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ECO NEWS

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C.P.R. ENVIRONMENTAL EDUCATION CENTRE
The C.P. Ramaswami Aiyar Foundation
1, Eldams Road, Alwarpet, Chennai 600 018, Tamilnadu, India.
Phone : 91-44-24337023 / 24346526 Fax 91-44-24320756
Email : cpreec@gmail.com
Websites : www.econewscpreec.com / www.cpreec.org / www.cpreecenvis.nic.in
A Centre of Excellence of the Ministry of Environment, Forests & Climate Change, Govt. of India.

C.P.R. ENVIRONMENTAL EDUCATION CENTRE

Established in 1989

- ✯ **1980** - The C.P. Ramaswami Aiyar Foundation starts nature education for teachers and students.
- ✯ **1989** - C.P.R. Environmental Education Centre (CPREEC) established jointly by the Ministry of Environment and Forests and the C.P. Ramaswami Aiyar Foundation as a Centre of Excellence of the Ministry of Environment and Forests. Government of India.

Our Mission

- ✯ To increase knowledge, awareness and interest among the public about the environment in all its aspects
- ✯ To develop resource materials for environmental education and awareness raising
- ✯ To conduct training programmes for a wide cross-section of people
- ✯ To take up environmental projects for demonstration and research

Our Activities

- ✯ Training and awareness raising
- ✯ Awareness to and through action
- ✯ Awareness programmes in ecologically fragile areas
- ✯ Conservation of the ecological heritage
- ✯ Research and surveys
- ✯ Generation of resource materials
- ✯ Exhibitions
- ✯ Courses, seminars and symposia

Facilities

- ✯ Environmental Laboratory
- ✯ Library
- ✯ Computer Division
- ✯ Publications Division

Geographical Spread

CPREEC's activities extend to

- ✯ Andaman & Nicobar Islands
- ✯ Andhra Pradesh
- ✯ Goa
- ✯ Karnataka
- ✯ Kerala
- ✯ Maharashtra
- ✯ Orissa
- ✯ Tamilnadu
- ✯ Puducherry

NGO Network

CPREEC has an extensive network of about 600 NGOs. All educational programmes are carried out in partnership with select NGOs, Universities, Colleges and Schools.

Publications

- ✯ Activity and information books and pamphlets for children
- ✯ Environmental training guides and kits for teachers
- ✯ Researched Publications
- ✯ Colourful and informative posters
- ✯ *ECONEWS* - A quarterly magazine
- ✯ *Indian Journal of Environmental Education*, a peer-reviewed journal

Exhibitions

CPREEC designs three new exhibitions every year and has a bank of mobile exhibitions that travel all over India.

Environmental Education

- ✯ Green Schools of India (GSI)
- ✯ Training programmes for Teachers
- ✯ Training programmes for School and College Students
- ✯ Environmental Law Education

Special Projects

- ✯ National Green Corps (NGC)
- ✯ Biomedical Waste
- ✯ Biodiversity Conservation

Research and Surveys

- ✯ Sustainable Technologies
- ✯ Surveys of Natural Resources
- ✯ Socio-Economic Surveys
- ✯ Lab to Field Technology Transfer

Contents

Natural Food Colours

Dr. P. Sudhakar

Food colours are a matter of choice. As discussed in the previous issue of "Eco news", colour is added to food to improve the appearance, delight the onlooker and deceive the senses, as most of the synthetic dyes are Polycyclic Aromatic Hydrocarbon (PAH) derivatives. PAHs have been established as a class of carcinogens. It is a matter of concern that synthetic colours originally prepared for the textile and paper industries have found their way into the food processing industry.

Due to the awareness on the therapeutic and medicinal properties of natural dyes and colours and the toxicity of artificial colours, the demand for natural dyes and colours are increasing among the public throughout the world. Natural dyes obtained from plant-based pigments have medicinal values hence they are mostly preferred. Some of the dyes obtained from various plants and animals are listed below:

Substance	Source	Colour
Alkanet	roots of the plant	red
Annatto	fruit of the shrub	yellow
Caramel	burnt sugar	yellow
Carotene	carrots and other plants	yellow
ChlorophyII	Leaves	green
Cochineal	dried female insect	red
Indigo	fern	blue
Cocoa Red	Cocoa beans	red
Tyrian blue	murex shell	blue
Cocoa blue	dried female insect	red
Litmus	lichens	red
Flavine	bark of tree	yellow
Osage orange	dried orange	Yellow
Orchil	lichens	red
Persian berries	fruit of thorn bush	yellow
Safflower	flowers of saffron	red
Saffron	dried stigmas and petals	yellow
Sandal	red sandalwood	red
Turmeric	roots	yellow
Tyrian purple	murex shell	blue

Curcuma longa *(*Turmeric) Curcumin is the primary pigment which is yellow-orange in colour. It is generally used in various food industries for colouring. It is mainly used in pickles, sausages, confectionaries, ice cream, bakery and savory products. It is used as an alternative to saffron. Apart from colouring, it is also used in skin care and hair care cosmetic products. It is also used in Ayurvedic medicine as an analgesic, antiinflammatory, antitumor, antiallergic, antioxidant, antiseptic, in treating anemia, diabetes, indigestion, gallstones, food poisoning and poor blood circulation.

