country plough.

By looking comparison between tilled and untilled soil, the question of whether different intensity and type of tillage affect the physical properties of soil will be addressed. The question will be answered by comparing the bulk density, water holding capacity, presence of micro and macro pores and soil temperature.

**Objectives:**

1. To study the influence of tillage on water holding capacity of soil
2. To find out the influence of tillage on bulk density
3. To identify the influence of tillage on soil porosity

**Materials required:**

- Agricultural fields in which a) ploughing is done through power tiller/tractor, b) ploughing is done through country plough c) Pasture/barren land where (no ploughing done)
- 9 GI pipes of 6 cm height and 5 mm diameter to be used as soil core
- Knife, Hammer, Wooden plank, Spade, Small cloth, Rubber band, Weighing Balance, Drier, Beaker, Thermometer
- Funnel fitted with a polythene pipe of 100 cm length
- A clump attached at 100 cm height

**Methodology:**

**Study -1 : Bulk density of soil (g/ cm<sup>3</sup>)**

1. Scrap the soil surface with spade where the core is to be inserted
2. Insert a core with the use of a wooden plank and hammer
3. Pull the core from the soil with the help of a spade
4. Cut the extra soil present in the two open ends with knife and clean the soil from the outer of the core by hand
5. Weigh the empty can and put the excavated soil from the core and keep it in the drier at 105° C for 24 hrs
6. Measure the volume of the core as:  $\pi r^2 h$  (3.17 x 2.5<sup>2</sup> x 6)
7. After deducting the empty weight of the can from No 5, measure the dry weight of the soil in can.
8. Measure the bulk density of soil as-

$$\text{Bulk density (g/ cm}^3\text{)} = \frac{\left[ \text{weight of the dry soil} \right]}{\left[ \text{volume of the core} \right]}$$

**Study - 2: Water holding capacity (%)**

1. Same as from SI No. 1 to 4 of Study 1.
2. A small piece of cloth is covered in one end of the core with the help of a rubber band
3. Place the core in a Petri dish and water is poured 1/3<sup>rd</sup> in it
4. Keep this as such for 24 hrs, in that time the soil gets saturated
5. Take the core out of the Petri dish and keep it on the table for 10 min.
6. Collect 5 tea spoon moist soil from the core in an empty can
7. Weight the soil in can and keep it in the drier at 105°C for 24 hrs
8. After deducting the empty weight of the can, measure the moist and dry weight of the soil in can
9. Calculate the soil moisture content in the soil core as:

$$\text{Soilmoisture}(\%) = \frac{\left[ \text{weight of the moist soil} - \text{weight of the dry soil} \right]}{\left[ \text{weight of the dry soil} \right]} \times 100$$

10. The calculated value indicates the water holding capacity of the soil. As all the pores here are occupied by water, the calculated water holding capacity also indicates the total porosity of the soil.

**Study - 3: Soil porosity (%)**

1. Calculate percent total pore space (Micro and macro pores) present in a soil core using the following formula –

$$\text{TotalPorosity} (\%) = \left[ 1 - \frac{\text{Bulk density}}{\text{Particle density}} \right] \times 100$$

2. The value of bulk density can be obtained from SI. No. 8 of Study 1

3. The value of particle density (also known as True density) can be considered as 2.65 g/ cm<sup>3</sup>, which is the average value considered for all practical purposes.
4. One can find out separately both micro and macro pores of the soil by other way too as given below

**(A) Micro porosity**

1. Same as from SI No. 1 to 4 of Expt. 2
2. Clamp the funnel at 100 cm height
3. Place a beaker at the end of the pipe fitted in the funnel.
4. Keep the core on to the funnel for 24 hrs
5. Collect 5 tea spoon moist soil from the core in an empty can
6. Same as from SI No 7 to 9 of Expt. 2..
7. The moisture content thus calculated indicates the moisture present in the smaller/micro pores i.e., micro porosity.

**(B) Macro porosity**

Deduct the values obtained in SI No. 10 of Study- 2 and SI. 7 of Study-3.

**Study -4: Soil temperature (°C)**

- Insert thermometers in tilled and untilled soil up to a depth of 5 cm (2 inches) at the morning (8 hr) and record the soil temperature
- Compare the variations in soil temperatures

**Relevance:**

With the increase in intensity of tillage: (1) soil gets compacted i.e., bulk density is increased, (2) total pore space is reduced (3) micro pore space is decreased (4) water holding capacity is decreased (5) soil temperature is increased.

**Note:**

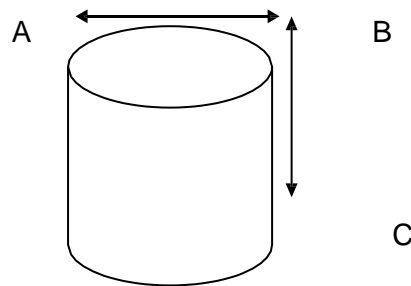
Density is the mass of an object per unit volume. It is expressed as gm/cm<sup>3</sup>  
Soil has got two densities – Particle density and Bulk density.

- **Particle density (pd)** is the density of the solid soil particles (sand, silt and clay). For all practical purposes and on-farm studies average particle density is considered as **2.65 gm/cm<sup>3</sup>**
- **Bulk density (bd)** is the density for a volume of soil as it exists naturally, which includes any air space and organic materials in the soil volume. Science bulk density is calculated for the dried soil, moisture is not included in the sample. It is calculated using the following formula

$$\text{bd} = \text{weight of soil} / \text{volume of soil core}$$

$$\text{Volume of soil core} = \pi r^2 h \quad (\pi = 22/7 = 3.14)$$

Where, **r** is the radius of the core = **d/2** (d is the diameter of the core)  
**h** is the height of the soil core



Suppose, in the figure of the cylinder, AB is the diameter (d) and AB/2 or d/2 is the radius (r). BC is the height (h) of the cylinder.

Calculate (i) cross sectional area(A) of the cylinder ( $A = \pi r^2$ )

(ii) Volume of the cylinder ( $V = A \times h = \pi r^2 \times h = 3.14 r^2 \times h$  ( $\pi = 3.14$ ))

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$$\text{Soil porosity, \%} = (1 - \text{bd}/2.65) \times 100$$


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**Suggested Additional project ideas:**

1. Minimize fluoride and nitrate toxicity in drinking water?
2. Organic farming for improving soil quality and food quality
3. Diagnosis of acid, saline and alkali soils for their better management
4. Minimizing heavy metal pollution for protecting soil quality
5. Arsenic contamination in ground water
6. Influence of management practices on land quality
7. Recycling of industrial wastes for Agricultural use
8. Soil microbial population – Key to soil health
9. Pesticide effects on land quality
10. Effect of pollutants on soil biota?
11. Eco-friendly composting of agricultural wastes
12. Eco-friendly farming
13. Knowing water holding capacity of soil of the locality
14. Fluctuation of water tables in any season of the year of the locality/region
15. Delineation and characterization of local watershed based on topography, drainage network and local knowledge
16. Chemical farming to organic farming and the journey towards eco-resort  
sajivakhetithi study sujavatosansodhanatamka Agriculture
17. Comparative study of modern farming methods
18. Modern techniques of different resources (agricultural land, water damage, etc.);  
Side effects of the underground water and agriculture tulanatamka product / food  
nisatvikaranano study
19. Agriculture used to study changes in soil and water quality and measures /  
mechanisms to be refined again to undo the progress that has been a long-term  
consideration
20. Food, seeds, fruit, vegetables ityadimate quality production, studied traditional and  
modern ways of referring to their collection; There were no measures to increase  
selphalaipha mapping is available to study its design / technical information, etc.
21. Solutions for positive, long-term environmental protection is not commonly used in  
agricultural products, the maximum tolerance used in the second / agriculture



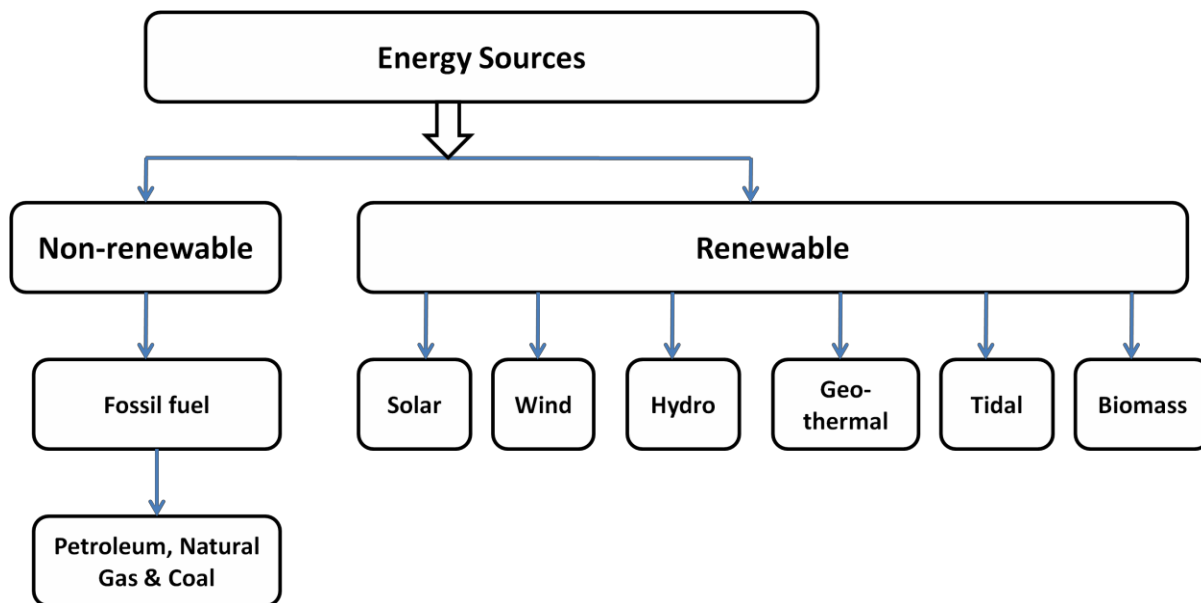
22. Whether increased agricultural tools / equipment or changes in functionality have been no other changes? The study
23. Farming Information (TV, Radio) of machines / media impact and ways to make it more efficient. Its spreading awareness about the study or the study of how many farmers
24. Traditional solutions / tools for food storage practice
25. Study innovative methods of soil analysis for crop cultivation
26. Industrial area polluted water found in soil chemical analysis and the study of its effects

Sub Theme III

Energy

### Sub theme: Energy

Economic development of any region or a country largely depends on how its energy requirements are satisfied. Every production process has certain amount of energy requirement. Hence, availability of quality energy is crucial for overall scientific and technological progress of any country. Per capita energy consumption is one of the key deciding factors of the level of well-being of any society or for any country. It is also referred through the relationship between economic growth and energy consumption.



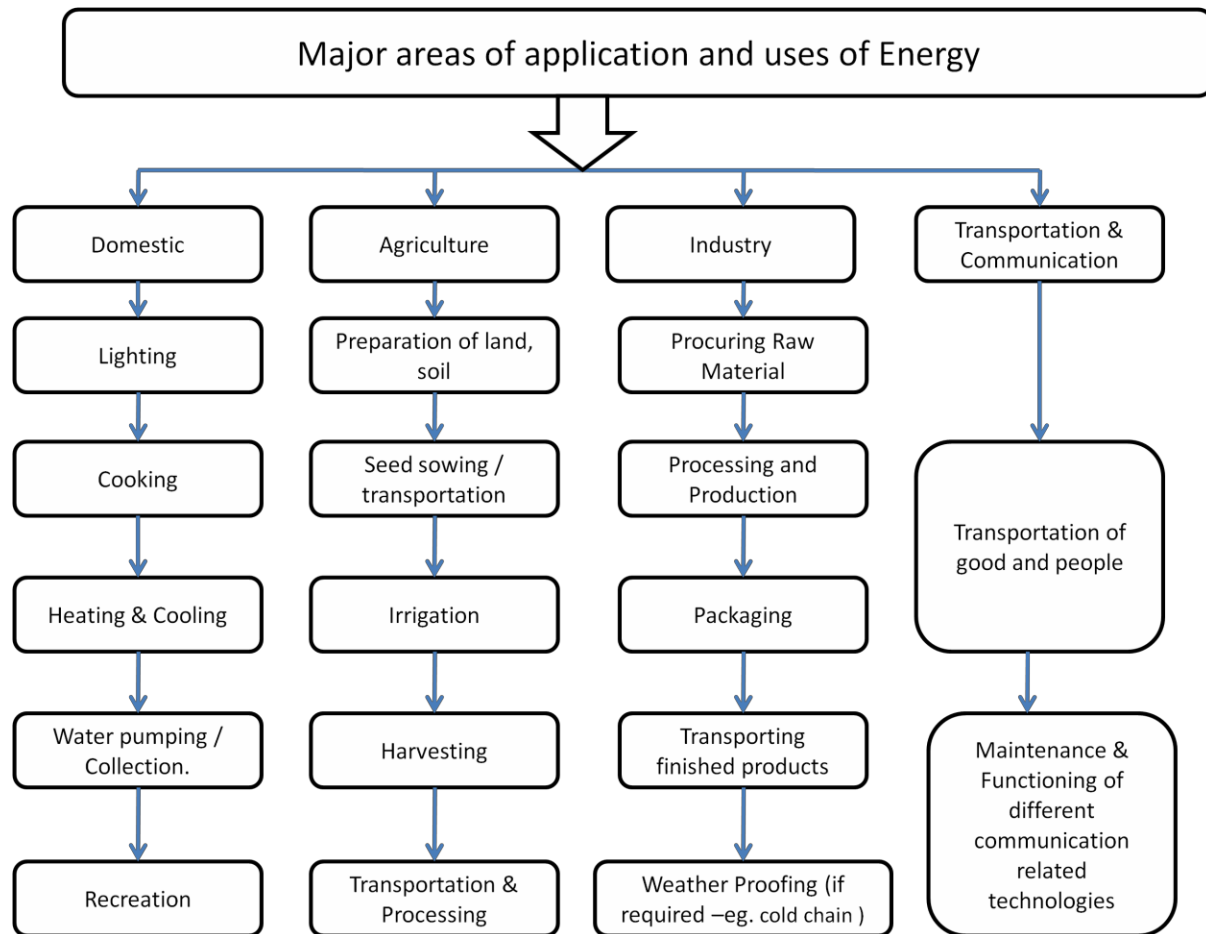
Energy is central to sustainable development and poverty reduction efforts. It affects all aspects of development - social, economic, and environmental - including livelihoods, access to water, agricultural productivity, health, population levels, education and gender-related issues. None of the Sustainable Development Goals (SDGs) can be met without major improvement in the quality and quantity of energy services in developing countries. Energy is mainly used in domestic, agriculture, industry, transport and communication sectors and they are interlinked. Efficiency of the technology in use and its purpose to produce services are important which determine the situation of energy sufficiency. In these perspectives, to achieve energy sufficiency and efficiency for suitability each one is interlinked through proper value setting, management principles, technological efficiency with policy measures

In the above perspectives Sustainable issues are reflected as follows:

Sustainable energy is the sustainable provision of energy that meets the needs of the present without compromising with the ability of future generations to meet their needs. Technologies that promote sustainable energy include renewable energy sources, such as hydroelectricity, solar energy, wind energy, wave power, geothermal energy, and tidal power, and also technologies designed to improve energy efficiency. Energy efficiency and renewable energy are said to be the twin pillars of sustainable energy.

“Dynamic harmony between equitable availability of energy-intensive goods and services to all people and the preservation of the earth for future generations”. And, “the solution will lie

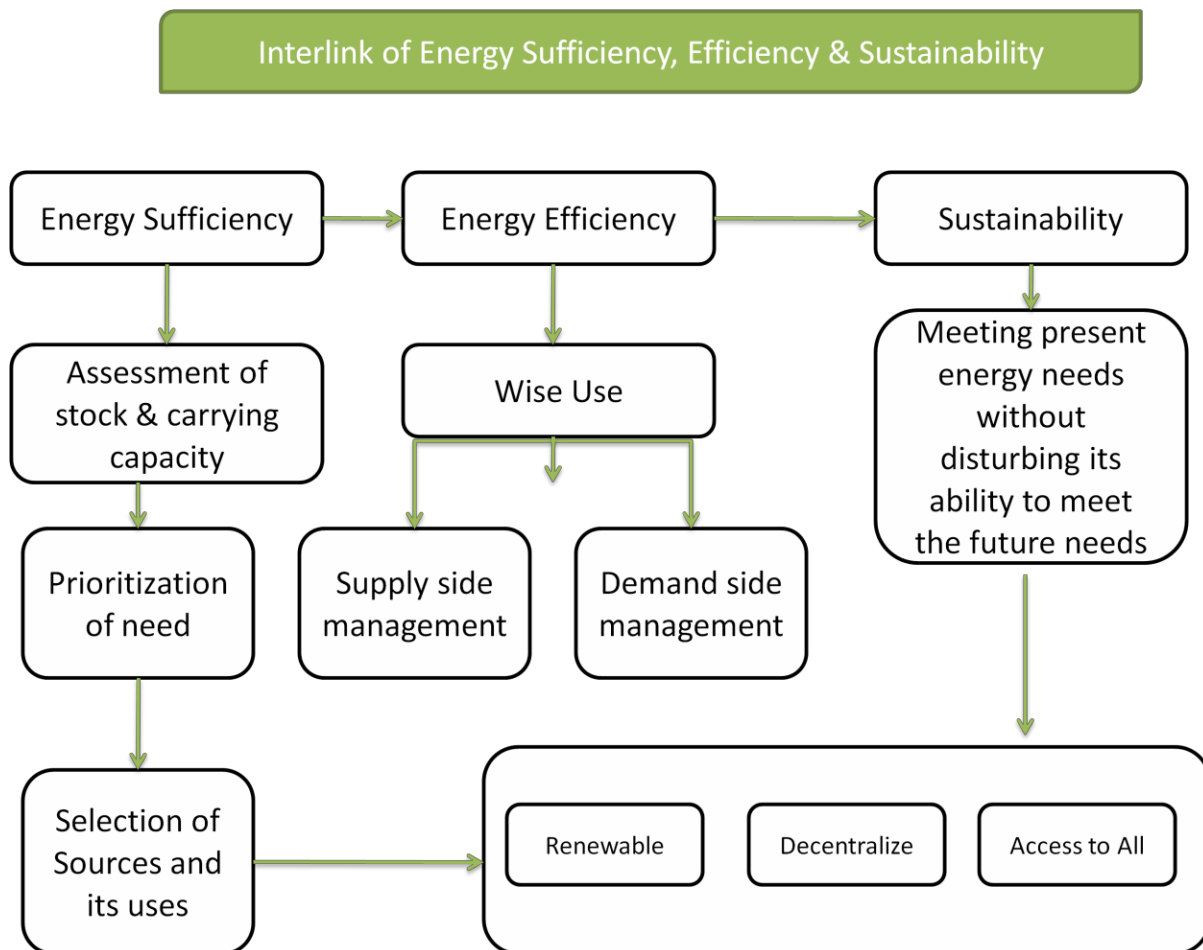
in finding sustainable energy sources and more efficient means of converting and utilizing energy”.



Any energy generation, efficiency & conservations our where resources are available to enable significant portion of energy generation in long term. The growing concern for climate change and energy security now means that energy sufficiency is something that warrants serious consideration. It looks beyond technical energy efficiency measures and address the challenging issue of curbing consumer demand for energy services in an ethically acceptable fashion. It also implies a need to recognize limits and to establish acceptable minimum standards for energy services. Taking consideration of our required initiatives in this era of global climate change challenges, efficient energy use and replacement of carbon based fuel with non-carbon based fuel are the key areas by which we can reduce our carbon footprint to a large extent and undertake some pragmatic measures for mitigation and adaptation of climate change. It is noteworthy that awareness and understanding in such areas in many cases encourage us for taking self initiatives for conservation, rational uses and strategies for enhancing efficiency.

