National Children's Science Congress

NCSC 2022 and 2023

Focal Theme and Sub-themes

National Children's Science Congress (NCSC), a flagship programme of National Council for Science and Technology Communication (NCSTC), Department of Science & Technology (DST), Government of India, was launched nationwide in 1993, for children of 10- 17 years age which includes both regular school-goers, dropouts, children of slum or street dwellers. The programme also provides platform for specially-abled children (*Divyangjan*). It acts as a platform for the children to be rational and apply scientific methods to understand, research and seek solutions for solving local problems in their neighbourhoods.

This inquiry-based learning programme is held every year on a specific focal theme which is continued consecutively for two years, and is decided upon the basic principle of 'Local for Global'. Under the 'new normal' situation following Covid pandemic the UNO has declared 2021- 2030 as the UN Decade on '*Ecosystem Restoration'* within existing structures and available resources considering its commitment to human well-being, biodiversity conservation and achieving Sustainable Development Goals. Keeping this declaration as well as consequences in view, the focal theme of NCSC 2022 and 2023 has been decided as-

UNDERSTANDING ECOSYSTEMFOR HEALTH AND WELL-BEING

Ecosystems are the planet's life-support systems not only for humans but also for all other life-forms. Humansurvival has fundamental needs for food, water, clean air, shelter and regulated climatic condition. Other benefits derived from an ecosystem include full complement of species, intact watersheds, climate regulation and genetic diversity. Stress of any form on ecological balance, biodiversity, freshwater sources, food- producing systems and climate regulation cause major adverseimpacts on health and well-being. Therefore, understanding ecosystem aslife-support-system in terms of its components, interrelationships among the components, role and functions of abiotic and biotic factors, significance of food chain, energy dynamics, ecological services, biodiversity (genetic and species varieties) are very important to develop ecological literacy. Moreover, understanding human impacts on ecosystems affecting health and well-being are also quite important. It is essential to know how our activities disturb the ecosystem functions leading to various negative impacts on health and overallwell-being. Hence, our daily activitiesat all levels need rectification and re- designing to reduce the negative impacts on ecosystem and thereby achieving ecosystem sustainability, health safety and security as well as well-being for all.

The focal theme will focus on themajor following aspects by engaging children for inquiry-based learning applying methods of science in their own local contexts:

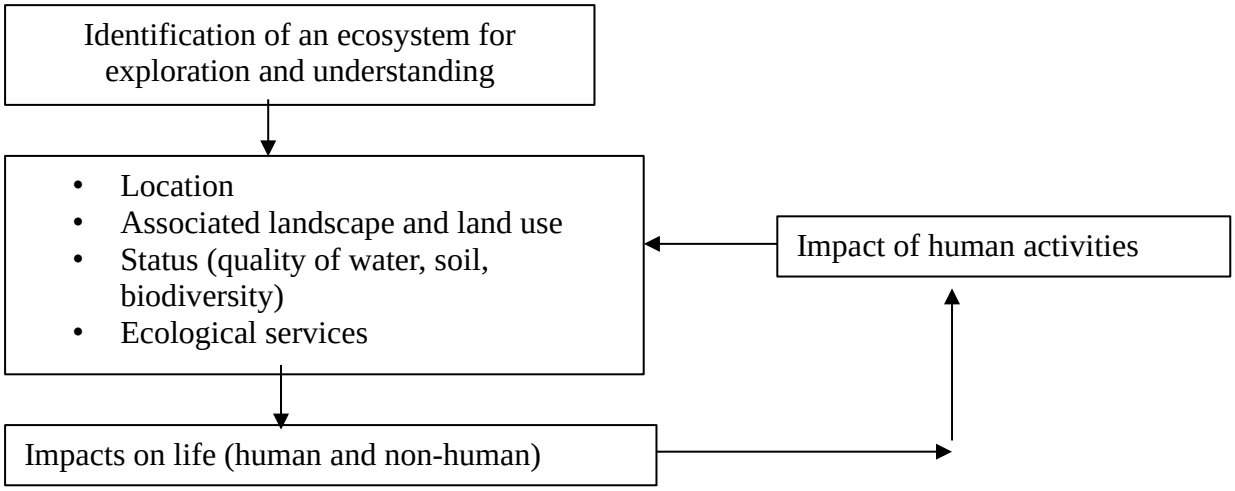
- Exploring and understanding ecosystem(s) in their neighborhoods and taking initiatives for ecosystem conservation and restoration;
- Making inquiry into the interlinkages of ecosystem with health, nutrition and well- being along with their implications;
- Taking initiatives for experimentation, based on ecosystem approach, for local level natural resource management, farm and non-farm- based production, and finding out ways for food, nutrition and livelihood security, health safety, and developing resilience and adaptation towards climate change and disaster risk reduction.
- Looking into innovative S&T solutions for ecosystem conservation and restoration, nutrition and health safety.