Indigofera tinctoria**:** (Indigotine)The blue colour obtained from flowers is mainly used to dye fabrics and is used to cure constipation, liver disease, heart palpitation and gout.

Alkanna tinctoria**:** Alkanna is an astringent and a source of red pigment used in cosmetics. It is used traditionally in the treatment of skin wounds and diseases. Orally, alkanna root has been used for diarrhea and gastric ulcers.

Tagetes erecta (Mexican marigold): Lutein is a purified extract obtained from the petals of marigold flowers with organic solvents which changes from yellow to orange colour. It is used as a food colouring agent and nutrient supplement (food additive) in a wide range of baked goods, beverages, breakfast cereals, chewing gum, dairy products, etc.,

Vaccinium myrtillus (Bilberry): The fruit juice is red in colour and this turns blue in basic medium. The extract can be used for treating bladder stones, biliary disorders, scurvy, coughs, and lung tuberculosis. Bilberry leaf decoctions have been used to lower blood sugar in diabetic patients.

Crocus sativus (Saffron): The essential oil of saffron contains several terpenes (pinene, cineole) and carbonyl compounds. Saffron also finds use in medicine, as a food spice, and in the textile industry as a dye and in perfumery.

Natural food colours not only add flavour and good appearance to the food, but it also enhances health.

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Sathyamangalam Tiger Reserve

Dr. T. Sundaramoorthy

The Project Tiger scheme was launched in 1973 to protect our national animal, the tiger. Initially, nine (9) tiger reserves were established. At present, there are forty nine (49) tiger reserves existing in 18 states of our country. Project Tiger is an on-going centrally sponsored scheme and is managed by the National Tiger Conservation Authority (NTCA) of the Ministry of Environment, Forests & Climate Change (MoEF&CC), Govt. of India. The Head Office is located at New Delhi with regional offices of Project Tiger functioning at Bengaluru, Guwahati and Nagpur. The main objective of Project Tiger is the conservation of the tiger by implementing different sustainable activities. The main activities are habitat protection, reduction of man-animal conflicts through eco development activities, etc. The budget allocation for the Twelfth Five Year Plan was 1245 crores.

In Tamil Nadu, there are four tiger reserves. They are Kalakad – Mundunthurai, Mudumalai, Anamalai and Sathyamangalam. The Sathyamangalam Tiger Reserve (STR) was recently added and is located in Erode district. The details and the importance of this reserve are discussed in this article.

The Sathyamangalam forest area is an important wildlife corridor in the Nilgiris Biosphere Reserve. It is situated between the Western Ghats and Eastern Ghats. This forest area is well connected to Mudumalai National Park and Tiger Reserve in Tamil Nadu, Bandipur National Park and Billigiri Rangaswamy Temple Wildlife Sanctuary in Karnataka. The Sathyamangalam forest was declared as a wildlife sanctuary in the year 2008 spread in an area of 1142 sq.km. In the year 2013, it was declared as the fourth tiger reserve in the state of Tamil Nadu with an area of 1408 sq.km. of which 793 sq. km. is the core area and 615 sq.km. is the buffer zone (G.O. (MS) No. 41 dated 15.3.2013 of Tamil Nadu Government and G.O. (MS) No. 167 of the Ministry of Environment & Forests, Government of India dated 22.10,2013).

Forest Area of Sathyamangalam Tiger Reserve

Core Area	**Area in Hectare**	**Buffer Area**	**Area in Hectare**
Guthiyalathur Reserve Forest (Part)	25083.25	Guthiyalathur Reserve Forest (Part)	53656.47
Talamalai Reserve Forest	49662.53	Guthiyalathur Extension Reserve Forest	162.31
Nilgiris Eastern Slope Reserve Forest	4878.15	Talamalai Reserve Forest	3410.06

Core Area	Area in Hectare	Buffer Area	Area in Hectare
		Talamalai Extension Reserve Forest	1240.63
		Akkurjorai Reserve Forest	383.64
		Akkurjorai Extension Reserve Forest	155.80
		Berabetta Reserve Forest	1468.52
		Ullepalayam Reserve Forest	059.58
	79623.930		61537.010
Forest settlement area (7 settlements)	(-) 274.599	Forest settlement area (2 settlements)	(-) 45.800
	79349.331		61491.210

Total Core Area 79349.331 Ha
Total Buffer Area 61491.210 Ha
Total Tiger Reserve 140840.541 Ha (or) 1408.405 sq.km.

The Sathyamangalam Tiger Reserve is divided into two divisions – Sathyaman -galam and Hasanur. There are seven forest ranges, they are Sathyamangalam, Bhavani Sagar, T.N. Palayam, Talamalai, Hasanur, Germalem and Talawady.

The major soil types of this reserve are red soil, laterite soil and alluvial soil. The terrain of this area is undulated and the elevation ranges from 960 mm to 1266 mm. The rock of this reserve belongs to the pre-Cambrian age. The average annual rainfall is 600 mm.

The main forest type of this reserve is tropical dry thorn forest. Sub type of this forest area are southern tropical dry mixed deciduous forest, southern sub tropical hill forest , southern tropical semi evergreen forest and riparian forest along the Moyar river.