The last century witnessed an exponential growth of human population and it has altered the life style of the people from ecosystem based approach to a market base approach. In this context, the development index is controlled by GDP and associated with the pattern of consumption. As a result of which growth of different sectors like agriculture, industry etc is highly dependent on energy consumption. These processes create more demand for energy

generation. Eventually to fulfil these demands now a days focus is given more on power generation either from hydel or from thermal. But normally in planning and designing such project only economic perspectives is considered while ignoring the issues related to environment, human life and society. Such non-futuristic and unsustainable approach leads to the problems of global warming, developmental inequality, conflicts, and health and ecosystem damage.



It is essential to address issues to take care of all the evolving system related to development. If the development process has to be sustainable, it is necessary to increase the efficiency of energy utilities and processes, conserve energy and explore renewable sources of energy. From such perspectives, efficient and equitable energy access and supply system can create an ideal situation for energy sufficiency and provides energy security to all.

The energy connect of Sustainable development can be dealt at five levels: Production, Processing, Transmission, Consumption and Disposal. Energy production, let it be hydel, thermal, nuclear, fossil fuel, biomass or non conventional, has some impact on environment. Oil refineries pump a large quantity of GHS into the atmosphere. The high voltage transmission line and petroleum transmission pipes cause some mishaps in the environment. The greatest quantity of pollutants are emitted during the consumption of energy and fuels. The consumption of energy in industry, health care, cooking, agriculture, entertainment, housing, transportation, communication and in domestic domains have direct or indirect far reaching impact on life supporting systems like air, water, land and



ecosystems like forests, wetlands, rivers, water sources, and biodiversity at large. Beginning of agriculture and industrial revolution are considered as landmarks in human civilization.

During the progress of civilization the demand on energy also increased. Energy consumption rate is considered an indicator of standard of living and development index of a country.

Energy is the driver of growth. International studies on human development indicate that India needs much larger per capita energy consumption to provide better living conditions to its citizens. But such growth has to be balanced and sustainable. Two important concepts here are energy management and conservation.

Planning commission of India has estimated that India has conservation potential at 23% of the total commercial energy generated in the country. India's energy requirement comes from five sectors; agriculture, industry, transport, services and domestic, each having considerable saving potential. For example, energy costs amount to 20 percent of the total production cost of steel in India which is much higher than the international standards. Similarly the energy intensity per unit of food grain production in India is 3 - 4 times higher than that in Japan. Sustainable growth also implies that our energy management and energy conservation measures are eco-friendly and accompanied by minimum pollution, in particular minimum carbon emission.

### **MODEL PROJECTS**

PROJECT: 1

TITLE : Sustainability of the Energy Self-Reliance of a village / housing society

Any given village can be using a combination of renewable and non-renewable energy sources available to it. Probably the combination evolved in such a manner because of the different requirements came at different point of time. Now it might be necessary to relook the combination of different energy sources so that the village / society to be more of self-reliant and sustainable. This would help to make the future growth as sustainable in long term with the least carbon foot print.

#### **OBJECTIVES**

1. To identify the various energy sources available for the said village
2. To bring out the optimum energy usage pattern for the village leading to the maximum possible self reliance.
3. To suggest a various options for reducing the village level carbon foot print with more of renewable energy sources.

#### **METHODOLOGY**

Firstly the identify the various energy requirements for the most of the common facilities in the village/society like street lighting, water pumping station, sewage treatment plant, community cooking, public storage, energy for public buildings like schools, government offices, libraries, recreation clubs etc. Then the various energy sources readily available for the village/society need to be categorized under the ambit of renewable and non-renewable, cost-effective, long-term maintainability, reliability, less-polluting etc. Once these jobs are done, the whole data can be taken to meeting of village people and discuss the suitability of each source and requirements so as to make the village more self-reliant and hence it can be sustained for very long term. Points of discussion and suggestions of people and professionals can be noted down and a people participatory practical suggestions to make a energy self reliant can be worked out.

## ANALYSIS

The water pumping can be done using solar or wind energy without any storage of energy. Simple and small storage systems can be made for the street lightings and energy can be stored in the day-time. The government offices work mostly in day-time, hence the energy requirements can be met by the solar power itself. Biogas or solar power can be used for community cooking. If the sources and requirements are matched by various factors the energy from various sources can be mixed in right proportion so as to make the village/society self-reliant and hence the future growth can be sustained. When the energy requirements increase in the village/society in future in a particular activity, the present fulfilment of all requirements should be looked afresh and appropriate reallocation should be done. A preparation of a model can be attempted with all the information collected and creative and synthetic ideas generated.

## CONCLUSION & SIGNIFICANCE

If each and every village/ housing society is made self reliant, then the model can be replicated for wider area hence fuelling the future growth with sustainable activities and understandings.

## PROJECT 2

**TITLE:** Equity and Distribution of energy in a locale and its effect on sustainable development.

The distribution of energy in a locale / village could have been evolved in a very non-uniform manner because of many socio-political and economic reason. In future, if the benefits of growth in terms of energy is not distributed uniformly and also by mitigating the present non-uniformity, then the sustainability of the growth can be disturbed by the social unrest due to the inequality. Distribution of energy usage can be documented and studied scientifically and can help to re-orient the distribution leading to sustainability.

## OBJECTIVES

1. To identify the non-sustainable distribution energy in terms of economical, societal and ecological factors.
2. To suggest ways to redistribute the energy sources considering the sustainability of energy usage in future.

## METHODOLOGY

Firstly, it is to identify the various sources of energy available in a locale/village and then to characterize them under the ambit of renewable and non-renewable sources. Then the pattern of the energy consumed in the locale needs to be mapped along the lines of per capita energy. Then the various reasons for the non-uniformity in the distribution, if any, need to be identified. After studying reasons scientifically, the same can be discussed with people of various background and steps for making the sustainable distribution can be identified. This needs to be done considering the present life style of people and future needs as well as new sources of energy.

## ANALYSIS

The temporal and spatial patterns of energy consumption need to be studied scientifically.

Then, with sustainability of growth in mind, the temporal and spatial requirements need to be matched with the characteristics of available energy sources. For example the solar energy can be tapped for all the day-time energy requirements and wind energy can be tapped to the increased energy requirements during monsoon season. During monsoon it is imperative to eat the hot food all the time to avoid any virus/bacteria related diseases. Then the energy distribution can be done uniformly across the sub-locales keeping the growth in mind. If the redistribution is more uniform now, many potential social unrests can be avoided which is an important factor for the sustainability of any growth.

#### CONCLUSION & SIGNIFICANCE

The equitable distribution of energy to be consumed is an important ingredients for the sustainability of growth and that needs to tackled in terms of economical, societal and ecological factors.

#### PROJECT – 3.

**TITLE:** Assessment of wastage of energy and energy budgeting of festivals and social functions.

Lot of energy gets wasted though our carelessness and many ritualistic behaviours. Celebration of festivals in different parts of country witnesses increased energy usages. This may be by way of cooking, transportation, lighting and firecrackers so on. Students may be encouraged to explore the ways in which the celebration practices have changed over time and their impact on the health of the community and eco-system.

#### OBJECTIVES

1. To study the change in the pattern of energy uses in festivals
2. To find out the amount of energy consumed by a group of households during the festival days.
3. To compare the energy consumption pattern in the society during festival days and non-festival days.
4. To suggest ways to reduce the excessive/ unwanted use of energy during festival celebrations

#### **Methodology:**

**Sample:** For the study the students should select, randomly, a group of households in their locality. A suggested sample size could be 25-40 households.

**Tools:** Students should prepare the following types of tools under the guidance of their teachers;

1. Check Lists of devices used, during the festivals, which consumes energy and the quantity of material / fuels etc. procured and consumed during festival days.
2. Interview Schedules to collect information from the Heads of households about the practices that require energy for celebrating festivals
3. Collection and analysis of electricity bills for the festival month(s) and non-festival month(s) to find out the difference in the energy consumption, if any.

#### **Techniques:**

1. The students should visit the households before the festival and after the festivals to collect relevant data and information.
2. If possible, they should collect the information from the field/ sample by observing the households during the festival.

#### **Analysis and Interpretation of the Data:**

The data/information so collected should be analysed in view of the objectives of the study and it should be interpreted to arrive at conclusions.

*Expected outcome:*

1. Suggestion of Eco-friendly efforts/ measures to be take nup by the society while celebrating the festivals
2. Awareness levels of public about energy saving techniques particularly for celebrating festivals
3. Examining people's sensitivity towards energy conservation while celebrating festivals

**PROJECT IDEAS**

1. Biofuels an alternative to our oil and energy needs. Children can study the availability and potential to use the biofuel as an alternative to the existing usage of fossil fuel or any other conventional fuels.
2. Village energy budget. A thorough analysis of existing village energy budget identifying the wastages and suggesting the corrections can be good project.
3. Changes in energy usages of people, Comparison of energy usage of different sections of people in the socio economic strata can be attempted.
4. Energetics of irrigation. Irrigation sector uses a very high energy. The practices of energy usages in this area can be studied in a village, identify the possibilities of energy saving and working modalities
5. Energy dynamics of dryland farming and irrigated farming. Children can think about a comparison of energy needs of dryland farming and irrigated farming in the same area.
6. Energetics of fast food culture: Energy needs of production, preservation, distribution and consumption of fast food as opposed to the traditional local foods can be compared and studied.
7. Energetics of building architecture. Every building needs energy for many aspects such as lighting, temperature maintenance and so on. There is a direct link with architecture and energy requirement. This can be compared.
8. Energetics of life stock. Different practices of livestock maintenance requires different levels of energy. Also the life stock give back energy a balance sheet of energy requirement and return can be attempted.
9. Energy demands of cooking. Cooking involve a significant energy usage of people everywhere. Energy demands of different cooking styles and be studied and compared.
10. Energy comparison of different mode of transportation. Sustainability of future transportation sector lies in how we are making it more and more energy efficient. A study of energy efficiency of different modes of transportation can be worked out focusing a specific city/town or even villages.
11. Storage of energy and sustainability. We may have to store energy for various purposes as in the batteries and so on. How much this is sustainable and the usage of such storage devices can be studied in the light of sustainability.
12. Waste of energy. We can see wastages of energy in all levels locations and contexts. Identifying the wastage of energy in different locations, practices etc can be taken as good study topic.
13. Effect of Energy policies on sustainability. Government takes various policies regarding energy usages such a electricity fare hike and so on. Effect of such policies on the usage pattern of energy can also be studied.
14. Using a solar module, calculate the maximum power output at different solar radiation and also try to evaluate the power output at different inclination angle of the solar module.
15. Measure the amount of gas output from different kinds of organic waste materials (cow

- dung, vegetable waste, food waste, municipal solid waste etc.).
16. Evaluation/estimation of energy supplied by cattle in the village ecosystem for the traction power
  17. Cow dung as fuel etc and estimates the amount of other conventional energy sources required to substitute them.
  18. Study the amount of fuel required to boil water/ cook a certain amount of food in different structured utensils and identify the most energy efficient one.
  19. Study the components of energy systems supporting in maintaining a garden and relative roles.
  20. Study the relative role of different energy systems in development of a green building.
  21. Sustainability and food processing. Comparison of energy usage and energy system contributions in food processing.
  22. Check the performance of chullahs in the village and rank them on the basis of performance in the light of availability and sustainability of firewood resources.
  23. Sustainable energy conversion systems in a village. This need to include the energy source conversion devices, output work and kind of losses and try to rank them based on the work performance to develop a sustainable model.
  24. Different refrigeration systems and their role in energy saving and management
  25. Maintenance of room temperature – sustainable models. Record and analyse the room temperature inside the building with different types of roofs.
  26. Charcoal production potential of different types of biomass and its role in the sustainable energy availability of a village.
  27. Innovative energy efficient stoves to utilise locally available bio-residues as a source of sustainable cooking option for the village
  28. Carbon sequestration through community initiatives
  29. An investigation about the impact of energy availability on the change on lifestyle of the people
  30. Traditional practice of backyard farming of the non-timber firewood species
  31. Experimental study on conscious reduction in energy use in the household and role of awareness in the energy usage of people.
  32. Reducing energy consumption through the use of energy transformation methods.
  33. Comparative study of energy and resources required.
  34. Biodiversity and energy.
  35. Measuring and evaluating the cost of energy to stay healthy gymnastics.
  36. Influence on the management of waste energy.
  37. The impact on food and feed of energy.
  38. Using solar energy is based on a new idea.
  39. Related stove energy efficient new idea.
  40. New ideas regarding the use of energy, protection of the planet.
  41. Large-sized power plants impact on the environment.
  42. Sight pastoral energy, evaluate the number of animals.
  43. Social structure, gender - female - male, education and energy conservation, storage.
  44. What is an acceptable solution to burn simply log for waste disposal?
  45. As well as the evaluation of the energy produced by wind, sea mountain hill area.
  46. Comparative study of the uses of farm animals, bulls, etc. as well as the machinery (tractor).
  47. The use of solar cookers, When? Why ?
  48. Electrical energy savings methods.
  49. Enormous hydroelectric practice in your area.

**References:**

[http://www.undp.org/content/undp/en/home/ourwork/environmentandenergy/focus\\_areas/sustainable-energy.html](http://www.undp.org/content/undp/en/home/ourwork/environmentandenergy/focus_areas/sustainable-energy.html)).



Bureau of Energy Efficiency Guidelines; [http:// www.beeindia.in/](http://www.beeindia.in/))

<http://www.fao.org/forestry/17111/en>

*“The Twin Pillars of Sustainable Energy: Synergies between Energy Efficiency and Renewable Energy Technology and Policy”.* [www.aceee.org](http://www.aceee.org).)

([http://www.undp.org/content/undp/en/home/ourwork/environmentandenergy/focus\\_areas/sustainable-energy.html](http://www.undp.org/content/undp/en/home/ourwork/environmentandenergy/focus_areas/sustainable-energy.html)).

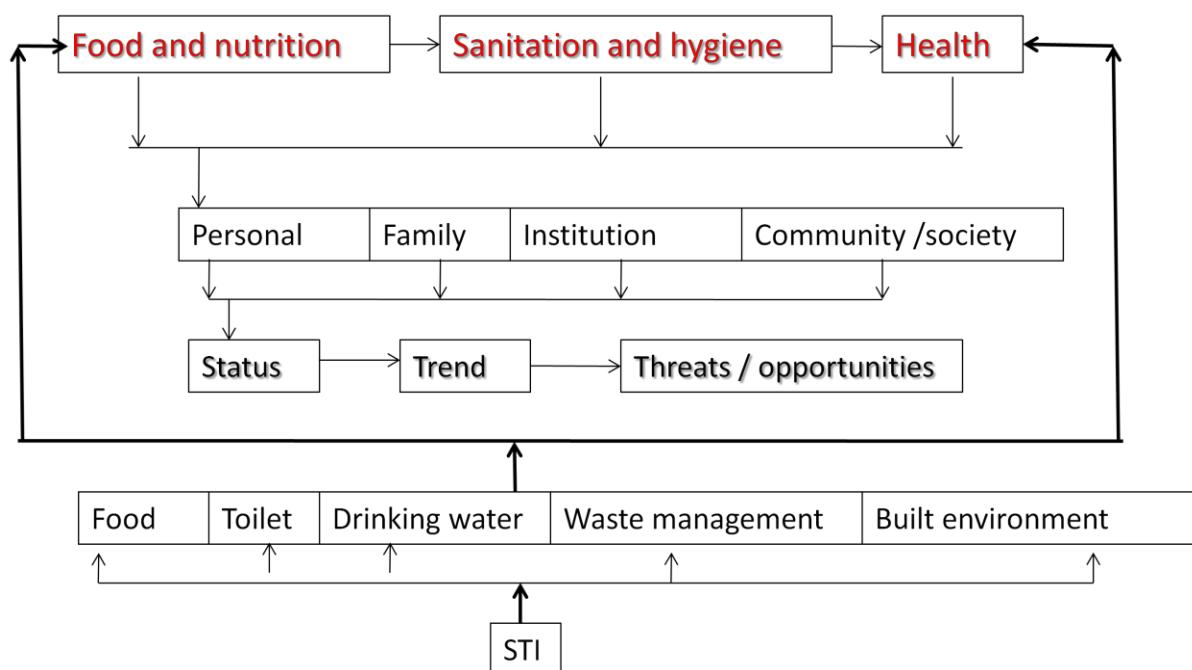
## Sub Theme IV

### Health, Hygiene & Nutrition

**Sub-theme:  
Health, Hygiene and Nutrition**

**Introduction:**

On the surface, it is a common-sense argument. *Of course* the children of today and tomorrow are central to sustainable development and the future of our planet and all its inhabitants. All too often in practice, however, the issues of children and young people are relegated to being only a –sociall issue -- and their health, safety, education and rights are not seen as being inextricably linked to ensuring economic growth and shared prosperity, a protected natural environment and more stable, safer societies. Overlooking their role is to the peril of us all, the communities in which we live and to the planet.



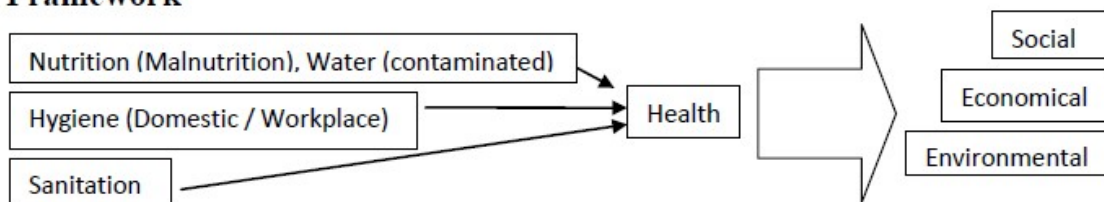
Children and young people are both shapers of and shaped by the world around them. When a child is not healthy, has compromised brain functionality due to chronic poor nutrition, does not receive a quality education, does not feel safe in his or her home, school or community, will that child be able to fulfill their potential and responsibilities as a parent, an employee or entrepreneur, a consumer, a citizen? In many cases, the answer is –no! and that denies the individual child his or her rights, *but also* deprives the entire human family of the intellectual, social and moral benefits that derive from the fulfillment of these rights.

*Sustainable Development* – the core concept for the Post-2015 Development Agenda – provides *an integrated response* to the complex environmental, societal, economic and governance challenges that directly and disproportionately affect children. With appropriate focus, investment and innovation, the Post-2015 Development Agenda now under formulation presents an unprecedented opportunity to create *a World Fit for All Children*

The relationship between children and sustainable development is symbiotic. Progress in sustainable development underpins child rights and well-being, and conversely, child rights and well-being underpin lasting and equitable development progress. Finding the balance to achieve progress for all in today's world and for future generations depends upon three key propositions:

1. Sustainable development starts with safe, healthy and well-educated children;
2. Safe and sustainable societies are, in turn, essential for children; and
3. Children's voices, choices and participation are critical for the sustainable future we want.

**Framework**



**Areas covered:**

**Key words: Health, Nutrition, Hygiene, Sanitation**

People in general, and children in particular, are at the core of sustainable development. Individual wellbeing is essential to sustaining the inter-generational gains in health, productivity and social engagement that underpin the sustainable development agenda (OWG 2014). The choices that individuals are able and willing to make regarding foods to produce and market, the diets their families consume, and the care and nurture of nutritionally vulnerable people (particularly mothers and infants), all have a direct bearing on the success or failure of the Sustainable Development Goals (SDGs).