Keeping these major focuses in view, the focal theme has been divided into the following five sub-themes:

Sub-theme I: Know your ecosystem

Broadly, this sub-theme willencourage the children to explore, identify and carry out studies on the ecosystem(s) in their neighbourhoods to know about its different components (abiotic and biotic), their inter- relationship, functions, role of certain species in the ecosystems, association of biodiversity with the ecosystems, ecological services, human dependencyon the ecosystem(s) and impact of human activities on the ecosystem(s).

Logical framework:



Focal areas:

- Exploring and understanding the ecosystem in your neighborhood
  - a. Freshwater (stream, river, pond, lake, tank etc)
  - b. Forest
  - c. Grassland
  - d. Agroforestry
  - e. Farmland
  - f. Home garden
- Tree as ecosystem or repository biodiversity
- Area under Construction Products Regulation
- Community-based practices
- Anthropogenic pressure /interruption

Project ideas:

1. Comparison of butterfly populations in urban and rural environs
2. Diversity in the mangrove
3. Diversity of water plants in the local pond/wetland
4. Diversity of water plants in the disturbed pond/wetland and intact pond/wetland in the locality
5. Impact of urbanization on the mangrove ecosystem
6. Impact of solid and liquid wastes on the mangrove ecosystem
7. Impact of solid and liquid wastes on the wetlands
8. Diversity of flora and fauna in the sacred grove

9. Comparison of soil organism in sacred grove and agricultural land/plantations in the neighborhood
10. Urban birds and their survival tactics
11. Probe in to reasons of the disappearance of sparrows in urban/ rural environs
12. Pollinators in the home gardens
13. Diversity of spiders in the paddy fields and their role in pest control
14. Mixed hunting party of birds in rural areas and their dynamics
15. Birds in the paddy fields
16. Study of heronry and the dynamics
17. Fruit eating birds in the locality and their role in seed dispersal
18. Dragonfly and damselfly diversity in the locality
19. Dragonfly larvae and their role in mosquito larvae control
20. Bird flowers and flower birds
21. Ecosystem restoration of different mined areas
22. Coastal erosion and impacts
23. Choice of native and exotic plants in the home gardens and the transformations in the garden ecosystems
24. Change in riparian vegetations in different zones in a river
25. Analysis of change in the local landscape based on satellite images and land surveys
26. Riparian vegetation dynamics and its relation to diversity in aquatic fauna in the locality
27. Earthworm presence and density as an indicator of soil organic content and soil health
28. Study of pollinators in the mustard field.
29. Pollinators and pollination

Sub-theme II: Fostering health,nutrition and well-being

This sub-theme will inspire the children to make scientific inquiry, in their own localities, about situation of health (both human and animal), nutrition and well-being and will also encourage them to make efforts to identify ways and means to fortify and foster the situation ensuring health safety and security, nutritional security and well-being at individual, family andcommunity levels.

Focal areas:

- Know your health
- Know your food
- Sources of food in your locality
- People's practices
- Myth and reality
- Disaster and health safety

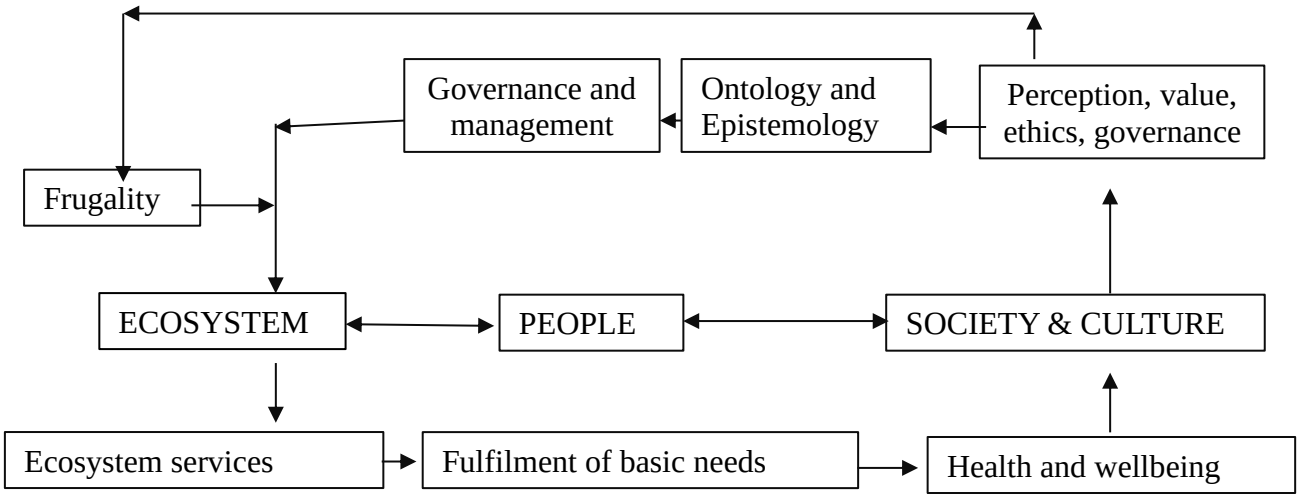
Project ideas:

1. Water disinfection / treatment using solar energy
2. Correlation between junk food and obesity
3. Nutritive value of local / seasonal fruits / vegetables
4. Study of common / local zoonotic diseases
5. Evaluation of level of essential nutrients in food stuffs
6. Impact of climate change on the diseases of humans and/or plants and/or animals
7. Assessment of animal feeds on production
8. Study of food-system in tribals and its impact on their health and well-being
9. Role of public health system on societal well being
10. Study of deficiency diseases and approach to overcome at local level
11. Comparison of balanced diet across cultures
12. Study of methods adopted for physical / social well-being at school level
13. Companion animal health and impact on household well-being
14. Study of nutritional deficiency in the community and means to overcome
15. Analysis of nutritive values of plant-based versus animal-based food for specific ingredient

Sub-theme III: Social and culturalpractices for ecosystem and health

Under this sub-theme children willbe inspired to identify, document and validate local socio-cultural practices intheir local contexts evolved over a period of time for the protection of ecosystems and their associated services, sustainability, conservative nature way and means such knowledge systems got transferred from one generation to another.

Logical framework:



Focal areas:

- Understanding the society and culture, people and their practices, interrelation to ecosystem and health
    a. TKS base frame of references
    b. Acquired modern frame of references
    c. Induced frame of references

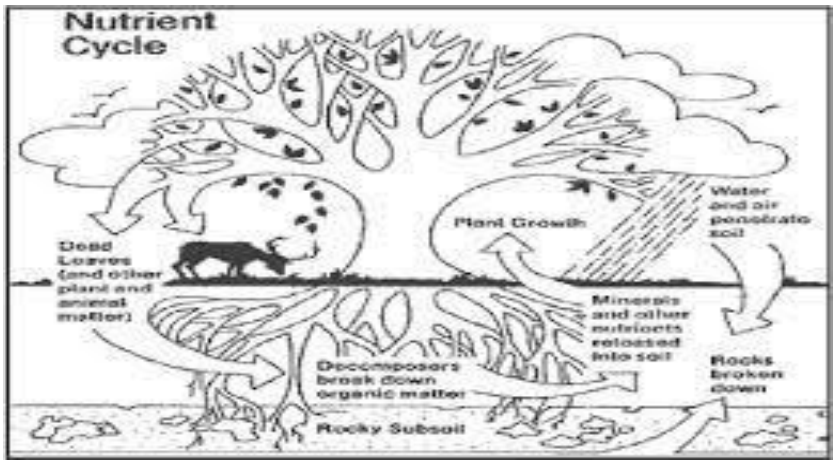
Project ideas:

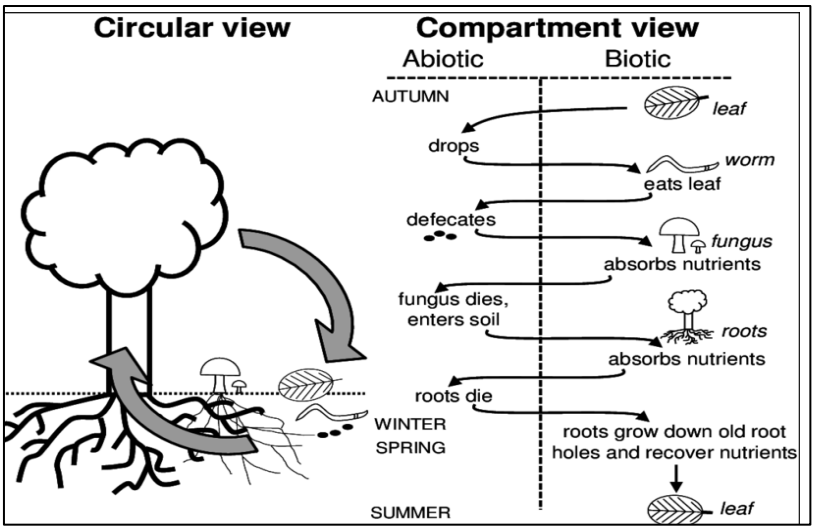
1.Agriculture related social and cultural practices leading to non-chemical farming with respect to biological pest and nutrient management.
2.Human animal conflict and linkage to local ecosystem degradation and coping mechanisms.
3.Land use changes causing ecosystem changes leading to flash-floods/land-slides including vulnerability mapping of potential landslide hotspots.
4.Cloud-burst and resultant flooding and its impact on agro-ecosystems.
5.Rain-gardening/farm ponds/soil erosion control measures / Continuous Contour Trenches/gabion etc. and study of regeneration of green cover over sloppy terrains.
6.Season watch – mango and other fruit orchards / other species / link to local marketing and study the process of flowering and its linkage to whether they have the same latitude/longitude etc.