Plant diversity

About 65% of the tiger reserve is with forest cover. There are more than 700 plant species found in the reserve. About 60 plant species are considered endemic. The dominant plant species in each forest sub type varies. This reserve is famous for the sandal tree (*Santalum album*). The other common species are given below:

S.No.	Botanical name	Habit	Family	Common name	Vernacular name
1	*Anogeissus latifolia* (Roxb. ex DC.) Wall. ex Guillem. & Perr.	Tree	Combretaceae	Axle Wood Tree	Vakkali
2	*Terminalia crenulata* (Heyne) Roth	Tree	Combretaceae	Laurel	Karu Maruthu
3	*Themeda triandra* Forssk.	Herb	Poaceae	Red grass	Peru manip-pul
4	*Themeda cymbaria* Hack.	Herb	Poaceae	Elephant grass	Pothai pul
5	*Heteropogon contortus (L.) P. Beauv. ex Roem. & Schult.*	Herb	Poaceae	Black Speargrass	Sulam pul
6	*Grewia tiliifolia* Vahl	Tree	Tiliaceae	Dhaman	Unu
7	*Kydia calycina* Roxb.	Tree	Malvaceae	Kydia	Pula
8	*Sapindus emarginata* Vahl	Tree	Sapindaceae	Soapnut tree	Poovan kottai
9	*Acacia torta* (Roxb.) Craib	Climber	Fabaceae	Twisted Acacia	Inkkai
10	*Acacia planifrons* Wight & Arn.	Tree	Fabaceae	Umbrella thorn	Kudaivel
11	*Albizia amara* (Roxb.)B.Boivin	Tree	Fabaceae	Bitter Albizia	ushil
12	*Bauhinia racemosa* Lam.	Tree	Fabaceae	Burmese Silk Orchid	Aathi
13	*Hardwickia binata* Roxb.	Tree	Fabaceae	Indian Blackwood	Aacha
14	*Dichrostachys cinerea* (L.) Wight & Arn.	Tree	Fabaceae	Sickle bush	Veduttalam
15	*Cassia fistula* L.	Tree	Fabaceae	Indian Laburnum	Sarakonrai

S.No.	Botanical name	Habit	Family	Common name	Vernacular name
16	*Mesua ferrea* L.	Tree	Calophyllaceae	Iron Wood Tree	Nangil
17	*Pterocarpus marsupium* Roxb.	Tree	Fabaceae	Indian Kino Tree	acamai
18	*Schleichera oleosa* (Lour.) Oken	Tree	Sapindaceae	Ceylon Oak	Puvam
19	*Ziziphus mauritiana* Lam.	Tree	Rhamnaceae	Indian jujube	Ilantha
20	*Bischofia javanica* Blume	Tree	Phyllanth -aceae	Javawood	Malai-poovarasu
21	*Celtis tetrandra* Roxb.	Tree	Cannabaceae	Nilgiri Elm	Kuriyaa
22	*Chukrasia tabularis* A. Juss.	Tree	Meliaceae	Chitta gong wood	Aglay
23	*Dalbergia latifolia* Roxb.	Tree	Fabaceae	East Indian Rose Wood	Thodagathi
24	*Machilus macrantha* Nees	Tree	Lauraceae	Large-Flowered Bay Tree	iruli
25	*Mangifera indica* L.	Tree	Anacardiaceae	Mango	Mankai
26	*Santalum album* L.	Tree	Santalaceae	Sandalwood	Chandanam
27	*Syzygium cumini* (L.) Skeels	Tree	Myrtaceae	Indian Blackberry	Naval
28	*Terminalia chebula* Retz.	Tree	Combretaceae	Chebulic Myrobalam	Kadukkai
29	*Toona ciliata* M. Roem.	Tree	Meliaceae	Australian redcedar	Thera Tharam
30	*Trema orientalis* (L.) Bl.	Tree	Cannabaceae	Charcoal Tree	Yerralai
31	*Bambusa arundinacea* (Retz.) Willd.	Herb	Poaceae	Indian Thorny Bamboo	Mungil
32	*Dendrocalamus strictus* (Roxb.) Nees	Herb	Poaceae	Solid bamboo	Kattu-munkil
33	*Pongamia pinnata* (L.)Pierre	Tree	Fabaceae	Hongay oil tree	Pungan

Animal diversity

The Sathyamangalam tiger reserve supports a good number of tigers. In 2011, 25 tigers were reported and in the year 2015, 54 tigers were reported. The tiger population was estimated by using camera traps and pug mark study by scientific agencies. In addition, 40 species of mammals, 30 species of reptiles, 230 bird species, 15 species of amphibians, 85 species of butterflies and 10 species of fishes are reported from the reserve.

One of the endangered vulture species – the Indian Vulture (*Gyps indicus*) breeds in the Moyar river valley region of the reserve was reported in the year 2010. The other common animals and birds found in this reserve are tiger, leopard, jackal, hyena, jungle cat, bison, spotted deer, sambar deer, black buck, barking deer, sloth bear, otter, mongoose, Indian pangolin, porcupine, bonnet macaque, slender loris, Indian wild dog. Bird species include white backed vulture, woodpecker, tree pies, hornbills, peacock, bulbuls, babblers, mynahs, etc. A good number of elephants were also reported from this area. About 800 elephants were recorded in the year 2011.