Reflecting this understanding in 2012, the World Health Assembly (WHA) endorsed a Comprehensive Implementation Plan on Maternal, Infant and Young Child Nutrition which included 6 targets based on their public health relevance; namely, child stunting, anaemia in women of reproductive age, low birth weight, childhood overweight, child wasting and exclusive breastfeeding for the first 6 months after birth (de Onis 2013). Alone, each of these targeted problems represents a challenge to most of the world's governments. Together, they combine to pose a significant threat to global development initiatives. Data from 2013 suggest that 161 million children under the age of 5 years were stunted (too short for their age), at least 51 million were severely or moderately wasted (weighing too little for their height), while another 42 million children were overweight or obese (Black et al. 2013; UNICEF, WHO, WB 2014). In addition, there are several billion children and adults who are deficient in one or more vitamins or minerals which can lead among others to anaemia, blindness, cognitive impairment, greater susceptibility to many diseases and higher mortality. Public and private investment in resolving and preventing each of these problems represents a commitment to development. In addition, actions to reduce low birth weight and/or small for gestational age (which can reflect in utero nutritional compromise and maternal under nutrition) and to increase exclusive breastfeeding help promote enhanced child nutrition early in life when future paths for growth, health and productivity are set in motion.

The –strong synergies between health and nutrition (World Bank 2013) are well-documented; good health is not possible without good nutrition. Malnutrition remains one of the main determinants of the global burden of disease, with 45% of child mortality attributable to under nutrition (Black et. al. 2013)

Nutrition in many ways represent a process by which individuals achieve their physical and mental growth potential; it is a characteristic of the quality of an individual's diet in relation to their nutrient needs; and it is a benchmark or metric against which the effectiveness of numerous development goals are assessed. It is also, not least, a fundamental right of all of

humanity. Without good nutrition, the mind and body cannot function well. When that happens, the foundations of economic, social and cultural life are undermined.

Nutrition must be understood as both an input to, and an outcome of, the SDGs as a whole. The many manifestations of malnutrition derive not just from a lack of sufficient and adequately nutritious and safe food, but from a host of interacting processes linking health, care, education, sanitation and hygiene, access to resources, women's empowerment and more. Good nutritional status leads to higher individual earnings and mental acuity, which in turn support macroeconomic and societal growth. Malnutrition (which includes several forms of under-nutrition as well as overweight and obesity) impairs individual productivity which acts as a drag on national growth. In this sense, malnutrition will represent a pernicious, often invisible, impediment to the successful achievement of SDG targets.

Today, it is acknowledged that there are several distinct, albeit linked, facets of poor nutrition, and each carries its own implications for impaired human productivity, development and well-being. It has also come to be recognized that weight-for-age is not the only or best metric for representing the full array of nutrition conditions of concern.

Nutrition is intimately linked to nutrient sufficiency (relative to need) and diet quality, both in the short term and the long term. For health, care and other actions that are also needed to improve nutrition to gain traction, individuals must be well-nourished at all times. This requires efforts to enhance access to healthy diets, improved knowledge for food choices, stronger resilience of food systems to economic, climatic and human-made shocks, and remediation of food-borne threats to consumers.

Resolving all forms of under-nutrition and obesity would dramatically reduce the social burden of sickness and premature death, and the economic burdens of lost productivity and burgeoning health care costs that face virtually every country in the world. Appropriate investments in the first 1,000 days (from pregnancy through the first two years) will yield benefits not only for that child's lifetime, but across generations (Black et al. 2013).

The Global Nutrition Report (2014) argues that, –improvements in human nutrition represent both a maker and a marker of sustainable development. This Technical Note confirms that nutrition problems of many kinds manifest through the life-cycle affect, and in turn are affected by, each of the SDGs. The world as a whole did not meet the Millennium Development Goals (MDG) target relating to nutrition, and is currently not on track to meet the six global nutrition targets set by the World Health Assembly for 2025. As such, the nutrition community, and its natural allies in the food security, agriculture, WASH, gender and health communities, advocate for nutrition within the SDG framework. In the end, sustainable development will depend on it.

In calculating the relative contribution of various factors to the progressive decline in child stunting between 1970 and 2010, Smith and Haddad (2014) estimated that increased access to safe water accounted for 25 % of the change. The risks to nutrition derive from waterborne diseases, microbial contaminants that provoke enteric dysfunction, diarrhoea, and a lack of cleanliness that itself increases food safety risks and lack of hygiene-related nutritional compromise. Separately, Smith and Haddad (2014) calculated that roughly 14% of the total fall in stunting between 1970 and 2010 resulted from improved sanitation.

Today nearly 90 influential international organizations, including Action Against Hunger, called upon key United Nations decision makers to ensure that hygiene, a critical component of global health and development, be addressed as an indicator in the forthcoming SDGs.

Hygiene—specifically hand-washing with soap—is one of the most important interventions



for human health and development and is a universal necessity. Fundamental to fighting under-nutrition, reducing child mortality, overcoming antibiotic resistance, and advancing access to education, hygiene underpins the delivery of several other SDGs and ultimately advances gender equity, dignity, and human rights.

Hygiene is included alongside sanitation in Target 6.2 of the current draft of the SDGs. Given the massive role that hygiene plays in multiple areas of development, nearly 90 international corporations, non-governmental organizations, and coalitions have signed a letter asking the United Nations Statistical Commission and key Member States involved in determining proposed indicators to address this oversight.

“If hygiene is neglected in the Sustainable Development Goals at the indicator level this will be to the detriment of those populations who have the most to gain through global development—the poor and vulnerable”

According to Dr. Layla Mc Cay, Secretariat Director of the Global Public-Private Partnership for Hand-washing, “Failing to include a global, mandatory hygiene indicator means that the SDGs will also fail to fully capitalize upon this historic opportunity to bring better health, education, and economic opportunities to millions around the world. We ask those involved in determining the SDGs to not let this moment go by without taking action”

While rarely discussed alongside the –big three attention-seekers of the international public health community—HIV/AIDS, tuberculosis, and malaria—one disease alone kills more young children each year than all three combined is diarrhoea (Boschi-Pinto et al, 2008)], and the key to its control is hygiene, sanitation, and water (HSW).

Much of the impact of water supply on health is mediated through increased use of water in hygiene. For example, hand washing with soap reduces the risk of endemic diarrhea, and of respiratory and skin infections, while face washing prevents trachoma and other eye infections. A systematic review of the literature (Chant, 2008) confirmed that hygiene, particularly hand washing at delivery and postpartum, also helps to reduce neonatal mortality. It might be argued that water supplies also make flush toilets feasible, but this does not necessarily add to their health benefits, as we have seen no credible evidence that the health benefits of sanitation cannot be achieved by dry latrines, if they are properly built and maintained (Cairncross and Kolsky, 1997).

A balanced interpretation of the available evidence suggests that a reasonably well-implemented intervention in one or more of hygiene, sanitation, water supply or water quality, where preexisting conditions are poor, is likely to reduce diarrhoeal disease prevalence by up to a third. Still greater reductions (up to 63%) are associated with water piped to one or more taps on a property (Esrey et al, 1991). Such a major impact merits far more attention from health professionals and health systems than has been common in recent decades.

We are still learning about the role of HSW in disease control. For example, *Ascaris* and other intestinal worms are known to be associated with poor sanitation, but a recent review (Fung and Cairncross, 2009) found evidence that hand washing with soap can also help to prevent transmission of ascariasis. We know that trachoma is prevented by facial hygiene and hand washing, but recent research has also highlighted the role of latrines in controlling the *Muscasorbens* flies that carry the *Chlamydia* pathogen between children's faces (Emerson et al, 2004). Even regarding the effect of hygiene on diarrhoea among young children in poor communities, we still have much to learn. There is good evidence to justify promotion of hand washing with soap (Curtis and Cairncross, 2003), but for other aspects of hygiene behaviour, such as proper disposal of children's stools (Yeager et al, 1999), the epidemiological evidence is from observational studies, which are subject to confounding.

The most effective means of promoting behaviour change is also a fruitful research field. It has only recently become clear to health professionals that emotional levers (–Clean hands feel good!) change people's health behaviours more effectively than cognitive statements (–Dirty hands cause disease!). Advertising agencies have known this for years. They also know the importance of Investing in formative research, testing, and evaluation, to tailor the messages to local people's beliefs and aspirations (Curtis et al, 2009). If health workers can divest themselves of the unsubstantiated belief that health considerations motivate behaviour, they can become a more effective force for hygiene behaviour change.

There are alternative ways to tackle some of the HSW-associated disease burden. The widespread introduction of oral rehydration therapy (ORT) in the 1980s, for example, contributed much to reducing mortality from diarrhoeal disease (Victoria et al, 1996). However, such interventions focus on mortality rather than morbidity and on secondary rather than primary prevention. Moreover, ORT does not address the problems of persistent diarrhoea and dysentery.

To improve the quality and accessibility of drinking water, the MVP supports the construction and rehabilitation of improved water sources; builds capacity of water committees to operate, maintain and financially manage water sources; and promotes point of use water treatment and safe storage. Water Safety Plans are also designed in close collaboration with the community, and are key tools to empower communities and local authorities to take the lead on these efforts. Generating demand for improved sanitation through community-led approaches and sanitation marketing is complemented by building the capacity of private sector actors to manufacture and supply sanitation Commodities. For schools, health facilities and the most vulnerable households, the MVP also subsidizes construction of improved latrines.

Hygiene refers to the science of the establishment and maintenance of (human) health. In everyday life, hygiene is closely associated with good housekeeping. This article will focus on home hygiene in relation to cleaning, on microorganisms, and on sustainable development of domestic technology. In domestic cleaning there are two beneficial effects: the aesthetic aspects of cleanness and the removal of microorganisms. In cleaning science substantial attention is paid to the interrelation between cleaning and removal of microorganisms. It appears that the parameters of the cleaning process and the detergent properties play a significant role in this interrelation. Changing technology to reduce the environmental impact of household cleaning not only influences the household activities and the functional performance of the cleaning processes but also has an impact on the level of hygiene. Results are presented of research in which the hygiene has been evaluated in relation to such changes. One option studied to reduce the environmental impact of households is the reduction of water consumption by water reuse. In such concepts water is used in successive steps for various processes before it is drained. The potential impact of such systems and of the use of rain water on the level of home hygiene is discussed. (Am J Infect Control 2001;29:211-7)

Promotion and demonstration of safe hygiene practices – i.e., hand-washing with soap, food hygiene, menstrual hygiene management, safe stool disposal, and solid waste management – at the household, community and institutional level is carried out collaboratively with the health, education, community development and business development sectors working in the MVP. These practices include hand-washing with soap, food hygiene, menstrual hygiene management, safe stool disposal, and solid waste management. The success of these programs involves ensuring that schools and health facilities enable the practice of safe hygiene behaviors (e.g., hand-washing stations, waste disposal facilities) and that health workers and educators are trained on appropriate behavior change Communication. Developing educational and communication materials for WASH, and strengthening school health club programs, are also instrumental to reinforcing hygiene promotion in schools.

In short;

- Today more than 1 billion people are chronically undernourished and food insecure.
- Undernourishment compromises immune systems, which leads to a higher incidence of illness and disease that in turn contribute to lower productivity and life expectancies.
- Poor nutrition undermines economic growth. According to UNICEF, 195 million children younger than 5 are chronically malnourished. Chronic undernourishment in children creates a vicious cycle of compromised physical and cognitive development that reduces their economic productivity when they become adults, mirroring people in poverty that, in turn, leads to chronic undernourishment and poor health in the next generation.
- A massive disease burden is associated with deficient hygiene, sanitation, and water supply and is largely preventable with proven, cost-effective interventions.
- The total benefits of these interventions are greater than the health benefits alone and can be valued at more than the costs of the interventions.
- Hygiene, sanitation, and water supply are development priorities, yet the ambition of international policy on drinking water and sanitation is inadequate.
- Hygiene, sanitation, and water supply continue to have health implications in the developed world.
- The active involvement of health professionals in hygiene, sanitation, and water supply is crucial to accelerating and consolidating progress for health.

Model Projects:

*Formulating nutritive food mix using locally available items*

**Objective:** To use locally available items and formulate a food mix which is cost effective and has nutritive value for anytime usage

**Methodology:**

Locate items in the vicinity, known for its nutritive value, in the community

Analyze the nutrient levels present in the items from nearby food science institute or laboratory

Mix different items in such a proportion that maximizes the overall nutritive value

Formulate these items in powder or any other form that makes the assimilation easy

Analyze the nutrient content of the said formulation

Work out on stability and shelf life at room temperature

Compare nutrient composition at different intervals

Carry out cost-benefit analysis to assess economics of the formulation

**Results:**

An alternative, nutritive food mix can be formulated from locally available food items, and which is cost-effective too.

***Personal hygiene – for not missing out on studies***

**Objective:** To establish role between personal hygiene and health in everyday life, particularly for students

**Methodology:**

Design and develop a questionnaire with key questions related to personal hygiene (hand-washing, bathing, using soap, cleanliness – hair, nail, frequency of keeping oneself clean, and the likes)

Record number of children absent for a definite period (may be for a month)

Assess reasons behind the absence, and identify number absent due to illness

Correlate type of illness with parameters of personal hygiene (a common factor among children)

Record number of classes, chapters in different subjects missed out by the absentees

Record level of personal hygiene followed by the others who has been present all through the study period

Create awareness about personal hygiene measures to be taken and the manner in which these are to be adopted

**Results**

Establish the role of personal hygiene with the missed out studies, signifying importance attached to personal hygiene on day-to-day basis

***Improving quality of potable water***

**Objective:**

Assess quality of potable water in school / community and make it fit for consumption (if not consumable) using suitable mechanisms / process

**Methodology:**

Collect 100 ml of water sample in a dry and clean (free from any kind of chemicals) bottle or container from the source

Analyze the sample collected for physical (color, smell, turbidity..), chemical (pH, metals...), and microbial (algae, bacteria...) properties, at school / college / research institute laboratory

Establish whether the sample water, based on properties analyzed, fit for consumption

If found unfit for consumption, use suitable mechanism / process, like bio-filtration (filtration through specific type of plant and the likes)

After processing, reanalyze for properties

**Results:**

Establish the efficacy of the bio-filtration

**Suggested projects:**

1. Nutritive value of traditionally consumed food in light of standards available from NIN and/or ICMR, for optimum health
2. Nutritive value of food items consumed during period of fasting (religious / recovery from illness)
3. Alternative food stuff available in a locality and their nutritive value
4. Balanced diet

5. Highly nutritive food (proteins / carbohydrates / fats) from nearby wild / forest area
6. Metals / heavy metals in potable water and its management
7. Quality of potable water
8. Biofiltration / bioremediation processes to make available water potable
9. Hygiene at personal / familial / community level and its impact on health
10. Assessment of hygiene maintained at regular basis
11. Level of hygienic conditions during different seasons
12. Occurrence of diseases due to breakdown in hygienic conditions and its management
13. Waste management (eg., hospital waste)
14. Diseases (microbial / parasitic) and their impact of social / economical / environmental parameters
15. Impact and management of zoonotic diseases
16. Impact and management of conditions arising out of vital nutrient deficiency / malnutrition
17. Comparison of sanitation before and after Swachch Bharat campaign, in terms of behavioral change
18. Epidemics and its management
19. Development of seasonal vegetables / fruits calendar of a particular locality
20. Role of kitchen garden in providing nutritive foodstuff
21. Health condition in post disaster scenario and its management
22. Impact of non-stick cookware used on health
23. Effect of Indoor Air Pollution on health
24. Maternal health and hygiene during pre and post-partum stages
25. Gender specific health and hygiene and its control / management
26. Food consumption pattern v/s health status in tribal and rural areas
27. To determine amounts for healthy nutrition, health, science and technology since it involves? Find it
28. Comparative Study about hygiene and health
29. Study malnutrition or diseases caused by food contamination
30. Solutions to the study of the diseases / damages on the basis of economic / cleanliness of the different areas of nutrition, in order to prevent it? If no mapping is available to implement the following suggestions into the world of modern methods / efforts for its dissemination
31. Various communities, tribes, allowing an average combined / nuclear family diet studies, who called balanced diet, what diet system diseases including diseases that evidence-two groups? The study
32. Diseases of the water quality, water purification, water-borne diseases and to study ways of preventing them
33. Preservation of health (diet) for costs and expenses arising from the disease, as well as ways of preventing them
34. What nutrients are found in a variety of diets of fruits, vegetables, herbs, meat, fish, milk, beans, grains, etc.? And how much food is needed per capita family? Etc. Practice
35. According to the study of traditional food from a particular region or community, family and study of diseases typical of the territory of the community
36. MDM or fortified foods given to study in private schools
37. Health check-up interval of information and awareness effort and health survey / study
38. to assess the needs of the poor, in particular, about their problems in daily life
39. to increase the awareness and sensitivity of the specialists involved in the project and also those responsible for programs designed to improve the basic need situation of the poor



## 40. Planning and preparation of the nutrition survey

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## Case Study

### **What causes sustainable changes in hygiene behaviour? A cross-sectional study from Kerala, India Cairncross et al (2005)**

This study was designed and the field work carried out by a non-governmental organisation (NGO) responsible for implementing hygiene promotion. The sustainability of changed hygiene behaviour was studied at various periods up to nine years after the conclusion of a multifaceted hygiene promotion intervention in Kerala, India. Various methods including a questionnaire to assess knowledge, spot observation, demonstration of skills on request, and household pocket voting were used and compared for the measurement of the hygiene outcome. Pocket voting gave the lowest prevalence of good practice, which we infer to be the more accurate. Good hand washing practice was reported by more than half the adults in intervention areas, but < 10% in a control area. Hand washing prevalence showed no association with the elapsed time since the interventions, indicating that behaviour change had occurred and persisted. Recall of participation in health education classes was significantly associated with good hygiene as indicated by women's hand washing practice (OR 2.04, CI 1.05–3.96) and by several other outcomes, suggesting that the classes were an effective component of the intervention. The evidence for a specific impact on behaviour from home visits and an awareness campaign is less strong, although the home visits had influenced knowledge. The finding of an association between interventions and male hand

washing, in ecological analysis (comparing administrative areas i.e. panchayats) but not at individual level, suggests that the effect of the interventions on men may have been indirect, via women or neighbours, underlining the need to direct interventions at men as well as women. The finding that hygiene behaviour persisted for years implies that hygiene promotion is a more cost-effective health intervention than previously supposed.

### **Calculating Body Mass Index (BMI)**

$BMI = \text{weight (lb)} \times 703 / \text{height}^2 \text{ (inch}^2\text{)}$

$BMI = \text{weight (kg)} / \text{height}^2 \text{ (m}^2\text{)}$

### **Estimating caloric value of food**

A kilocalorie or food calorie is a unit of energy used to measure the chemical energy in food. It is generally defined as the quantity of energy needed to raise the temperature of 1 kilogram of water by 1 degree Celsius. You can estimate the caloric value of food from the amount of carbohydrates, fats, protein and dietary fiber that it contains. This value will be an estimate because the efficiency with which food is digested varies considerably.

**Step 1** Read the nutritional label. Obtain the number of grams of fat, total carbohydrates, dietary fiber and protein in a serving of the food. You will also need to obtain the serving size of the food.

#### **Step 2**

Calculate the calories provided by fat. A gram of fat contains 9 calories so multiply the number of grams of fat by "9" to get the number of calories in a serving that come from fat.

#### **Step 3**

Determine the calories provided by protein. A gram of protein contains 4 calories so multiply the number of grams of protein by "4" to get the number of calories in a serving that come from protein.

#### **Step 4**

Establish the number of calories that come from non-fiber carbohydrates. Non-fiber carbohydrates have about 4 calories per gram. Subtract the number of grams of dietary fiber from the total grams of carbohydrates. Multiply this value by "4" to get the non-fiber carbohydrate calories.

#### **Step 5**

Compute the number of calories from dietary fiber. The digestibility of fiber may run the range from completely indigestible to almost completely digestible. Use the middle of this range (2 calories per gram) to estimate the calories from dietary fiber. Multiply the number of grams of dietary fiber by "2" to obtain the approximate number of calories that come from dietary fiber.