7.Sacred groves and their importance / role in conservation and local traditions and ecosystem services.
8.Selective and controlled pruning of trees/fodder for cattle rearing / Jack tree leaves for goats etc. as a conservative measure.
9.Role of traditional games/sports and their linkage to health / Physical activity mapping/ seasonal games etc.
10.Food preservation/processing linked to seasonal availability of resources / fish /meat /vegetable process / in various agro-ecosystems.
11.Fisheries / Conservative measures leading to sustainable fishing.
12.Pest-predator balance in agro-eco systems and cultural pest control measures as opposed to conventional farming / comparative study / economics of input-based farming with natural farming systems
13.Study on sustainable menstruation as a means to avoid plastic waste.
14.To study role of rain garden in water recharge.
15.Study and compare lifestyle of different group/communities either in village or cities.
16.To study the effect of market force on changing pattern of festivals / dresses / food habits/ Community celebration and its effect on ecosystem.
17.To study the importance of our various festivals/traditional games/toys and their relation with our cultural aspects and mental health.
18.To study traditional biological control methods of pest management and its role in ecosystem.
19. Study on biofencing plants of local area and its role in a)checking man animal conflict b)conservation of ecosystem.
20.Scientific study on traditional method of food storage processing and its role in ecosystem.
21.Study on land use and its role in ecosystem conservation by sea buckthorn (Hippophae)[In reference to local area of Leh- ladakh]
22. Study on local community knowledge of polyherbal medicine to control tick infection in Dairy Animals in eco-friendly way.
23.Study of machining Makhana(Fox nut/Gorgen nut) popping a way to save health and improve livelihood of makhana growers.

Sub-theme IV: Ecosystem based approach (EBA) for self-reliance

Children, under this sub-theme, will get scope to identify the prospects and study / explore how integrated management of land, water and living resources promotes conservation and sustainable use in an equitable way. Children can also study the wide range of ecosystem management activities that increase the resilience and reduce the vulnerability of people and the environment to climate change. Various approaches based on different ecosystems can be studied and explored by children under this sub-theme.





Focal areas:

- EBA in farm-based practices
- EBA in human settlement development and planning
- EBA in architecture
- EBA in drainage planning
- EBA in disaster risk reduction
- EBA in climate change adaptation and resilience development
- EBA in industrial planning
- EBA in tourism, recreation, and hospitality management
- EBA in water management

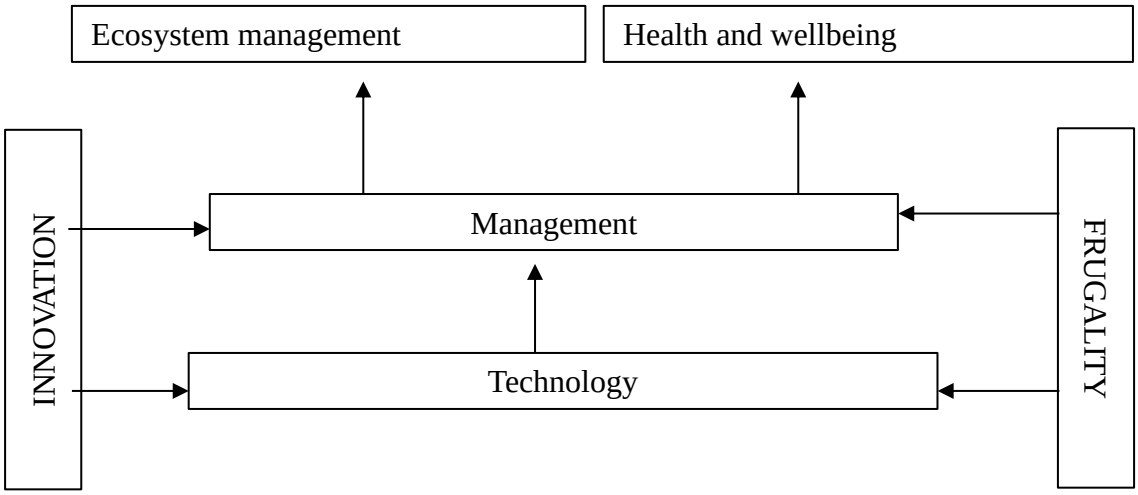
Project ideas:

1. Study of dependency of a village on the nearby forest.
2. Documentation of the wild edibles from different habitats in the surrounding area.
3. Assessment of current scenarios of different natural resources in the surrounding area of your school.
4. Management of solid waste in urban areas- Reduce, Segregation, Collection (efficiency), Transportation, Resource recovery, Disposal.
5. Study of impact of traditional agriculture on water harvesting system.
6. Study of propagations techniques of different wild edibles.
7. Study of vulnerable/ degraded resource areas in the surrounding.
8. Study of restoration practices (indicative) for degraded ecosystems.
9. Study of different man-made habitats like gardens and other open spaces and their role in urban areas.
10. Study of aquatic flora to reduce water pollution.
11. To study different practices of crop rotation, relay cropping, etc. for sustainable production (documentation, reflected in soil health, comparison between two patches).
12. To study the diversity of birds in agriculture systems and their role.
13. Study of mushroom cultivation.
14. Study of beekeeping and its role in maintaining the ecosystem.
15. Effect on food supply chain during pandemic.
16. Study and documentation of food preservation practices for crisis period.
17. Study of per capita water resource availability (domestic use) for a village or town.
18. Study of salt tolerant and salt loving plants in coastal agroforestry and agriculture.
19. Assessment of existing fish habitats and measures to improve them.
20. Study of aquaponics cultivation.
21. Study of different groundwater recharge practices.
22. Study of role of vegetation in water percolation, retention,reducing runoff and erosion.
23. Integrating plants and water for cooling and air conditioning within settlements and buildings.
24. Micro watershed mapping.
25. Carbon sequestration in your surroundings (Vegetation- Height, girth of trees-)
26. Terraced cultivation in hilly areas
27. Study on After effect of flash floods, storms, landslides.
28. Water usages in packaged water bottle vs from Tap bottle water
29. Study of road killed small vertebrates and invertebrates
30. Survey and documentation of the biodiversity in the potential Biodiversity heritage sites
31. Study on different Tree species in an Homestead Agroforestry systems
32. Study of multipurpose tree species in the locality

Sub-theme V: Technological innovation for ecosystem and health

This sub-theme will encouragechildren to find local-level problems and take initiatives for developing local technological solutions from the perspectives of green technology, appropriate technology, information and communication technology or improvisingtraditional technology based on the principles of frugal innovation.

Logical framework:



Focal areas:

Ecosystem related

- Soil conservation
- Water management
- Disaster risk reduction
- Human Wildlife Conflict management
- Invasive species control
- Waste management
- Farm-based management
- Strengthening Ecosystem services

Health and wellbeing related

- Strengthening prevention system
- Health information system
- Stress management
- Improving nutritional inputs
- Health communication
- Promoting healthy lifestyles

Project ideas:

1. Biomass (Algae, Bio-residue, waste, etc.) as green energy
2. Design and development of simple and economical devices for measuring water quality
3. Appropriateness of water purifiers
4. Technology for potable drinking water delivery during flood
5. Design, development of a solar water still for coastal and brackish water areas
6. To develop a simple tool for measuring water table depth in tube well
7. Bamboo as a sustainable engineering material.
8. Solar/ biomass-based crop dryers for farmers
9. Simple technology for weather monitoring (measurement of rainfall, wind, solar radiation duration, humidity, etc.)
10. Technologies for person with disability
11. Grey water treatment using plants and microorganisms.
12. Use of Biochar to improve moisture and nutrient retention in soil
13. To study traditional fishing tools and gears and its modification to make it more efficient and productive
14. Rain water harvesting accessories
15. Comparative study of thermal performance of traditional and modern houses
16. Exploring electric mobility
17. Measuring specific heat of water and appreciating its role in ecosystem maintenance
18. Information and communication technology (ICT) for decentralized healthcare delivery
19. – to develop a frugal process
20. Application of artificial intelligence for estimating market demand for agri-products
21. To study micro climate condition at the habitat level
22. To develop solutions for stubble burning issue
23. To explore the use of fruit and vegetable waste for extraction of value-added materials like pectin or pigments