Conservation issues of Sathyamangalam Tiger Reserve

The conservation and management of this tiger reserve is vested with the Director / Conservator of Forests based in Erode. According to TRAFFIC India, poaching of wildlife is still reported in this area. The National Tiger Conservation Authority has given adequate financial assistance to strengthen manpower, logistics and equipments to tackle the issue. Man animal conflicts are reported in this area. Leopards prey on local cattle and goats. This weakens the local population support for conservation. Elephants enter the agricultural lands in the nearby villages and damage the crops. This reserve supports a good number of Irula and Sholiga tribal population. About 17 tribal settlements are inside the reserve forest. More than one thousand families living in the border area of the reserve forest collect minor forest produce in various seasons. It is one of the largest tiger reserves in South India. The importance of the tiger reserve is not fully known to the public. Awareness on conservation of biodiversity of this reserve should be carried out intensively.

Source:

- National Tiger Conservation Authority (NTCA) / Project Tiger, Ministry of Environment, Forests & Climate Change (MoEF&CC), Government of India.
- Forest Department, Government of Tamil Nadu

Sustainability in Campuses of Higher Education: Green Campus - An Environmental Monitoring Approach

U.Thirunavukkarasu

Institutions of higher learning

Institutions of higher learning are hotbeds of thinking and nurseries of social change. The institutions of higher learning educate future leaders, thinkers, social activists, administrators and responsible citizens of the country. India was a knowledge hub and seat of learning from ancient times. It was also home to great institutions like Nalanda, Taxila and Vikramsila Universities of the bygone era.

The colleges and universities of the country are expanding the boundaries of the knowledge and play an important role in the economy and society. In addition to that it holds the power of youth in its campuses.

In India, there are 350 State Universities, 123 Deemed to be Universities, 47 Central Universities 239 Private Universities - totalling a solid figure of 759 universities in India (as on 05.07.2016). There was a great momentum in the number of universities and colleges in the recent past. The number of Universities has increased 34 times from 20 in 1950 to 677 in 2014 and the number of colleges has also increased 74 times from 500 in the year 1950 and growing to 37,204, (as on 31st March, 2013).Under the total of 759 (various types of) universities, today, India is host to one of the largest higher education systems in the world.

Sustainable Development and Sustainability

The World Conservation Strategy, IUCN 1980, UNEP and other institutions at the international level introduced "sustainable development" as a concept in relation to human being and his/her interaction with the biosphere. It also shed light on conservation and development as complimentary activities of present day sustenance.

'Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature' -United Nation Environment Programme, 1972.

The concept had many antecedents at international fora and discussions. The World Conference on Environment and Development (Rio Declaration in 1992) reiterated the outcome of the United Nations Conference on Human Environment held at Stockholm in 1972. The widely accepted definition of sustainable development was brought out by the Brundtland Report.

The Brundtland Commission's report defined sustainable development as "development which meets the needs of current generations without compromising the ability of future generations to meet their own needs".

However, along with the concept of 'sustainable development', the controversies over 'development paradigm' being included in the 'conservation agenda' have also been raging all over the world. There were many interpretations and shades of definitions purported around the world, alleging that the term sustainable development does not give any direction to arbitrate between the conflicting interests of economic rationality, social justice and ecological equilibrium.

There were political thoughts interpreting the ability of sustainable development in a restrictive meaning "the ability of sustainable development to respond to persistent social problems of a country is considered as sustainable development". The positive side of those wide discussions on sustainable development has also yielded acceptability at the highest policy level and political thinking leading to formation of 'sustainable development national committees' and action plan based on Agenda 21.

There was also criticism about 'sustainable development' that it promotes globalisation and corporate agenda of expansion. The terms 'sustainability' and 'sustainable development have been used in many contexts with inter changeable / same meaning. But on deep exploration of its origin, usage and objectives 'sustainability' means the ultimate goal and destination, whereas 'sustainable development' is the framework for achieving sustainability.

Sustainable Education

The institutes of higher learning - Universities - should reinforce sustainability principles and bring out best models for the society to practice.

The intensity of present environmental challenges requires new initiatives in teaching - learning process of environmental education in the formal education sector. The models practiced should bring about a perceivable environmental standard improvement – to justify and to measure the learning outcomes. If the learner has to progress through systematic environmental milestones, benchmarking environmental standards in an educational setting is highly necessary from time to time for effective environmental learning.

It becomes essential when young minds are involved in the process. The models practiced should bring about a perceivable attitudinal change on the knowledge communities, i.e. students, towards improving our environmental standards.

Green Campus: An Environmental Monitoring Approach for University Students

C.P.R. Environmental Education Centre (CPREEC) conceived a novel programme of involving young minds in the environmental conservation through environmental quality monitoring. The programme aims to instil a sense of responsibility on the health of individuals through monitoring the surrounding environment, namely the air, water and soil. The colleges across the country are intended target groups. In the city of Chennai institutions were approached for this environment and health initiative to promote scientific temper about essential natural resources.

Sensitizing college students on the major trends of our environment is important with field based hands on activities. Green Campus - An

Environmental Quality Monitoring was an outcome of sustained discussions between CPREEC, Ajuba Solution India Private Limited and other partners of the programme.