#### **Step 6**

Find the total number of calories that come from the serving of food. Add the calorie counts from Step 2 through Step 5 to find the total calories in the food.

<http://www.livestrong.com/article/67787-determine-caloric-value/#sthash.YRn7E3xW.dpuf>

International Year of Pulses 2016

The 68th UN General Assembly declared 2016 the International Year of Pulses (IYP) (A/RES/68/231)

The Food and Agriculture Organization of the United Nations (FAO) has been nominated to facilitate the implementation of the Year in collaboration with Governments, relevant organizations, non-governmental organizations and all other relevant stakeholders. Under the slogan „nutritious seeds for a sustainable future,“ the United Nations, led by its Food and Agriculture Organization (FAO), launched the IYP 2016 to raise awareness about the protein power and health benefits of all kinds of dried beans and peas, boost their production and trade, and encourage new and smarter uses throughout the food chain.

The IYP 2016 aims to heighten public awareness of the nutritional benefits of pulses as part of sustainable food production aimed towards food security and nutrition. The Year will create a unique opportunity to encourage connections throughout the food chain that would better utilize pulse-based proteins, further global production of pulses, better utilize crop rotations and address the challenges in the trade of pulses.

“Pulses are important food crops for the food security of large proportions of populations, particularly in Latin America, Africa and Asia, where pulses are part of traditional diets and often grown by small farmers,” said FAO Director-General José Graziano da Silva. “They have been an essential part of the human diet for centuries,” he further added, “Yet, their nutritional value is not generally recognized and is frequently under-appreciated.”

Pulses are annual leguminous crops yielding between one and 12 grains or seeds of variable size, shape and colour within a pod, used for both food and feed. The term “pulses” is limited to crops harvested solely for dry grain, thereby excluding crops harvested green for food, which are classified as vegetable crops, as well as those crops used mainly for oil extraction and leguminous crops that are used exclusively for sowing purposes (based on the definition of “pulses and derived products” of the Food and Agriculture Organization of the United Nations).

Pulse crops such as lentils, beans, peas and chickpeas are a critical part of the general food basket. Pulses are a vital source of plant-based proteins and amino acids for people around the globe and should be eaten as part of a healthy diet to address obesity, as well as to prevent and help manage chronic diseases such as diabetes, coronary conditions and cancer; they are also an important source of plant-based protein for animals.

In addition, pulses are leguminous plants that have nitrogen-fixing properties, which can contribute to increasing soil fertility and have a positive impact on the environment.

According to FAO, pulses, including all kinds of dried beans and peas, are not merely cheap and delicious; they are also highly nutritious source of protein and vital micronutrients that can greatly benefit people’s health and livelihoods, particularly in developing countries. There are hundreds of varieties of pulses grown throughout the world. Popular ones include all varieties of dried beans, such as kidney beans, lima beans, butter beans and broad beans. But also chickpeas, cowpeas, black-eyed peas and pigeon peas.

Speaking about their nutritional value, the FAO chief said that pulses have double the proteins found in wheat and triple the amount found in rice. They are also rich in micronutrients, amino acids and b-vitamins; Mr. Graziani da Silva underlined, and added that they are vital parts of a healthy diet.

FAO also added that as an affordable alternative to more expensive animal-based protein, pulses are ideal for improving diets in poorer parts of the world, where protein sources from milk is often five times more expensive than protein sourced from pulses. Pulses also offer a

great potential to lift farmers out of rural poverty, as they can yield two to three time higher prices than cereals, and their processing provides additional economic opportunities, especially for women.

"The International Year of Pulses 2016 is a great opportunity to raise awareness of the benefits of pulses as the world embarks on efforts to achieve the newly adopted Sustainable Development Goals," said UN Secretary-General Ban Ki-moon. Mr. Ban added that pulses contribute significantly in addressing hunger, food security, malnutrition, environmental challenges and human health and also are a vital source of plant-based proteins and amino acids.

"Despite strong evidence of the health and nutritional benefits of pulses, their consumption of pulses remains low in many developing and developed countries. The International Year can help overcome this lack of knowledge," said Mr. Ban. Further, he also said that pulses impact the environment positively due to their nitrogen-fixing properties, which increase soil fertility.

"Much work needs to be done to end hunger and provide food security and nutrition for all. One concrete, promising opportunity lies with pulses. Let us join forces to raise awareness of the benefits of pulses," said the Secretary-General. The UN chief also called for collaborative commitment and concrete action by all relevant actors within the UN system, farmers' organizations, civil society and the private sector, to make the IYP 2016 a success.

### **Swachh Bharat Abhiyan (Clean India Mission)**

A national campaign by the Government of India, covering 4,041 statutory cities and towns, to clean the streets, roads and infrastructure of the country.[1][2][3] The campaign was officially launched on 2 October 2014 at Rajghat, New Delhi, where Prime Minister Narendra Modi himself cleaned the road. Modi said that the best memorial to Mahatma Gandhi would be to achieve a "Clean India" by 2019, his 150th birth anniversary. It is India's biggest ever cleanliness drive and 3 million government employees and school and college students of India participated in this event.[4][5] It has been carried forward since then with people from all walks of life joining it.

### **Objectives**

This campaign aims to accomplish the vision of a 'Clean India' by 2 October 2019, the 150th birthday of Mahatma Gandhi. Specific objectives are:[6]

1. Eliminate open defecation by constructing toilets for households, communities
2. Eradicate manual scavenging
3. Introduce modern and scientific municipal solid waste management practices
4. Enable private sector participation in the sanitation sector
5. Change people's attitudes to sanitation and create awareness

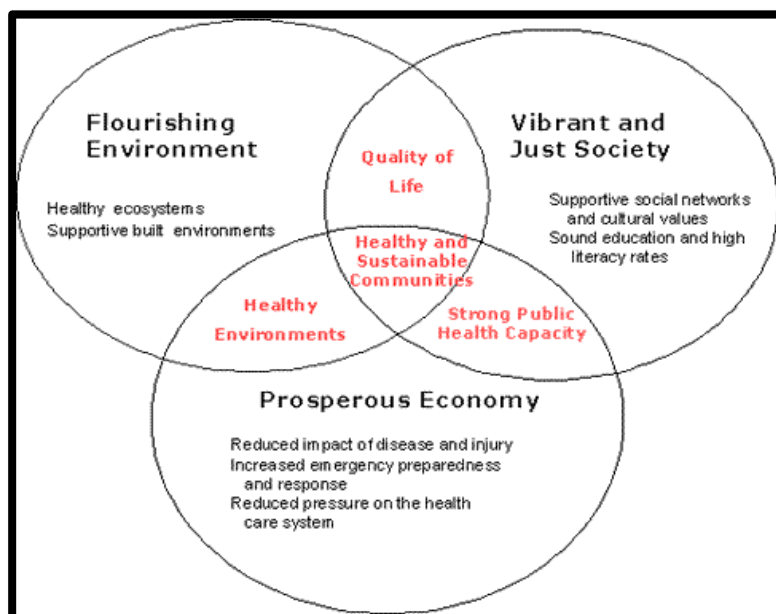
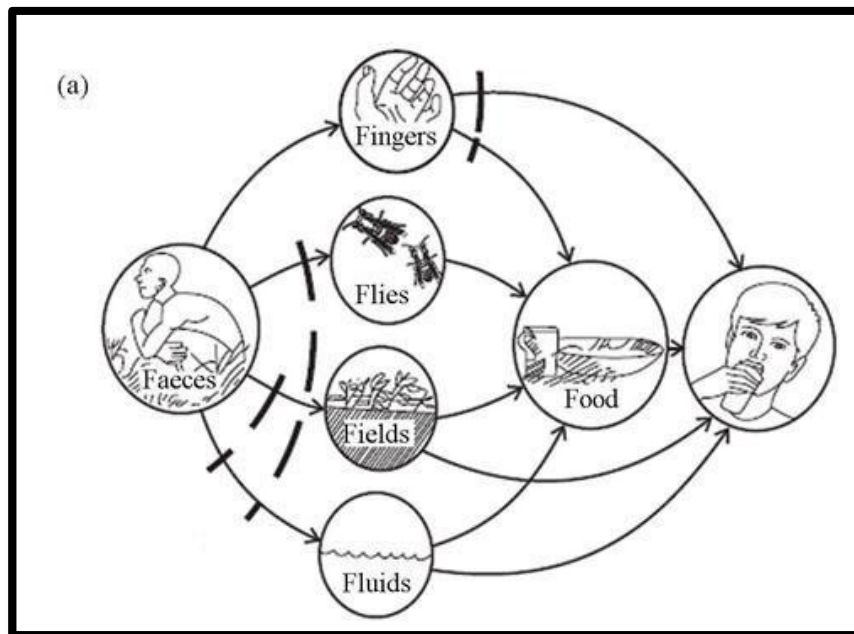
The program plans to construct 12 crore toilets in rural India by October 2019, at a projected cost of Rs 1.96 lakh crore (US\$29 billion).[7]

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Sub Theme V

Lifestyles & Livelihoods

## Sub theme: Lifestyle and Livelihood

*“Young people around the world are well aware of environmental challenges, but the connection between such challenges and their lifestyles is not clear to them. There is a great need to translate these challenges into actions and opportunities at the local and individual level, as well as to create a holistic and pragmatic vision of what a sustainable society is.”*  
— Fibenne Pierre, UNEP

The idea of this sub theme is to promote the concept of conscious and cautious involvement of science, technology and innovation to evolve a sustainable lifestyle & livelihood. The sub theme looks at several concepts related to the effect of occupational changes, cultural changes and environmental changes and its relation with lifestyle and livelihood. The subtheme not only tries to focus on the negative impacts but also positive impacts on lifestyle and livelihood and identifying them as opportunities to carry forward for developing a sustainable future.

### Introduction:

Lifestyle and livelihood are few of the main factors which are associated directly with human lives and further mainly with sustainable development. The concept of Sustainable development consists of 3 main pillars which are People (Social), Planet (Environment) and Profit (Economy). All these three main pillars of Sustainable development are interwoven with Lifestyle and Livelihood and both have an effect on each other.

#### 1. **Scenario & Problems related to lifestyle and livelihood:**

Change is a continuous process, it is ever evolving. The continuous evolving changes in the local, national and global scenarios has a direct impact on individual, families and community lifestyle and livelihood and vice-versa.

In the last few decades, several man made activities and interventions which are unsustainable, have accelerated the problems related to shelter, environment, food, health, society, culture and working pattern. These problems areas are also associated, linked and guided mainly in relation with lifestyle and livelihood.

The Modern lifestyles are unsustainable in many ways and are based on overproduction and overconsumption; putting too much pressure on our natural resources and imposing negative environmental, economic, (individual and collective) social and health impacts.

#### 2. **Conceptual understanding of lifestyle and livelihood:**

**Lifestyles define us**; they are the way we live our lives, what we do, with whom, where, how and what we use to do earlier. This includes everything from the food we eat and how we interact with others to the way we get around. **Lifestyles also define our identity**; we express our social position, political preferences and psychological aspirations to others through our lifestyles.

Creating **Sustainable lifestyles** means rethinking our ways of living, how we buy, what we consume and how we organize our daily lives. It **is about transforming our societies and living in balance with our natural environment**. All our choices and

actions - whether at home or at work - on energy use, transport, food, waste and communication – contribute to sustainable lifestyles.

Sustainable lifestyles refer to patterns of action and consumption, used by people to affiliate and differentiate themselves from others, which: meet basic needs, provide a better quality of life, minimize the use of natural resources and emissions of waste and pollutants over the lifecycle, and do not put at risk the needs of future generations. Sustainable lifestyles reflect specific cultural, natural, economic and social heritage of each society (*Mont 2007*).

### **What do you think it means to live sustainably?**

- Living within Earth's limits
- Reducing our impact on the earth's resources
- Making lifestyle and consumer choices to limit our use of resources
- Living more simply
- Reducing our footprints by our handprints
- Taking care of nature so nature can take care of us
- Meeting our needs without compromising the ability of future generations to meet their needs
- Creating a balance between our natural systems, our economic system and our social system

Livelihood and lifestyle are closely associated with each other. Livelihood is one of the very important factor impacting and defining the lifestyle as many of the activities of the daily life are associated with the economic factor.

A livelihood comprises the capabilities, assets and activities required for a means of living. Livelihood defines as a means of supporting one's existence, especially financially or vocationally.

A livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets. It should provide sustainable livelihood opportunities for the next generation; and should contribute net benefits to other livelihoods at the local and global levels in the short and long term.

The concept of Sustainable Livelihood is an attempt to go beyond the conventional definitions and approaches to poverty eradication. It is also recognized that more attention must be paid to the various factors and processes which either constrain or enhance poor people's ability to make a living in an economically, ecologically, and socially sustainable manner.

### **3. Nature, extent and significance of problems:**

India, located in South Asia, is the seventh-largest country in the world by area and the second-most populous country behind only China. As of 2014, it has a population forecast around 1.26 billion people, with the capital New Delhi estimated to be home to almost 17 million inhabitants. Despite the fact that India's population has grown steadily, the fertility rate in the country is on the decline.

When asked about the most polluted cities worldwide, most people usually name larger Chinese cities as being the worst air quality culprits. However, according to research published by the World Economic Forum, Delhi is actually twice as polluted as Beijing. The level of PM 2.5 (micrograms per cubic meter) in Delhi is six

times above the recommended World Health Organisation maximum. In fact, out of the world's 15 worst cities, ten are in Delhi. Pollution is one of the main factor related directly with livelihood and lifestyle.

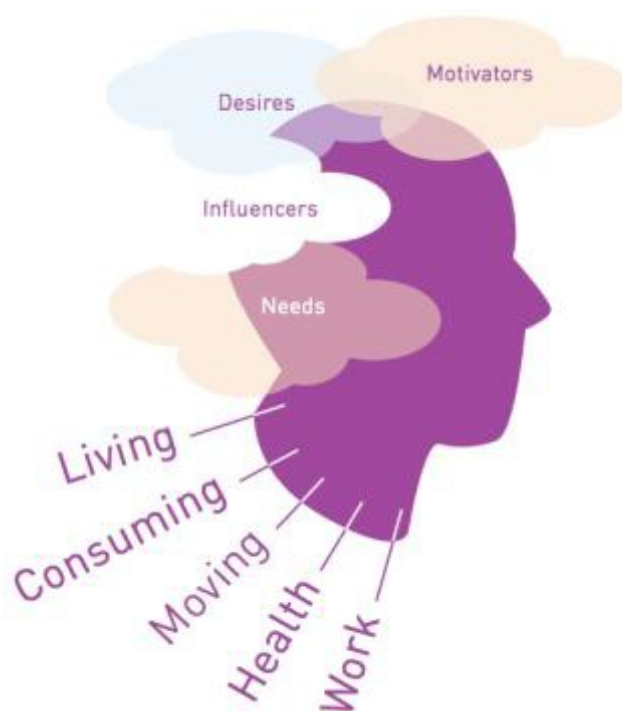
On the national level as per the data of 2010, there are approximately 12 lacs new cancer cases every year in India. There are also almost 10 lacs cases of strokes every year. There are 50 lacs cardiac patients and 63 lacs diabetes patient. According to government data, the prevalence of heart failure in India due to coronary heart disease, hypertension, obesity, diabetes and rheumatic heart disease ranges from anywhere between 1.3 to 4.6 million, with an annual incidence of 491,600 to 1.8 million. Another important factor that should be highlighted is that every year 130,000 children in India are born with congenital heart disease.

As per the data of FAO 2002, though India has made significant progress in food production and sufficiency over last 50 years, most rural populations / communities have to deal with uncertainties of food security on daily basis, year after year. In aggregate one fifth of India's population suffers from chronic hunger. Almost 190 million people were under nourished in India as per the data of UN in year 2012-2014

Several similar problems have emerged and accelerated in the recent years due to the changes in lifestyle and livelihood. Such observations have been made in Health sector, cultural disturbances, economic sector, farming, etc.

#### 4. *Type of Areas:*

The lifestyle and livelihood is mainly driven by certain crucial factors such as Desires, Needs, Influencers and Motivators. These factors link and define an individual's living patterns, consumption patterns, migration patterns, travel patterns, health patterns and work patterns.



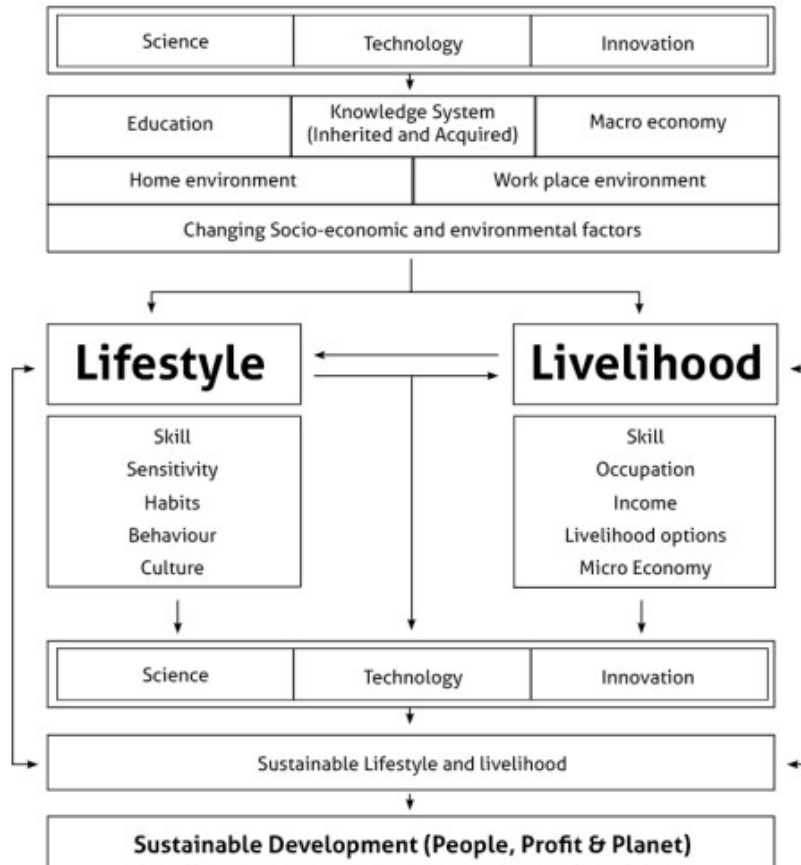


*Sub Image reference: SPREAD project report*

These changes in the patterns of livelihood and lifestyle further define the perception or actions of humans towards skills, sensitivity, habits, behavior, economy and culture.

**Framework:**

Framework for the approach of the sub theme of Lifestyle and Livelihood and how should a child see the sub theme for evolving their project.



Under this framework, we have tried to associate different areas of problems or opportunities:

**Skill :**

Skills play a major role in defining ourselves, our lifestyle and livelihood. They are responsible for what we know, what we do and how we do it? The skills over a period of time are transforming, the priorities of a human, families and community has been changing. Some of the areas are as under:

- Life skill (Ability & Requirement necessary for Daily life and living)
- Interpersonal Skill (Ability to maintain effective relationship with another individual belonging to different background or strata)
- Communication skill (Ability to express or present individuals thoughts, desires and expressions)
- Occupational skills (Inherited or Acquired)

**Sensitivity:**

Sensitivity is one of the major concern in current era. By the change in the patterns in life and livelihood the priorities of human has been changing. Several new products and activities have become a part of life and which has further lead the individuals to defocus few of the main areas where the sensitivity is required. Some of the areas are listed below, they are categorized under Material and Non-material.