Carefully selected leading educational institution/colleges, which care for young adults and educates them through university courses are the prime environmental health-system beneficiary and partners in monitoring environment through green campus.

The major objectives of the Green Campus is to

- ❖ Sensitize the student and teaching community in different educational institutions.
- ❖ Promote environmental thinking as a base for healthy living among the young adult student population of university courses.
- ❖ Pass on the skill of monitoring environmental resources through a systematic environmental management approach.
- ❖ Encourage green campus partners to discuss scientifically validated environmental indicators to guide further remedial and environmental conservation measures.
- ❖ Galvanize the creative ability of stakeholders in solving environmental challenges and to extend it to the local community.

The project aims to create awareness among the college students about essential natural resources; namely air, water and soil. Involving volunteers and college students in action oriented activities, the CPREEC team facilitated them in improving the environmental quality of the institutional campus. The skill of air quality survey, water quality sampling, soil sampling was taught to them by the CPREEC team.

Air is essential for life; the quality of air decides the quality of life we lead in cities and towns. Nature has created mechanism to purify air by plants in its natural existence and activity. Due to increasing industrial activity, transportation, population pressure and reduction in green space worsened the air quality. The impact is felt on the health front of human beings and other animals. In the same way, noise beyond the prescribed limits can cause damage to human health. Exceeding noise level is a disturbing factor in residential and industrial areas.

Ambient air quality survey in the vicinity of the college campuses with a high volume air sampler were conducted during peak and non peak hours with corresponding vehicular frequency count on the nearby roads. It is also proposed to repeat the activity for environmental status after a period of time or season.

Water is essential for all life forms and must be preserved at micro and macro levels. The water resources quality of a specific area decides the welfare of people dwelling in diverse environmental conditions. Even the daily routine of people is highly connected with the quality of water.

Survey of water stored, surface and underground water in college campus to ascertain its status and quality have been carried out through sample testing on field and verification at the competent laboratory.

Soil is an important substratum for life. The health of the soil reflects the quality of life lead by the community. Excessive pollution, absence of green cover, soil air, soil moisture and weather influences the health of soil. The soil samples were studied in a scientific manner to ascertain its composition and status.

The state of art laboratory facility of CPREEC was used to verify and analyze water, air, and soil samples.

Green Campus-process questionnaire

CPREEC's process questionnaire on Green Campus was circulated among the participating students to initiate and to carry out environmental up-gradation activities in the campuses. The questionnaire could be used as a template for recording environmental enhancement activities on focused issues.

The students and faculty members will be made to understand the importance of environmental monitoring and sustainability (air, water and soil quality) through consultative meets at the college campus at periodic intervals.

Outcome of Green Campus Activities

- Air, water, noise and soil status and quality of it have been ascertained and compared with the standards prescribed at the national level. Remedial measures and applicable suggestions to reduce the impact are given.

- The knowledge gained by students will motivate the student community to understand and preserve the quality of resources available in the campus in a sustainable way.
- Based on the findings, the students with the guidance of faculty members will initiate measures to ensure environmental sustainability of the institutional campus

- The students/youth will convey the importance and status of air, water and soil and its sustainability to their parents and thereby to the community.

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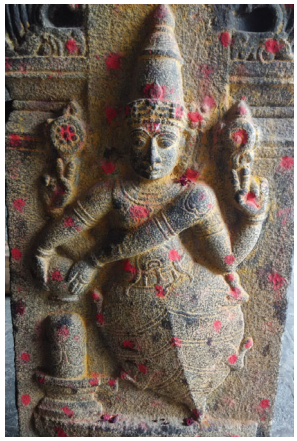
Cultural tradition of Kachabeswarar temple

M. Amirthalingam

It is one of the largest and most important temples of Kanchipuram town, the town of a thousand temples. Kachabeswarar temple is located in the southern corner of Western Raja street at a distance of about one kilometre from the famous Ekambareshwara temple. The presiding deity of the temple is Lord Shiva, also called Kachabeswarar. His consort is Soundarambigai. The temple contains a big Rajagopuram and is built in the Gajaprushta style. The temple occupies quite a large area. The temple also houses other idols such as Saraswati, Ganesha, Chaturmukeswarar, Sastha and Bhairava. There are also four shrines dedicated to Lord Shiva situated around the temple tank (called *Ishta* Siddhi *Tirtha*). These are Dharma Siddheswarar, Kama Siddheswarar, Artha Siddheeswarar and Moksha Siddheswarar. Located near the main deity is an idol of Lord Ganesha called Satyamozhi Vinayaka which is reputed to have been worshipped by Lord Vishnu himself.

There is a legend connected with this temple. It is said that during the churning of the ocean of milky, the Mandara hill, used as the stick, (mathu) began to sink. To retrieve it, Lord Vishnu incarnated as Kashyapa (tortoise) in order to help the Devas. He came to this place and created a spring, bathed and prayed to Lord Shiva to help him in his endeavour. Lord Shiva responded to his prayer, hence the name Kachapeshwara. Kachapa means tortoise and Ishwara is Lord Shiva.



Vishnu in the form of Koorma worshipped Lord Shiva

It is said that mother Anjanakshi blesses the devotees from a separate shrine. Anjanam means eyes. The origin of the word Anjanam is derived from the fact that she is blessing devotees as her own eyes. The Sri Chakra is also installed in the *mandapa* before this shrine. Women light ghee lamps here for family welfare and prosperity.

Traditionally, the sacred tree in this temple is the banyan tree; hence, the temple is also known as *Aala Koil* - or the banyan tree temple.

There is an interesting legend connected with this temple. Once upon a time, Lord Vishnu sat under the *purasa maram* (flame of the forest / *Butea monosperma*) and worshipped Lord Shiva. In response to his prayer, Lord Shiva appeared in front of him as a Jyotir Linga. Lord Vishnu worshipped him and received his blessings from him. This temple is situated under the *purasa* tree which is on the bank of the temple tank.

In Tamil culture, pipal is also known as *arasa maram* (the king of trees). Some of the places named after the pipal or *arasa* tree are Arisili, Arasadi, and Arasur in Tamil Nadu. The deity named after this tree is Arisilinathar. The pipal is a source of knowledge and the serpents which surround the tree are the keepers of divine knowledge. It is the most sacred tree, because it is the dwelling place of the Hindu trinity: Brahma, Vishnu and Shiva. The tree has been described as the 'tree of Knowledge' 'tree of life', 'tree of eternal life', and 'tree of creation'. It is closely connected with fertility: the tree is worshipped by women for fertility and longevity. A platform is built around it and an idol of a snake is placed under the trees and worshipped. Several inter-twined or coiled snake stones, symbols of fertility, are installed beneath the tree by childless couples and worshipped in the hope of begetting a child and for good health of the husband. In villages, women bathe early in the morning and circumambulate the trees.

In this temple, *Amavasya*, which falls on Monday is said to be *Somvati Amavasya*. According to Hindu mythology, women observe a fast on this day for the long life of their husbands. Married women perform *parikrma* (rounds) around the pipal tree 108 times. The pipal tree holds a special significance in Indian culture. A sacred thread is tied around the pipal tree by women as a part of a ritual on *Somvati Amavasya*.

There is a legend associated with *Somvati Amavasya*. According to the epic Mahabharata, Bhishma Pitamah narrated the legend of *Somvati Amavasya* to Yudhisthira. Another legend is about a money lender who was very happy with his family of seven sons and one daughter. All the sons of the money lender were married, but his daughter was still in search of a perfect match.

The money lender had a friend who was a pandit. Whenever he used to come to his place, his blessings were always for the daughters-in-laws, but not for his own daughter. The daughter of the money lender was very upset with this behaviour of the pandit. Once, the wife of the money lender asked the pandit about his unusual behaviour. As a solution, the pandit mentioned a washerwoman living on Singhal island. He said that if the washer woman put *sindoor* (vermilion) on the forehead of her daughter, she would become fortunate. Hearing this, the girl went to Singhal island and met the washerwoman. The washerwoman fulfilled her wish by putting the *sindoor*

on her forehead. Since then, women follow this ritual on the day of *Somvati Amavasya* for the long life of their husbands. This may be the reason why people come to this temple and worship Lord Kachabeswara and circumambulate the pipal tree during the early morning on the new moon which falls on Monday (*Soma amavasiya*).

Scientifically, it has been proven that the pipal tree exudes the maximum amount of ozone during the period of sunshine. The absorption of ozone helps female fertility. By circumambulating the tree, the lungs are made to work more and thus take in more fresh air and ozone. The ozone thus strengthens the uterus and fallopian tubes. A new moon day helps absorb ozone more than other days due to gravitational forces.

I wish to acknowledge the help rendered by Mr. R.Selvapandian who provided the photographs for this article.

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Enjoying the dawn with birds – My Chilika experience

T R Gowthama

Sometime back, when I travelled to Chilika Lake (Lagoon), I got a unique chance to educate children as well as experience nature, both of which I adore. It was a nature camp and I was sent there officially to educate the children about nature and its significance. It's always cool to teach children, especially those at elementary and secondary school level. They are charming, inventive and most importantly mischievous.

As part of the nature camping programme, we are advised to stay within the limits of any protected natural landscapes, viz-a-viz wildlife sanctuary, reserved forest or national park. We stayed in the midst of a lavish green backdrop encompassed by a variety of species, resident of Chilika. The ever-soothing early morning breeze flows alongside the twittering and chattering cries of birds and little creatures.

Chilika Lake is the biggest tidal pond of Asia found along the Coromandel Coast of peninsular India. Being declared one of the six wetlands under the *Ramsar convention*, it offers a great deal of scenic beauty.

Illumination of sky
With a crack of dawn
The never ending horizon
Never to be missed

Furthermore, this picturesque locale is a safe haven for diverse aquatic life forms such as birds (both waterfowl and waders), fishes, crabs, etc.

We organized a birding trip to the nearby island, *Nalbana*. Boats were arranged for the trip. Nalbana is a wonderful island with vast life forms situated at the heart of Chilika Lake.