**Material:**

- Food habits
- Abuse (Smoking, substance abuse and drinking waste)
- Pollution (Biodegradable & Non degradable)
- Digital divide
- Sensitivity towards use of technology

**Non-material:**

- Physical fitness,
- Surroundings
- Society and community
- Environment

**Habits and Behavior:**

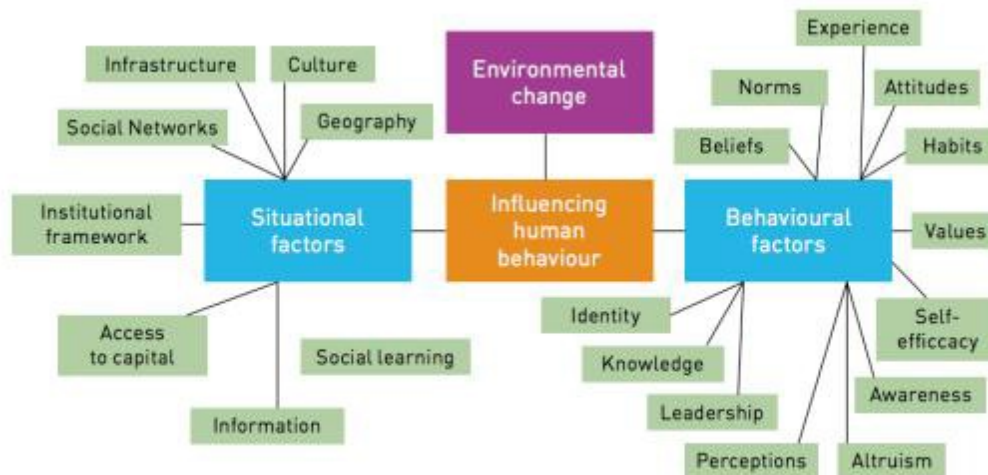
Habits could relate to most of the areas related to lifestyle. It could be linked with food, environmental sensitivity, health consciousness, abuse, technological interventions, etc. The continuous repetition of the habits gets converted to behaviors.

**Culture:**

India as a country was a culturally very strong country. Our family traditions, community knowledge and connections between different communities were one of the main keys to keep the activities in the country sustainable. With the passing of time and due to factors such as desires, needs and influencers there is a visible transition in the culture. There are several areas which can be looked upon, some of which are mentioned under:

- Socialization process
- Behavior of growing up child away from home and
- Nuclear family and Joint family
- Traditional knowledge
- Celebrations and festivals
- Lack of connections between different communities

Framework on effect of Environmental changes due to Manmade and natural changes on Human behaviour, lifestyle and livelihood.



Source: Defra, Sustainable Lifestyles Framework, 2011.

### Why this sub theme?

- Current lifestyles and consumption patterns are unsustainable
- Our sensitivity towards environment has become more and more unsustainable.
- Human behavior is changing very rapidly which has been challenging the environmental factors and situational factors.
- There are several patterns of unsustainability observed in the health of humans and food security patterns at a national level
- Malnutrition and other diseases is a major area of concern at national level
- Our aspirations for prosperity are intrinsically linked to current patterns of unsustainable economic growth
- Due to the digital divide there is a great gap visible between the communities and families
- There is a massive cultural shift visible
- The occupational patterns have been changing rapidly and thus creating a great number of unemployment for unskilled members
- There are also great number of health hazards increasing due to changes in livelihood patterns
- The rural population is increasingly migrating from the rural areas to urban areas
- Meeting our individual needs and desires within the limits of available resources is our collective challenge

### What all will it cover:

The subtheme Science, Technology and Innovation for Sustainable Development in relation to Lifestyle and Livelihood will mainly focus on the role of Science, Technology and Innovation for betterment of lifestyle and livelihood. It would also cover the areas which have been positively and negatively impacted due to the intervention of Science & technology. Some of the subject areas are as under:

### Waste

#### (Human waste, food waste, bio waste, medical waste, industrial waste):

- Waste generation from lifestyle
- Waste generation from livelihood options

- Handling of waste produced through lifestyle and livelihood
- Management / disposal of waste produced through lifestyle and livelihood
- Innovative approaches towards efficient and sustainable waste disposal

**Food****(Procuring, Preparation, Storage, Consumption, Wastage):**

- Traditional / culturally imbibed food
- Organic food
- Fast / western food
- Packaged food
- Home cooked food
- Parceled food

**Habits related to Lifestyle & Livelihood:**

- Abuse (Smoking, Drinking, Substance)
- Biological clock of an individual
- Socialization process affecting habits
- Technology dependency habits
- Media sensitive lifestyle habits and its imbibing
- Food habits leading to lifestyle habits

**Lifestyle and livelihood impacting culture and community:**

- Demographic composition
- Migration
- Community culture
- Cultural diffusion / transition
- Impacts of Community activities & celebrations
- Impacts on Community values

**Lifestyle & Livelihood diseases****Carbon footprints and impacts of handprints:**

- Measuring of carbon footprints
- Value addition
- Innovative approaches
- Business entrepreneurship

**Sensitivity towards Environment concerning lifestyle and livelihood****Occupations, economy and Environment:**

- Occupational migration
- Occupational health hazards
- Occupational insecurity
- Digital divide in work
- Changes in work patterns in communities and its relation with culture and society
- Economic changes

### Linkage with the focal theme and other sub themes:

The focal theme of the National Children Science Congress 2016 and 2017 is 'Science, Technology and Innovation for Sustainable Development'. One of the main concern of the focal theme is to promote the idea of Sustainable Development and the role and association of Science, Technology and Innovation with it.

Sustainable development in today's context is one of the most important issue addressed not only on national level but also on global level. Sustainable development has three pillars – People (Social), Planet (Environment) and Profit (Economy). If all the three pillars are addressed in a sustainable manner and several different steps can be planned to make lifestyle and livelihood more sustainable.

The subtheme 'Lifestyle and Livelihood' mainly addresses the concept of Science, Technology and Innovation to develop and live a sustainable lifestyle and practice sustainable livelihood.

Model of Sustainable Development:



**People (Social / society):** The conscious or unconscious actions taken related to lifestyle and livelihood, by an individual, community, organization or entrepreneurial activity has a direct impact on the humans and further to the society. Similarly under this sub theme, it is planned to allow a child to evolve sustainable ideas and solutions which can be carried forward in the future, for the betterment of individuals and society.

**Planet (Environmental):** In the current scenario, there are several problems and challenges which our environment faces on regular basis. There have been macro and micro issues related to the planet and which need to be addressed. One of the factor for these problems is the unsustainable lifestyle and livelihood which can be further identified as an opportunity to support the planet and develop different innovative approaches to support the planet.

**Profit (Economy):** Occupation and economy defines us, it drives or guides us on several of our actions we take on daily basis. Lifestyle and livelihood are interconnected and have a direct link to the economy. Science, Technology and innovation plays a very major role in supporting to generate better economy.

The subtheme 'Lifestyle and Livelihood' is one of the only themes which has the maximum association with most of the other sub themes mentioned under this guide book. It is associated with Energy, Natural resource management, Health, Hygiene & Nutrition,



Traditional knowledge, Disaster management, Food and Occupation. It links with all these sub themes, in the association with the changes evolved in relation to lifestyle and livelihood.

**Approach & Methodology a child should follow:**

The sub theme 'Lifestyle and livelihood' is one of the very interesting aspects linked with sustainable development. The changes in the environment and several different human and manmade actions have brought many modifications in the Lifestyle patterns and Livelihood patterns which are observed at every stage and place which has brought unsustainability in several aspects. As a child it would be very interesting to study these changes in the patterns of living and identify or suggest ideas for living a supportive and sustainable lifestyle. While developing a project on the Sub theme of 'Lifestyle and Livelihood' it would be ideal for a child to follow the following approach and methodology:

- Observations
- Mapping
- Case studies
- Surveys
- Key informant survey
- Impact assessments
- Focus group Discussions
- Using media (Audio, visual)

The main idea of the subtheme is identify the involvement or the role of Science, technology and Innovation for Sustainable Development. It could be a product, process, system, ideas which a child can identify or suggest related to sustainability to lifestyle and livelihood and its impacts on Society, Environment and Economics.

**Ideas for Projects:**

Some of the ideas for the projects under the sub theme of Lifestyle and Livelihood are listed under few main subject areas. They are mentioned as under:

**Waste (Human waste, food waste, bio waste, medical waste, industrial waste):**

- Study and understand the Lifestyle waste generation, handling and management
- Understanding the impacts of human waste, food waste on city and village.
- Understanding the impacts of medical waste and industrial waste on city and rural lifestyle, its health hazards and impacts on environment.
- Mapping the innovations for waste management systems on village, city or state level.
- Conducting an analytical study of waste generation at different places and its relation with lifestyle and livelihood and designing a system for waste management on basis of the analysis.

**Food (Procuring, Preparation, Storage, Consumption, Wastage):**

- Study on Food and energy consumption pattern of your village or city.
- Studying the changes in the food consumption patterns and its relation with changes in lifestyle and livelihood
- Analytical study of impact of media on food consumption amongst adults, youth and children and its relation with health.

- Studying the occupational migration and the changes it has brought in food consumption patterns and its relation with health.

**Habits related to Lifestyle & Livelihood:**

- Study of relation of young children with technology and media and its effect on their lifestyle, health and education
- Observation and study on the effects of lifestyle and livelihood amongst youth in aspect of abuse like Smoking and Drinking.
- Changes in the work pattern and economy and its relation with abuse.

**Lifestyle and livelihood impacting culture and community:**

- Studying of natural lifestyle & organic lifestyle of a tribal community
- Comparing lifestyle of different groups / communities either in villages or cities
- Mapping of changes in community lifestyle & livelihood of a village or urban area
- Changing lifestyle of children with urbanization
- How the market force/ peer pressure has forced to change the pattern in celebration of festivals, occasions and community celebrations.
- Comparative study of the behavior of group of children growing at home and away from home
- How the traveling pattern has changed in communities and its impact (Socio-economic and political)?
- Use of social media and changing communication and interaction patterns. A behavioral study.
- Interface of formal education and livelihood
- Change in pattern of livelihood in relation with traveling
- Socialization process affecting habits in relation to peer pressure like purchasing new gadgets, toys, etc.
- Change in pattern of livelihood in relation with traveling
- Study of impact of media on cloth and consumption pattern (men's cosmetic market, cosmetic surgery, hair transplant)

**Lifestyle & Livelihood diseases:**

- Understanding and studying the disease due to the changes in food patterns
- Understanding and analyzing the diseases evolved due to changes in work pattern and its possible solutions

**Carbon footprints and impacts of handprints:**

- Measuring Carbon footprint of your own area, either in village, town or a city
- Documenting innovative approaches for reducing carbon footprints in your area and measuring its impacts and possible suggestions for replicating it in different areas
- Measuring the carbon footprints and looking at the handprints in your area
- Identifying the local heroes in your village, town or city and their impacts on individuals, communities or societies in relation with sustainable development
- Comparative study of joint family and nuclear family, in relation to their consumption pattern and cost analysis and carbon footprint and handprint

**Sensitivity towards Environment concerning lifestyle and livelihood:**

- Role of jugad on lifestyle and livelihood
- Positive and negative impacts caused on the environment due to expanding cities
- Study of effects on environment due to human migration
- Sensitivity of young children towards environmental protection, pollution and waste management
- Study of Sensitivity of industries and business towards environment

**Occupations, economy and Environment:**

- Application of S&T in traditional livelihood skills
- Occupational mobility
- Entrepreneurial orientation of young people
- Interface of skill training to livelihood
- Case studies on Sustainable lifestyles
- Impact of technology on lifestyle & Livelihood
- New business propositions and vocations and their impact on health, behavior and their sustainability.
- Economic and environmental of celebration of festivals in urban and rural areas.

**Other combined areas of activities in relation with lifestyle and livelihood:**

- Studying and analyzing change in Traveling, food, energy consumption, health issues, and migration patterns in relation to Social, Economic and Environmental context by assessing them in relation to sustainability.
- Study about the sensitivity and perception about the above the actual mentioned issues (Material and Non material) in relation to Gender, age, social / economic, demographic / geographical profile.
- Impact of media on young people and community
- Case study of lifestyle of children peer group children
- Designing of your festival / celebrations in sustainable way in relation to environment and culture conservation
- Use of social media and changing communication and interaction patterns. Do a behavioral study of humans in Villages, towns and cities.

**Detailed Project ideas:****Project 1:****Mapping of Changes of Community Lifestyle and Livelihood in a Village****Objectives**

1. To develop an understanding of changing community lifestyles of the families in a village
2. To explore livelihood of the villagers in historical perspective
3. To develop a comparative understanding of existing community lifestyles and livelihood in the village community
4. To present a comparative mapping of community lifestyles and livelihood of the village community.

**Methodology**

1. Base life survey of a village
2. Key informant interview of school master, Sarpanch, gramsevak, postman, etc.

3. Focus group discussion

**Expected Results**

1. Village Resource inventory
2. Village lifestyle Map
3. Village livelihood Map
4. Graphic comparative picture/ presentation of lifestyles & livelihood changes in the village
5. A report on village lifestyles and livelihood.

**Project 2:****Lifestyle Waste Generation, Handling and Management at Household Level****Objectives:**

1. To identify and describe lifestyle related waste generation among families
2. To study the perception about waste handling and waste management among the households
3. To explore actual handling of household level waste management practices
4. To study demerits and merits of household level waste management practices
5. To develop / suggest a suitable model for household level waste generation, handling and management.

**Methodology**

1. Interview of select households in a community
2. Review of secondary literature on household level waste generation, handling and management
3. Field visits to select successful waste management facilities in Co-operative Housing Societies.

**Expected Results**

1. A data based report on household level waste management
2. A comparative chart of select successful models of household level waste management practices
3. A suggested model / prototype of household level waste management.

**Project ideas**

- 1 To verify whether it is contributing to the study of the various livelihood and their environment and sustainable development for nirvaho
- 2 Nirvaho assets being raised through environmental paripeksamam observe / practice, often short-term studies lasting damage to development bahuja
- 3 Impact on a variety of essential utilities and media (demand from the market)
- 4 Was erected by the city multipleksa / mol employment growth above the long-term study of their causes
- 5 Which has developed a new livelihood opportunities through new routes / stations with an overview of future plans for both a & b of the comparative study and the population
- 6 Livelihood changes in the name of advancement and the economic, physical, mental health of the above effects
- 7 Their society / area beautiful lifestyle / work practice effective lifestyle of living / inspirational individuals relevant to the community through
- 8 Exclusive lifestyle / system environment, health, society and the effects of its procedures (for groups) or a comparative study of the two communities would

thus covering different issues

- 9 Ideal lifestyle pichanava village, city, should do in the big cities - to understand the current situation of the study
- 10 The study of diseases associated with lifestyle such as diabetes, hypertension, etc.
- 11 Country, region, community, according to the study of subsistence lifestyles
- 12 The study of employment and migration

**Reference material:**

**Web reference:**

<https://sustainabledevelopment.un.org/sdgs>

<http://www.indiastat.com/default.aspx>

<http://www.statista.com/>

[www.academia.edu](http://www.academia.edu)

<http://www.unep.org/resourceefficiency/Consumption/EducationLifestylesandYouth/SustainableLifestyles/tabid/101304/Default.aspx>

**Publication & Reports:**

Baseline Report of SPREAD Project

Sustainable Livelihood Report to Poverty Reduction by Sida

Food Insecurities in India- Causes and Dimensions

The State of Food Insecurity in the World

UNEP Guideline



Sub Theme VI  
Disaster Management

## **Sub theme: Disaster Management**

### **Introduction**

Over the past two decades, losses due to disasters are increasing in terms of life and property across the globe. Disasters apart, factors that enhance the gravity and severity of disasters include density and size of population, unplanned urbanization, environmental degradation, local and global impacts of climate change and ozone depletion etc.

The Global Assessment Report on Disaster Risk Reduction: Risk and Poverty in Changing Climate, 2009, identifies ecosystem decline as a key driver that will enhance the spread and depth of impacts of natural calamities, as we move into the future. This is further corroborated by the World Disaster Report. Unfortunately efforts to tackle disasters do not match the timing, frequency and the holism that pervades targets.

### **Definition of Disasters**

Disaster is defined differently depending on the purpose of intervention.

- WHO defines disaster as “any occurrence causing damage, ecological disruption, loss of human lives, deterioration of health and health services on a scale sufficient to warrant any extraordinary intervention from outside the affected community” In fact, disaster is an event or series of events, that cause casualties and damage or loss of properties, infrastructures, environment, essential services or means of livelihood on such a scale which is beyond the normal capacity of the affected community to cope with.
- The Disaster Management Act of India, 2005 defines disaster as “a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or manmade causes, or by accident or negligence which results in substantial loss of life or human suffering or damage to, and destruction of property, or damage to, or degradation of, environment, and is of such a nature or magnitude as to be beyond the coping capacity of the community of the affected area”.
- The United Nations defines disaster as “the occurrence of sudden or major misfortune which disrupts the basic fabric and normal functioning of the society or community”. Disaster is also sometimes described as a “catastrophic situation in which the normal pattern of life or eco-system has been disrupted and extra-ordinary emergency interventions are required to save and preserve lives and or the environment”.
- As per Paho (1980) it is “an overwhelming ecological disruption occurring on a sufficient scale to require outside assistance”.
- According to Red Cross/Red crescent “A disaster is a sudden, calamitous event that seriously disrupts the functioning of a community or society and causes human, material, and economic or environmental losses that exceed the community's or society's ability to cope using its own resources. Though often caused by nature, disasters can have human origins as well.

### **Classification of Disasters**

Disasters are classified differently using different criteria. They are classified on the basis of origin as natural or manmade or on the basis of severity as major or minor disasters.

- In India a high power committee was constituted in August 1999 by the government of India to prepare a comprehensive model plan for disaster management. This committee identified 31 disasters on the basis of their origin (**Natural Hazards or Technological or man-made**) and classified them into five categories, in tune with the classification given by Red Cross and Red Crescent. ([//www.ifrc.org/en/what-we-do/disaster-management/about-disasters/definition-of-hazard/](http://www.ifrc.org/en/what-we-do/disaster-management/about-disasters/definition-of-hazard/))
- Technological or manmade disasters are such events that are caused by humans and occur in or close to human settlements. The factors such as increasing population, degraded environment, unplanned urbanization and under-development/poverty etc. are some other factors which sometime play a role of key aggravating factor to increase the frequency, complexity and severity of the disaster.

### Disasters as identified in India on the basis of origin. They include:-

- I. **Hydrological and Meteorological Disasters (11 Types):-**  
Floods, Cyclones, Hailstorms, Cloudburst, Heat and Cold waves, Snow Avalanches, Droughts, Sea erosion, Thunder &Lightening.
- II. **Geological Disasters (6 Types):-**  
Like landslides, Mud flows, Earthquake, Mines fires, Dam failure and General fire.
- III. **Biological Disasters (4 Types):-**  
Epidemics, Pest attacks, Cattle epidemics and Food poisoning.
- IV. **Nuclear & Industrial Disaster(3 Types):-**  
Chemical, Industrial and Nuclear accidents.
- V. **Accidental Disaster (7 Types):-**  
Urban and forest fire, Oil spill, Mine flooding incidents, Collapse of huge building structures, Bomb blast, Air, road and rail mishaps, Boat capsizing and Stampede during large congregations.

### Why this Sub Theme?

India, by her geography and climatic condition and high degree of socio-economic vulnerability is one of the most disaster prone areas in the world. She is vulnerable to wind storm spawned in the Bay of Bengal and Arabian Sea, floods, brought by monsoons and drought in the arid and several arid areas of the country, which are almost the annual features of the country besides the earthquake by the active crustal movement in the Himalayan region. In last few years Indian subcontinent is also witnessing the extreme weather phenomena in the form of unprecedented cold and heat wave. The vulnerability of India subcontinent could be well understood by the Bhuj Earthquake (about ten thousand deaths) and super cyclone (13805 Deaths) and Tsunami which accounted for many deaths and loss of property worth of several cores.

In fact out of 27 state and 7 UTs, about 22 are prone to one or the other type of natural disasters. As per the Vulnerability Atlas of India ([www.nidm.nic.in](http://www.nidm.nic.in)), 57% of the Indian land mass is vulnerable to earthquake (High Seismic zone – III-V) 68% to drought (Arid & Seismic arid zones) 8% to cyclone and 12% to food. The coastal are of India has become vulnerable to Tsunami since 2004, the India ocean Tsunami. India has witness two major earthquake shocks in Gujarat (January 2001) and in J&K (October 2005) causing a severe danger to life

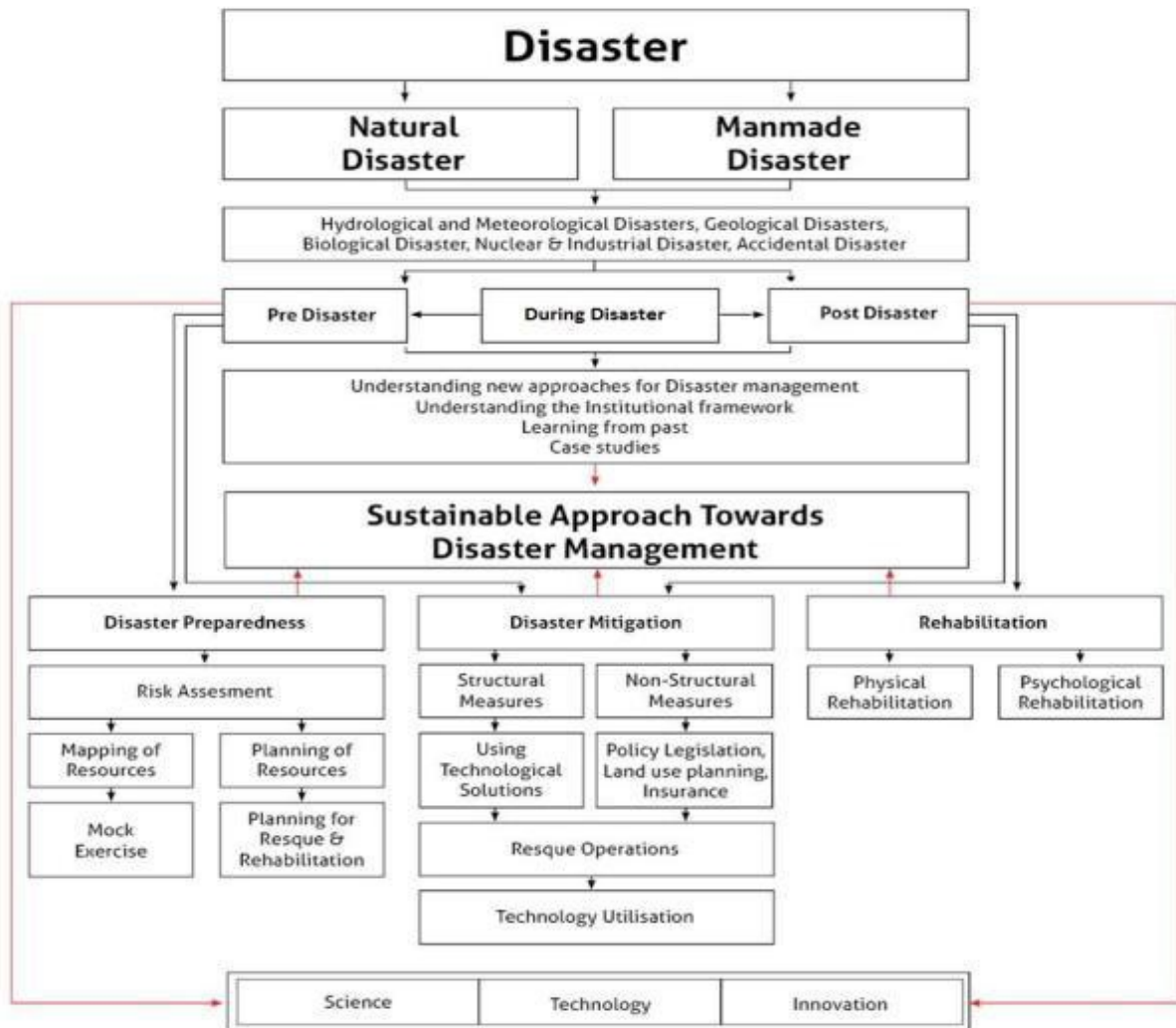
& property. The entire north eastern states, Andaman & Nicobar and six states in North/West states are in seismic zone V.

According to India's Tenth Five Year Plan, natural disasters have affected nearly 6% of the population and 24% of deaths in Asia caused by disasters have occurred in India. Between 1996 and 2001, 2% of national GDP was lost because of natural disasters, and nearly 12% of Government revenue was spent on relief, rehabilitation and reconstruction during the same period. As per a World Bank study in 2003, natural disasters pose a major impediment on the path of economic development in India. (*GOI-UNDP Disaster Risk Reduction Programme 2009-2012, Programme Document*)

Whatever may be the origin or cause, it always affects people and halts overall development processes. Fortunately over the past 15 years, there has been a paradigm shift in managing the disaster at the global level which pleads a productive and preventive approach and integrate disaster management with ongoing development activities i.e. sustainable development. A shift in disaster management approach has evolved gradually since 1990's with the declaration of the International Decade of Natural disaster Reduction (1990-2000) by UN, General Assembly.

- In 2005, during the World Conference on Disaster Reduction, Hyogo (Japan) the Yokohama Strategy for disaster management was renewed. (*“Yokohama Strategy and Plan of Action for a Safer World: guidelines for natural disaster prevention, preparedness and mitigation”*). A three part document was the output of the World Conference on Natural Disaster Reduction, held in Yokohama, Japan, from 23 May to 27 May 1994. This document provides guidelines for natural disaster prevention, preparedness and mitigation. Yokohama Strategy also emphasized that disaster prevention, mitigation and preparedness are better than disaster response in achieving the goals and objectives of vulnerability reduction. Hyogo conference laid emphasis on some very crucial and so far neglected aspects of disaster management like governance and policy framework, risk identification and early warning, knowledge management, reducing risk factors and preparedness for effective response and recovery.
- As the outcome of the conference, a framework of Action 2005-2015 called “Building the Resilience of Nation and communities to Disaster” was adopted by the member states of UN.
- In the backdrop of the above, the Disaster Management Act 2005 was passed by the Indian parliament to provide the legal and institutional framework for the disaster management in India at the national, State and district level. This Act defines Disaster Management as a continuous cycle and integrated process of planning, organizing, coordinating and implementing all necessary measures relating to prevention of threat of any disaster, capacity building, and preparedness to deal with any disaster, prompt response to disaster, assessment of the severity and magnitude of effects of disaster, evacuation, rescue and relief including rehabilitation and reconstruction.

Framework of the Sub theme:



**Box-I**  
**Understanding and Managing Disasters:**

1. **New Approach in Managing Disasters:** (i) Shift from response and relief mode to integrate it with planning & Developmental process in the light of Yokohama Message
- (ii) International Decade of Natural Disaster Reduction (1990-2000)
- (iii) Hyogo framework of Action policy of India.
- (iv) Disaster Management in India
- (iii) Reference to 10 and 11<sup>th</sup> five- year plan document.
- (iv) Disaster management Act 2005.



**Classification of Disasters:-** (i) Different types based on severity or origin. Geological, Meteorological, Hydrological, Biological, Nuclear, Industrial & Accidental Disasters (as suggested by high-power committee in August 1999 and identified 31 disaster and categorized into five major group) (Reference to Red cross and Red Crescent organization.)

2. **Geological Disasters: - Earthquake:-** Earlier Theories, Tectonic plates, Scales and severity of Earthquake. Earthquake Prediction. Earthquake prone area of the world. Recent major earthquakes of the world.
3. **Earthquake profile of India,** Zonation. Major earthquakes in India and discussion on lesson learned. Do not Do not's. Institutional Framework for research and recent updates, Building designs and regulations
4. **Landslide, Mudflow and Snow Avalanches:-** Causes, Landslide , snow avalanches prone area of India. Prevention and Mitigation:- Role of Geological survey of India (GSI) in study of land contours and warning about landslide hazards & DRDO role in Avalanche warning.
5. **Tsunami:-** Causes, Tsunami of 1994 of India Ocean and losses in the coastal States and other part of the world. Measures & mitigating. Tsunami warning (INCOIS) Indian National Centre for oceanic Information system.

#### **Hydrological Disasters:**

6. **Floods:-** Causes and impact of Flood, Flood profile of India, (natural ecological system of India, its impact specially on poor people and & in rural area, outbreak of epidemics (Malaria, cholera) & scarcity of water , National flood control programme, Main flood prone area of the country, Damages by flood, Advantages of Floods, Flood management programme
7. **Droughts:-** Causes, droughts profile of India-mitigation:- Manual management Manual (Ministry of Agriculture in 2009) Rainfall forecasting system (IMD). Drought Prone Area & Desert Development programme. Water Conservation & Harvesting, Management of Drought
8. **Tropical Cyclones:-** Definition, causes, cyclone prone area of India, effect, cyclone & wind speed, super-cyclonic storm Forecasting and warning of cyclones (Role of IMD)
9. **Flesh Flood or cloud Bursting:-** Meaning, causes, effects and impact, mitigation:- Laddak, Uttarakashi flash floods,, warning system. Lesson Learned
10. **Thunderstorm, Hail storm & Dust storm** Definition, causes & effect, Impact, profile in India. Early warning systems, Dos and Do not's
11. **Heat & Cold wave:** Extreme weather phenomena, causes & Impact, preventive measures.
12. **Biological Disaster:-** Epidemics in India , meaning, types, causes, effect, impact, preparedness and mitigation i.e. meningitis, measles, dengue, polio, typhoid (Epidemic profile:- water born diseases :- mitigation, preparedness (Pest Attack, cattle epidemics and food poisoning) Manmade Disaster.
13. **Industrial Disaster (oil and chemical):-** Classification as chemical mechanical civilian

electrical or other process failures due to accidents, negligence & incompetency in an industrial plant.

**Bhopal gas tragedy:** - Causes, Impact, Major accidents Hazards units mitigation preparedness in India.

**14. Fires & Forest Fire:** -Causes Impact, mitigation & preparedness (master plan on forest fire control), preventive and mitigation measures. Do & don't.

**15. Mine Disaster:** - Definition (Mine Act 1965), Major mining disasters, causes, (poisonous gas leak, asphyxiant gases, flooding etc.) preventive measures.

**16. Nuclear Disaster:-** Nuclear Material, Radiation its impact, possible causes, permissible limit of radiation, Nuclear emergency situations. Lethal diseases caused by radiation, Incidents in India in nuclear plants and Mayapuri Delhi in 2010, Russia (Chernobyl ) and Japan (Fukushima )

**Project Ideas:**

1. Identification of potential disaster prone sites, locations, vulnerable target groups/population and developing a action plan by involving local community and authorities and creating awareness by organising mock exercises using locally available recourses . (*Efforts should be made to utilize locally available resources in an innovative way*)

**Tips to Remember:**

1. Make sure that your plan is cost effective, innovative and sustainable.
2. Make optimum use of locally available resources rather than depending on the external agencies for help and support.
3. Assess the existing capacities/resources (both externally/within community) that can assist in risk reduction to provide an element of novelty in your planning.
4. Suggest a mechanism how the risk reduced is measurable.
5. Involve villagers/community members to assess the local resources and drawing the map and plan.

**Box-II**

**Types of Preparedness: It could be :-**

1. Task oriented
2. Target Oriented
3. Disaster oriented

2. Identification of vulnerable target groups in your area/locality specifically those are prone to a particular disaster and making/developing a response plan involving vulnerable target group and community and testing of same by periodic mock exercises.

3. Formation of Disaster Management club and taking up some activities like preparing emergency preparedness and response plan for the school involving students, Parents ,Teachers and local authorities.

*(Activities may include awareness creation, mock drill, development of education material and creation of awareness, preparing volunteers and developing*

*opportunities for leadership.)*

*(Activities may also include preparing students with basic lesson in tackling a fire outbreak, accident in a chemical laboratory, flood or even a bomb threat and terrorists attack and hostage crisis.)*

*The Disaster Management club could also work on assessing the impacts of few disasters in their region and the role of media which could be played by the media.*

4. Developing community/school plan to tackle disasters and emergencies by risk assessment, hazards, vulnerabilities and contingency planning to bring back life to normalcy in shortest period of time.

*(A community may be prone to various types of disaster due to factors like geological location, proximity to a chemical factory or nuclear plant etc. Accordingly a plan could be developed by involving vulnerable groups and communities. )*

5. Study and developing a strategy for mitigating structural/material deficiencies prone to disaster like earthquake, fire, flood etc. through retrofitting or during on-going remodeling in your locality, housing society and village.
6. Chemical hazard identification and risk analysis including awareness about basic information about the resources, demography, existing organizational set up, administrative facilities at the state, district and local levels. Describes preparedness and mitigation measures as well as response mechanisms.
7. Defines specific roles and responsibilities for various actors at different levels. Ensures networking/coordination with the media, NGOs, international agencies and other stakeholders.
8. Develop a disaster specific preparedness plan keeping in view the demography/topography and the disaster profile of your area.
9. Identification of hazard and risk analysis of your area by incorporating basic information about the resources, demography, existing organizational set up, administrative facilities at the state, district and local levels by developing a workable mechanism for preparedness and mitigation measures along with a response mechanisms.

*(Also describe and defines specific roles and responsibilities for various actors at different levels. Ensures networking/coordination with the media, NGOs, international agencies and other stakeholders)*

10. Develop a plan and create awareness in high-density settlements areas and develop information centre and watchdog committees to mitigate the impact of disaster.
11. Prepare a plan to protect the livestock of your village from flood by listing the appropriate measurement that could be undertaken keeping in view the demographic, topographic profile of your area.

*(In project include mapping exercises to identify vulnerable places, resources available and safe places for taking shelter and Setting up of different Disaster Management Teams to perform specific tasks)*

12. Plan to Reduce vulnerabilities and increase capacities of households and communities to withstand damaging effects of a specific disasters (Food, Earthquake,

Storm, flash flood, etc)

13. Develop a Rescue plan for persons with special needs (like physically/visually disabled population and senior citizens) in relation to a particular disasters or emergencies (fire, flood, earthquake, etc) The project must have following components:-
  - a. Consultation with persons with special needs for resources needed during disasters/emergencies.
  - b. Identification of basic amenities (water sanitation etc.) required by them during/after the disaster takes place.
  - c. Existing schemes and institutes providing assistance devices.
  - d. Identification and listing of people/govt and non-govt institutes/agencies of the people who can provide the help to people of special needs.
  - e. Preparing the inventories of items required for rescue and relief operation.
14. Study of some traditional housing earthquake resisting technologies and to what extent same has been use in modern housing construction.
15. Study some historical/old dwelling structures (Houses, *hawalies* etc) which had withstood the previous disaster like earthquake, floods, etc. Find out the special feature of those structures and validate the same by scientific experimentation.
16. Study the legal and Intuitional framework emerged in your area as result of new approach to tackled potential disaster. Suggest new measure to make it operationally optimum by doing a series of mock exercises.
  - a. Case study can be taken with reference to a particular disaster (Natural or Manmade)
  - b. Create awareness and Suggest Alternative planning/strategies and mobilizing local and state authorities for the same.
17. Study the impact of disaster on the livelihood of affected population in recent past.
18. Develop a mechanism (including mathematical modeling) to estimate the loss of livelihood or environmental degradation in a hypothetical disaster situation of your area/ region or State.
19. Estimate the economic loss by collecting primary and secondary data in relation to Environmental Degradation / loss of livelihood in your area and propose a plan to reduce the same in relation to a particular disaster (flood, cyclone, earthquake)
20. Study the local and traditional consideration, taken into consideration while constructing houses or other dwelling units or systems in relation to a particular disaster and compare it with modern method of construction.
21. To visit the affected areas and collect information including the type of disaster frequency and photos
22. Any traditional remedies against a repeat of the disaster-equipment exercises
23. The study of the meteorological department forecast the disaster by other sources
24. Re-affected areas: habitat considerations of supply schemes (compensation) against quick solutions and permanent disability

**Box****Approaches to Study Disaster**

- i) Geographical Approach
- ii) Anthropological Approach
- iii) Sociological Approach
- iv) Development Studies Approach
- v) Disaster Medicine & Epidemiology Approaches
- vi) Technical Approach

**Box:-****Learning from Disasters**

- i) Demystifying Myths
- ii) The constant process of learning and Improve planning.

**Detailed Project Ideas:****25. Development of Hazards specific response procedure using existing local infrastructure /knowledge/capabilities, resource constraints.****Indicator of success:-**

How innovative resources/knowledge and capabilities has been used to develop and operationalize response procedure in term of attending medical emergencies, Emergency call system, evacuation etc. Response system can be with reference to Fire, Earthquake Terrorists Attack, Storm, Tsunami, Bomb threat, Gas leak, Hazard material release, , chemical or suspicious material spill.

*Children and youth could be engaged in child-participatory School Disaster Management planning inaction oriented activities in their own schools, and neighbouring communities*

**26. Project:- School Earthquake safety & preparedness for school to prevent catastrophic consequences of earthquake**

**Relevance:-** Many time the catastrophic consequences of earthquake is preventable as Death are not by Earthquakes but by collapse of buildings due to designed and material used and lack of awareness. The project is to equip student/teacher community to help themselves during disaster.

**Objective:-** To assess the risk by building structure, material and design, equipment, window/doors settings that may cause injury to students.

- To create awareness and trained students and teachers of life saving skill through lectures, demonstrations, training programmes, workshop, mock drills and first aid trainings.
- To promote a culture of earthquake safety in school/housing society/village etc. .
- To impart knowledge on disaster risk reduction focusing on earthquake safety.



**Methodology:-**

Risk assessment in relation to building, design, construction, material, equipment's etc installed, awareness creation followed by training in life saving skills specifically required at the time of disaster.

Development and compilation of literature explain the basics cause and effect of earthquake for creating awareness and equipping target group in life saving skill.

**DID YOU KNOW?**

Any disaster preparedness programme should essentially include:

Perceptions that need to be examined, and opportunities, which need to be created for people to modify their perceptions where necessary

Strategies that need to be created to rouse the curiosity of the members of vulnerable affected community, and instil in them a desire for change.

Individuals and communities that need to be helped to compare the existing practices with proposed innovations

Source:-

<http://www.ignou.ac.in/upload/Disaster%20Preparedness%20and%20Mitigation.pdf>

**References:****Web Reference:**

1. <http://www.ndma.gov.in/images/guidelines/national-dm-policy2009.pdf>
2. <http://www.unisdr.org/2005/mdgs-drr/national-reports/India-report.pdf>
3. <http://www.newworldhope.org/School%20Safety.html>
4. <http://www.ignou.ac.in/upload/Disaster%20Preparedness%20and%20Mitigation.pdf>

## Sub Theme VII

### Traditional Knowledge Systems

## Sub Theme: Traditional Knowledge Systems (TKS)

### Introduction:

Traditional knowledge is the knowledge, innovations and practices of indigenous and local communities around the world. Developed from experience gained over centuries and adapted to the local culture and environment, it is transmitted orally from generation to generation.

It tends to be collectively owned and takes the form of stories, songs, folklore, proverbs, cultural values, beliefs, rituals, community laws, local language, and agricultural practices, including the development of plant species and animal breeds.

Sometimes it is referred to as an oral tradition because, it is practiced, sung, danced, painted, carved, chanted and performed down through millennia. Traditional knowledge is mainly of a practical nature, particularly in such fields as agriculture, fisheries, health, horticulture, forestry and environmental management in general.