The children jumped out of joy as the boat surged through brackish water and moved forward. We tried to arouse their interest by showing them some beautiful creatures like Irrawaddy Dolphins, Seagull, Gull-billed Tern, Pied Kingfisher, White-bellied Sea Eagle, etc. The children were given binoculars to observe the birds. Some of the kids were curious, questioning the open-feather stance of a bird. It was a Cormorant. Unlike other water birds, cormorants do not have wax coating around their feathers. So it stays under the sun with its feathers open to get dry. This in turn looks striking and attracts students, birders and

photographers. The children were so thrilled watching the hunting behaviour of terns and kingfishers.

Hovering along the airstream
With her eyes glued
Dives and captures him in a flash

As we paddled through the lake, we saw a huge flock of Ruddy Shelducks taking off, sensing us (strangers). Northern Pintails, Shovelers and Gargeneys accompanied them shortly. It was beyond belief to spot all these wonderful creatures at the same time. Children looked absolutely thrilled.

After an hour long journey, we reached the island. The forest officials briefed us about the island and its significance. Nalbana Island was declared a bird sanctuary in 1973. It serves as a massive wintering ground for birds. One can see over thousands of birds hysterically foraging the mudflats during the season. The best part about this island is, it vanishes during the monsoon season due to heavy showers and resurfaces back once the water recedes.

The children were taken to the watch tower, where they got to watch the birds through high range spotting scopes. Watching the peculiar behaviour pattern of larger and smaller birds, the children's curiosity was piqued. The larger birds include greater and lesser Flamingos, Herons, Egrets, Pelicans, Storks, Ducks and Ibises. The smaller birds include Stilts, Terns, Sandpipers, Ruffs, Snipes, Lapwings, Coot, Teal, etc. They even saw a few raptors like Sea Eagle, Kites and Falcons.

As they were curiously screening the birds through the spotting scope, one of the children shouted out an alarm. He informed us that he has spotted a bird which has a white head with dark eyes and sharp beak pointed downwards,

Injured Brahmini Kite

brownish feathers and pale yellow coloured legs with talons. It was clear that the bird he was describing about was the Brahminy Kite; we were startled by his acute observation.

He continued further that the bird had repeatedly fallen into the water while attempting to take off. He sounded very concerned about the bird and its condition. We responded quickly by taking a look at that bird through the scope and witnessed the same scene as narrated by the boy. Immediately, we informed the forest officials, who after observation told us that the bird was injured. The feathers were wounded because of which it was struggling to fly. Without wasting much time, their team rushed to the spot and rescued the bird.

The Forest Ranger and Divisional Officer appreciated the boy for his intuitive observation and quick thinking. They presented him the famous book "The book of Indian Birds by Salim Ali" and encouraged him to do bird watching regularly. It was pleasant surprise for the boy and also for the entire group.

Overall, it was an enchanting experience in Nalbana both for the children and us (educators). It was one of my most unforgettable experiences with children and nature.

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Tackling Groundwater Pollution

B. Tirumala

According to a UNICEF report on Indian water "There will be constant competition over water, between farming families and urban dwellers, environmental conservationists and industrialists, minorities living off natural resources and entrepreneurs seeking to commoditise the resources base for commercial gain" [1].

The impact of globalization on environment and sustainable development remains in transition in India. The Indian economic environment is also largely squeezing its natural resources, at a faster pace, exploiting resources and effluents of affluence are thrown into the sink of water bodies, land, air, commercialization, of agriculture, expansion of industries, urbanization high level of migration that have led to a disastrous effect on environment. Modern consumers desire a life style based on mobility, convenience and product disposability and this has led to further advancement of resource inefficiency and waste generation. (Duraisamy and Latha, 2011).

Water pollution signifies contamination of water bodies, which makes their water unfit for drinking and other purposes. There are basically five primary sources of water pollution–domestic sewage, agricultural runoff, industrial effluents, wastewater from septic tanks, and storm-water runoff.

In recent years, the increasing threat to groundwater quality due to human activities has become a matter of great concern. A vast majority of groundwater quality problems present today are caused by contamination and by overexploitation, or by a combination of both. Rapid urbanization and industrialization in India has resulted in a steep increase in the generation of wastes. Due to lack of adequate infrastructure and resources the waste is not properly collected, treated and disposed; leading to accumulation and infiltration causing groundwater contamination. The problem is more severe in and around the large cities as also various clusters of industries. In many of these areas groundwater is only source of drinking water, thus a large population is exposed to the risk of consuming contaminated water [3]. It is estimated that 60% of groundwater sources will be in a critical state of

degradation within the next twenty years [4].

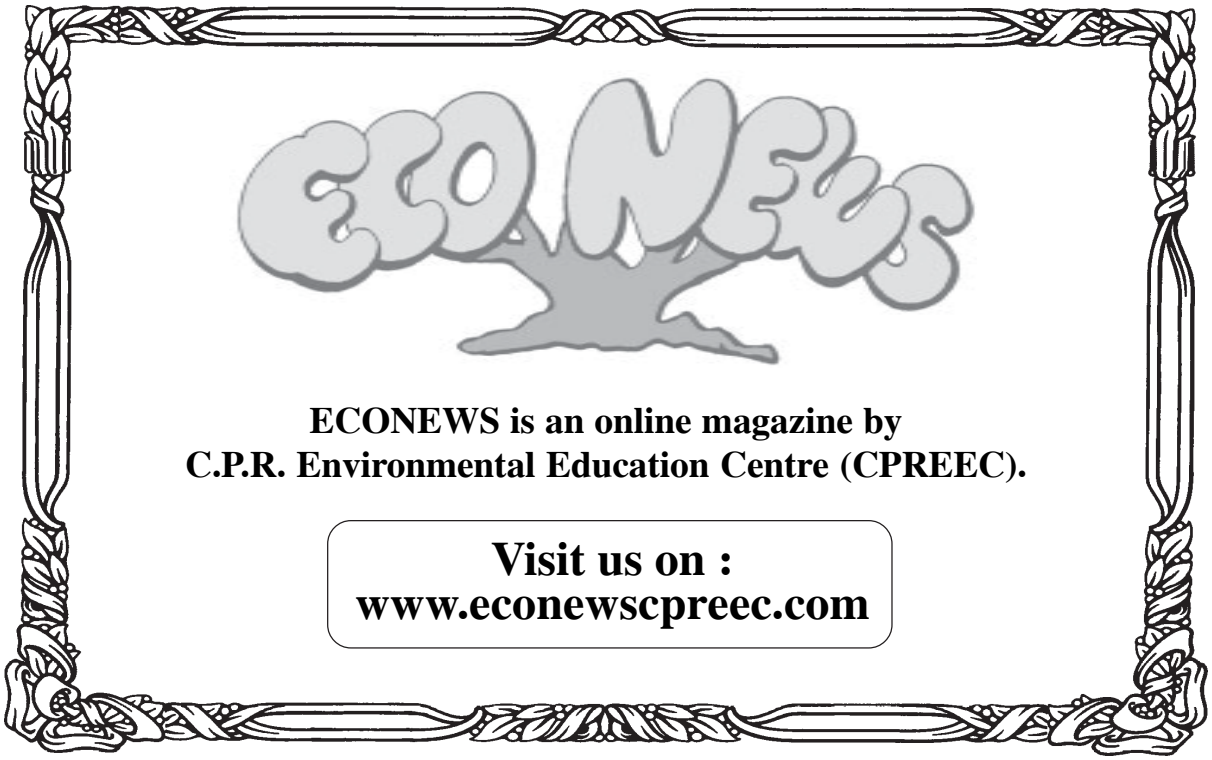
Every river in India is polluted to some degree. The water quality in underground wells violates the desired levels of dissolved oxygen and coliform, the presence of which is one measure of filth, in addition to having high concentrations of toxic metals, fluoride, and nitrates [5]. India's rivers also have high fluoride content, beyond the permissible limit of 1.5ppm, which affects 66 million people. The polluted water then seeps into the groundwater and contaminates agricultural products when used for irrigation. Over 21% of transmissible diseases in India are related to unsafe water [6]. Millions of poor people are affected by preventable diseases caused by inadequate water supply and sanitation.

Once polluted, groundwater is extremely costly to clean up. It is often not feasible with today's technology, although pump-and-treat is commonly used with the goal of restoring the water drinking quality: water is pumped to the surface, treated to remove pollutants and then returned to its source.

Issues in Tackling Groundwater Contamination

Groundwater pollution requires serious action and continuous monitoring as without the availability of fresh water, sustainable development will not be possible. The first step towards evolving measures to prevent and cure groundwater quality deterioration is generating reliable and accurate information through water quality monitoring (WQM) to understand the actual source/cause, type and level of contamination. However, there are a few observation stations in the country that cover all the essential parameters for water quality and hence the data obtained are not decisive on the water quality status. The existing methodology for WQM is inadequate to identify the various sources of pollution.

The Central Pollution Control Board (CPCB) and the State Pollution Control



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Boards (SPCBs) are the pollution watchdogs in India. Though monitoring of groundwater quality has come under their purview, only recently has the water quality of rivers is being monitored. There are problems associated with institutional design itself. The SPCBs perform the dual functions of monitoring pollution and enforcing pollution control norms. But, the fact that regular WQM and its proper dissemination itself could question the existence of the Boards as an enforcement agency creates a disincentive for them to perform the first function meaningfully. Also, the agency lacks legal aid and an administrative apparatus to penalize polluters. This reduces the effectiveness of the agency in enforcing pollution control norms. The fact that the cost of pollution is much less than the cost of treatment works as a disincentive for polluters, whereas the Boards are not mandated to execute environmental management projects.

It is ordinary people who raise the alarm about poor water quality. The capacities of civil society/institutions must be built, so as to strengthen them to respond to water quality problems quickly. This is possible only through better knowledge and information about the nature of groundwater contamination, potential sources of threats to groundwater quality in their respective regions and degrees of vulnerability, the ill-effects of using contaminated water, and the possible preventive measures.

These institutions can in turn put pressure on the line agencies to perform and come up with a viable method to tackle or prevent groundwater pollution. Strengthening civil society institutions is particularly important because groundwater quality variations in nature are often sporadic and it is not economically feasible to establish an elaborate network of WQM stations due to the high costs and technical manpower involved [7].

In the absence of complete and accurate information about the quality of water in various sources, it is also not possible for line agencies to identify appropriate treatment measures. It is the moral duty of credible and technically competent NGOs to take initiative in strengthening civil society, by generating the vital database on groundwater quality.

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