- **Indigenous knowledge (IK)** system refers to the combination of knowledge system encompassing technology, social, economic and philosophical learning (**Hoppers, 2002**).
- **Indigenous knowledge (IK)** is the local knowledge – knowledge that is unique to a given culture or society. It is the basis for local-level decision making in agriculture, health care, food preparation, education, natural-resource management, and a host of other activities in rural communities (**Warren 1991**).

### Understanding what is traditional knowledge

Traditional knowledge\* refers to the knowledge, innovations and practices of indigenous and local communities around the world. Developed from experience gained over the centuries and adapted to the local culture and environment, traditional knowledge is transmitted orally from generation to generation. It tends to be collectively owned and takes the form of stories, songs, folklore, proverbs, cultural values, beliefs, rituals, community laws, local language, and agricultural practices, including the development of plant species and animal breeds.

*\* for the purpose of this paper, the terms traditional knowledge, indigenous knowledge and local knowledge are used interchangeably*

Source: THEMATIC PAPER towards the preparation of the 2014 World Conference on Indigenous Peoples- INTER-AGENCY SUPPORT GROUP ON INDIGENOUS PEOPLES' ISSUES

### Why this Sub Theme?

Traditional knowledge is valuable not only to those who depend on it in their daily lives, but to modern industry and agriculture as well. Many widely used products, such as plant-based medicines, health products and cosmetics, are derived from traditional knowledge. Other such valuable products include agricultural and non-wood forest products as well as handicraft. Traditional knowledge can make a significant contribution to sustainable development.

Most indigenous and local communities are situated in areas where the vast majority of the world's genetic resources are found. Many of these over a period of thousands of years have been brought under cultivation. . Some of the practices of the indigenous and local communities have proven to enhance and promote biodiversity at local level and aid in maintaining healthy ecosystems.

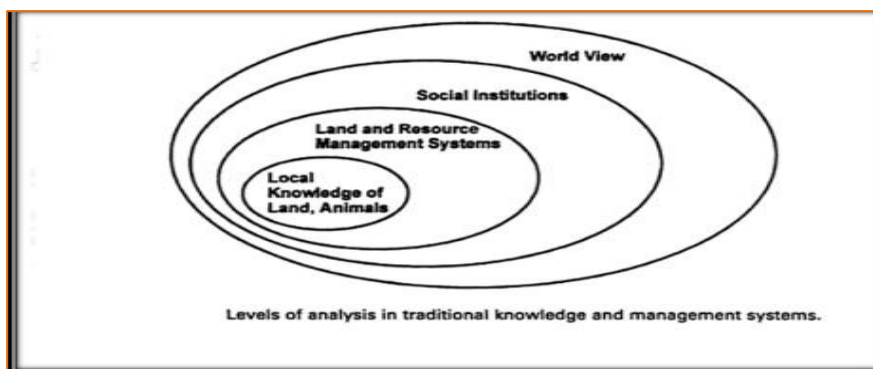
It is pertinent to mention here that, the contribution of indigenous and local communities to the conservation and sustainable use of biodiversity goes far beyond their role as natural resource managers. As on-site communities with extensive knowledge of local environment, they are directly involved with conservation and sustainable use. Their skills and techniques provide valuable information to the global community and useful models for enabling policies on biodiversity conservation..

Traditional knowledge issues cross-cut across many domains in relation to global environmental issues, from biodiversity conservation and natural resource management, to use of genetic resources and to climate change observations, mitigation and adaptation Work on indigenous knowledge provides support to understanding the role of customary livelihoods within sustainable development and the links between environmental management, science and well-being. Recognition of the links between traditional knowledge, sustainable and customary use of biological resources has led to global issues on sovereign rights to ones own resources, access and benefit sharing.

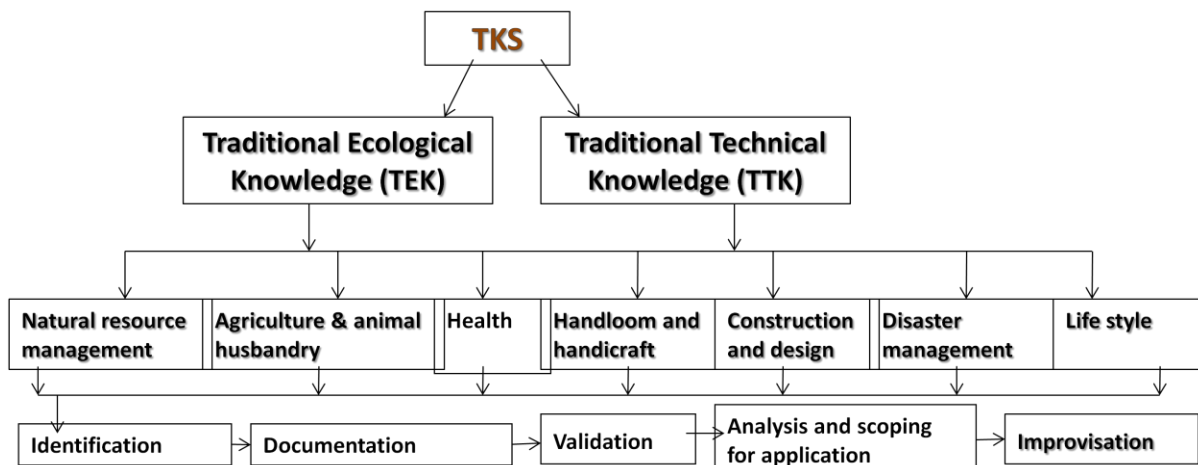
**The Convention on Biodiversity (CBD) provides the clearest recognition of these links through work on the following two Articles that:**

*'...respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge innovations and practices' (Article 8(j)) and 'protect and encourage customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation or sustainable use requirements.'* (Article 10(c))

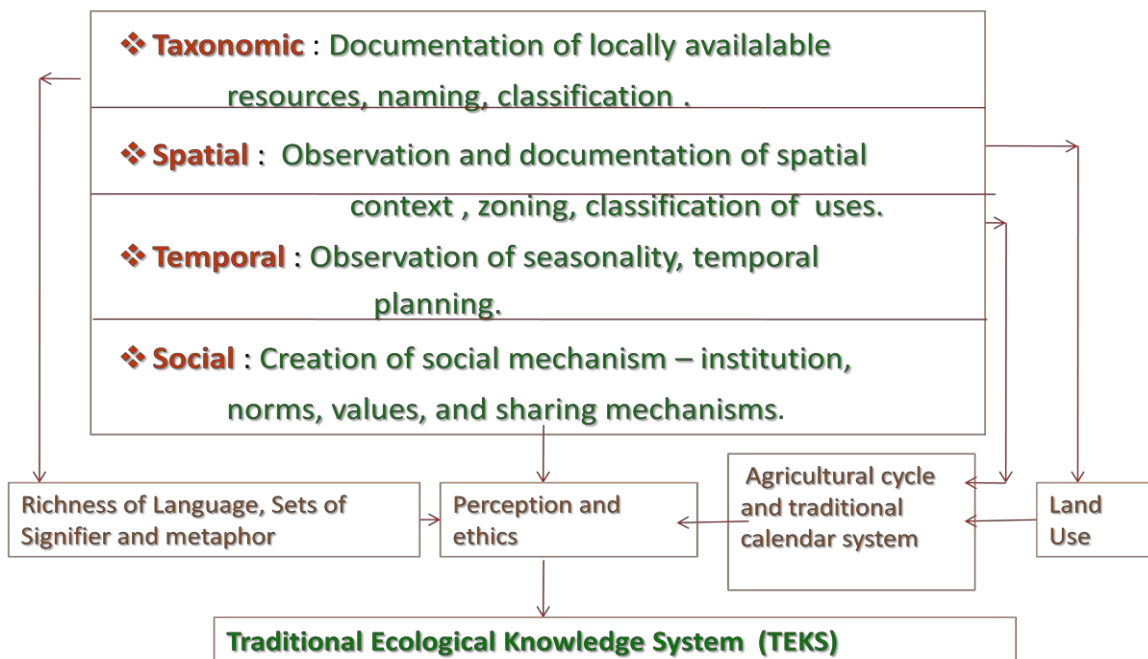
*The larger holistic Frame work.*



Source : *Sacred Ecology: Traditional Ecological Knowledge and Resource Management*, - By : Fikret Berkes,



## Frame of reference in TKS



### Coverage under the sub-theme:

Most commonly accepted is the role of Traditional Knowledge) TK in the “traditional” or primary sectors of the economy: agriculture and pastoralism, forestry, fisheries, water, and products made from natural resources such as crafts, furniture, housing, and so on (Posey 1999). Given the fact that a majority of the world’s population remain dependent on these sectors for their survival and livelihoods, and for various aspects of shelter, the contribution that TK makes and can continue to make towards sustaining billions of people is quite clear (though not necessarily acted upon in policies and programmes of most countries).



However, the role of TK in the secondary and tertiary sectors of the economy too is becoming clearer. A whole range of industrial products are dependent on or use TK in varying ways. This is true for sectors like textiles, pharmaceuticals, household good, and so on. Health care, through all systems of medicine, is to varying degrees of extent dependent on TK, or on combinations of TK and modern knowledge. According to the World Health Organization (WHO), the majority of the world's population (in areas like Africa, up to 80 per cent of the population) is dependent for varying degrees on medicinal plants through traditional health care systems ([www.who.int/mediacentre/factsheets/fs134/en/](http://www.who.int/mediacentre/factsheets/fs134/en/)). Numerous studies have demonstrated the contribution that TK also makes to the modern pharmaceutical industry and modern health care, a contribution that may only increase as people in the western world (including westernized people in the "developing" countries) become more conscious of plant-based cures. The World Health Organization (WHO) estimates that 25 per cent of modern medicines are made from plants first used traditionally.

Services like food distribution, education, climate forecasting and warning, and community care also continue to be performed through institutions using traditional means, and in some cases even modern institutions of the government or corporate sector are discovering the value of this. In a Food for Work programme in Nepal, significant losses of food in the distribution system were reduced when the programme switched to the use of local technologies and networks (Gorjestani 2004). Rates of maternal mortality at childbirth were reduced significantly when traditional institutions (including the traditional birth attendant) were used in combination with modern communications (Musake 1999, cited in Gorjestani 2004).

The trade sector too has seen a significant and continuing contribution of TK related products and services, as recognized by institutions such as UNCTAD (Twarog and Kapoor 2004).

Though much more recent, there is now a growing recognition of the role that TK could play in humanity's response to the gravest threat it now faces: climate change. The fact that communities have for centuries and millennia adjusted their behaviour and strategies and knowledge systems to changes in their surrounds, is central to this realization. Communities adjust their agriculture/pastoralism/fishing and hunting-gathering to subtle or not-so-subtle changes in climate, to threats from other communities or invasions, to disease and epidemics, and so on.

Traditional systems appear to be static, but they are indeed dynamic in making such adjustments. Such adaptability could be a key factor in the response that we give as a species, to the impacts of climate change and TK's role in all the sectors named above could provide the alternatives needed to build towards a more sustainable way of dealing with our atmosphere. As an example of the potential of this (as yet considerably under-utilized), researchers, government agencies, and indigenous peoples of Canada are collaborating in research and action related to climate change that brings together TK and modern knowledge (see <http://www.itk.ca/environment/climate-change-index.php>; and Birkes and Jolly 2001). Parties to the CBD are also beginning to highlight this issue, as pointed out by its Executive Secretary Ahmed Djoghlaif at the "International Expert Seminar on Indicators Relevant to Indigenous Peoples, the Convention on Biological Diversity and the MDGs" (Banaue, Ifugao, Philippines, 5 March 2007) (<http://www.biodiv.org/doc/speech/2007/sp-2007-03-05-ind-en.doc>).

### **On the Demarcation of Pseudo-science from Traditional Knowledge**

*(From ICSU Series on Science for Sustainable Development No. 4, Science, Traditional*

### *Knowledge and Sustainable Development)*

The demarcation of pseudo-science from traditional knowledge is fairly straightforward. As noted earlier, traditional knowledge is a cumulative body of knowledge, knowhow, practices and representations maintained and developed by peoples with extended histories of interaction with the natural environment. Thus, it has typically originated independently of science in a particular cultural setting, and critically, independently from Western culture. Traditional knowledge is therefore neither intended to be in competition with science, nor is such a competition the necessary result of their interaction. On the contrary, traditional knowledge has informed science from its very beginnings and it continues to do so today. If competition between science and traditional knowledge arises at all, then the initiative typically comes from people who want science to replace these other forms of knowledge. Pseudo-science, on the other hand, tries at least partly to de-legitimize existing bodies of scientific knowledge by gaining equal epistemological status. The existence of pseudo-science as an enterprise in competition with science is thus invariably bound to the existence of science itself whereas traditional knowledge is independent of science.

### **The Way Forward**

It is acknowledged in the introductory note to the Science Agenda - Framework for Action of the World Conference on Science (Annex 1) that modern science does not constitute the only form of knowledge available to further the development of humankind. Traditional knowledge systems harbor an enormous and, for the most part, untapped wealth of information that is acquired and constructed within a wide range of cultures. It is also acknowledged that these unique knowledge systems are increasingly weakened in the face of globalization and the growing dominance of a single view of the natural world as espoused by science.

The valuable contribution to science that has been made by traditional knowledge systems was recognized at the World Conference on Science. Further, the need to preserve, protect, research and promote this empirical knowledge was advocated. To assure mutually beneficial and enriching exchanges between these two distinct knowledge systems requires the development of a way forward that is based on two lines of action. The first concerns recommendations for action within the scientific community to raise awareness about the unique values of traditional knowledge systems. The second area of action that must be predicated on the first, concerns establishment of a foundation upon which to build partnerships that can constructively couple science and traditional knowledge.

### **Measures to be taken by the Scientific Community**

Scientists and scientific institutions should promote dialogue and build awareness and understanding within the scientific community about traditional knowledge and its relationship to science. Specifically, they need to:

- Recognize that science does not constitute the only form of empirical knowledge about the world;
- Encourage research into the history and philosophy of science to identify and highlight the tangible contributions that traditional knowledge systems have made to the development of science;
- Raise awareness of the important distinctions between traditional knowledge, science and pseudo-science;
- Recognize that traditional knowledge systems offer unique and valuable approaches to the acquisition and construction of knowledge, processes that can only be addressed by acknowledgement of the specific cultural milieu within which they are reproduced;

- Recognize that scientists are also influenced by their own cultures in which they learn, work and research;
- Promote and support research into traditional knowledge systems that represent considerable stores of, as yet "undiscovered", knowledge and potential for mutually beneficial exchanges with science.
- Actively support and strengthen the systems of acquisition, transmission and maintenance of traditional knowledge in the societies that are keepers and developers of that knowledge. Specifically with respect to building appropriate bases to articulate equitable exchanges between traditional knowledge and science:
- Understand that knowledge in traditional societies, contrary to an often held perception, is also dynamic and constantly evolving;
- Recognize that there also exist traditional processes of transmitting and acquiring traditional knowledge, and that these processes deserve to be maintained and supported;
- Recognize, support and encourage research into the role of women's traditional knowledge that has often been neglected.

#### **Possible initiatives.**

- Creating sensitization and awareness on traditional knowledge systems and best practices;
- Developing information and data base through the means of Heritage Register, People's Biodiversity Registers; Technology Register; ( write in Indian Journal of Traditional Knowledge )
- Promoting inquiry based learning in curriculum framework;
- Participatory action research;
- Training in vocational area ( IGNU experiments traditional drum making in NER)
- Identify appropriate means of communication, etc.
- Mainstreaming TKS through validation, adaptation to modern lifestyles, proper packaging, value addition,

#### **Project ideas**

- i. Title of the project : Study of the use of herbal medicine for the treatment of dengue fever.
- ii. Need statement: Recent spurt in the incidence of dengue fever and an increasing number of deaths occurred due to the disease incidence triggered a re-look into the traditional Siddha medicine and its effectiveness for treatment of fevers, body ache, temperature control etc.. Documented work on the use of leaf extracts of Papaya, and/or Nilavembu (*Andrographis paniculata*) was revisited and validation of the same led to large scale adoption of this traditional practice. Now this has become a standard treatment protocol for treatment of dengue fever accepted by many state health departments leading to centralised preparation and administration of the herbal preparation to the affected population.  
This is said to have led to effective control of the epidemic and is also a care case where it has been accepted by the modern system of allopathic medicine also.
- iii. Objectives
  1. To do a review of literature of all available herbal medicine for treatment of body ache, fevers and associated difficulties.
  2. To Study the disease incidence pattern of dengue fever in a location with refer to vector occurrence, breeding point mapping, study of socio-economic background of affected population.

3. To study the out of pocket (OOP) expenditure incurred by dengue patients before the introduction of the herbal medicine and compare with the expenditure incurred after the introduction of the herbal medicine.
  4. To document, study, validate the traditional knowledge, attitude and perceptions (KAP) of affected population, related to dengue fever.
  5. To study the disease profile with help from community health centre (with adequate precautions of not getting disease to oneself).
  6. To study the loss of livelihood due to disease incidence to a sample population.
- iv. Proposed methodology
1. Secondary reference to available documentation related to use of specific medicinal plants/plant parts.
  2. OOPs study format (ref. National Health Systems Resource Centre, NRHM, New Delhi)
  3. KAP study related to Objective No. 4.
  4. Experimentation with sample population and disease monitoring using simple body thermometers, diagnostics procedures adopted by doctors (with help from PHC doctors)
  5. Development of a protocol for disease reporting, procedures for treatment, dos, dnts etc.
  6. Looking at the source of vector multiplication as the problem and identifying solutions pf avoiding water stagnation points, standard protocols, drainage mapping.
  7. Community based action for awareness building, Solid waste management, health, hygiene etc. including schools, panchayats, Civil society organizations, govt. infrastructure, media etc.
  8. Use of modern communication technologies for effective health communication outreach.
  9. To also look at Control groups who have not taken other forms of medicine or no medicines at all and to see how far the herbal medicine is effective or not.
  10. To look at the various preparations, protocols for preparation of the herbal extracts, their shelf life et.
- v. Expected outcome
1. Understanding the intricacies of traditional knowledge and its modern application potential to newer challenges.
  2. To mainstream, adopt, adapt and integrate the traditional knowledge systems to modern and changing socio-ecological and economic conditions
  3. Understanding the economic impacts leading to loss of livelihoods, attendance in schools, negative impact to local production systems, and possible impact on developmental process, sustainability etc.
  4. To understand the pattern of Out of Pocket (OOP) expenditure of various sections of the community / classes and the varied impact of the same disease on different socio-economic sections.
  5. Effective and meaningful S&T/health communication strategies designed, implemented and adopted by the communities themselves can lead to sustainable livelihoods ,
  6. To see if there are fake herbal products sold in the name of Traditional practices, commercialization of traditional knowledge if any etc.

**Project 2: Community Knowledge about Classification of Land**

This exercise is intended to know the process of farmers' classification of their land based on their perceived criteria. This will also help the student to understand the farmers' decision making process in respect of land management especially crop choice, fertilizer use, irrigation scheduling, etc. This project has two basic components. At first level a field survey and mapping will be made at a community field adjacent to his/her locality with the participation of knowledgeable farmers and in the second level the community knowledge may be validated in school laboratory or agriculture laboratory nearby.

**Objectives:**

1. To identify different categories of land in farmers' field according to farmers' own criteria
2. To understand the rationale behind the farmers' classification system and its affect on land management.
3. To validate the farmers' classification process with some simple analytical techniques.

**Methodology:**

**Requirements:** Photocopy of the revenue map of the field, colour pen and paper, soil testing kits

**Steps**

1. Select a field around your locality
2. Collect a copy of the revenue map of the field and make a photocopy
3. Meet with the some knowledgeable practicing farmers from the field and explain the purpose in details
4. Ask the farmers about different types of land they have in the field
5. Visit the different types of land and ask them the reasons for differentiation
6. Take a note while visiting each type of land about the land type, soil type, slope, vegetation, nutrient management and irrigation management practices, water table, yield, cost of land, revenue etc.
7. Request the farmers to draw boundary lines of each homogenous type of land in the revenue map.
8. Transfer the map to graph paper for quantification of area under each type of land
9. Make a comparative table for different types of land based on their attributes

**Experiment:**

- Collect appropriate sample of soil from each type of land
- Assess the pH, electrical conductivity, NP K status of each type of land with the help of soil testing kits
- Compare the results with farmers' classification technique for validation

**Conclusion:**

- Find out the strength and weaknesses of farmers' classification technique

**Relevance:**

This project will help the students to understand the farmers' land classification system, and their relevance in land management and it will also promote respect towards the farming community.



**Project-3 : Community knowledge on soil and water conservation**

Topsoil of land surface is the outcome of weathering process, which encompasses a variety of physical, chemical, and biological processes acting to break down the rock. Topsoil is more vulnerable to erosion by water and wind. High intensity rainfall on the bare soil causes soil detachment and transport of finer particles elsewhere. Ultimately soil is eroded and become unfit for any use, especially agriculture. There are several mechanical and biological measures to check the soil erosion. Mechanical measures like bunding, terracing, stone bunding, check dam involve huge monetary cost, whereas biological measures like strip cropping, cover cropping, grass cover cost less. Cover crops like black gram or sweet potato are grown over the surface soil and are mostly used for smothering the land surface to protect the land from the beating action of rain and to increase infiltration of rainwater by checking the run-off water. *Vetiver* grass is grown across the slope for same purpose. People try number of location specific mechanical and biological measures to conserve the soil

**Objectives:**

1. To record soil and water conservation practices in your locality practiced over the years
2. To analyse the causes/reasons behind such practices
3. To assess the benefits of such practices followed by the farmers/community

**Methodology:**

- The children have to survey the locality where the farmers/ people practice soil and water conservation
- Identify the conservation practices against soil erosion and water run off
- Observe the details of practices as mentioned in the table
- Identify some easily measurable parameters by which the efficacy of the practices can be measured

**Table:** List of practices followed to conserve land and soil

Name of practice	Details of practice	Farmers' logic	Validation with simple innovations
1.			
2.			

**Relevance:**

This study will provide good information on land and soil conservation practices practiced by the farmers

**Additional Project Ideas**

1. Scientific study of pottery based products and its potential impact on reduction of non-bio-degradable wastes.
2. Traditional methods of preservation of food items using pottery products, coolers, their economics compared to refrigerators etc.
3. Traditional granaries, pest protection practices using herbs in comparison to chemical methods of pest protection in seeds, their germination % etc.
4. Assessment, study and validation of traditional weather forecasting techniques used by tribal communities and its linkage to sustainable lifestyles.
5. Study of traditional housing in terms of climate adaptability, cultural practices, cost, life of the buildings, maintenance costs, energy efficiency etc.

6. Study of traditional food processing techniques and its comparison to new forms of modern food preservatives, carbon footprints etc.
7. Traditional crop calendars and use of indigenous seeds and cropping systems and their adaptability to pests and diseases, climate and weather extremes like flooding, drought, cyclones etc.
8. Study of sacred groves in relation to sustainability, preservation of biodiversity and eco system services.
9. Traditional water harvesting systems, their sustainability, transfer of knowledge from one generation to another etc.
10. Traditional festivals and their interconnectedness to health, energy, food, weather, agriculture, biodiversity etc.
11. Documentation, Validation of Traditional knowledge practices in your area in differentiation to superstitions/pseudoscience based practices.
12. Peoples' wisdom about utilization of wetlands for commercial purposes.
13. Farmers' indicators about good/bad soil
14. Farmers' concept on multiple cropping (intercropping, mixed cropping, *paira* cropping etc)
15. Community knowledge about biological indicators of soil quality

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**Sub Theme VIII**

**Accessibility for children  
with disability**

## **Sub Theme: Accessibility for children with disability**

### **Introduction:**

Almost 10 percent of the world's population — 650 million people — live with some type of disability. A disability is any physical, sensory, or cognitive impairment that makes daily activities more difficult. Many people are born with a disability. Others acquire a disability later in life, from an accident, an illness, or the aging process. Many older individuals are diagnosed with chronic conditions that lead to functional or cognitive disabilities. Education is one of the most effective ways to break the cycle of discrimination and poverty that children with disabilities and their families often face.

According to the World Report on Disability approximately one hundred crore people in the world are living with a disability, with at least 1 in 10 being children and 80% living in developing countries. India has an alarming statistics of children with disabilities and with an increase order in rural urban ratio. Children with disabilities are one of the most marginalized and excluded groups of children and remain invisible to the mainstream population.

Disability is recognized as one of the least visible yet most potent factors in educational marginalization. Reaching the marginalized, children with disabilities remain one of the main groups being widely excluded from quality education as per the EFA Global Monitoring Report 2010.

The National Children Science Congress programme attempts to take a bold step by inspiring the physically challenged children to participate with their creative and innovative projects along with the mainstream students.

It is essential that the state coordinators and state academic coordinators of each state adapt their methodologies to ensure that all children, irrespective of age, gender and disability, can engage in the NCSC programme without discrimination of any kind. This applies to engagement and enrollment which need changes and new, innovative approaches to fit the specific needs of children with disabilities.

### **The challenge:**

- Between 93 million and 150 million children are estimated to live with disabilities. (GEM Report 2015)
- An estimated 90% of children with disabilities in the developing world do not go to school (UNICEF. Global Initiative on Out-of-School Children)
- Poverty, malnutrition, poor health, illiteracy, and lack of access to proper sanitary conditions or clean water aggravate the consequences of existing disabilities.
- Millions of children with disabilities are left out of education sector plans due to poor data collection and a lack of knowledge on how to include them in education planning and implementation. (UNICEF. Children and Young People with Disabilities Fact Sheet)
- Children with disabilities are often overlooked in humanitarian action and become even more marginalized as fewer resources are available in the midst of an emergency.

**How the children with disabilities can be enrolled in NCSC programme?**

**Children with disabilities enrolled in school but excluded from learning** because the curriculum has not been adapted to their needs or teachers do not have the capacity or time to make the needed adaptations, and/or they do not have access to assistive devices necessary for their learning needs.

**Example:** Children with low vision are unable to see the board without eye glasses.

**Children who are not enrolled in school but who could participate** if schools had the capacity in terms of knowledge, skills and equipment to respond to their specific needs.

Example: Children with physical disabilities who cannot access the classrooms or children with learning difficulties who may require a slightly different method of teaching or extra hours of instruction.

**Children with severe disabilities** who require additional specialized support, whether in school or not. This group is relatively small (2-3% of all children with disabilities).

Example: Children with limited speech or communication, children with a need for support in major life activities or children with multiple disabilities.

***Towards Inclusive Education***

For over a century, the prevalent model for offering education to children with special needs has been the special school. This system had major drawbacks – it is expensive and has

only limited reach. Moreover, segregating children based on disability was discriminatory and violation of the human rights. Subsequently, the philosophy of 'integration' emerged which advocated education of children with mild and moderate disabilities in general schools along with others with adequate resource support. But children under integration method were still treated separately in schools and integration or mainstreaming was only partial.

This led to the emergence of the new concept called Inclusive Education (IE) which argues that all children irrespective of the nature and degree of the disability should be educated in general schools with normal children. More and more experts in special needs education are now advocating inclusive education not only on educational grounds but also on social and moral grounds. Inclusive education is all about making classrooms responsive to the needs of the learner. It stresses on child centered pedagogy using peer tutoring, co-operative learning and group learning.

Inclusive education has been introduced in the schools in the project areas of DPEP on a limited scale. Success of IE depends on teachers and good classroom practices. A beginning has been made in this area, but a lot more has to be done. Inclusive education may be the *mantra* to provide education to all children with special needs in the country. Then only the country will be able to achieve the elusive goal of Universal Elementary Education (UEE).

**Encouraging children with disabilities for NCSC programme:  
Improving access and quality**

This Activity Guide Book discusses on how to engage, motivate and provide access and quality for children with disabilities. It gives an overview of the global context, provides best practice case studies and clearly signposts practical tools and resources.

"Ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all" is the Sustainable Development Goals will be impossible without improving access to and quality of education for children with disabilities.



**Poverty is both a cause of consequence of disability.**

In 1999 the World Bank estimated that people with disabilities may account for as many as one in five of the world's poorest people. A 2005 World Bank study also tentatively concluded that "disability is associated with long-run poverty in the sense that children with disabilities are less likely to acquire the human capital that will allow them to earn higher incomes", but stressed the need for more research in this area. People in developing countries are more likely to be affected by disability caused by communicable, maternal and prenatal diseases and injuries than people in developed countries. These disabilities are largely preventable. Furthermore conflict often occurs in poorer countries which increases the number of people with disabilities and invariably worsens the delivery of basic services which is likely to impact those with disabilities to a greater degree than others.

**Educating children with disabilities is a good investment.**

It has been reported that by educating and empowering the children with disabilities reduces welfare costs and future dependence. It reduces current dependence and frees other household members from caring responsibilities, allowing them to increase employment or other productive activities. It also increases children's potential productivity and wealth creation which will in turn help to alleviate poverty.

**Education can reduce discrimination against children with disabilities and tackle poverty.** Education, particularly inclusive education, is able to reduce discrimination through enabling children with and without disabilities to grow up together. Education gives children with disabilities skills to allow them to become positive role models and join the employment market, thereby helping to prevent poverty.

**The best way to improve education for children with disabilities is to improve the education sector as a whole.** In countries where teachers are untrained, working with large class sizes and few resources in structurally unsafe classrooms, pragmatic context-specific and cost effective decisions are necessary.

Inclusive education is primarily about restructuring school cultures, policies and practices so that they respond to the diversity of students in their locality. It sees individual differences not as problems to be looked, but as opportunities for enriching learning and for education systems to embrace change. It is a dynamic, continuing process of facilitating the participation of all students, including those with disabilities

The between integrated and inclusive education relates to access and quality. Save the Children notes that integrated education tends to focus more on children with disabilities attending school whereas inclusive education focuses more on ensuring children with disabilities are learning. Save the Children argues that inclusive education is about restructuring the cultures, policies and practices in schools so that they respond to the diversity of students in their locality. This means that all children, including children with disabilities, not only have access to schooling within their own community, but that they are provided with appropriate learning opportunities to achieve their full potential. However, it is also essential that parents, children and communities are supported to change their attitudes and understanding of why inclusion matters, as this is what will sustain change.

**UNESCO's policy guidelines for inclusion state that in order to move systems towards greater inclusion, there needs to be:**

- A recognition of the right of children with disabilities to education and its provision in non-discriminatory ways

- A common vision of education which covers all children of the appropriate age range
- A conviction that schools have a responsibility to meet the diversity of needs of all learners, recognizing that all children can learn.

### **NCSC and quality of education for children with disabilities**

There are a range of interventions which can be explored, examined and experimented as Children Science Congress project and the consequence results and observations could improve the quality of teaching and learning for children with disabilities. The extent to which these can be implemented will be dependent on the overall education context in terms of school resources, teacher training, curriculum development.

For much of history, many people with disabilities have had to rely on technologies that were designed for the nondisabled community. Even technology specifically designed for people with disabilities—such as Braille text for people with a visual impairment or text telephones (TTY) for people with a hearing disability—could require a high learning curve, be limited in availability, or have a high cost because of its specialized nature.

Recently, however, the shift from analog technology to digital technology has eliminated many of these barriers. The reason is simple: digital information can easily be converted into voice, text, or even physical patterns (e.g., Braille), allowing the development of many more low-cost, readily available general purpose devices that also can be used by people with disabilities. The digital era has led to many advances in technology that have directly improved the quality of life for the disabled community. As discussed below, technology that improves accessibility for people with disabilities generally falls into three categories:

- **Assistive technology** (technology designed specifically to improve a disabled person's functional capabilities)
- **Adaptive technology** (technology that provides a mechanism that allows people with disabilities to use technology that would otherwise be inaccessible to them)
- **Accessible technology** (technology that has many broad applications but helps remove barriers and make the world more accessible for people with disabilities)

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<p><b>33. Uttara Kannada Dist.</b> Shri Shrikanth Hitnalli Science Teacher, Shri Chennakeshwara High School Karki, Honnavara Taluk Uttara Kannada Dist. Mo : 9449236598 Email : sckkarki@gmai.com</p>	<p>Shri Veerabhdrapa Asst. Teacher, Popular New English School, Chandiya, Karwar Uttara Kannada Dist. Mo : 9483617705</p>
<p><b>34. Yadgiri Dist.</b> Shri B. Rajashekhar Gowda Academic Coordinator B.E.O. Office, Yadagiri - 585 201 Mo : 9449697282</p>	<p>Shri Rajshekhar Pattar Asst. Teacher Shahapur Yadgiri Dist. Mobile : 9741696393</p>

**Government of Karnataka**

No.ED/100/RGN/90

Karnataka Government Secretariat  
Education Department  
M.S. Building, II Stage, VI Floor  
Bangalore, Dated 10th December 1990

**CIRCULAR**

**Sub: O.O.D. facility for Government Employees participating in  
Karnataka Raja Vijnana Parishat activities.**

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It is brought to the notice of Government that the teachers of schools and lecturers of Junior Colleges/ Colleges in the state are assisting in the various activities of Karnataka Raja Vijnana Parishat. Some times they are required to visit other places in Karnataka in connection with the parishat's work like attending Annual Executive Committee meetings, Participating in Science Exhibition, Science Melas and delivering popular lecturers, etc. This is a part and parcel of the efforts of Karnataka Raja Vijnana Parishat to develop science and technology in the state.

In these circumstances, the teachers / lecturers who participate in the activities of Karnataka Raja Vijnana Parishat are treated as on other duty subject to the following conditions.

1. Total period shall not exceed 15 days in a year.
2. The participants shall obtain permission of the competent authority before hand;
3. No additional financial commitments shall arise due to this; and
4. The Participants shall obtain Attendance Certificate and produce to the Authority concerned.

Sd/-

(Neelakanta Murthy)  
Under Secretary to Government  
Education Department

**Copy to:**

1. The Commissioner for Public Instruction, Bangalore
2. The Director of Collegiate Education Department, Bangalore
3. The Director of Technical Education Department
4. The Joint Director of Public Instruction, Bangalore, Gulbarga, Mysore, Bellary (Administration)
5. Weekly Gazette
6. Copy for information to:  
Sri Abdul Khadir, Under Secretary, Department of Science & Technology with reference to U.O. Note No.DST 15 KRVP 90 dated 9-10-1990.

ಅನುಬಂಧ - 9

ಕರ್ನಾಟಕ ಸರ್ಕಾರದ ಸಾರ್ವಜನಿಕ ಶಿಕ್ಷಣ ಇಲಾಖೆ ಅಯುಕ್ತರ ಕಛೇರಿ ನೃಪತುಂಗ ರಸ್ತೆ, ಬೆಂಗಳೂರು-01

ಸಂಖ್ಯೆ:ಸಿ4(3)ಶಾ.ಸಂ.ನಿ/04/2011-12

ದಿನಾಂಕ:21/05/2011

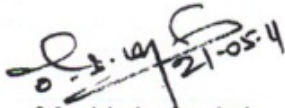
**ಸುತ್ತೋಲೆ**

**ವಿಷಯ:** ಅಖಿಲ ಕರ್ನಾಟಕ ಮಕ್ಕಳ ವಿಜ್ಞಾನ ಸಮಾವೇಶದ ಅಂಗವಾಗಿ ಜಿಲ್ಲಾ ಹಂತದಲ್ಲಿ ಭಾಗವಹಿಸುವ ವಿದ್ಯಾರ್ಥಿ ಮತ್ತು ಮಾರ್ಗದರ್ಶಿ ಶಿಕ್ಷಕರಿಗೆ ಶಾಲಾ ಸಂಚಿತ ನಿಧಿಯಿಂದ ಪ್ರಯಾಣಭತ್ಯೆ ಹಾಗೂ ಯೋಜನಾ ವರದಿಗೆ ತಗಲುವ ವೆಚ್ಚಕ್ಕಾಗಿ ರೂ.400/- ಗಳನ್ನು ಭರಿಸಲು ಅನುಮತಿ ನೀಡುವ ಬಗ್ಗೆ.  
**ಉಲ್ಲೇಖ:** ಮಾನ್ಯ ಪ್ರಾಥಮಿಕ ಮತ್ತು ಪ್ರೌಢಶಿಕ್ಷಣ ಸಚಿವರ ವಿಶೇಷ ಕರ್ತವ್ಯಾಧಿಕಾರಿಯವರ ಪತ್ರ ಸಂಖ್ಯೆ:ಪ್ರಾಪ್ರೌಶಿಸ/ಒಎಸ್ ಡಿ/75/2011 ದಿನಾಂಕ:10/05/2011.

&&&&&&&

ಮೇಲ್ಕಂಡ ವಿಷಯಕ್ಕೆ ಸಂಬಂಧಿಸಿದಂತೆ, ಅಖಿಲ ಕರ್ನಾಟಕ ಮಕ್ಕಳ ವಿಜ್ಞಾನ ಸಮಾವೇಶದ ಅಂಗವಾಗಿ ಜಿಲ್ಲಾ ಹಂತದಲ್ಲಿ ಭಾಗವಹಿಸುವ ವಿದ್ಯಾರ್ಥಿ ಮತ್ತು ಮಾರ್ಗದರ್ಶಿ ಶಿಕ್ಷಕರಿಗೆ ಶಾಲಾಸಂಚಿತ ನಿಧಿಯಿಂದ ಪ್ರಯಾಣ ಭತ್ಯೆ ಹಾಗೂ ಯೋಜನಾ ವರದಿಗೆ ತಗಲುವ ವೆಚ್ಚಕ್ಕಾಗಿ ರೂ.400-00 ಗರಿಷ್ಟ ಭರಿಸಲು ಅನುಮತಿ ಕೊಡುವಂತೆ ಉಲ್ಲೇಖದ ಪತ್ರದಲ್ಲಿ ಸೂಚಿಸಿರುತ್ತಾರೆ.

ಶಾಲಾಸಂಚಿತ ನಿಧಿಯ ಚಾಲ್ತಿ ಹಣದಲ್ಲಿ ಪ್ರಯಾಣ ಭತ್ಯೆ ಹಾಗೂ ಯೋಜನಾ ವರದಿಗೆ ತಗಲುವ ರೂ.400-00 ಗಳನ್ನು ಭರಿಸಲು ಈ ಮೂಲಕ ಅನುಮತಿ ನೀಡಲಾಗಿದೆ.

  
ಕೆ.ಪಿ.ಹನುಮಂತರಾಯಪ್ಪ  
ನಿರ್ದೇಶಕರು(ಪ್ರೌಢಶಿಕ್ಷಣ)

ಇವರಿಗೆ,

- 01.ರಾಜ್ಯದ ಎಲ್ಲಾ ಉಪನಿರ್ದೇಶಕರು(ಆಡಳಿತ) ಸಾರ್ವಜನಿಕ ಶಿಕ್ಷಣ ಇಲಾಖೆ ಇವರಿಗೆ ಮುಂದಿನ ಕ್ರಮಕ್ಕಾಗಿ.
- 02.ಗೌರವ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕರ್ನಾಟಕ ರಾಜ್ಯ ವಿಜ್ಞಾನ ಪರಿಷತ್ತು, ವಿಜ್ಞಾನ ಭವನ,ನಂ.24/2,21ನೇ ಮುಖ್ಯ ರಸ್ತೆ,ಬಸನಕೆರೆ 2ನೇ ಹಂತ ಬೆಂಗಳೂರು-560 070.
- 03.ಕಛೇರಿ ಪ್ರತಿ.